

The Impact of Heuristics on Moral Decision-Making Confidence: A Quantitative Comparative Analysis

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ABSTRACT

Heuristics are decision-making strategies based on rules or shortcuts that enable individuals to quickly make choices. Heuristics have been primarily researched in a cognitive sense thus far, and it has been established that in cognitive decision-making, individuals select specific heuristics based on their past experiences in similar situations. Previous research has also demonstrated that selecting the appropriate heuristic for a given situation consistently leads to increased confidence; consequently, the heuristic that provides the highest level of confidence is the one utilized most often. However, this concept has not yet been explored in moral decision-making. This paper analyzes the five most common moral heuristics, social proof, authority figure, betrayal, tit for tat, and acts vs. omission, and the average confidence levels individuals report when using them. This study required participants to respond to a moral decision-making scenario using one of these five heuristics and rate their confidence in their decision. The heuristics yielding the highest average confidence ratings were betrayal and tit for tat, while the social proof and authority figure heuristics yielded the lowest. These results suggest that people utilize the betrayal and tit for tat heuristics the most often. Furthermore, when constructing arguments, these specific heuristics should be emphasized, as individuals are more likely to respond with confidence and agree with the presented argument.

INTRODUCTION

Indecisiveness has been shown to lead to “negative health consequences and lower life satisfaction” (Patalano & LeClair, 2011). Because of this, researchers have tried to figure out how people increase their confidence and ability to make effective decisions. Economists initially believed that shorter time limits for decisions led to much less effective decision-making. This is because decision-making models used to be purely rational (Wheeler, 2024). These models claimed that individuals made decisions through deliberating options and possible outcomes. However, these rational models were recently disproven as the primary decision-making strategy with the development of the concept of heuristics. Heuristics are rules or shortcuts that people use to make decisions requiring less time and effort. Decisions are able to be made quickly and with less information, which is more realistic to daily life. This lack of time and information can cause a decrease in confidence in the decision maker, but has been proven to be able to be solved through continued use of heuristics (Gigerenzer, 2011). Heuristics were primarily referenced in a cognitive sense before Cass Sunstein’s 2003 paper, “Moral Heuristics” (Nadurak, 2020). This paper

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describes how people use specific kinds of heuristics for moral decisions compared to cognitive decisions, specifically referencing the social proof, authority figure, betrayal, tit for tat, and acts vs. omission heuristics. However, this paper, and others addressing moral heuristics, did not reference *confidence* in moral decision-making using heuristics. There have been studies looking at how confidence is affected by the use of different cognitive heuristics; however, this has not been replicated with moral heuristics. This gap begs the question: Do different heuristics impact confidence in moral decision-making? If so, which has the largest impact? Therefore, this study investigates a correlation between specific moral heuristics and increased or decreased confidence in the decision maker. I hypothesize that certain heuristics, like social proof, will result in increased confidence, and others, like the acts vs. omission, will result in decreased confidence.

LITERATURE REVIEW

Rational vs. Heuristic Decision-Making

Heuristics were not always considered an effective method for decision-making. Previously, rational decision-making was considered the most effective and utilized method. Rational decision-making requires that all the possible information and time that could be needed to make the best decision possible be provided. This concept is introduced in Daniel Bernoulli's 1738 paper, "Exposition of a New Theory on the Measurement of Risk", translated in 1954, which describes what would become utility theory. Utility theory proposes that decision makers predict all the possible outcomes of all the decisions they could make and then weigh the risk and probability of occurrence associated with each of the outcomes. They then pick the option with the smallest risk and largest probability (Bernoulli, 1954). However, it has been described as an "idealized approximation to the actual behavior of men" (Marshak, 1950). This means that while this model provides a fairly good representation of decision-making, it still ignores some important factors. These factors can consist of time, information, emotion, and bias.

Since utility theory ignores many important factors in decision-making, Herbert Simon posed an alternative model in 1955. He argued that in most cases, there is no measurable value to compare to evaluate outcomes. For example, it is not possible to know the exact amount someone could profit from every alternative of a financial decision. Similarly, it would be impossible to measure the exact amount that an even more vaguely defined variable, like happiness, could increase from every alternative of a decision. He also argued that people do not even evaluate every outcome of a decision. For example, if a chess player is asked to make a move and finds an outcome that wins them the game, they will not look further for other solutions, even if there are more successful options, as there is no point. This challenges Bernoulli's theory and presents the first idea, which he named "Bounded Rationality", that would eventually lead to a concept called heuristic decision-making (Simon, 1955).

Simon's idea of heuristic decision making quickly took hold in the fields of economics and psychology. A landmark example of this is Gerd Gigerenzer's "Simple Heuristics That Make Us Smart". Gigerenzer described heuristics as a decision-making model where the individual ignores part of the information. For

example, if someone were to use what he called the recognition heuristic, they would just quickly pick the option they recognized first. This would be the only information the person considered, and the decision would be made very quickly. Other researchers argued that heuristics were not an effective decision-making strategy because ignoring relevant information must mean that unreliable decisions are being made (Wheeler, 2024). This is an idea that is heavily refuted in Gigerenzer's work. He argues this through a concept he named "The Adaptive Toolbox". "The Adaptive Toolbox" describes how people will use a heuristic for a decision and then evaluate how effective or ineffective it was for that particular situation. This information is then used to determine whether to pick the same or a different heuristic in similar future situations. This means that a person's heuristic decision-making skills improve over time and become very accurate as they make more decisions. Gigerenzer also lists several prominent cognitive heuristics that have surfaced over time, like the recognition heuristic, the take-the-first heuristic, and the fluency heuristic. If these heuristics are picked correctly for certain decisions, then they can have the same or more success than if a rational and deliberate decision were made instead. This is beneficial for the decision maker as it saves time and effort (Gigerenzer & Gaissmaier, 2011).

