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# Examining Moral Foundations and Thinking Styles

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Examining Moral Foundations and Thinking Styles

By

Megan Kuczma

This thesis is submitted in partial fulfillment of the requirements for Honors in the Discipline in  
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## Abstract

Intuition and moral beliefs are used unconsciously in every day decision making, with intuition being the main decision maker and moral foundations providing reasoning for a decision. Intuition refers to the gut feelings a person may have about a situation or decision. Moral foundations refer to themes of morality that individuals may rely on. Under varying circumstances, different moral beliefs may be more salient and important when making a judgement. Given the role that both of these play in everyday decision making, this study aimed to explore the relationship between the three types of intuition (holistic, inferential, and affective) and the five moral foundations (harm/care, fairness/cheating, loyalty/betrayal, authority/subversion, and sanctity/degradation) and how different thinking styles, namely analytic and intuitive thinking styles, would influence the moral foundations that are relied on when making moral decisions. It was hypothesized that the three types of intuition would be related to the sanctity/degradation moral foundation and that these relationships would be positive. Furthermore, it was expected that participants under cognitive load would rely more on individualizing moral values when making moral judgements. Results showed the strongest relationship between the harm/care moral foundation and affective intuition. Thinking styles did not affect the moral foundations that participants relied on when making moral decisions.

### Examining Moral Foundations and Thinking Styles

Making decisions is an important aspect of our lives. Some decisions require more overt consideration, such as determining what to eat for lunch that day, while other decisions are more covert, such as determining which food item to start eating first. Regardless of the nature of a decision, different cognitive processes are involved and personal beliefs can influence the final decision that is made. Personal beliefs elicit emotional responses within people that can affect their judgments. Moral foundations, deeply held beliefs associated with morality that influence judgements, are related to personal beliefs and may be relied on for decision making in different ways when in diverse situations (Haidt, 2012). Dual process theory is discussed here along with research on moral foundations and how they relate to intuition.

Different thinking styles, ways of thinking that vary based on the cognitive processes being used, may result in different decisions being made (Evans, 2010; Evans & Stanovich, 2013). Given that both thinking styles and moral beliefs affect people's decisions and judgements, it is possible that the two would be related. This could go beyond a simple relationship. Thinking styles may affect the different moral foundations people rely on when making judgements or decisions.

#### **Dual Process Theory**

The dual process theory states that there are two different cognitive processes, Type 1 and Type 2 (Evans, 2010; Evans & Stanovich, 2013). Type 1 processing is automatic and quick, and often occurs without conscious awareness. This type of processing does not require working memory and is able to handle a higher capacity of information. Type 2 processing, on the other hand, is a much slower and analytical type of processing, and requires conscious effort. This processing style requires working memory and cannot handle a large capacity of information. Given this requirement of working memory for analytical processing, it is clear that individuals who are put under a

cognitive load would be forced to rely more on Type 1 processing because they would not have the cognitive resources that are necessary to complete Type 2 processing.

**Intuition.** Intuition is understood to be a form of Type 1, automatic processing (Evans, 2010). Numerous definitions of intuition have been proposed over the years (Abernathy & Hamm, 1995) and it has been noted that most of these definitions explain intuition in terms of what it is not rather than what it is (Epstein, 2010). Pretz et al. (2014) overcame this trend by identifying intuition as an initial gut reaction or the immediate feelings people have about the decision options that are present in a given situation. This intuitive knowledge comes about unconsciously and people are not able to recognize where this knowledge originates from (Epstein, 2010).

**Types of Intuition.** Intuition can further be defined in terms of different types of intuition. Pretz and Totz (2007) identified three unique types of intuition: holistic intuition, inferential intuition, and affective intuition. Holistic intuition is defined as non-analytic judgements that are made based on the holistic integration of various information and cues. These judgements are not obvious in nature. Inferential intuition is defined as a process that was once analytic but has become automatic in nature as a result of practice. This process is based on inferences that have been made. Finally, affective intuition is defined as emotionally driven judgements based on a person's emotional reaction to a given situation.

