

Utilizing Game Theory to determine whether Political Biases or Statistical Probability is
More Significant in Predicting an Individual's Political Association

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Abstract

There are two ways in determining an individual's political association: political stereotypes and biases. Political stereotypes in this scenario is directly referring to the characteristics people attribute to a certain political party while biases in this scenario refer to the history of a certain party dominance given in a particular area. Both methods are commonly used in analyzing political data as they both generally tend to produce accurate results. However, to determine which method is more accurate, we utilized the basic principles of statistical game theory. We asked 176 students a few questions regarding what they thought an imaginary individual's political affiliation was, given their political stereotypes and their region's political bias. Given both choices, the students mostly made their choice on political stereotypes, choosing against the high probability of an imaginary character being a particular political party member due to the region that they live in.

I. Introduction

In this project, we will focus on how biases affect the assessment of probabilities in terms of game theory. The experiment will answer the question, will political stereotypes and biases overcome statistical probability when determining the political association of an individual in a group of people?

According to the Oxford dictionary, the stereotype is a widely held but fixed and oversimplified idea of a particular type of person or thing. According to a paper by Pedro Bordalo, Nicola Gennaioli, and Andre Shleifer, stereotypes cover racial groups, genders, and political beliefs. While stereotypes enable for a fast and natural classification of groups, there are some judgments and biases behaviors such as intergroup conflict as well as discrimination (“Stereotypes.”)¹. Based on Kahneman and Tversky's (1972) notion, "an attribute is representative of a class if it is very diagnostic; that is, the relative frequency of this attribute is much higher in that class," which captures the definition of stereotypes. Stereotypes apply to political beliefs, especially in the United States, wherein there are two dominant political parties, the Democratic Party and the Republican Party. Parties adopt an explicit and robust ideology which forms a strong correlation between an individual's thinking and their choice of political parties (“Ideologies of Political Parties: Lesson Overview (Article).”)²

In this experiment, the test will investigate how people categorize a person based on their community's beliefs. It will test how people have difficulties in understanding probabilities as they focus on the biases they have.

¹ economics.mit.edu/files/9904.

² www.khanacademy.org/humanities/us-government-and-civics/us-gov-american-political-ideologies-and-beliefs/us-gov-ideologies-of-political-parties/a/lesson-summary-ideologies-of-political-parties .

II. Hypothesis

If a person sees the question, then he is likely to answer that Johnny is a Republican. The reason for this is because people have difficulties understanding probabilities. People do not use Bayes' Rule. People don't use Bayes' Rule because when people assess probabilities, people don't take into account the proportions of the population. Bayes Rule has been considered the most important rule of probability. It calculates the probability of an event based on prior knowledge of the conditions concerning the related event ("Bayes' Rule with a Simple and Practical Example.")³. However, despite being a very powerful tool, people fail to be rational in their decision making due to biases they have. Thaler and Sunstein stated that people "fail to make forecasts that are consistent with Bayes' rule" ("On the Supposed Evidence for Libertarian Paternalism.")⁴. This claim was also made by Kahneman and Tversky, who rejected earlier research that concluded that people are approximate and are not Bayesians ("On the Supposed Evidence for Libertarian Paternalism.")⁵. There is a tendency for people to focus on specific information rather than on base rates presented to them when making decisions based on probabilities. ("Base Rates and Bayes' Theorem.")⁶.

III. Method

The method we used for this experiment was to create a survey that will ask the participant to decide if Johnny (theoretical person) is a Republican or Democrat. The survey includes a background information on Johnny, a New Yorker against same-sex marriage, gun control, and Obama care. Once they answer Republican or Democrat, they will also identify the state they live in (United States) or which country they live in. Included are the percentages of Republicans and Democrats in New York.

³ towardsdatascience.com/bayes-rule-with-a-simple-and-practical-example-2bce3d0f4ad0.

⁴ www.census.gov/library/visualizations/2016/comm/voting_age_population/cb16-tps49_voting_ny-social.html.

