The influence of personality and money priming on outcomes in the prisoner's dilemma

Medhini Urs

Psychology

Dr. Patrick Smith

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Money priming has been shown to cause behavioral changes in people, and make them more individualistic, persistent, and selfish. The money priming effect has been studied worldwide, and is known to have varying effect sizes depending on the method used to induce the prime. Game theoretical models have been utilized in studying the extent of money priming, however, there are mixed results with regards to the effect of money priming on outcomes in game theory. There may be a mediating factor of personality that has caused varying results in the literature. The proposed study aimed to determine whether money priming and personality (i.e., agreeableness and neuroticism) play a role in the outcomes of the prisoner's dilemma. Contrary to previous research studies, results revealed that there was no evidence of money priming or personality playing a role in the rates of cooperation and defection in the prisoner's dilemma game.

Introduction

Money priming and the self-sufficiency hypothesis

The self-sufficiency theory of money proposed by Vohs, Mead, and Goode (2006) states that exposure to money (either subtle signs of money or to the concept of money itself) makes people more likely to favor solitary activities, pursue their individual goals, act more selfishly, and be less willing to help others. The results of multiple experiments conducted by Vohs and colleagues (2006) give support to this theory. In one experiment, participants who were reminded of money worked longer on a given task before asking help from the experimenter compared to those who were not reminded of money. In another experiment, those were primed with money-related concepts were less helpful than those who were primed with neutral concepts. The concept of self-sufficiency was also bolstered by the results gathered in the experiment in which the mere exposure to money (i.e., screensavers displaying money) significantly increased participants' desire to work solitarily on a proposed activity compared to those who were exposed to a neutral

screensaver or no screensaver. Vohs and colleagues (2006) state that the high effect sizes gathered in some of the experiments was surprising that although money is present all around us in our society, even minor alterations in the environment with respect to money exposure were still able to have a powerful effect on human behavior.

If the manipulation of a ubiquitous element of daily life in modern society like money can produce a large effect size in behavior (e.g., differences in helpfulness, and selfishness) it may be necessary to not only explore the extent of this effect, but also the contexts in which it manifests. It is important to understand the extent of the influence of money priming on human behavior, as money is central to life in the modern world. It is not only integral in the everyday lives of individuals, but to the progress of mankind itself. It is therefore beneficial to understand what the exposure to money or the concept of money does to individual's thoughts and behavior. Extending the case that Vohs and colleagues (2006) made about the large effect size of money priming, there could be a wide range of significant effects with far-reaching consequences to society. One example of a drastic consequence of money priming is its effect on individuals' worldview. There have been studies which show that activating the concept of money via reminders can even impact ideological perspectives on social systems (Caruso, Vohs, Baxter, & Waytz, 2013). For example, people who have been exposed to the concept of money have been shown to favor free-market capitalism and endorse the current social system in the United States compared to people who have not been exposed to money (Caruso, Vohs, Baxter, & Waytz, 2013).

Perhaps on the account of consequential real-world implications that can be attributed to money priming, researchers have tried to explore this concept a bit further (Caruso, Vohs, Baxter, & Waytz, 2013). Following the initial hypothesis and theory proposed by Vohs and colleagues (2006), numerous studies involving the concept of money priming and its influence on human

behavior have emerged. Similar effects of money priming have been obtained not only in North America, but in numerous locations worldwide including Europe, and Asia (Vohs, 2015). All of these studies incorporated money priming either in the form of a descrambling task or through the physical handling of money and had a variety of dependent measures (e.g., helpfulness, empathy, generosity, task-persistence, etc.) In a systematic exploration of money priming by Caruso, Shapira, and Landy (2017), the researchers aimed to determine which of the money priming manipulations present in the literature consistently had the greatest effect for varying dependent measures. The results from their study showed that the priming methodology utilized played a significant part in whether or not money priming was effective in altering behavior. In addition, there was no consistent effect of any single manipulation on any dependent variable. The authors propose that the inconsistency of the results may be due to the sensitivity of money priming effects itself to experimental design and methodology, and the participant population itself. The current study aims to determine the effects of certain manipulations in money priming while obtaining more evidence to either support or weaken the claim that sensitivity of money priming may vary among the population.

Money priming and Game Theory

From the study conducted by Vohs and colleagues (2006), there is evidence to suggest that being primed with monetary concepts can have a significant impact on behavior. Decision-making is a universal human behavior, and money priming experiments have been conducted in the domain of human decision-making (Gąsiorowska & Helka, 2012; Michailova & Buren, 2017). Models that have been utilized in this domain come from a branch of experimental economics known as game theory. Game theory is the formal study of strategic interactions, where multiple agents make decisions that affect each other (Osborne, 2000). The effect of money priming on a game

theoretical model known as the dictator game is has been studied (Gąsiorowska, & Hełka, 2012). In the dictator game, one of the players gets to decide how much of an allocated sum of money is given to the other player (Bardsley, 2008). Gąsiorowska, and Hełka (2012) manipulated the type of prime (neutral or money) and measured the effects of this manipulation in economic behavior. The dependent measure was the amount of prosocial behavior present in the dictator game, as measured by the amount of money given to the other player during the game. Based on the results obtained from Vohs and colleagues (2006), Gąsiorowska and Helka (2012) hypothesized that activating the concept of money would decrease prosocial behavior (i.e., the participants in the experimental condition will give less money to the other participant). The results did support the self-sufficiency theory (Vohs et al., 2006) under the paradigm of the dictator game as well as the influence of individual differences in money priming. Participants in the money priming condition who had a symbolic attitude towards money transferred significantly a smaller amount of money than those in the control condition. However, there was no significant difference in the amount of money transferred between the money condition and the control condition for those who had an instrumental attitude towards money. These results suggest that money attitudes and hypothetically other individual differences may mediate the effect of money priming on people.

