

Introduction to the Mathematics

I will be talking about two different topics that Blackwell dove into. I will talk about Markov Matrices, which he wrote his doctoral thesis on and then on Game Theory. Blackwell is known as one of the greatest statistician of his time. Both Markov matrices and Game theory deal with statistics. I feel these two topics are topics that Blackwell enjoys diving into himself.

Markov Matrices

Markov matrices are square matrices whose columns are probability vectors and are also called stochastic matrices. Probability vectors are vectors that add to one. In the Markov matrix we put numbers we found through observation, estimation, and/or probability. For example if you were to look at how two animals were to survive together on an island you would first have to do some research and see how they depend on each other. One of the animals would prey upon the other and therefore you would need to find out how many they kill in a year. Also you would need to find out birthrate and rate of death for each animal. With these numbers you pull in your use estimation and then probability to find out how they would live together. These numbers would make up percentages that would go in your Markov matrix. If you raise this matrix to the year you are interested in finding results and then multiply that by the original population you would find out if they are compatible or if one animal would kill another. Markov matrices can be used in predicting how things will pan out in the future. A perfect example would be to try and see how populations will turn out in the future. Another example would be in predicting how species would live together. These matrices are only a prediction according to statistics but they give a good estimation.

Game Theory

Game theory is a very interesting field that I only dive a little into. I will be looking at Blackwell's paper "The Big Match" and explaining the game he is talking about and his theories behind the important decisions. In the game there are two players. Player 2 gets to pick a 0 or a 1 each day and player 1 guesses player 2's choice. Each day that player 1 guesses correctly he wins. As long as player 1 guesses a 0 the game continues as just explained. If player 1 were to choose a 1 then the game comes to a sort of halt. The day player 1 picks a 1 player 2 must choose the same number he chose on that day for every day thereafter and player 1 must always choose a 1. This means that once player 1 chooses a 1 he either wins everyday from then on or loses everyday from there on. This is why the game is called the "Big Match" because you either have a big win or a big lose. Blackwell looks at the progress of the game and tries to determine when player 1 should pick 1 or if he should ever pick a 1. Game theory develops general mathematical formulas and algorithms to identify best possible strategies and to predict the result of occurrences. Game theory is used in economics with the stock market, mathematics, statistics, political science, and psychology.