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Game theory shows how strategic decisions of interdependent actors interact to produce outcomes. Like its name suggests, game theory deals with games, with actors using different strategies to maximize their results. The 2006 *Omicron Delta Epsilon* guest lecturer, Illinois Wesleyan Alumna and Assistant Professor of Economics at Fordham University, Dr. Gwen Alexander, based her talk on game theory and its application.

A typical game is comprised of players, their actions, and the pay-offs of those actions. The players are the decision makers and they base their decisions on an analysis of the pay-offs of their various strategies. They also interpret the information structure of the game as it makes a whole world of difference in determining the results. For instance, a game of perfect information where every player knows every move of every other player would have actors making far different decisions from a game of imperfect information where the players are not aware of their rivals' moves.

After a detailed explanation of the prisoners' dilemma, Dr. Alexander launched into her most interesting "application" of game theory to the movie *A Beautiful Mind.* The film is set in 1950 and focuses on burgeoning future Nobel laureate John Nash as he introduced the concept of the Nash Equilibrium and essentially founded game theory. A Nash Equilibrium occurs when players are doing the best they can holding constant the choice of their opponent. Russell Crowe, playing the part of John Nash, supposedly acts out how Nash discovers his theory, but Dr Alexander shows why the film does not actually show him finding a Nash Equilibrium.

In the scene, Nash (Crowe) is studying in a bar with his friends when they sight four attractive brunettes and a supposedly more attractive blonde across the room. Nash and his three other friends are all interested in the blonde but Nash rationalizes they will all be better off if none of them go for the blonde. He reasons that if they all go for the blonde, she will reject them all. They will end up not getting any of the brunettes either because the brunettes would not like to feel inferior to the blonde. However, if they all go for the brunettes and none of them goes for the blonde, they will all get the brunettes and be better off. Thus, the optimal strategy according to Nash would occur when "everyone does what is best for himself *and* the group."

According to Dr. Alexander, the entire situation did not have a Nash Equilibrium. Dr Alexander asserted that the solution to the game was a mixed strategy solution, or a strategy that comprises probability distributions given actors' choices. In this instance, there are two equilibria and therefore there is no clear solution as to what the outcome will be without considering probability. There is no dominant strategy for either player, and as such, there can be no final Nash Equilibrium. Though the moviemakers probably did not care much, they were actually misrepresenting Nash's theory.

Regardless, Dr. Alexander demonstrated the versatility of game theory. Game theory can be applied in diverse spheres of life. It can be applied in trade wars as a policy instrument. In the realm of politics, it can be used in the arms race to predict nations' possible actions. In business, it can be used in collusive agreements between firms to assess rival firm's behavior. In environmental economics, it can be used to assess global commons problems such as over-fishing. When we play chess and checkers we play sequential games of perfect information. Knowledge of game theroy gives economists an analytical framework with which to work with in the workplace, in school, at home, and even in debate.