Confidence Caused By Heuristics

Studies of confidence in cognitive decision making have pointed to less confidence in heuristic decisions than rational decisions. Heuristic decision-making can cause an amount of confidence that falls below the person's desired level for that decision. That can lead to them moving on to rational decision-making. They deliberate more and spend more time and effort to achieve their desired level of confidence. This is called the "sufficiency principle," which states that "individuals are sometimes motivated to exert additional cognitive effort in order to reach a certain level of judgemental confidence" (Chaiken & Ledgerwood, 2012, p. 4). Because of the extra time and effort required to make a rational decision due to decreased confidence from a heuristic decision, this is a very negative outcome. This means that in situations where an individual does not have the time or effort to make a decision, they would leave that decision with very little confidence and increased anxiety over the outcome of that decision.

This lack of confidence can be improved through the use of "the adaptive toolbox," though. If a person learns the correct use of heuristics in certain situations, then they will start making more effective and accurate decisions (Gigerenzer & Gaissmaier, 2011). Confidence is based on prior performances and beliefs about a task or decision. Individuals combine prior beliefs and information on the present decision to choose a level of confidence (Boldt et al., 2019). This means that if a person has learned the correct heuristic for a certain decision and has used it effectively in the past, then they will be more confident in future similar situations using this heuristic. This also implies that if a person feels more confident using a certain heuristic, then it is a heuristic they use very often.

Cognitive vs Moral Heuristic Decision Making

Similarly to cognitive decision-making, moral decision-making research was also originally dominated by a rational decision-making model. Rational moral decision making describes a very similar theory to cognitive rationality and ignores the emotional aspect that is so prominent in moral decision making

(Haidt, 2001). Social psychologist Johnathon Haidt rectified this issue with his idea of the social intuitionist model. The social intuitionist model asserts that moral intuitions come before any type of logical reasoning. This means that moral decisions are primarily made in very little time and are based on a gut reaction. This differs from cognitive decision making because while both cognitive and moral decisions are made with heuristics, in moral decision making, the heuristic reaction always comes first and leads to the majority of the decision-making reasoning.

Additionally, in cognitive decision making, the use of the rational versus the heuristic model is mostly based on the time and information provided to the decision maker. However, in moral decision-making, this is based on the type of decision presented. The decision could be “personal” or “impersonal”. A “personal” decision would be one where the decision maker is directly committing the action. For example, in a murder case, a “personal” decision would be the choice to actually murder. An “impersonal” decision is when the decision maker is involved but not directly causing the action. So, in the example of the murder case, the “impersonal” decision would be a bystander deciding whether or not to stop the murder from happening. “Personal” decisions usually lead to more heuristic use than “impersonal” decisions because people are more likely to rely on social or emotional cues (Greene et al. 2004). The only heuristic that is primarily present in “impersonal” decisions is the later defined “acts vs. omission” heuristic as it describes people’s desire to be the bystander rather than the person actually committing the action.

Main Moral Heuristics

This study will be based on the five main moral heuristics as defined by Harvard economist Cass Sunstein. These heuristics are the social proof heuristic, authority figure heuristic, betrayal heuristic, tit for tat heuristic, and acts vs. omission heuristic. It should be noted that there are other moral heuristics, but they are not as common, so I did not include them in my study.

The social heuristic pushes the decision maker to act in the same way as the people around them. If their peers act in one way, then the individual will act similar to them. This heuristic works with majority rules and is not affected by the credibility of the peers.

The authority figure heuristic is like the social heuristic in that the person bases their actions on the decisions of someone around them, but the heuristic is more based on the credibility of the person. The decision maker picks the choice that a trusted and credible figure recommends or has picked in a similar situation.

The betrayal heuristic changes the individual’s reaction to their own or others’ actions and changes the way they value the action. People are more likely to see an act as bad or immoral if they originally thought good of whoever is committing the act. For example, if an individual was insulted by someone who they thought was a very close friend, they would be more outraged than if they were insulted by someone they had never met. They will also feel worse about their actions if they feel that they are betraying someone else.

The tit for tat heuristic is representative of “an eye for an eye”. If Person A committed a negative action against Person B, then Person B will be inclined to commit a negative action against Person A. It is the same if this action is positive as well. It also does not matter how good or bad the original action is. That is, a person can commit a very small action but receive a large reaction in return. The tit for tat heuristic is also only based on the last action someone performed. It does not matter the history between the two people or the actions performed before the final one.

The acts vs. omission heuristic references people’s preference to being a bystander rather than actually committing a negative action. People see actually committing a negative action as much worse and much more immoral than standing by and letting it happen. This can be seen in how a murderer would get more jail time than their accomplice. The murderer is treated harsher because they actually committed the action, while the accomplice, who knew they were going to do this but wasn’t the one who actually did it, is seen as a much better person.

METHOD

My research aimed to observe a correlation between increased confidence and different moral heuristic strategies. To accomplish this, I created and modified moral decision-making scenarios to correspond to each main heuristic, added these scenarios to a survey that was released to a group of high school students, and analyzed the survey results.