Other researchers such as Michailova, and Buren (2017) have also studied the effects of money priming on the outcomes of the dictator game as well as the ultimatum game, and the prisoner's dilemma in their experiments. The ultimatum game is similar to the dictator game, but with a slight modification. In the ultimatum game, there is a sum of money that has to be split and one player decides how it is shared. Unlike the dictator game, if the player who is receiving the money decides to not accept the amount, then both parties get nothing (Bland et al., 2017). In the prisoner's dilemma game, two parties have to make a decision to whether betray their partner (i.e.,

defect) or not (i.e., cooperate) in order to get a reward. Michailova and Buren (2017) hypothesized that in the dictator game, those in the money priming condition will be more likely to take more money for themselves and pass less money on to someone else. In the ultimatum game, they expected those in the experimental (money prime) condition to make less generous offers (i.e., the proposer), and also be willing to accept low offers (responder). In the prisoner's dilemma experiment, they speculated that there will be significantly lower levels of cooperation for those who have been primed with money. However, there have been contradictory results in the studies involving the effect of money priming in game theoretical models. Unlike Gąsiorowska and Hełka (2012), Michailova, and Buren (2017) did not find any significant results in the amount of money transferred in the dictator game, when participants were primed with subtle signs of money. There was also no difference in the level of cooperation in the prisoner's dilemma between the money prime condition and the neutral condition, nor any difference in the money transaction (i.e., offer and acceptance) between the experimental condition and the control condition in the ultimatum game. This study aims to gather more data on the effects of money priming within the framework of a game theoretical model, specifically, the prisoner's dilemma.

The Prisoner's Dilemma

The prisoner's dilemma falls under the category of cooperative and non-cooperative games in game theory. In the prisoner's dilemma, the outcome for the players (usually two players or collective agents) is determined by whether the players decide to cooperate or defect in their choices throughout the game. The classic theoretical scenario behind the prisoner's involves two people who have been caught and taken into police interrogation in different rooms. Both the prisoners are offered the same deal: betray the other person by testifying that the other person was

responsible for the crime, or chose to cooperate with the other person by remaining silent. If both the players chose to betray each other (i.e., defect), then they both get 2 years in prison. If both the players chose to remain silent (i.e., cooperate), then they both get 1 year in prison. If player A defects and player B cooperates, then player A gets no jail time and player B will serve 3 years in prison, and vice versa. Osiński, Karbowski, and Rusek (2017) have given each outcome for the players a point value, with 1 being the lowest (i.e., the least optimal outcome) and 4 being the highest (i.e., the most optimal outcome). The playoff matrix outlined by Osiński and colleagues (2017) in the prisoner's dilemma is shown in Figure 1.

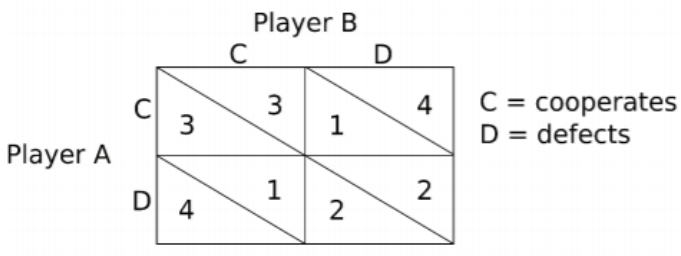


Figure 1: The playoff matrix in the prisoner's dilemma. (Osiński et al., 2017).

Although the mathematical and economic theory of classical games suggest that the most rational decision for a player in the standard one-shot prisoner's dilemma is defection, many people act irrationally and prefer to cooperate. The rational choice is defection because it theoretically has the highest probability of getting the maximum reward. If player 1 defects, and player 2 cooperates, then player one obtains the greatest available reward. Likewise, if player 2 adopts the same strategy they have a higher chance of obtaining the maximum reward. This is from the assumption that players are completely rational, and purely self-interested. However, a lot of the empirical data from psychological studies of the prisoner's dilemma indicate that people choose irrationally. A meta-analysis of 35 years of experiments from decision making, cooperation and prisoner's

dilemma showed that over half of the players chose to cooperate rather than defect, and therefore behaved irrationally in the context of the prisoner's dilemma (Sally, 1995).

There are numerous factors as to why people make irrational choices in the prisoner's dilemma. Kanazawa and Fontaine (2013) found that intelligence might influence the choice between cooperation and defection. More intelligent people are more likely to defect (i.e., choose more rationally) compared to less intelligent people. They also found that people were more likely to cooperate (i.e., behave less rationally) when they were shown a video of people while they were making a decision as compared to when they were not. Kiesler and Sproull (1996) studied cooperation between humans and computers using the prisoner's dilemma. The experimental data gathered showed that the highest levels of cooperation was between humans and humans and the lowest levels of cooperation was between human-like computers. In fact, the more humanistic a computer, defection was a more likely option among participants. Soutschek and Schubert, (2016) demonstrated that cognitive factors like working memory updating interfere with rational decision making, allowing greater levels of cooperation in the prisoner's dilemma. Therefore, there is evidence to suggest that there are several reasons (both internal factors and external factors) as to why people make an irrational choice in the prisoner's dilemma.