**Analytical Thinking.** Analytical thinking is a form of Type 2 processing that involves thinking through intuitive decisions and possibly overriding those thoughts or decisions (Pennycook, Fugelsang, & Koehler, 2015). This style of thinking is slower and more deliberate, and involves more cognitive resources. A similar term, cognitive reflection, has been used to refer to this thinking style as well. Frederick (2005) defines cognitive reflection as the ability to move past initial thoughts and refrain from responding to a question or problem with the first response that comes to mind.

This is often measured through the use of the Cognitive Reflection Task in which correct answers to three questions can only be arrived at through analytical thinking and Type 2 processing.

### **Moral Foundations**

Moral foundations are deep-set beliefs that people hold and can influence people's judgements and decision making. Haidt (2012) identified five moral foundations: harm/care, fairness/cheating, loyalty/betrayal, authority/subversion, and sanctity/degradation. The harm/care moral foundation reflects a person's sensitivity towards cruelty and harm. The fairness/cheating moral foundation is driven by whether or not someone thinks another person will be good to work and collaborate with. The loyalty/betrayal moral foundation focuses on a person's assessment of the extent to which others will be a team player and support their own in-group. The authority/subversion moral foundation refers to a person's assessment of ranks and positions of authority and acting appropriately according to those ranks or positions. Finally, the sanctity/degradation moral foundation reflects beliefs that some acts are disgusting and unnatural and are, therefore, immoral. These sanctity/degradation beliefs regarding purity help bind people together.

Pennycook et al. (2015) categorized the five moral foundations into two different groupings. Individualizing moral values include the harm/care and fairness/cheating moral foundations whereas binding moral values include the loyalty/betrayal, authority/subversion, and sanctity/degradation moral foundations. These moral foundations can be used to explain how various cultures have different views and reliance on morality (Haidt & Joseph, 2004), and the moral foundations that people rely on the most are different for people of varying political backgrounds (Graham, Haidt, & Nosek, 2008). Liberals depends mostly on individualizing moral values whereas conservatives

depend mostly on binding moral values (Graham, Haidt, & Nosek, 2008; Haidt & Graham, 2007; Pennycook et al., 2015).

### **Moral Foundations and Intuition**

The five moral foundations are closely related to intuition with certain relationships being stronger than the others. Pennycook, Cheyne, Barr, Koehler, and Fugelsang (2014) noted a negative relationship between binding moral values, namely the loyalty/betrayal, authority/subversion, and sanctity/degradation moral foundations. Some researchers have gone beyond looking at simple relationships and have examined the effects that thinking styles may have on moral judgements. Tinghög et al. (2016) asked participants to respond to moral judgement scenarios while under cognitive load, inducing an intuitive thinking style. They noted that an intuitive thinking style did not influence participants' responses on the moral judgement scenarios. Greene, Morelli, Lowenberg, Nystrom, and Cohen (2008) conducted a similar study in which participants under cognitive load responded to high-conflict moral dilemmas. However, in contrast to the findings of Tinghög et al. (2016), Greene et al. (2008) noted that cognitive load increased participants' response times to utilitarian moral judgements, demonstrating that cognitive load can interfere with moral judgements. Similarly, Björklund (2003) observed that participants under a time constraint, and thereby using a more intuitive thinking style, used more justice-oriented reasoning for moral decisions. These studies indicate that thinking styles may have an effect on moral judgements, but it is not clear exactly what that effect is or how strong it may be.