Based on my prior research, there are five main moral heuristics, as defined by Gigerenzer & Gaissmaier and Sunstein: social proof, authority figure, betrayal, acts vs. omission, and tit for tat. I created five base scenarios that could be easily altered to correspond to each heuristic. These base scenarios were then put into five different surveys centered around a different heuristic. This means that each survey had all five base scenarios and answer choices, but each scenario was tweaked slightly to push the answerer to use the heuristic the survey was centered around. A respondent would take just one survey, meaning that they would react to all five scenarios using only one heuristic for the whole survey. After reacting to each scenario, the respondent would then rate their confidence in that decision.

Designing the Scenarios

The base scenarios designed had to be specific enough for the overall decision to be the same in each survey, but broad enough to be easily altered for each heuristic. These scenarios were entirely made up with inspiration for three of them coming from Morales-Sanchez & Cabello-Medina’s 2013 study. The scenarios were then altered to fit each heuristic for each survey. The social proof heuristic and authority figure heuristic were the easiest to apply to the scenarios. In the social proof survey, each of the scenarios just had a fake statistic added at the end showing that the majority of “previous respondents” chose a certain option. For the authority figure survey, each scenario had an authority figure telling the answerer to pick a certain option. The tit for tat and betrayal surveys required more specific alterations to the scenarios. When Gigerenzer described the tit for tat heuristic, he specifically noted that action could be

negative or positive to create a reaction following this heuristic. So, the information added to alter the base scenarios was negative for some scenarios and positive for others. This let me tailor the extra information to whatever makes the most sense and would have the biggest emotional impact on the answerer rather than making sure it was negative or positive. The betrayal heuristic, as described by Sunstein, could also have two options. The answerer could be betrayed or could be worried about betraying someone else. Like the tit for tat heuristic, this meant that I was able to focus more on what made the most sense for the scenario rather than which side the betrayal is coming from. Finally, the acts vs omission scenarios were the hardest to create and impacted the creation of the rest of the scenarios as well. Sunstein identified “omission” as the more favorable option in a moral decision; so, since I wanted to study which heuristic gave the most confidence in moral decision making, all scenarios in the acts vs omission survey had to be given in a way that let the respondent be a bystander or indirectly cause the immoral action, meaning that they would be able to pick “omission”. By altering the scenarios this way, it would eliminate the extra factor of “acts” possibly causing less confidence, and “omission” causing more in the same survey, making it harder to compare results between surveys since results would have had to have been compared within the survey. Altering the scenarios in this way also impacted the rest of the surveys. If a survey of entirely “omission” based scenarios had to be in contrast with the four other surveys, then all the other surveys must be entirely “acts” based scenarios. This means that in all the other surveys, the respondent was put in a position where they were directly committing the immoral act. The different variants of these 5 scenarios can be found in Tables 1-5.

Table 1

Question 1 scenario variants

	Base Scenario	Social Proof	Authority Figure
Question 1	You are on a jury and have to give input on the sentence length of a man who is guilty of murdering his wife in the first degree (intentional and planned). What do you believe the sentence length should be? - 25 years - 50 years - Life sentence - 10 years	You are on a jury and have to give input on the prison sentence length of a man who is guilty of murdering his wife in the first degree (intentional and planned). The rest of the group thinks that it should be 25 years. What do you believe the sentence length should be? - 25 years - 50 years - Life sentence - 10 years	You are on a jury and have to give input on the sentence length of a man who is guilty of murdering his wife in the first degree (intentional and planned). The foreman of the jury thinks that it should be 25 years, what do you think it should be? - 25 years - 50 years - Life sentence - 10 years
	Betrayal	Tit for Tat	Acts vs Omission
	A man in your town who you know well is guilty of murdering his wife in the first degree (intentional and planned). You knew him as a very good person who treated his wife well. How long of a prison sentence do you believe he should be given? - 25 years - 50 years - Life sentence - 10 years	A man you know is guilty of murdering his wife in the first degree (intentional and planned). The man has said a lot of insulting things behind your back. What do you believe his sentence length should be? - 25 years - 50 years - Life sentence - 10 years	You are on a jury and have to give input on the sentence length of a man who is guilty of murdering his wife in the first degree (intentional and planned). You and rest of the jury each get one vote and the majority rules whether it was your choice or not. - 25 years - 50 years - Life sentence - 10 years

Table 2

Question 2 scenario variants

	Base Scenario	Social Proof	Authority Figure
Question 2	You have discovered evidence that a local charity has been secretly misusing donations. If you share the story, the charity will lose funding and could close, which hurts hundreds of people who depend on it. If you stay silent the corruption goes unnoticed. Do you reveal this information? - Reveal the information - Stay silent	You have discovered evidence that a local charity has been secretly misusing donations. If you share the story, the charity will lose funding and could close, which hurts hundreds of people who depend on it. If you stay silent, the corruption continues unnoticed. Do you reveal this information? Previous surveys show that 70% of people would choose to stay silent. - Reveal the information - Stay silent	You have discovered evidence that a local charity has been secretly misusing donations. If you share the story, the charity will lose funding and could close, which hurts hundreds of people who depend on it. You decided to tell a trusted adult in your life and they believe that you should stay silent. If you stay silent, the corruption continues unnoticed. Do you reveal this information? - Reveal the information - Stay silent
	Betrayal	Tit for Tat	Acts vs Omission
	You have discovered evidence that a local charity has been secretly misusing donations. If you share the story, the charity will lose funding and could close, which hurts hundreds of people who depend on it. If you stay silent, the corruption continues unnoticed. You are angered by this because you have donated a lot of money to this charity thinking you are doing good. Do you reveal this information? - Reveal the information - Stay silent	You have discovered evidence that a local charity has been secretly misusing donations. You are already angry at this charity because you applied to work there and they rejected you. If you share the story, the charity will lose funding and could close, which hurts hundreds of people who depend on it. If you stay silent, the corruption continues unnoticed. Do you reveal this information? - Reveal the information - Stay silent	You have discovered evidence that a local charity has been secretly misusing donations. You can reveal this information anonymously. If you share the story, the charity will lose funding and could close, which hurts hundreds of people who depend on it. If you stay silent, the corruption continues unnoticed. Do you reveal this information? - Reveal the information - Stay silent