Personality and The Prisoner's Dilemma

Personality can also be considered to be another factor that may influence irrational behavior in the prisoner's dilemma, as it has been demonstrated to be a predictor of choice in prisoner's dilemma. Haesevoets, Folmer, Bostyn and Hiel (2018) found that people who scored high on the Social Value Orientation Scale (SVO) were more likely to cooperate than those who scored low on the SVO. This scale was used to measure behavior when allocating money in

hypothetical scenarios. People who had an increasing concern for others as measured by the SVO were also more likely to cooperate in the prisoner's dilemma. On the other end of the spectrum, those who possess the traits associated with the dark triad (i.e., subclinical psychopathy, narcissism, and Machiavellianism) were more likely to betray their partner (i.e., they had higher rates of defection) and act selfishly compared to those who did not score high in the dark triad (Deutchman, & Sullivan, 2018). The Big Five Personality model has also been utilized in predicting the outcomes in the prisoner's dilemma. The big five personality traits include openness to experience (a measure of open-mindedness), conscientiousness (a measure of self-discipline and organization), extraversion (a measure of assertiveness and outgoing tendencies), agreeableness (a measure of politeness and compassion), and neuroticism (a measure of stability and volatility) (McCrae, & Costa, 1987). Hirsh and Peterson (2009) gathered evidence that the withdrawal aspect of neuroticism and the enthusiasm aspect of extraversion were significant predictors of cooperation. However, when participants were instructed to partake in a non-hypothetical, incentivized prisoner's dilemma experiment, those with low neuroticism and high in openness to experience were more likely to cooperate (Lönnqvist, Verkasalo, & Walkowitz, 2010). Therefore, there are mixed results in terms of the relationship between personality and the prisoner's dilemma.

However, two personality traits stand out – neuroticism and agreeableness in terms of the personality literature and social dilemmas. Previous studies involving personality traits and social cooperation show that neuroticism has been correlated both positively and negatively, while agreeableness has been predominantly positively correlated with social cooperation (Schroeder, Nettle, & McElreath, 2015). Hirsh and Peterson (2009) postulate that those who score high in neuroticism will not want to face the possible repercussions from defecting and thus choose to

cooperate. Likewise, Skatova and Ferguson (2010) suggest that neuroticism is positively correlated with cooperation because they are less likely to defect on a partner when they could have repercussions in the future. However, some other researchers (Lu, &Argyle,1991) conjecture that those with neuroticism are more likely to defect because they have a lower concern for other's well-being. Therefore, due to the opposing evidence with a variety of explanations, the trait neuroticism should be investigated further. With regards to agreeableness, there seems to be more of a consensus regarding outcomes in social dilemmas, with those who are more agreeable tending to cooperate more (Schroeder, Nettle, & McElreath, 2015). Therefore, it would be beneficial to incorporate agreeableness as a factor when studying the relationship between a new experimental paradigm and personality.

Although a variety of personality traits and individual characteristics have been studied under social cooperation games such as the prisoner's dilemma, one factor has been absent in the literature – intolerance to uncertainty. This trait exemplifies the discomfort of unknown outcomes or feeling threatened when facing uncertainty (Dugas, Buhr, & Ladouceur, 2004; Jensen, Kind, Morrison, & Heimberg, 2014). Research shows that those who score high in this domain tend to be risk averse during risky decision-making (Jensen et al., 2014; Luhmann, Ishida, & Hajcak, 2011). The prisoner's dilemma can be placed in this domain, as there is huge uncertainty in terms of final payoffs for individuals due to the unpredictable choices made by each player. Therefore, incorporating this factor (intolerance of uncertainty) while studying the prisoner's dilemma may provide a more comprehensive picture regarding the choices made by people in this paradigm.

The purpose of the current study and hypotheses:

Vohs, Mead, and Goode (2006) demonstrated that priming individuals with the concept of money increases selfish behavior, and the propensity for individualistic thinking. Due to some of the inconsistencies in the effect of money priming, and the claim that money priming may be sensitive to the population (Caruso, Shapira, & Landy, 2017), an exploration of the influence of individual differences on money priming is needed. The prisoner's dilemma is one of the most studied game theoretical models that gives a framework for studying human social interactions and decision-making. There have been previous investigations on money priming in the context of the prisoner's dilemma, but the results are highly incongruous and more empirical data is needed to fully understand the relationship between money priming and rates of cooperation and defection. Because research suggests that individual factors such as personality can influence the rates of cooperation and defection in the prisoner's dilemma, it may prove to be helpful to incorporate such factors when studying the effects of money priming in game theoretical frameworks like the prisoner's dilemma. The purpose of the current study is to examine the effects of money priming and the influence of individual personality traits such as neuroticism and agreeableness in the outcomes of the prisoner's dilemma. The hypotheses for the current study are as follows:

Hypothesis 1: Participants in the money priming condition will have greater levels of defection than participants in the control condition regardless of personality trait.

