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Research Assessment

Subject: Game Theory

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Hotz, Heiko. "A short introduction to game theory." *Retrieved* on 21 (2006): 2017.

Assessment:

      Heiko's "A short introduction to game theory" is composed of numerous parts; however, for this research assessment, I decided to focus on the basic definitions of game theory. In the article, Heiko defines normal and extensive form games, the Nash equilibrium, and mixed strategies. Overall, I learned that mathematics is the forefront of understanding players' decisions in games, where individuals can predict the conflicts and interactions of players and their decisions. By understanding how game theory can explain behavior, I am able to understand the relationship between probability and strategical thinking.

      Heiko defines a game as "a finite number of players who interact to given rules." These players make decisions based on available information and desired outcomes. The choices they make not only impact their own results but also influence the outcomes of other players. This interconnected decision-making process highlights the strategic nature of games, where players attempt to anticipate the actions of others to maximize their own success.

Heiko's explanation of normal and extensive form games further provided valuable insights. Heiko explains that normal form games have a finite number of players and a strategy set to each player. They present strategies and payoffs in a matrix, simplifying the visualization of possible outcomes. On the other hand, extensive form games is described where "the agents of the game execute their moves consecutively." Extensive form games use a game tree, which illustrates the sequence of choices and the associated payoffs in a probability tree structure. Understanding these forms allowed me to better grasp the role of probability in predicting outcomes and rational decision-making.

Additionally, learning about Nash Equilibrium, "a game with two or more players where no player has anything to gain by changing his strategy," emphasized the significance of stable outcomes in strategic decisions. Although the Nash equilibrium appears as a plateau in strategy, it is simply a state where no player improves their outcome by changing their strategy while others keep theirs constant. Additionally, the concept of mixed strategies, where players randomize their choices to achieve better outcomes, further emphasized how probability influences decision-making.

Overall, Heiko's article not only clarified key game theory concepts but also deepened my understanding of how mathematics and probability play crucial roles in strategic thinking and decision-making. This article will be valuable in my exploration of probability-based games and the analysis of player behavior for my final product, where I am designing a game to determine how individuals form strategies based on others. In my game, I predict that with experience, players will develop strategies that balance risk and caution, eventually reaching a Nash equilibrium. Players may involve aggressive or conservative approaches in early attempts, but over time, players will likely adopt strategies that maximize their chances of success.

Additionally, conditional probability will also play a significant role. By analyzing player decisions across multiple trials, I aim to identify emerging strategies and examine how players adapt their tactics based on observed outcomes, ultimately aligning with key game theory principles that Heiko explored in "A short introduction to game theory."