Table 3

Question 3 scenario variants

	Base Scenario	Social Proof	Authority Figure
Question 3	You have a neighbor who is selling their lot, and you want it. When speaking with the neighbor, they say they're thinking of selling the lot for \$10,000. However, you know their property is worth around \$30,000. Do you tell them what it's actually worth or do you buy it for \$10,000? - Tell the neighbor what their lot is actually worth - Buy the lot	You have a neighbor who is selling their lot, and you want it. When speaking with the neighbor, they say they're thinking of selling the lot for \$10,000. However, you know their property is worth around \$30,000. Do you tell them what it's actually worth or do you buy it for \$10,000? Previous surveys show that 60% of people would tell the neighbor. - Tell the neighbor what their lot is actually worth - Buy the lot	You have a neighbor who is selling their lot, and you want it. When speaking with the neighbor, they say they're thinking of selling the lot for \$10,000. However, you know their property is worth around \$30,000. Your parents told you not to buy the lot and tell the neighbor. Do you tell them what it's actually worth or do you buy it for \$10,000? - Tell the neighbor what their lot is actually worth - Buy the lot
	Betrayal	Tit for Tat	Acts vs Omission
	You have a neighbor who is selling their lot and you want it. You are very close with this neighbor and know that the trait he values most about your friendship is trust. When speaking with the neighbor, they say they're thinking they will ask for \$10,000. However, you know their property is worth around \$30,000. Do you tell them what it's actually worth and honor your friendship or do you buy it for \$10,000? - Tell the neighbor what their lot is actually worth - Buy the lot	You have a neighbor who is selling their lot, and you want it. When speaking with the neighbor, they say they're thinking of selling the lot for \$10,000. However, you know their property is worth around \$30,000. You feel a little bit in debt to this neighbor because they often mow your lawn for you. Do you tell them what it's actually worth or do you buy it for \$10,000? - Tell the neighbor what their lot is actually worth - Buy the lot	You have a neighbor who is selling their lot, and you want it. When speaking with the neighbor, they say they're thinking of selling the lot for \$10,000. However, you know their property is worth around \$30,000. You feel a little bit in debt to this neighbor because they often mow your lawn for you. Do you tell them what it's actually worth or do you buy it for \$10,000? - Tell the neighbor what their lot is actually worth - Buy the lot

Table 4

Question 4 scenario variants

	Base Scenario	Social Proof	Authority Figure
Question 4	You are a car dealer who purchases cars that have been in accidents. You then fix them and sell them. Someone is buying a car from you. She picks a car that was previously totaled. You were not able to fix this car to its previous form, the car looks to be fine but in reality the car will quickly break and she will need to buy another new one. Do you tell the buyer? - Sell the car - Tell the buyer	You are a car dealer who purchases cars that have been in accidents. You then fix them and sell them. Someone is buying a car from you. She picks a car that was previously totaled. You were not able to fix this car to its previous form, the car looks to be fine but in reality the car will quickly break and she will need to buy another new one. Do you tell the buyer? Previous surveys show that 80% of people would choose to sell the car. - Sell the car - Tell the buyer	You are a car dealer who purchases cars that have been in accidents. You then fix them and sell them. Someone is buying a car from you. She picks a car that was previously totaled. You were not able to fix this car to its previous form; the car looks to be fine, but in reality the car will quickly break and she will need to buy another new one. Your boss tells you to sell her the car. Do you tell the buyer? - Sell the car - Tell the buyer
	Betrayal	Tit for Tat	Acts vs Omissions
	You are a car dealer who purchases cars that have been in accidents. You then fix them and sell them. Your very close friend is buying a car from you. She picks a car that was previously totaled. You were not able to fix this car to its previous form, the car looks to be fine but in reality the car will quickly break and she will need to buy another new one. Do you tell your friend? - Sell the car - Tell the buyer	You are a car dealer who purchases cars that have been in accidents. You then fix them and sell them. You recognize this person because they recently helped you after your car broke down. She picks a car that was previously totaled. You were not able to fix this car to its previous form; the car looks to be fine, but in reality the car will quickly break and she will need to buy another new one. Do you tell the buyer? - Sell the car - Tell the buyer	You know a car dealer who purchases cars that have been in accidents. He then fixes them and sells them. Someone is buying a car from him. She picks a car that was previously totaled. You know for sure that he was not able to fix this car to its previous form; the car looks to be fine, but in reality, the car will quickly break, and she will need to buy another new one. Do you tell the buyer? - Sell the car - Tell the buyer