Hypothesis 2: Those with higher levels of neuroticism will show greater levels of cooperation than those with lower levels of neuroticism regardless of condition.

Hypothesis 3: Those with higher levels of agreeableness will show greater levels of cooperation than those with lower levels of agreeableness regardless of condition.

Hypothesis 4: Intolerance of Uncertainty will be a significant predictor of outcomes in the prisoner's dilemma, with those scoring high on this trait being more likely to cooperate than defect.

Method

Design

The experiment formed a single factorial design with the type of prime (money vs. neutral) as the between subjects' factor and the rates of cooperation and defection as the dependent measure. Two of the the Big-Five personality traits (agreeableness and neuroticism) as well the trait intolerance to uncertainty were measured for direct and indirect effects.

Participants

Undergraduates from a small, liberal arts college in the southeastern United States participated in the study. Due to the multiple phases in the study, there was attrition of participants and varying numbers of participants in each phase. There was a total of 80 who undergraduates who participated in the intolerance of uncertainty measure, and a total of 60 undergraduates who participated in the Big-Five personality measure. For the decision-making portion of the study, there were a total of 35 participants. All the participants were sampled from the psychology research participation pool which consists of introductory psychology students as well as some upper-level classes. In exchange for their participation, they received extra credit or course credit, as determined by their instructor.

Materials and Tasks

Personality Measure

The Intolerance of Uncertainty Scale (IUS-12) (Carleton, Norton, & Asmundson, 2007) and the Big-Five inventory (BFI-44) (John & Srivastava, 1999) were used to assess the

participants' personality. The IUS-12 measures one's attitudes towards uncertainty and has been shown to be internally consistent (α = .85) (Carleton et al., 2007). The IUS-12 consists of 12 questions where participates rate the degree to which they agree with a given statement on a 5-point Likert scale (1= not characteristic of me at all, and 5 = entirely characteristic of me). The BFI-44 measures dimensions of personality such as openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism and each dimension has been shown to be internally reliable (α = .83) (John & Srivastava, 1999). This measure consists of 44 questions where participants rate themselves on a 5-point Likert scale. However, for this study, only the traits agreeableness and neuroticism were measured. The personality measures (i.e, IUS-12, BFI-44) are shown in Appendix A.

Money Priming and Control priming

Participants engaged in a descrambling task (Rohrer, Pashler, & Harris, 2015) utilized by Vohs and colleagues (2006). The aim of the descrambling task was to prime participants either with concepts related to money, or neutral, non-money concepts. Participants in both the money condition and the control condition were instructed to rearrange 30 sets of 5 words each to make a 4-word sentence. For example, in the money prime condition, the sentence was supposed to induce a prime of monetary objects for participants descrambling a sentence like "revenues our rising books are". The descrambled answer would be "our revenues are rising". In the neutral prime condition, the task was supposed to induce a prime of non-monetary objects for those descrambling a sentence such as "on printer grass she walked" to "she walked on grass". The descrambling task for both conditions was administered online through the SurveyMonkey website. The list of word sets used in both the money and control condition is shown in Appendix B.

Decision-making task: Prisoner's Dilemma

Participants completed a one-shot prisoner's dilemma scenario online through a SurveyMonkey link. The one-shot prisoner's dilemma in this study was similar to the one used by Kanazawa and Fontaine (2013). The prisoner's dilemma was explained to the participants in a way that outlined the rules and the hypothetical individual payoffs, but without disclosing that the decision-making task was the well-known prisoner's dilemma. That is, instead of using the traditionally used terms like cooperation and defection, this study utilized the colors red and green to serve as choices in place of cooperation and defection, just as Kanazawa and Fontaine (2013) did. Based on the payoff matrix, green served as an alternative term to cooperation, while red was defection. Participants were instructed to read a scenario where they are making a decision along with other people and that choices made by each agent can alter the hypothetical payoff amount for each person. The decision-making task utilized in the experiment is shown in Appendix C.

Procedure

The first part of the study involved the personality measures. The IUS-12 and the BFI-44 were administered concurrently a few weeks before the second part of the study which constituted the descrambling task and the decision-making task. Although in the BFI-44, only the traits neuroticism and agreeableness were measured, participants were instructed to finish the entire scale in order to preserve validity and consistency of the measure. Informed consent was received from all participants for both phases of the study (see Appendix D). After the personality data was collected, participants were randomly assigned to one of two conditions – the money priming condition or the neutral priming condition. Then, the participants in both conditions were sent a survey monkey link to participate in the second phase of the study. Depending on their assigned condition, participants first had to descramble either money-themed sentences (i.e., money prime

condition) or neutral-themed sentences (i.e., neutral priming). They typed the answer for each set of scrambled words in the space provided below the prompt. Immediately after the descrambling task, participants engaged in the decision-making task where they were given a hypothetical prisoner's dilemma scenario and asked to make a choice by picking a color – either green or red. After the online experimental session, they were debriefed on the purpose of the experiment and its protocols. The debriefing form can be found in Appendix E. A flowchart of the experimental procedure is shown in figure 2.

