Battle of sexes game theory pdf

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This lesson shows how to solve the battle of the sexes. A man and a woman want to go on a date tonight. There are only two forms of entertainment in the city: ballet and fight. This woman wants to see the ballet. A man wants to see a fight. But if they wrap up in different places, they'll both have to go home miserable. What are the rational ways to solve this dilemma? Takeaway Points Battle of the Sexes has three equilibriums: two in clean strategies and one in mixed strategies. Mixed worse than any of the net equilibria strategies for both players. We'll see it when we learn how to calculate the winnings. Back to Game Theory 101 For other purposes, see Battle of the Sexes (disambiguation). This article contains a list of general references, but it remains largely unverified because it does not have enough relevant link. Please help improve this article by entering more accurate quotes. (May 2015) (Learn how and when to delete this template message) Opera Football Opera 3.2 0.0 Football 0.0 2.3 Battle of the Sexes 1 Opera Opera 3.2 1.1 Football 0.0 2.3 Battle of the Sexes 2 In Game Theory, Battle of the Sexes (BoS) is a two-player coordinating game. Some authors call the game Bach or Stravinsky and appoint players simply as Player 1 and Player 2, instead of prescribing sex. Imagine a couple who agreed to meet tonight but can't remember whether they'll be attending an opera or a football game (and the fact that they forgot is common knowledge). My husband would rather go to a football game. My wife would prefer to go to the opera. Both would rather go to the same place rather than different. If they can't communicate, where should they go? The Winning Matrix with the inscription Battle of the Sexes (1) is an example of a battle of the sexes, where the wife chooses a line and the husband chooses a column. In each cell, the first number is a wife's win, and the second number is a win. This performance does not take into account the additional harm that can come from not only going to different places, but going to the wrong one as well (for example, it goes to the opera when it goes to a football match, satisfying neither). To do this, the game is sometimes presented as in Battle of the Sexes (2). Balance Analysis This game has two pure strategies of Nash Equilibrium, one where both go to the opera and the other where both go to a football match. There is also a mixed Nash equilibrium strategy in both games where players go to their preferred event more often than others. For the wins listed in the first game, each player attends the preferred event with a probability of 3/5. This is an interesting case for game theory because each of Nash's Equilibrium is inadequate in some way. Two pure Nash strategies unfair; one player is constantly doing better than the other. Nash's mixed equilibrium strategy (when it exists) is ineffective. Players will incorrectly coordinate with the probability of 13/25, leaving each player with an expected return of 6/5 (less than a return you would get from permanently going to one less favored event). One possible solution to this problem is the use of correlated equilibrium. In their simplest form, if the game's players have access to a commonly observed randomized device, they may decide to correlate their strategies in the game based on the result of the device. For example, if a pair can flip a coin before choosing their strategies, they may agree to correlate their strategies based on flip coins, say, choosing a football in the case of a head and an opera in the case of tails. Note that once the results of the flip coin are revealed neither husband nor wife have any incentive to change their proposed actions - which will result in incorrect alignment and a lower gain than simply adhering to agreed strategies. The result is that perfect coordination is always achieved and, before the coin flip, the expected winnings for the players are exactly equal. Burning Money Opera Football Opera 4.1 0.0 Football 0.0 1.4 Unburned Opera Opera 2.1 -2.0 Football -2.0 -1.4 Burned Interesting strategic changes can take place in this game if one player is able to burn money - that is, allowing this player to destroy some of their usefulness. Consider the version of the Battle of the Sexes in the photo here (called Unburned). Before making a decision, the player of the line can, taking into account the player's column, choose to set fire to 2 points, making the game Burned pictured on the right. This results in a game with four strategies for each player. The player of the string can choose to burn or not burn the money, and also choose to play opera or football. The player of the column watches whether or not the rank player burns and then chooses to either play opera or football. If one iteratively removes weakly dominated strategies then one arrives to a unique solution where the range player does not burn money and plays opera and where the column player plays Opera. The strange thing about this result is that by simply being able to burn money (but not really using it), the player's line can provide them with a favored equilibrium. The reasoning that leads to this conclusion is known as forward induction and somewhat controversial. In short, by deciding