Table 5

Question 5 scenario variants

	Base Scenario	Social Proof	Authority Figure
Question 5	A popular car company starts selling a new car. They cheated on their emissions tests and released the car as one that is compliant with clean air standards even though it is not. You are an executive at this company. If you release this information you will stop the detrimental effects to the environment; however, you will be fired. What do you do? - Release the information - Sell the car	A popular car company starts selling a new car. They cheated on their emissions tests and released the car as one that is compliant with clean air standards even though it is not. You are an executive at this company. If you release this information you will stop the detrimental effects to the environment; however, you will be fired. What do you do? Previous surveys show that 80% of people would choose to release the information. - Release the information - Sell the car	A popular car company starts selling a new car. They cheated on their emissions tests and released the car as one that is compliant with clean air standards even though it is not. You are an executive at this company. If you release this information you will stop the detrimental effects to the environment; however, you will be fired. Your boss tells you not to release the information. What do you do? - Release the information - Sell the car
	Betrayal	Tit for Tat	Acts vs Omissions
	A popular car company starts selling a new car. They cheated on their emissions tests and released the car as one that is compliant with clean air standards even though it is not. You are an executive at this company and were proud to work there because you thought they went out of their way to make their cars environmentally friendly. If you release this information you will stop the detrimental effects to the environment; however, you will be fired. What do you do? - Release the information - Sell the car	A popular car company starts selling a new car. They cheated on their emissions tests and released the car as one that is compliant with clean air standards even though it is not. You are an executive at this company. You are already a little angered at the company because they recently denied you time off. If you release this information you will stop the detrimental effects to the environment; however, you will be fired. What do you do? - Release the information - Sell the car	A popular car company starts selling a new car. They cheated on their emissions tests and released the car as one that is compliant with clean air standards, even though it is not. You accidentally learn about this. The company offers you millions of dollars not to say anything. If you release this information, you will stop the detrimental effects to the environment; however, you will not get the money. What do you do? - Release the information - Sell the car

Survey Release

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In this study, all subjects were students aged 14-18 from a predominantly white, suburban high school. The subjects were randomly divided into 5 demographically similar groups, each assigned a different survey and heuristic. Since all the survey respondents were minors, I had to receive parental permission before releasing the survey. I accomplished this by having the principal of the school where the survey was administered send an email to all of the parents of the participants describing my survey and what the data would be used for. All parents had to give permission, and any student without parental permission was not allowed to participate in the survey. All subjects took their assigned survey at the same time in rooms filled with other students taking the same survey. Having students in the same room take the same survey was only done for convenience and had no impact on the survey results. Students were asked to stay silent and not speak or compare answers to others so as to not accidentally trigger the social heuristic on a survey that might want them to use a different one. When taking the survey, respondents reacted to all the scenarios, and after every individual scenario they would rate their confidence in the decision they just made. This means that each survey had five versions of the moral scenarios and five identical questions asking them to rate their confidence after each scenario. This rating was on a 1 to 5 scale, one being the least confident and five being the most.

Data Analysis

After receiving my results, I transferred them into Google Sheets, as it easily linked to the Google Forms my surveys were conducted in. The data was exported in five different sheets, one for each heuristic. I received 327 responses and had to disregard four respondents that obviously did not realistically complete the survey, for example, selecting the top answer choice and five for confidence for every question. This led to group sizes of 65 respondents for social proof, 56 for authority figure, 59 for betrayal, 61 for tit for tat, and 44 for acts vs. omission. I also disregarded individual answers that did not match what the survey's heuristic was pushing the individual to pick. I did this because if the respondent was told that "previous surveys show that 80% of people would pick option A" and they chose option B, then that would mean that they ignored this information and did not use the social proof heuristic. Since my research is on whether the usage of certain heuristics provides increased confidence, if the respondent showed they did not use the heuristic for a certain question, this response could be disregarded. This did not affect the total number of respondents as I only disregarded specific answers. Because, my research is not on whether adherence to a heuristic affects decision-making confidence, disregarding these responses allowed me to better focus my results on what my actually objective: the effect of using a certain heuristic on confidence rather than the effect of whether or not the respondent chose to use a heuristic on confidence. This resulted in 175 confidence ratings being removed from a total of 325 original social proof confidence ratings, 186 ratings being removed from a total of 280 original authority figure ratings, 80 ratings being removed from a total of 295 original betrayal ratings, 77 ratings being removed from a total of 305 original tit for tat ratings, and 112 ratings being removed from a total of 220 original acts vs. omission ratings.

I then calculated an average confidence score for each individual and an average confidence score for each survey. I compared the individual averages by creating graphs to visually demonstrate the trends. To confirm if the trends in the graphs and the difference in survey confidence averages were statistically

significant, I performed multiple two sample t-tests for a difference in means. I performed ten tests so each survey could be individually compared to every other survey. A p-value of 0.05 or under signifies a statistically significant difference between two average confidence scores. After this, I had to use the Holm-Bonferroni correction. I did this because performing multiple two sample t-tests increases the probability of a false positive every time it is performed. So, I corrected my original values to a new group of p-values which I then compared to 0.05 to decide statistical significance.

RESULTS

To evaluate my study, I started by finding the average confidence level between all respondents for each heuristic. These averages can be found in Table 6. These averages before true evaluation do not present much variation, keeping around three to four. However, since the scale was only one to five this is not entirely surprising. The betrayal heuristic has the highest average confidence score and the social proof heuristic has the lowest average confidence. This difference needs to be confirmed as statistically significant though.

Table 6

Total average confidence scores

Heuristic	Average Confidence Score
Social Proof	3.573
Authority Figure	3.481
Betrayal	4.031
Tit for Tat	3.842
Acts vs. Omission	3.841

I also found each individual's average confidence level. Each individual made five decisions in their survey and gave a confidence score for each one. So, each individual's average confidence level is the average of the five confidence scores they gave. Figures 1 through 5 break down Table 6 to show individual confidence averages for each survey. Each graph shows how many respondents' individual average confidence level fell between each interval. Figure 1, the social proof averages, has most of the averages concentrated around 3 to 4. It also has some answers from 3 and below.