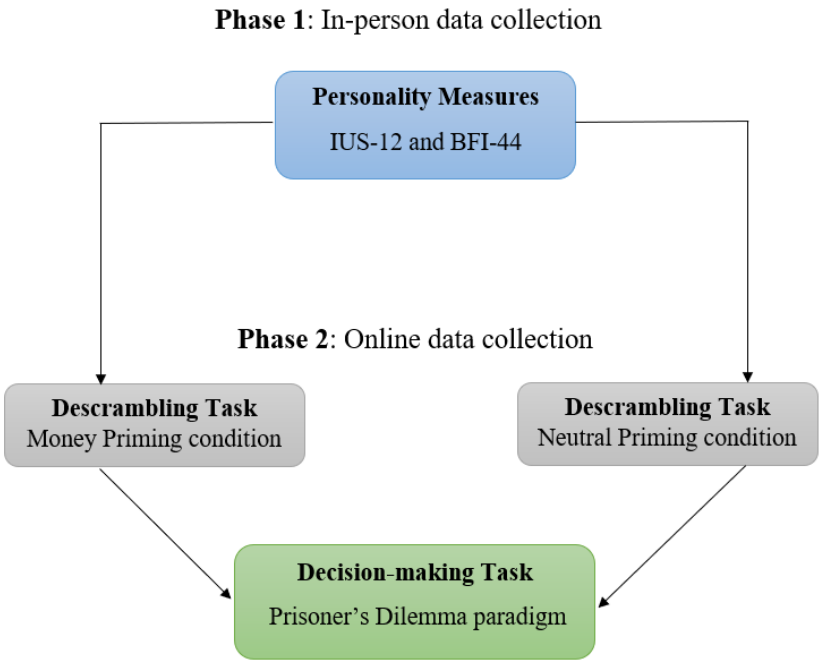


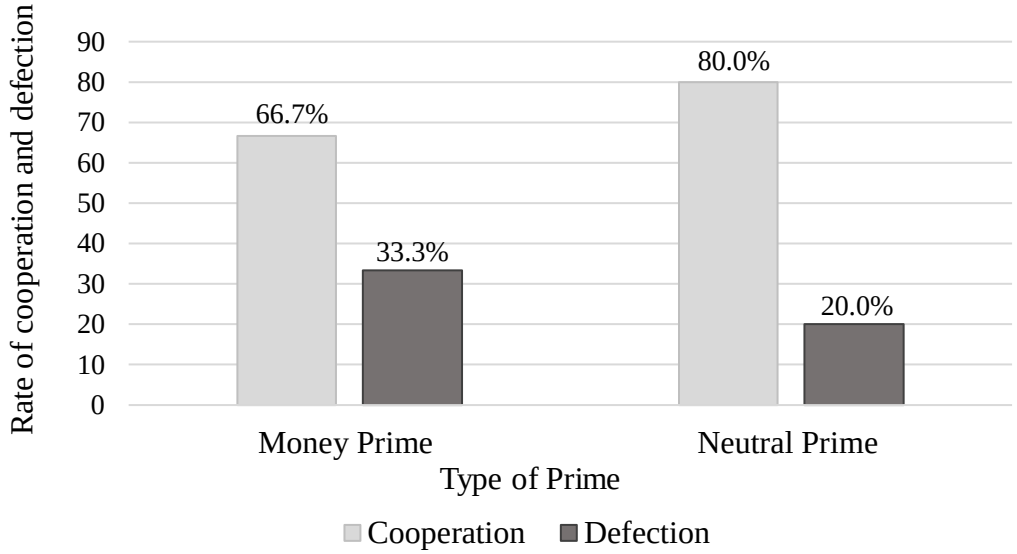
Figure 2: Flow chart of experimental procedure

Results

To determine whether there was a difference in rates of cooperation and defection as a function of the type of prime, a Chi-Square analysis was conducted. The type of prime (money, neutral) was the between-subjects independent variable, and the type of response (GREEN – cooperation, RED- defection) as the dependent measure. As shown in Figure 3, in the money prime

condition, the rate of defection was 33.3% and in the neutral prime condition, the rate of defection was 20.0%. Although the percentage of people that defected in the money prime condition was higher, the results from this analysis showed that there was no statistical difference in the rates of cooperation and defection as a function of the type of prime, $\chi^2(1) = 0.798$, $p < 0.372$.

Figure 3. Rates of cooperation and defection as a function of the type of prime



A binomial logistic regression was conducted to understand the effects of the type of prime along with personality variables (neuroticism, agreeableness) and intolerance to uncertainty on the rates of cooperation and defection. The covariates in this analysis were the self-rated scores on the BFI-44 that corresponded to the traits neuroticism and agreeableness, as well as participants' scores on the IUS-12. The categorical covariate was the type of prime (money, neutral) and the participants' response to the prisoner's dilemma task (cooperation, defection) was the dependent measure. The binomial logistic regression model was not significant, $\chi^2(4) = 5.20$, $p < 0.267$. The results from the regression supported the findings from the chi-square analysis, in which there was no significant effect of the type of prime on the rates of cooperation and defection ($p = 0.224$). In

addition, the big five personality traits of neuroticism (p = 0.949) and agreeableness (p = 0.107) were not significant predictors of rates of cooperation or defection. Neither were the scores on the IUS-12 (p = 0.303).

Discussion

Vohs and colleagues (2006) have shown that there is a large behavioral change (in terms of helpfulness, self-sufficiency, and tenacity) that is elicited when people are exposed to money or concepts of money. Due to the ubiquitous nature of money in everyday society, it may be important to understand the effects of money on people, their decisions, and what underlying psychological factors may strengthen or weaken that relationship. The aim of this study was to investigate the effect of money priming on outcomes in the prisoner's dilemma and to determine any relationship to the personality of individuals.