not to burn money, the player indicates that they expect a result that is better than any of the results available in the burned version, and this conveys information to the other party about what branch they will take. Links to Luce, R.D. and Raiff, H. (1957) Games and Solutions: Introduction and Critical Survey, Wiley (see Chapter 5, Section 3). Fudenberg, D. and Tyrol, J. (1991) Game Theory, MIT Press. (see Chapter 1, Section 2.4) Kelsey, D. and S. le Roux (2015): Experimental study of the effects of ambiguity in the coordination of play, theory and decision. Osbourne, Rubinstein (1994). Game theory course. MIT press. For detailed explanations see External Links GameTheory.net Co-op Solution with Nash Feature Elmer G. Wiens extracted from the (game_theory) 'oldid'964898501 In a battle of the sexes, the couple argues about what to do over the weekend. Both know they want to spend the weekend together, but they can't agree on what to do. A man prefers to go see a boxing match, while a woman wants to go shopping. This is a classic example of a game-by-game coordination analyzed for its application in many areas, such as business management or military operations. Since the couple wants to spend time together, if they go separate ways, they will not get any usefulness (the set of wins will be 0.0). If they go either shopping or at a boxing match, both will get some utility from what they have together, but one of them will actually enjoy the activity. The description of this game in strategic form is thus as follows: In this case, knowing your opponent's strategy will not help you decide on your own course of action, and there is a chance that the balance cannot be achieved. This can be easily seen by looking for a dominant strategy, eliminating all dominant strategies. However, there will be two dominant strategies, the two Nash equilibriums (emphasized in red). The way to solve this dilemma is to use mixed strategies in which we look at the likelihood that our opponent chooses one or the other strategy and balances our payouts against it. Battle of the Sexes (also known as Bach or Stravinsky) and Nash Balance We complete this section with another classic example - Battle of the Sexes (BoS). This example shows that the game may have several Nash equilibriums. In the traditional exposition of the game (which, as it will be clear, dates back to the 1950s), a man and a woman try to decide on evening entertainment; we analyze the gender-neutral version of the game. While in separate workplaces, Pat and Chris must take part in either a Bach concert or a Stravinsky concert. Both players would rather spend the evening together than apart, but Pat would prefer them to be together at Stravinsky's concert, while Chris would prefer them to be together at Bach's concert, as presented in the accompanying bi-matrix. Like the prisoner's dilemma, BoS simulates a wide variety of situations. Consider, for example, two officials of a political party, deciding to decide position on the issue. Suppose they disagree on the best position, but both are better if they take the same position than if they take different stands; cases in which they take different positions of leading voters to get confused are equally bad. BoS then fixes the situation they face. To find NE of this game, we can explore each pair of actions one by one. 1. (Bach, Bach): If Player 1 switches to Stravinsky, her winnings are reduced from 2 to 0; if Player 2 switches to Stravinsky, her winnings are reduced from 1 to 0. Thus, deviation from any player reduces her winnings. So (Bach, Bach) is Nash Balance. 2. (Bach, Stravinsky): If Player 1 switches to Stravinsky, her winnings increase from 0 to 1. So (Bach, Stravinsky) is not Nash Balance. (Player 2 can increase her winnings by rejecting, too, but to show that the pair is not an NE, it is enough to show that one player can increase her winnings by rejecting). 3. (Stravinsky, Bach): If Player 1 switches to Bach, her winnings increase from 0 to 2. So (Stravinsky, Bach) is not Nash Balance. 4. (Stravinsky, Stravinsky): If Player 1 switches to Bach, her winnings are reduced from 1 to 0; if Player 2 switches to Bach, her winnings are reduced from 2 to 0. Thus, deviation from any player reduces her winnings. Thus (Stravinsky, Stravinsky) is Nash Balance. We come to the conclusion that BoS has two Nash Equilibria: (Bach, Bach) and (Stravinsky, Stravinsky). That is, both of these outcomes are compatible with a stable state; both outcomes are stable social norms. If both players choose Bach in each meeting, neither player has an incentive to deviate; if in each meeting both players choose Stravinsky, then neither player has an incentive to deviate. If we use the game to simulate the choice of men when in a match with women, then the concept of Nash Balance shows that the two social norms are stable: both players choose actions related to the result preferred by women, and both players choose actions related to the result preferred by men. Men. battle of sexes game theory nash equilibrium. battle of sexes game theory pdf. battle of the sexes game theory real life example. battle of the sexes game theory dominant strategy. battle of the sexes game theory mixed strategy. battle of the sexes evolutionary game theory. game theory microeconomics battle of the sexes