⁵ www.ncbi.nlm.nih.gov/pmc/articles/PMC4512281/.

⁶ www.stockopedia.com/content/base-rates-and-bayesrsquo-theorem-106770/.

We sent the survey to our friends who reside in numerous parts of the world on various continents and are not limited to people living in the United States. Some of the countries where we researched included the Philippines, Canada, UAE, New Zealand, Singapore, South Korea, and South Africa. In doing this, we aimed to test if the hypothesis applies to people regardless of where they reside.

IV. General Information you should keep in mind as given in the survey

In the United States, Democrats support gun control, Obamacare, and same-sex marriage. Meanwhile, Republicans are against same-sex marriage, gun control, and Obamacare. In New York, it was found that 80% of citizens are Democrats, while 17% are Republicans.

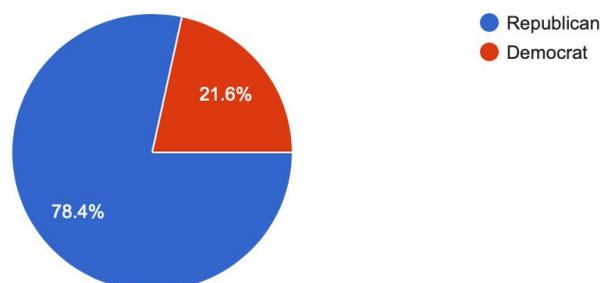
V. Analysis of Results

We found that despite the large number of citizens who are Democrats in New York, most people believed that Johnny was Republican. We found this to be a situation where biases came into effect probability. Speaking purely based on probability, it only seems natural to assume Johnny is a Democrat. However, because of pre-existing biases about the characteristics of Republicans, most people declared Johnny to be Republican.

VI. Data Results

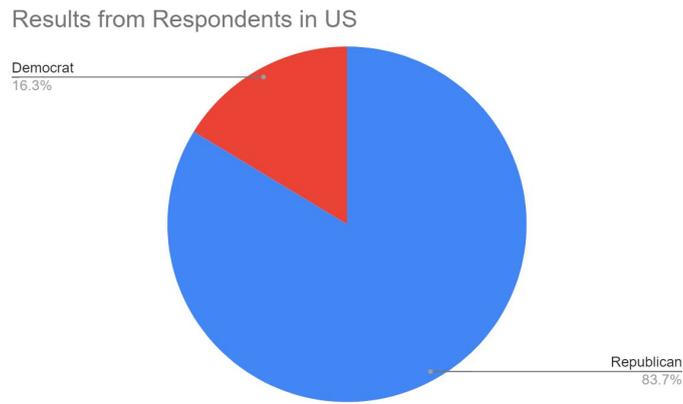
Johnny, a New Yorker, is against same sex marriage, gun control, and obama care. Is Johnny Republican or Democrat?

176 responses



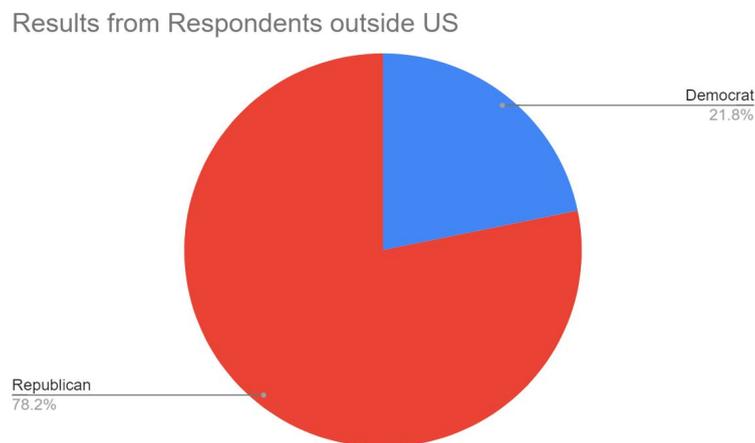
This figure outlines how 78% of people believed Johnny to be Republican, despite the large number of people who are Democrats in the state of New York.