Figure 1

Social proof survey individual averages

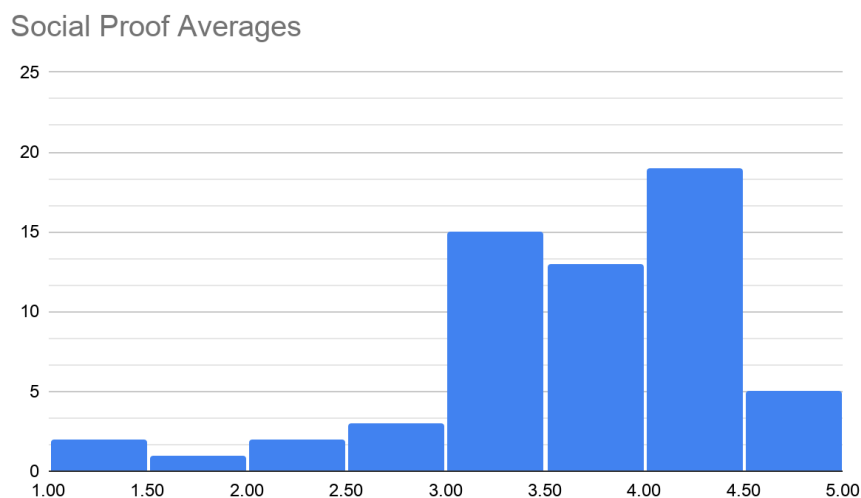


Figure 2, the authority figure averages, also has most averages falling between 3 to 4. Some also fall below 3, but there are less below 3 than in Figure 1. Additionally, there is a lack of averages above 4.5 in both Figure 1 and Figure 2, which differs from the other three heuristics.

Figure 2

Authority figure individual averages

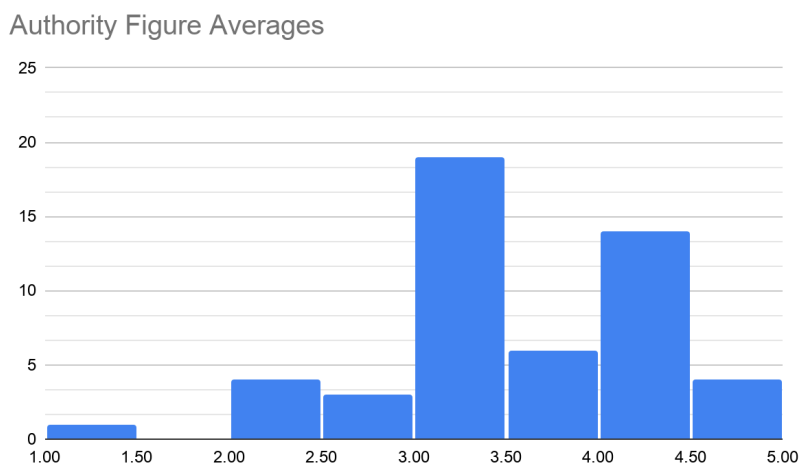


Figure 3, the betrayal averages, presents a very different shape from the first two heuristics. All individual confidence averages fall from 3 to 5 with zero individuals falling below 3. Figure 3 also has much more averages in the 4.5 to 5 interval than Figure 1 and Figure 2. This is consistent with the betrayal total average confidence score that can be found in Table 6. Table 6 shows the betrayal heuristic having the highest average confidence score and Figure 3 shows all individual confidence scores being very concentrated around 4.

Figure 3

Betrayal individual averages

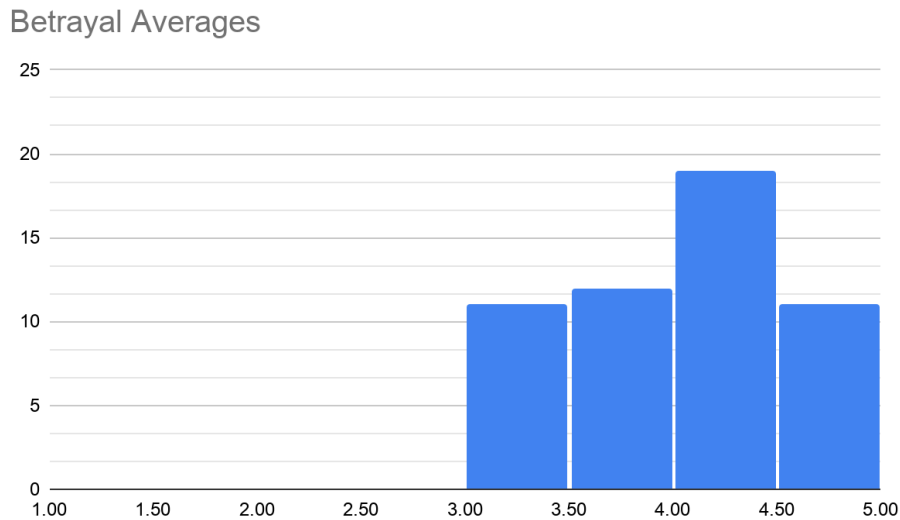


Figure 4, the tit for tat averages, shows the majority of averages falling between 3.5 and 4.5. It looks fairly similar to Figure 3 and only two individuals had average confidence scores below 3.