Haidt (2012) argues that, when making moral decisions, intuition is the first step in the decision process and a person's moral beliefs are used to later justify the judgments or decisions the person initially made. He found this pattern to be the strongest when feelings of disrespect and disgust were involved. This relationship is not necessarily one way, though. It has been shown that

morality can affect intuition. People who were primed to have an unconscious moral identity reported decreased beliefs in the ethicality of the business field (Leavitt, Zhu, & Aquino, 2016). Furthermore, these subtle priming cues were sufficient to change the intuitions people had about business. Other authors have noted how specific moral foundations may influence intuitions. Schnall and Cannon (2012) suggested that people's moral feelings of disgust influence the way they perceive others' characters. Physiologically, they noted that, when people are morally offended by a situation or decision, the situation or decisions can elicit an immediate emotional response which can later affect their judgements. Two studies were conducted in response to this literature. The first study looked simply at the relationship between moral foundations and types of intuition. The second study examined how different thinking styles may influence the moral foundations that people rely on when making decisions.

### **Study 1**

Given the role that both intuition and moral foundations can play in making judgements and how morality can influence intuition, it is important to examine the relationship between moral foundations and types of intuition. Currently, no studies have looked specifically at this relationship. As such, this study aimed to inspect the relationship between moral foundations and types of intuition. It was hypothesized that the sanctity/degradation moral foundation would be related to the three types of intuition and that these relationships would be positive.

#### **Participants**

91 undergraduate students at Elizabethtown College participated in this study. Participants were between the ages of 18 and 22 years ( $M=19.81$ ,  $SD=1.18$ ) and 70.89% were female. Students who were enrolled in a General Psychology course received 0.5 credit hours for participating in this study.



## Materials

**Moral Foundations Questionnaire.** The Moral Foundations Questionnaire (Graham, Haidt, & Nosek, 2008; see Appendix A) consisted of 32 different statements that participants were asked to rate. These statements assessed how much each participant relied on the five moral foundations: harm/care (“Whether or not someone suffered emotionally”), fairness/cheating (“Whether or not some people were treated differently than others”), loyalty/betrayal (“Whether or not someone’s action showed love for his or her country”), authority/subversion (“Whether or not someone showed a lack of respect for authority”), and sanctity/degradation (“Whether or not someone violated standards of purity and decency”). The first 16 statements were to be rated on a scale from 0 (not at all relevant) to 5 (extremely relevant) based on how much participants consider these statements when thinking and making decisions. The final 16 statements were to be rated based on how much participants agree with the statements on a scale from 0 (strongly disagree) to 5 (strongly agree). The sums of the items on the different subscales were computed. Higher scores on the different moral foundations subscales indicated more reliance on those particular foundations.

**Types of Intuition Scale.** The Types of Intuition Scale (Pretz et al., 2014; see Appendix B) consisted of 23 statements that assessed how much participants relied on holistic intuition (“When tackling a new project, I concentrate on big ideas rather than the details”), inferential intuition (“I trust my intuitions, especially in familiar situations”), and affective intuition (“I prefer to use my emotional hunches to deal with a problem, rather than thinking about it”) when making judgements. Participants were asked to rate each statement on a scale from 1 (definitely false) to 5 (definitely true) based on how true the statement is of themselves when they are making decisions or judgements. The sum of the items for each subscale were calculated. Higher scores on the different types of intuition subscales indicated more reliance on that particular type of intuition.

## Procedure

Participants read and signed a consent form prior to beginning the study. Participants then completed the Moral Foundations Questionnaire (Graham, Haidt, & Nosek, 2008) and the Types of Intuition Scale (Pretz et al., 2014). Finally, participants completed demographic information regarding age, gender, and major of study.

## Results

Descriptive statistics and correlations are reported in Table 1. Pearson Correlations were computed for the five moral foundations and three types of intuition. All five moral foundations were significantly positively correlated with each other with the exception of the fairness/cheating and sanctity/degradation foundations which were not significantly correlated with one another. Within the types of intuition, only holistic and inferential intuition were significantly related ( $r=.33$ ,  $p=.003$ ). It was hypothesized that the types of intuition and the sanctity/degradation moral foundation would be positively correlated. This hypothesis was partially supported. Affective intuition was not significantly correlated with the sanctity/degradation foundation ( $r=.15$ ,  $p=.2$ ). However, the sanctity/degradation foundation was significantly negatively correlated with both holistic intuition ( $r=-.23$ ,  $p=.044$ ) and inferential intuition ( $r=-.24$ ,  $p=.031$ ). Contrary to the hypothesis, these relationships were not positive. The harm/care foundation was positively correlated with affective intuition ( $r=.45$ ,  $p<.001$ ) while the fairness/cheating foundation was positively correlated with inferential intuition ( $r=.31$ ,  $p=.006$ ).