Figure 1. Results from all Respondents



Most people inside the United States believed Johnny was a Republican, despite the number of Democrats in New York state.

Figure 2. Results from Respondents in the US



Most people outside the United States also believed Johnny was a Republican, despite the number of Democrats in New York state.

Figure 3. Results from all Respondents outside the US

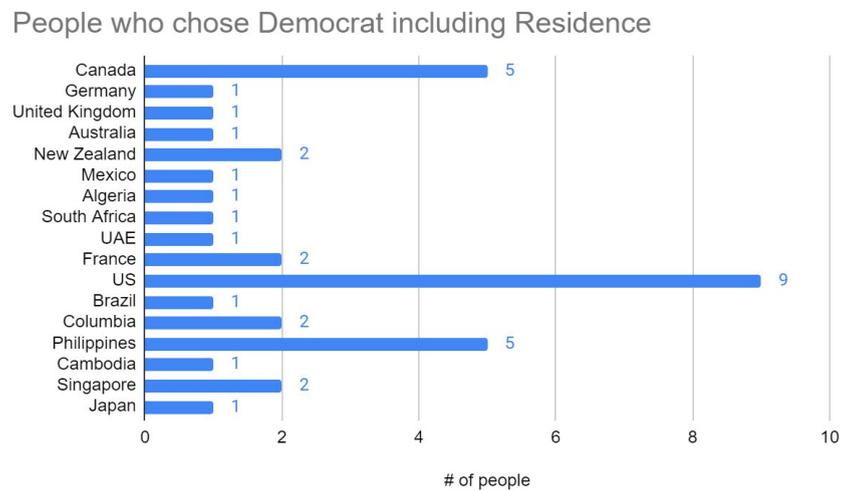
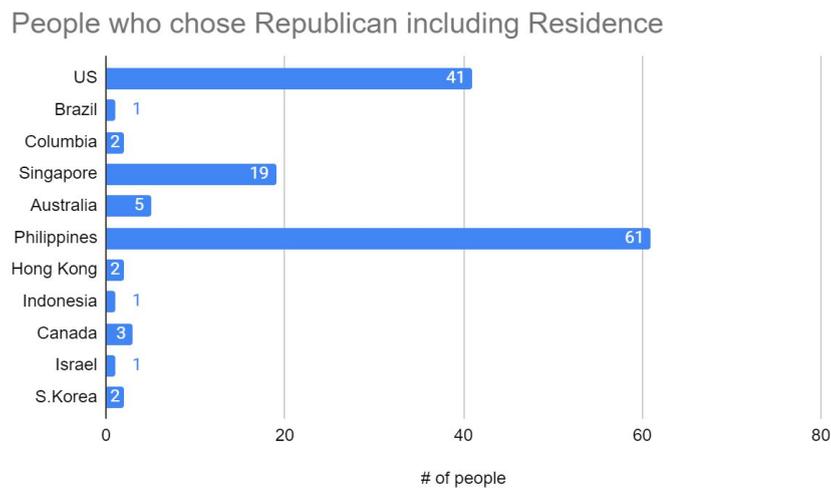


Figure 4. Results from all Respondents who chose Democrat based on Residence



VII. Data Table Conclusion

We ultimately did not see any correlation between how biased-affected probability worked depending where one was from.

VIII. Quantitative Analysis

It can be observed that most people that responded in the US and outside the US believed Johnny is Republican. Another observation is that people outside the US have a

higher percentage for Democrats than people inside the US with a 5.5% gap, as shown in Figures 2 and 3.

Out of 176 respondents, 78.4% answered that Johnny was a Republican while 21.8% voted for him to be a Democrat, as seen in Figure 1. Looking at Figure no. 2, which focused on US residents, shows that 83.7% answered Republican, which takes most of the pie. Meanwhile, figure 3, which includes people outside the US alone, shows that even if they are not part of the US government system still saw the question not based on the percentage of people in New York but from a political standpoint. The majority quickly voted Johnny to be a Republican. Looking at Figures 3 and 4, people who reside far from the US, like in Asia, still looked at the question based on the political stand and not on the numerical data given. Using Bayes Theorem, we can also see that the individuals in the test subjects went against probability.

$$P(A | B) = \frac{P(B | A) \cdot P(A)}{P(B)}$$

In this situation, $P(A|B)$, the probability of A given that B is true is 80%. $P(B|A)$, the probability of B given A is true was 17%.