Figure 4

Tit for Tat individual averages

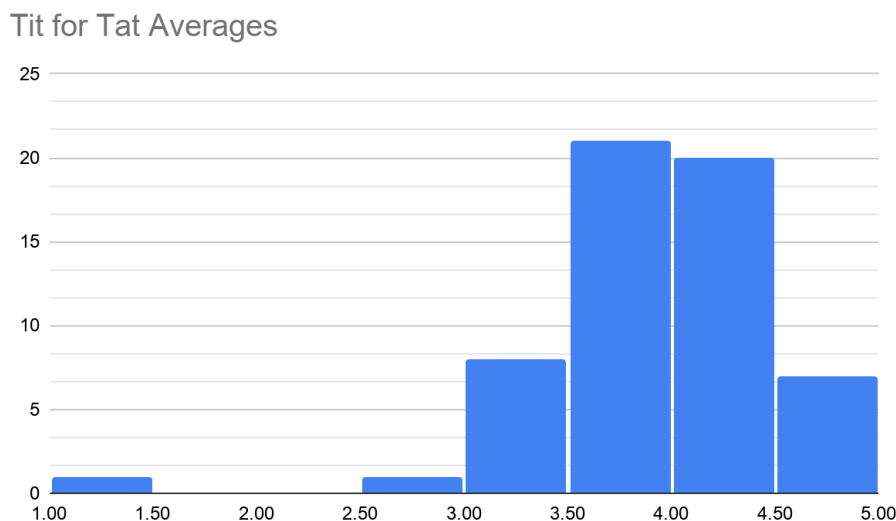
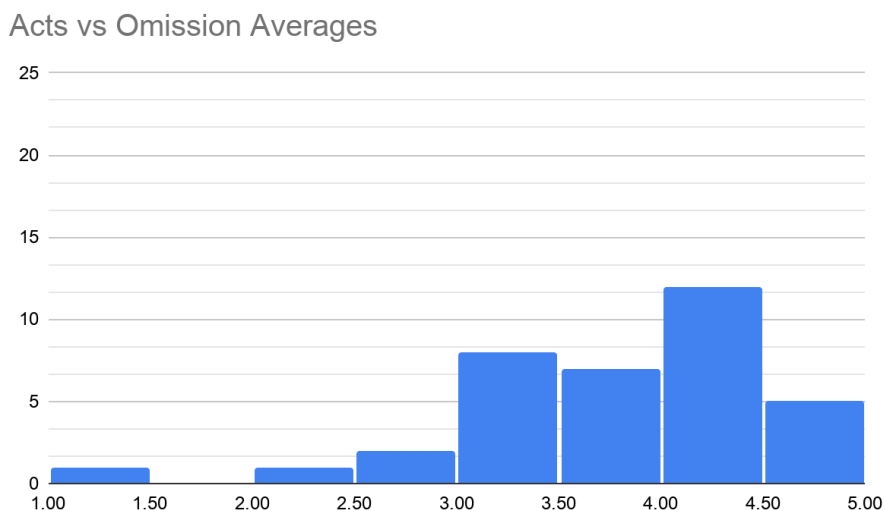


Figure 5, the acts vs. omission averages, shows a high concentration of averages around 4. Overall, there are much less responses in every interval because I got less responses for this heuristic. It is hard to compare this graph to the others because every interval is much lower. However, even though there are less responses, Figure 5 still had more responses falling below 3 than Figure 3 and Figure 4. This is similar to Figure 1 and Figure 2. Figure 5 differs from Figure 1 and Figure 2 in that it has more individuals with average confidence scores above 4.5. It still has fewer individuals with average confidence scores above 4.5 than Figure 3 though.

Figure 5

Acts vs. omission individual averages



Purely by looking at the graphs, two groups can be seen. The social proof, authority figure, and acts vs. omission heuristics have graphs with less confidence and less averages from 4 and above and have some averages below 3. The second group, the betrayal and tit for tat heuristics, have more confidence and most if not all averages above 3. However, just looking at the graphs is not enough to be sure that these groups can be created, especially because all survey groups are different sizes. The differences between each graph must be proved to be statistically significant to be able to make this claim.

Therefore, I utilized ten two sample t-tests to compare the total averages seen in Table 6. These tests aimed to reject a null hypothesis through the production of p-values. These p-values can be found in Table 7. The null hypothesis in my study is that there is no difference in average confidence levels between each heuristic. The null hypothesis is rejected when the p-value is 0.05 or less.

Table 7

Two sample t-tests p-values

Comparison	P-Value	1 = Social Proof 2 = Authority Figure 3 = Betrayal 4 = Tit for Tat 5 = Acts vs. Omission
1 v. 2	0.56	
1 v. 3	0.0007	
1 v. 4	0.047	
1 v. 5	0.11	
2 v. 3	0.0002	
2 v. 4	0.013	
2 v. 5	0.04	
3 v. 4	0.099	
3 v. 5	0.21	
4 v. 5	1	

As seen by the bolded values in Table 7, the null hypothesis was rejected in 5 of the tests conducted. In these 5 tests, the social proof heuristic and the authority figure heuristic had lower average confidence values than the betrayal, tit for tat, and acts vs. omission heuristics. The null hypothesis was not rejected in tests for the Social heuristic vs. the authority figure heuristic and tests between the betrayal, tit for tat, and acts vs. omission heuristics. However, these values still need to be corrected.

Table 8

Holm-Bonferroni Correction Values

Comparison	P-Value
1 v 2	1.0000
1 v 3	0.0063
1 v 4	0.2820
1 v 5	0.4950
2 v 3	0.0020
2 v 4	0.1040
2 v 5	0.2800
3 v 4	0.4950
3 v 5	0.6300
4 v 5	1.0000

1 = Social Proof
2 = Authority Figure
3 = Betrayal
4 = Tit for Tat
5 = Acts vs. Omission

Table 8 reveals the new p-values using the Holm-Bonferroni correction. These new values reveal that there is only a statistically significant difference in the social proof vs betrayal test and the authority figure vs betrayal test. This differs from what I originally assumed when looking at the graphs.