Multiple regression analyses were conducted to test the predictive abilities of the types of intuition on the different moral foundations and of the moral foundations on the different types of intuition (see Table 2). In line with the correlations, the sanctity/degradation foundation was an almost significant predictor of holistic intuition ( $\beta=-.27$ ,  $p=.056$ ) and was a significant predictor of

inferential intuition ( $\beta=-.28, p=.039$ ), but was not a significant predictor of affective intuition ( $\beta=.11, p=.411$ ). However, neither holistic intuition ( $\beta=-.20, p=.092$ ) nor inferential intuition ( $\beta=-.18, p=.128$ ) were significant predictors of the sanctity/degradation foundation. Further in line with the correlations, affective intuition was a significant predictor of the harm/care foundation ( $\beta=.46, p<.001$ ) and the harm/care foundation was a significant predictor of affective intuition ( $\beta=.63, p<.001$ ). Finally, and again in line with the correlations, inferential intuition was a significant predictor of the fairness/cheating foundation ( $\beta=.35, p=.002$ ) and the fairness/cheating foundation was an almost significant predictor of inferential intuition ( $\beta=.29, p=.051$ ).

### Discussion

Overall, there were few significant relationships between the moral foundations and types of intuition. The strongest relationship seems to have been between the harm/care foundation and affective intuition. This is understandable given that affective intuition focuses on a person's emotional response and the harm/care foundation refers to how people react to suffering and cruelty (Haidt, 2012; Pretz & Totz, 2007). People who are in tune with their emotions may have stronger emotional reactions when viewing or thinking about someone suffering. Given that liberals rely heavily on the care/harm foundation, it would be interesting to see if people with liberal beliefs rely more on affective intuition than holistic and inferential intuition (Graham, Haidt, & Nosek, 2008; Haidt & Graham, 2007).

The hypothesis that the types of intuition would be related to the sanctity/degradation moral foundation and that these relationships would be positive was partially supported. There was no significant relationship between affective intuition and the sanctity/degradation foundation. The sanctity/degradation foundation was significantly correlated with holistic and inferential intuition, but both of these relationships were negative. Given Haidt's (2012) argument that intuitions come

first and moral reasoning is used second to explain a person's judgement, these findings suggests that individuals who rely more on holistic and inferential types of intuition do not rely on the sanctity/degradation moral foundation as heavily and do not use the sanctity/degradation foundation to explain their decisions and judgements. These negative relationships can be explained by the fact that holistic and inferential intuition rely more on cognitive processes rather than emotional processes, while the sanctity/degradation moral foundation relies heavily on emotions.

The moral foundations were best at predicting affective intuition, although this seems to have been caused by affective intuition's strong relationship with the harm/care foundation. No other foundation was a significant predictor of affective intuition. Similarly, the types of intuition were best at predicting the harm/care foundation, again with affective intuition being the only significant predictor. None of the types of intuition were significant predictors of the loyalty/betrayal, authority/subversion, or sanctity/degradation foundations. Only inferential intuition was a significant predictor of the fairness/cheating foundation. This can be explained by the fact that both inferential intuition and deciding whether or not a person would be good to collaborate with involve cognitive processes rather than emotional processes.