To give a better perspective, it should be noted that there are about 15.5 million voters in the state of New York. This ultimately means that about 12.4 million people are Democrats while about 2.6 million are Republican. This is what gives us the 80% probability as $12.4 \text{ million} / (12.4 \text{ million} + 2.6 \text{ million})$ is about 0.8266 or approximately 80%. The equation works vice versa with 2.6 million replacing 12.4 million and likewise. Because there are so

many Democrats in the state of New York, it seems only likely that Johnny too is a Democrat. According to the Bayes rule, there's a higher probability of Johnny being a Democrat than Republican.

IX. Qualitative Analysis

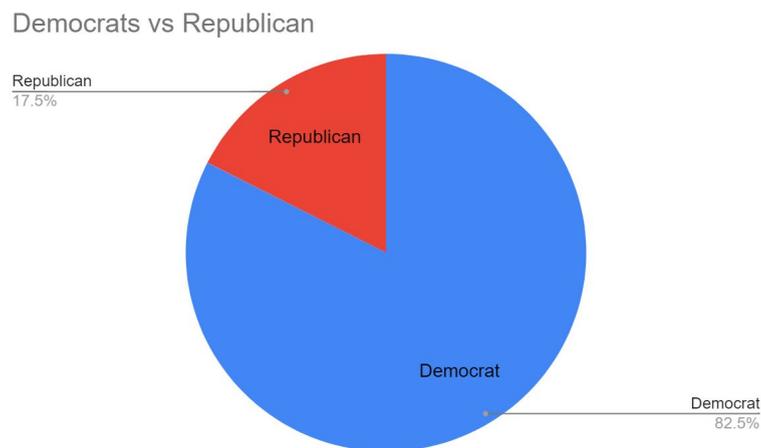
After answering the survey, some of the participants commented that they are not affiliated with any of the parties though they were not being asked about it. Others from America said, "I am a Democrat" or "I am not a Republican" when it is not questioned. It reflects how people interpret the question to be a political affiliation related question. It veers away from the question as to where Johnny belongs to given the numbers given.

Another interesting observation is that after answering the multiple questions, they would vent on the political issues and the ideologies promoted by the parties. Another person said that the general information was unnecessary, which exhibits that people are looking at this simple query as political competition and not looking deeply on the question as a whole. They are doing one way of thinking, which is fast-thinking.

X. Conclusion

In conclusion, if one will be rational, which is to use probability, a rational person would have chosen Johnny to be a Democrat since 80% of the people in New York are democrats. However, based on the results, people clearly did not look at the statistics and rely on one part of the information regarding the stand of Democrats and Republicans. Johnny can be a democrat but not necessarily agree to some of the positions of other Democrats. The survey mentioned what Johnny disliked on some democratic vision like ObamaCare, gun control, and same-sex marriage, which are just some of the aspects believed in by the Democrats but not necessarily the whole of the party's stand.

To give a better perspective, it can be noted that New York voting population is 15.5M (“Voting-Age Population: New York.”). Since 80% of the population are democrats, total people under this party 12.4MM while 17% (Republicans) accounts for 2.6MM. Using this data, the probability of Johnny being a democrat is higher than him being a Republican. It can clearly be shown by this graph:



Based on the analysis, it shows that our hypothesis is correct that people have difficulties understanding probabilities. They failed to take in the data on the portion of the population, as shown by the majority answering Johnny to be a Republican. People failed to recognize which facts are relevant in making the decision. Ultimately, from this research project and its analysis, we presume that pre-existing biases and stereotypes can often lead individuals to going against the probability factors.

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