The first hypothesis in this study directly related to the self-sufficiency hypothesis (Vohs et al., 2006). It stated that those who were cognitively primed with money or monetary concepts (thro `ugh the money-prime descrambling task) would have lower rates of cooperation than those primed with neutral concepts (through the neutral prime descrambling task). The rationale behind this postulation was the empirical evidence showing that those are primed with monetary concepts would act more in self-interest than those primed with neutral concepts (Vohs, 2015). In a one-shot prisoner's dilemma, the rational option is to defect (i.e., betray your partner and having a greater chance of receiving a higher reward). This choice is considered to be aligned with rational self-interest rather than cooperation. However, there was no support for this hypothesis in the results obtained. Those in the money priming condition did not choose to defect at higher rates than those in the neutral priming condition.

In addition, the hypotheses regarding individual personality traits were not supported either. It was predicted that those with higher levels of neuroticism would defect more than those with lower levels of neuroticism, but that was not the case. Neither was the prediction that agreeableness would be a significant predictor of cooperation in the prisoner's dilemma. The trait intolerance of uncertainty also did not seem to have a significant relationship with the outcomes of the prisoner's dilemma. Unlike (insert source) who found that there were elements of the big five personality inventory (i.e., extraversion and cooperation) were predictors of cooperation, there was no evidence of the influence of personality on the outcomes in the prisoner's dilemma in this study.

A possible explanation for the self-sufficiency hypothesis not being supported by the data obtained in this study may be the format of the study itself. Because the study was conducted online, participants were able to do the descrambling task and the decision-making task in any setting where they had a connection to the internet. Therefore, it is highly possible that extraneous variables were present in both the priming phase and the decision-making portion of the study, thus affecting the outcomes of the experiment. The amount of time participants were exposed to their respective primes in the descrambling task could not be controlled, nor could potential interruptions during the experimental tasks. If this experiment was conducted purely in a laboratory setting with the proper controls, like previous studies on money priming (Vohs, 2015), then extraneous variables could have been minimized. It is crucial to find a balance between rigid controls and extraneous variables. When an experiment is controlled too thoroughly, the researcher risks creating an artificial environment where the manipulation does not work outside the lab. In other words, the experiment would lack external validity. On the other hand, if the researcher is too lenient with the controls, there could be confounds which affect the internal validity of the

experiment. When studying phenomena in psychology and other behavioral sciences, the tradeoff between internal and external validity is very important. Cognitive priming is no exception and it is vital to balance the tradeoff between internal and external validity.

A reason why the hypotheses regarding personality were not supported could be attributed to the methodology/materials utilized in the experiment. The personality measure for the big-five traits used in this study was the BFI-44, and did not take into account the subscales of each dimension like the big five inventories used by Hirsh and Peterson (2009). When Hirsh and Peterson (2009) conducted their study, they capitalized on the existence of the big-five subscales, allowing them to see exactly which dimension of neuroticism and extraversion contributed to differences in cooperation and defection. With the BFI-44 however, these subtleties cannot be parsed out. Thus, in our study, one component of neuroticism could have impacted decision-making outcomes in the prisoner's dilemma, while the other component had no impact. If this occurred, then both subscales would nullify the impact of each other when looking at the overall trait. Due to the inability to detect which trait components/subscales were significant contributors to differences in decision-making (limitation of the BFI-44), the overall trait was only analyzed and may not give the full picture.

Some other limitations of this study were the small sample size, not gender balanced and a limited age range. Research shows that the behavioral effects of cognitive priming are relatively small ($d = 0.35$) (Weingarten, Chen, McAdams, Yi, Hepler, & Albarracín, 2016). Due to the small effect size, a large sample size may be necessary to truly determine whether a prime was induced and if there would be behavioral changes as a result of the prime. In addition, the sample was largely female with a small age range. In order to better generalize the results, having a more representative sample would be beneficial.

Another limitation with this study was that individual money attitudes were not measured. There is evidence that money attitudes may play a factor in behavioral manifestations due to money priming (Gąsiorowska & Helka, 2012). Two common types of money attitudes – symbolic and instrumental were shown to have differing results when it came to game theoretical outcomes. Gąsiorowska and Helka (2012) described those having symbolic attitudes towards money as being more concerned with reputational attributes revolving monetary elements, while those with instrumental attitudes treated money as a means to an end and had a managerial approach. The researchers state that perhaps due to a deeper association and approach to money, those with symbolic attitudes transferred less amount of money to their partner compared to those with instrumental approaches to money. It is possible that due to a lack of pre-screen for money-attitudes, that these individual differences may have counteracted any intended priming manipulation and thus contributed to the null findings.

Future studies that are looking into the relationship between money-priming. Personality, and decision-making outcomes should aim to have a larger sample size, and incorporate individual differences in money attitudes into the experiment. In order to clearly elucidate the relationship between money priming and human decision-making and increase external validity, future researchers could aim to build a computational model with personality, various individual traits, and robust controls to predict outcomes not only in game theoretical scenarios, but also in the real world.