Given that this study was part of a larger survey, it is possible that participants experienced fatigue and did not spend much time on each question, or may have been primed by a previous questionnaire. As such, future research should examine these variables in a separate study and should counterbalance which questionnaire is completed first. This study was conducted using a largely American population. Given that moral foundations differ across countries and cultures (Haidt & Joseph, 2004), different results may be found if other countries and cultures were examined. Perhaps future studies could look at how types of intuition differ across cultures and whether or not that difference affects the relationships between the moral foundations and the types

of intuition. Future research should also further examine the relationship between the harm/care foundation and affective intuition to determine if there are any mediating factors. Finally, this study was based on correlational data and did not involve any manipulation. This was taken into account when conducting Study 2.

## **Study 2**

Study 1 showed some significant relationships between moral foundations and intuition. Different thinking styles, ways of thinking that vary based on the cognitive processes being used, may result in different decisions being made (Evans, 2010; Evans & Stanovich, 2013). The current study aimed to examine the effects that intuitive and analytic thinking styles may have on the moral foundations that people rely on when making decisions. Thus far, no work has been done regarding how people's reliance on different moral foundations may change depending on the thinking style they are using. It is expected that the results reported in Study 1 noting a positive relationship between affective intuition and the harm/care moral foundation will be replicated in this study (Hypothesis 1). Furthermore, negative relationships between scores on the Cognitive Reflection Task (Frederick, 2005) and the binding moral foundations (loyalty/betrayal, authority/subversion, and sanctity/degradation) are expected, replicating the results discussed by Pennycook et al. (2014; Hypothesis 2). Given that the harm/care moral foundation is considered to be an individualizing moral value (Pennycook et al., 2015), it is predicted that people who are using an intuitive thinking style will rely more on individualizing moral values rather than binding moral values (Hypothesis 3). Finally, it is predicted that people who are induced with an analytic thinking style will not differ in their pre- and posttest moral foundations scores, but that people who are induced with an intuitive thinking style will have scores that shift more towards individualizing moral values in their posttest moral foundations scores as compared to their pretest moral foundations scores (Hypothesis 4).

## Methods

### Participants

Thirty-four undergraduate students between the ages of 18 and 21 ( $M=19.09$ ,  $SD=.996$ , 85.3% female) at Elizabethtown College participated in this study. Participants received 0.5 credit hours towards their General Psychology course for their participation.

### Materials

The Moral Foundations Questionnaire (Graham, Haidt, & Nosek, 2008) and the Types of Intuition Scale (Pretz et al., 2014) administered in Study 1 were used again in Study 2.

**Cognitive Reflection Task.** The Cognitive Reflection Task (Frederick, 2005; see Appendix C) assessed how well participants were able to cognitively reflect on a problem and refrain from giving their first, intuitive answer on three word problems. These short word problems involved some simple mathematical calculations and had an obvious, but incorrect, intuitive response (“A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?”). Correct responses were obtained through analytical thinking. Participants received a point for each question they answered correctly. If participants remembered the answer from prior experience, that question was omitted from their score. A higher percentage of unfamiliar answers participants got correct indicated more cognitive reflection and analytical thinking.

**Moral Scenarios.** The three moral scenarios (see Appendix D) incorporated both an individualizing and binding moral foundation in each scenario (“Imagine that you are in the Army. Your commanding officer tells you that you must leave an injured soldier behind in order to make it to your next destination on time. You know that this soldier is suffering and will likely die without any medical assistance. You decide to...”). Two possible responses to the scenario, one response representing an individualizing moral foundation action (“help the injured soldier”) and the other

response representing a binding moral foundation action (“follow the orders from your commanding officer”), were placed on either end of a four-point sliding scale. Participants were asked to move the scale to represent how they would behave in that scenario. Higher scores indicated a tendency to act based on individualizing moral values.