DISCUSSION

The results of this study indicate that there is a statistically significant difference in the average confidence levels between different moral heuristics. Specifically, the social proof and authority figure heuristics provide generally lower confidence levels than the betrayal heuristic. This confirms my hypothesis that there would be a difference in confidence levels between heuristics, but disproves my hypothesis that the social proof heuristic would provide more confidence.

This finding supports the conclusions found by Boldt et al. proving that frequent success in an action leads to more future confidence in that action, Gigerenzer's concept of "The Adaptive Toolbox", and Haidt's conclusion that moral decisions are largely based on emotional reactions. Combining Boldt et al. and Gigerenzer's conclusions suggests that the heuristic used most often is the heuristic that provides the most confidence because the "adaptive toolbox", which illustrates how people use heuristics more effectively over time as they use them and learn when it works effectively, can be connected with the assertion from Boldt et al. that states that people develop more confidence in performing a certain action

when they have performed it successfully in the past. For my study to suggest that this may be true, the heuristics I found to give the most confidence must follow this pattern. This means that since the betrayal heuristic provided the most confidence, it is likely to be used the most often. This supports Haidt's conclusion because this heuristic is based on emotional reactions like anger, sadness, and guilt. So, the heuristic people use most often is an emotion-based heuristic suggesting that people base moral decision-making primarily on emotions.

Limitations and Future Research

Although my research yielded successful results, there were several limitations to my study's scope and accuracy. Firstly, I used a very minimally diverse sample population. Due to my sample being predominantly white and aged 14-18 years old, it is not representative of the general population. This study can be repeated in the future with a more accurate and diverse survey population to properly represent the general population. Also, teachers at the high school where this survey was conducted encouraged students to take it. This could have led to students begrudgingly completing the survey, rushing through, and potentially providing dishonest answers. This was confirmed by the obvious cases of dishonest answers that were disregarded. Additionally, due to the way in which the scenarios were provided to the respondents it is not possible for them to know for certain how they would react or how confident they would be. Respondents were given scenarios with extreme repercussions for many people, long-standing friendships, or betrayal from pretend people. Since respondents do not actually know any of the people in the scenarios or are actually feeling the emotions, while they can give a fairly accurate assumption of how they would react in each scenario, it is impossible for them to know for sure. Also, the acts vs. omissions heuristic altered the surveys in a way that could have affected the reliability of the responses. Because, the acts vs. omissions scenarios had to force the respondent to use "omission" while all the other surveys then forced the respondent to use "acts", the responses on the other surveys may have been biased. Their confidence level could have been affected both by what heuristic they were using and the scenario forcing them to "act". Finally, since there was a large amount of disregarded responses due to answers not adhering to the use of the intended heuristic, some selection bias could have been introduced. This was regarded as relatively insignificant compared to bias introduced including by non-use of the heuristics, but still could have affected the validity of the results.

Other than correcting limitations in my study, future researchers can also explore the effects of other moral heuristics on confidence. I used the five most common moral heuristics for my study but other ones exist as well, like the outrage heuristic and the "do not tamper with nature" heuristic (Sunstein, 2005). Looking at less common heuristics is less likely to prove to have more confidence than the heuristics used in my study, since confidence is linked to amount of use, but it would be interesting to test if some less common heuristics cause extreme decreased confidence. Future researchers could also look at whether using cognitive heuristics in moral decision-making impacts confidence. The social proof and authority figure heuristics can be used for cognitive decision making and they have been proved to impact confidence, so I think it would be interesting to look at whether heuristics more specific to cognitive decisions heavily impact moral decision-making confidence.

Conclusion and Implications

Ultimately, this study looked at 5 common moral heuristics and evaluated the confidence each of them provided to the decision maker. The statistically significant differences found between the average confidence levels of the social proof and authority figure heuristics and the betrayal heuristic demonstrate that there is a significantly larger amount of confidence provided by the betrayal heuristic than the social proof and authority figure heuristics. However, there was no statistically significant difference between any other confidence levels. This knowledge can benefit large companies, public figures, and legal scholars. As large companies and public figures, who rely on a positive public opinion for success, make decisions they can take this knowledge into account. If a large company or a public figure makes a mistake that ruins a previously positive public perception of them, then this mistake will be incredibly detrimental as the betrayal heuristic has been identified as providing the most confidence in moral decision-making. They can then use this knowledge to better improve their situation as they now know that focusing on promoting the positive opinion of a large group of people or an authority figure is not going to have as much of an impact as addressing and rectifying their betrayal. Legal scholars can also take my results into account when debating the best way to present a certain case. Knowing that people are likely to have a greater response to the betrayal heuristic than the social proof and authority figure can help them focus cases. They can focus on how a client did or did not betray someone else rather than their social standing to gain greater decision-making confidence from the jury. The knowledge that there is no statistically significant difference between the social proof, authority figure, tit for tat, and acts vs. omissions heuristics also has wide implications. This reveals that there is no hierarchy between these different decision making strategies and, therefore, it cannot be assumed how people may react to certain scenarios. This means that choosing to present an argument using one of these four heuristics is not likely to have a large difference in outcome compared to the other three. This means that assertion can likely simply just be focused on whichever of these four heuristics is easiest. For example, if a person was trying to present themselves as trustworthy to someone else but they do not have evidence that would appeal to the tit for tat heuristic they can easily present themselves as an authority figure or as having a positive social presence and likely get the same result. In conclusion, this study has affirmed that there is most likely an impact on confidence from moral heuristics, but admits that further investigations are needed.

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