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Appendix A

Big Five Aspect Inventory

Here are a number of characteristics that may or may not describe you. For example, do you agree that you seldom feel blue, compared to most other people? Please fill in the number that best indicates the extent to which you agree or disagree with each statement listed below. Be as honest as possible, but rely on your initial feeling and do not think too much about each item.

Use the following scale:

1 - - - - - - - - 2 - - - - - - - - - 3 - - - - - - - - - 4 - - - - - - - - 5

Strongly Disagree	Neither Agree Nor Disagree	Strongly Agree

1. ___ Seldom feel blue.
2. ___ Am not interested in other people's problems.
3. ___ Carry out my plans.
4. ___ Make friends easily.
5. ___ Am quick to understand things.
6. ___ Get angry easily.
7. ___ Respect authority.
8. ___ Leave my belongings around.
9. ___ Take charge.
10. ___ Enjoy the beauty of nature.
11. ___ Am filled with doubts about things.
12. ___ Feel others' emotions.
13. ___ Waste my time.
14. ___ Am hard to get to know.
15. ___ Have difficulty understanding abstract ideas.
16. ___ Rarely get irritated.
17. ___ Believe that I am better than others.
18. ___ Like order.
19. ___ Have a strong personality.
20. ___ Believe in the importance of art.
21. ___ Feel comfortable with myself.
22. ___ Inquire about others' well-being.
23. ___ Find it difficult to get down to work.
24. ___ Keep others at a distance.
25. ___ Can handle a lot of information.
26. ___ Get upset easily.
27. ___ Hate to seem pushy.
28. ___ Keep things tidy.
29. ___ Lack the talent for influencing people.
30. ___ Love to reflect on things.
31. ___ Feel threatened easily.
32. ___ Can't be bothered with other's needs.
33. ___ Mess things up.
34. ___ Reveal little about myself.
35. ___ Like to solve complex problems.
36. ___ Keep my emotions under control.
37. ___ Take advantage of others.
38. ___ Follow a schedule.
39. ___ Know how to captivate people.
40. ___ Get deeply immersed in music.

41. ___ Rarely feel depressed.
42. ___ Sympathize with others' feelings.
43. ___ Finish what I start.
44. ___ Warm up quickly to others.
45. ___ Avoid philosophical discussions.
46. ___ Change my mood a lot.
47. ___ Avoid imposing my will on others.
48. ___ Am not bothered by messy people.
49. ___ Wait for others to lead the way.
50. ___ Do not like poetry.
and pictures.
51. ___ Worry about things.
52. ___ Am indifferent to the feelings of others.
53. ___ Don't put my mind on the task at hand.
54. ___ Rarely get caught up in the excitement.
55. ___ Avoid difficult reading material.
56. ___ Rarely lose my composure.
57. ___ Rarely put people under pressure.
58. ___ Want everything to be “just right.”
59. ___ See myself as a good leader.
60. ___ Seldom notice the emotional aspects of paintings
61. ___ Am easily discouraged.
62. ___ Take no time for others.
63. ___ Get things done quickly.
64. ___ Am not a very enthusiastic person.
65. ___ Have a rich vocabulary.
66. ___ Am a person whose moods go up and down easily.
67. ___ Insult people.
68. ___ Am not bothered by disorder.
69. ___ Can talk others into doing things.
70. ___ Need a creative outlet.
71. ___ Am not embarrassed easily.
72. ___ Take an interest in other people's lives.
73. ___ Always know what I am doing.
74. ___ Show my feelings when I'm happy.\
75. ___ Think quickly.
76. ___ Am not easily annoyed.
77. ___ Seek conflict.
78. ___ Dislike routine.
79. ___ Hold back my opinions.
80. ___ Seldom get lost in thought.
81. ___ Become overwhelmed by events.
82. ___ Don't have a soft side.
83. ___ Postpone decisions.
84. ___ Have a lot of fun.
85. ___ Learn things slowly.
86. ___ Get easily agitated.
87. ___ Love a good fight.
88. ___ See that rules are observed.
89. ___ Am the first to act.
90. ___ Seldom daydream.
91. ___ Am afraid of many things.
92. ___ Like to do things for others.
93. ___ Am easily distracted.
94. ___ Laugh a lot.
95. ___ Formulate ideas clearly.
96. ___ Can be stirred up easily.
97. ___ Am out for my own personal gain.
98. ___ Want every detail taken care of.
99. ___ Do not have an assertive personality.
100. ___ See beauty in things that others
might not notice.

Appendix B

Sentence Descrambling Task

Obtained from Rohrer, Pashler, & Harris (2015). Researchers stated that this task was utilized by Vohs, Mead, and Goode (2006).