### **Procedure**

Participants completed this study on a computer and were randomly assigned to either a control (analytic) or cognitive load (intuitive) condition. Participants first completed the Moral Foundations Questionnaire (Graham, Haidt, & Nosek, 2008), the Types of Intuition Scale ((Pretz et al., 2014), and the Cognitive Reflection Task (Frederick, 2005). Participants were asked to alert the researcher after finishing these tasks and before moving on to the next task, completing the moral scenarios and the Moral Foundations Questionnaire for a second time. The participants assigned to the intuitive condition completed the rest of the tasks and questionnaires under cognitive load, thereby inducing intuitive thinking. Cognitive load was induced by asking participants to listen to a recording of random numbers being spoken and make a tally mark for every prime number that was said. The participants assigned to the analytic condition completed the rest of the tasks and questionnaires under the same conditions they had completed the first part of the study, allowing them the cognitive freedom to think about their answers. Finally, participants reported demographic information, including age and gender, and were thanked for their participation.

### **Results**

Descriptive statistics and correlations of the measures are reported in Table 3. Cronbach’s alpha was computed for all of the variables. The six-item harm/care pretest moral foundation subscale ( $\alpha=.620$ ), six-item fairness/cheating pretest moral foundation subscale ( $\alpha=.684$ ), six item loyalty/betrayal pretest moral foundation subscale ( $\alpha=.549$ ), six-item authority/subversion pretest

moral foundation subscale ( $\alpha=.615$ ), and six-item sanctity/degradation pretest moral foundation subscale ( $\alpha=.691$ ) were all not reliable. The seven-item holistic intuition subscale ( $\alpha=.565$ ) and eight-item inferential intuition subscale ( $\alpha=.659$ ) were not reliable. However, the eight-item affective intuition subscale ( $\alpha=.736$ ) was reliable. The six-item harm/care posttest moral foundation subscale ( $\alpha=.728$ ), six-item loyalty/betrayal posttest moral foundation subscale ( $\alpha=.728$ ), six-item authority/subversion posttest moral foundation subscale ( $\alpha=.749$ ), and six-item sanctity/degradation posttest moral foundation subscale ( $\alpha=.775$ ) were all reliable. However, the six-item fairness/cheating posttest moral foundation subscale ( $\alpha=.578$ ) was not reliable. Given the lack of reliability of some of the measures, the results of this study should be considered with caution.

Pearson's  $r$  correlations were computed for the five moral foundations pretest, the three types of intuition, and cognitive reflection. Contrary to Hypothesis 1, affective intuition was not correlated with the harm/care moral foundation ( $r=-.167, p=.344$ ). Furthermore, cognitive reflection scores were not significantly correlated with the loyalty/betrayal ( $r=-.133, p=.536$ ), authority/subversion ( $r=-.172, p=.422$ ), and sanctity/degradation ( $r=-.108, p=.616$ ) moral foundations, contrasting Hypothesis 2.

It was hypothesized that participants under a cognitive load and therefore using an intuitive thinking style would rely on individualizing moral foundations (Hypothesis 3). An independent samples  $t$ -test was conducted to compare moral scenario scores in the control condition and under cognitive load. Differing from Hypothesis 3, there was not a significant difference in moral scenario scores between participants in the control condition ( $M=9.177, SD=.951$ ) and participants under cognitive load ( $M=9.765, SD=1.393; t(32)=1.438, p=.160$ ). Participants in the control condition relied on individualizing moral foundations as much as participants under cognitive load.



Factorial ANOVAs on moral foundations are reported in Table 4. It was hypothesized that participants' moral foundations scores would not change from pre- to posttest when they were using an analytic thinking style, but participants' pre- and posttest scores would shift towards individualizing moral foundations when they were under cognitive load and thereby using an intuitive thinking style (Hypothesis 4). A 2 (pretest vs. posttest) X 2 (control vs. cognitive load) factorial ANOVA was conducted to compare the main effects of time of test and condition and the interaction effect between time of test and condition on harm/care moral foundation scores. Both main effects were not significant (all  $ps > .05$ ). The interaction effect between time of test and condition was also not significant ( $A = .996$ ,  $F(1, 32) = .126$ ,  $p = .725$ ), not confirming Hypothesis 4. A 2 (pretest vs. posttest) X 2 (control vs. cognitive load) factorial ANOVA was conducted to compare the main effects of time of test and condition and the interaction effect between time of test and condition on fairness/cheating moral foundation scores. Both main effects were not significant (all  $ps > .05$ ). The interaction effect between time of test and condition was also not significant ( $A = .952$ ,  $F(1, 32) = 1.622$ ,  $p = .212$ ), contrasting Hypothesis 4.