Money Group	**Control Group**
1. you held pencil building the	1. you held pencil building the
2. ×received a raise blue she	2. on printer grass she walked
3. ×I a cashed pen check	3. took tight he a glass
4. to she music listened jump	4. to she music listened jump
5. metal I wrote letter the	5. metal I wrote letter the
6. ×has the capital line he	6. ski she to wanted many
7. ×received they large city profits	7. opens he door his top
8. we later will mountain swim	8. we later will mountain swim
9. ×revenues our rising book are	9. is green the sweater bottom
10. is green the sweater bottom	10. you coming are here purple
11. ×hundred bill one bottle dollar	11. camping ten went girls book
12. you coming are here purple	12. is hard he win studying
13. camping ten went girls book	13. bill the going sent we
14. ×won green the I lottery	14. sky went gray the is
15. ×he wealthy is cup very	15. meal she the calendar ate
16. is hard he win studying	16. again late worked watch we
17. ×secure I words financially am	17. gift he the helping gave
18. sky went gray the is	18. paper long going was the
19. ×pockets he deep blue has	19. is outside cold desk it
20. ×we cup afford can it	20. dishes we washed song the
21. again late worked watch we	21. room dark the city is
22. ×finances he manages mouse well	22. we coffee for went white
23. paper long going was the	23. walked the keyboard dog she
24. is outside cold desk it	24. exam was the grass challenging
25. ×liberally money she paperclip spends	25. up the stadium pick book
26. on printer grass she walked	26. was fun outside party the
27. ×job well pays the arrow	27. is making sun dinner who
28. took tight he a glass	28. read she paper the light
29. ×salary paying high desk a	29. deep the water number is
30. opens he door his top	30. volume turn the flower up

Appendix C

Informed Consent for Phase 1 (Personality Measure)

Informed Consent to Participate in Research

Information to Consider Before Taking Part in this Research Study

Project Title: Too Much on My Mind

Principal Investigator(s): Medhini Urs, Dr. Patrick Smith, Dr. Leilani Goodmon

PURPOSE OF THE STUDY: The purpose of this research is to investigate the relationship between money, personality and outcomes in a decision making scenario

STUDY PROCEDURES: You will complete a questionnaire about your personality

RISKS AND DISCOMFORTS: There are no more risks than those involved in everyday activities.

POTENTIAL BENEFITS: You will receive extra credit towards your grade for a course as determined by your course instructor. You will not directly benefit from participating in this study, however the results may help researchers better understand our personality. .

CONSENT: By signing this consent form, you agree that you understand the procedures and any risks and benefits involved in this research.

CONFIDENTIALITY: We must keep your study records confidential. Your privacy will be protected because you will not be identified by name as a participant in this project. This study requires you to create a unique codename that is known only to you. Your data will be assigned that codename and will be kept in a locked cabinet. No records will be kept with your name on them. The obtained information will be kept until the data collection is complete and will be shredded after completion. However, certain people may need to see your study records (including IRB officials). By law, anyone who looks at your records must keep them completely confidential.

VOLUNTARY PARTICIPATION / WITHDRAWAL: Your participation is completely voluntary and you are free to refuse to participate or to withdraw your consent to participate in this research at any time without penalty or prejudice.

QUESTIONS, CONCERNS, OR COMPLAINTS: If you have any questions, concerns or complaints about this study, please contact Medhini Urs at medhiniurs@gmail.com, or Dr. Patrick Smith at psmith@flsouthern.edu. For any further questions or clarifications, please contact the Chair of the Institutional Review Board at (863) 680-6205, or Vice President for Academic Affairs at (863) 680-4124.

Consent to Take Part in this Research Study

It is up to you to decide whether you want to take part in this study. If you want to take part, please sign the form, if the following statements are true.

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research.

_____ _____

Signature of Person Taking Part in the Study Date

_____

Printed Name of Person Taking Part in the Study

Appendix D

Informed Consent for Phase 2 (Decision Making)

Informed Consent to Participate in Research

Information to Consider Before Taking Part in this Research Study

Project Title: Too Much on My Mind

Principal Investigator(s): Medhini Urs, Dr. Patrick Smith, Dr. Leilani Goodmon

PURPOSE OF THE STUDY: The purpose of this research is to investigate the relationship between a descrambling task, personality and outcomes in a decision-making scenario

STUDY PROCEDURES: You will partake in a descrambling task, and be asked to make a decision in a given scenario

RISKS AND DISCOMFORTS: There are no more risks than those involved in everyday activities.

POTENTIAL BENEFITS: You will receive extra credit towards your grade for a course as determined by your course instructor. You will not directly benefit from participating in this study; however, the results may help researchers better understand our decision-making process.

CONSENT: By signing this consent form, you agree that you understand the procedures and any risks and benefits involved in this research.

CONFIDENTIALITY: We must keep your study records confidential. Your privacy will be protected because you will not be identified by name as a participant in this project. This study requires you to create a unique codename that is known only to you. Your data will be assigned that codename and will be kept in a locked cabinet. No records will be kept with your name on them. The obtained information will be kept until the data collection is complete and will be shredded after completion. However, certain people may need to see your study records (including IRB officials). By law, anyone who looks at your records must keep them completely confidential.

VOLUNTARY PARTICIPATION / WITHDRAWAL: Your participation is completely voluntary and you are free to refuse to participate or to withdraw your consent to participate in this research at any time without penalty or prejudice.

QUESTIONS, CONCERNS, OR COMPLAINTS: If you have any questions, concerns or complaints about this study, please contact Medhini Urs at medhiniurs@gmail.com, or Dr. Patrick Smith at psmith@flsouthern.edu. For any further questions or clarifications, please contact the Chair of the Institutional Review Board at (863) 680-6205, or Vice President for Academic Affairs at (863) 680-4124.

Consent to Take Part in this Research Study

It is up to you to decide whether you want to take part in this study. If you want to take part, please sign the form, if the following statements are true.

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research.

_____ _____

Signature of Person Taking Part in the Study Date

_____

Printed Name of Person Taking Part in the Study