A 2 (pretest vs. posttest) X 2 (control vs. cognitive load) factorial ANOVA was conducted to compare the main effects of time of test and condition and the interaction effect between time of test and condition on loyalty/betrayal moral foundation scores. The main effect of time was significant ( $A = .795$ ,  $F(1, 32) = 8.244$ ,  $p = .007$ ), indicating that pretest loyalty/betrayal moral foundation scores ( $M = 15.441$ ,  $SD = 3.807$ ) were significantly higher than posttest scores ( $M = 14.118$ ,  $SD = 5.080$ ). The main effect of condition was not significant ( $F(1, 32) = .329$ ,  $p = .570$ ). The interaction effect between time of test and condition was also not significant ( $A = .999$ ,  $F(1, 32) = .037$ ,  $p = .849$ ), not supporting Hypothesis 4. A 2 (pretest vs. posttest) X 2 (control vs. cognitive load) factorial ANOVA was conducted to compare the main effects of time of test and condition and the interaction effect

between time of test and condition on authority/subversion moral foundation scores. The main effect of time was significant ( $\lambda=.815$ ,  $F(1, 32)=7.248$ ,  $p=.011$ ), indicating that pretest authority/subversion moral foundation scores ( $M=15.824$ ,  $SD=3.966$ ) were significantly higher than posttest scores ( $M=14.824$ ,  $SD=4.988$ ). The main effect of condition was not significant ( $F(1, 32)=.386$ ,  $p=.539$ ). The interaction effect between time of test and condition was also not significant ( $\lambda=.988$ ,  $F(1, 32)=.401$ ,  $p=.531$ ), not confirming Hypothesis 4. Finally, a 2 (pretest vs. posttest) X 2 (control vs. cognitive load) factorial ANOVA was conducted to compare the main effects of time of test and condition and the interaction effect between time of test and condition on sanctity/degradation moral foundation scores. The main effect of time was significant ( $\lambda=.765$ ,  $F(1, 32)=9.815$ ,  $p=.004$ ), indicating that pretest sanctity/degradation moral foundation scores ( $M=13.559$ ,  $SD=4.627$ ) were significantly higher than posttest scores ( $M=12.441$ ,  $SD=5.264$ ). The main effect of condition was not significant ( $F(1, 32)=.005$ ,  $p=.945$ ). The interaction effect between time of test and condition was also not significant ( $\lambda=.992$ ,  $F(1, 32)=.245$ ,  $p=.624$ ), contrasting Hypothesis 4.

### Discussion

The aim of this study was to examine the effects that intuitive and analytic thinking styles have on moral foundations. Hypothesis 1 and Hypothesis 2, which predicted a positive relationship between affective intuition and the harm/care moral foundation and negative relationships between cognitive reflection scores and the pretest loyalty/betrayal, authority/subversion, and sanctity/degradation moral foundations respectively, were not confirmed. None of these predicted relationships were significant. These results contrast the relationships previously noted in Study 1 and by Pennycook et al. (2014). Given that the previous authors had larger sample sizes than was obtained in this study, it is possible that the results of the current study were limited by the small

sample size. A larger sample size in the present study may have yielded the predicted results in relation to the first two hypotheses.

The third hypothesis, predicting that participants under cognitive load would rely more on individualizing moral foundations than participants not under cognitive load, was also not confirmed. While the behavioral moral scenarios measure was a strength of the study, perhaps the cognitive load task did not correctly induce intuitive thinking, thereby limiting participants' reliance on individualizing moral values when responding to the moral scenarios. These results have implications suggesting that people will make the same moral decisions regardless of the style of thinking they are using and the cognitive load they are facing.

Finally, the fourth hypothesis, expecting that participants in the control group would not differ in their pre- and posttest moral foundations scores but that participants under cognitive load would have scores that shift more towards individualizing moral values in their posttest moral foundations scores as compared to their pretest moral foundations scores was not confirmed. This observation offers some support for the results noted by Tinghög et al. (2016) that intuitive thinking styles did not influence moral judgements. Furthermore, these results contrast those noted by Greene et al. (2008) and Björklund (2003) which indicated that cognitive load and time restraints have an effect on moral judgements and moral reasoning. Manipulation checks were not used in this study, presenting a limitation. Although attempting to induce a specific thinking style is a strength of this study, it is conceivable that the cognitive load placed on participants in this study was not enough to induce a truly intuitive thinking style. It is also possible that the moral scenarios induced a different, unintended thinking style and caused participants to rely on different moral foundation. Future research should experiment with other methods of inducing cognitive load and include manipulation checks to ensure that the cognitive load had the desired effect.

Unexpectedly, it was noted that participants had higher scores on the pretest loyalty/betrayal, authority/subversion, and sanctity/degradation moral foundations subscales compared to the posttest subscales. These results have implications that reliance on binding moral values may decrease over time. It is plausible that participants recognized the questions on the posttest from the pretest and, as a result, did not spend as much time or effort answering the posttest questions. Future research should attempt to control for this recognition by changing the order in which the posttest questions are presented, thereby reducing the likelihood that participants could answer from memory and requiring participants to pay attention to each question.

Finally, the three types of intuition were not related to any of the five moral foundations. This observation may have implications relating to Haidt's (2012) idea that intuition comes first and moral beliefs are later used as reasoning for a decision. Perhaps the types of intuition people rely on most do not influence the moral beliefs they use to justify their decisions. Future research should attempt to induce specific types of intuition (holistic, inferential, and affective) and measure which moral foundations are relied on the most when people are using these different types of intuition. Overall, intuition was not related to moral beliefs and different thinking styles did not appear to influence the moral foundations that people rely on when making decisions. Going forward, researchers should examine these conclusions further using different techniques and measures as these results could have applications for the type of environments critical decisions, such as decisions of war or decisions affecting an entire country, are made.

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Table 1

Descriptive statistics and correlations for Study 1.

Measure	M	SD	1	2	3	4	5	6	7	8
1. Harm/Care Foundation	20.571	4.778	–	.91	.91	.91	.91	.80	.80	.80
2. Fairness/Cheating Foundation	19.978	4.377	.774**	–	.91	.91	.91	.80	.80	.80
3. Loyalty/Betrayal Foundation	15.242	5.355	.500**	.407**	–	.91	.91	.80	.80	.80
4. Authority/Subversion Foundation	15.758	5.280	.334**	.288**	.733**	–	.91	.80	.80	.80
5. Sanctity/Degradation Foundation	13.835	5.556	.306**	.164	.610**	.630**	–	.80	.80	.80
6. Holistic Intuition	3.053	.521	.096	.016	-.031	-.172	-.226*	–	.80	.80
7. Inferential Intuition	3.913	.375	.160	.307**	.071	-.104	-.242*	.325**	–	.80
8. Affective Intuition	3.028	.705	.452**	.191	.081	.081	.145	.165	-.005	–

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).

Table 2

Predicting Moral Foundations and Types of Intuition.

	Predictor	$\beta$	t-value	Significance
Harm/Care Foundation $R^2=.232$	Holistic Intuition	-.036	-.333	.740
	Inferential Intuition	.174	1.630	.107
	Affective Intuition	<b>.459</b>	4.490	.000
Fairness/Cheating Foundation $R^2=.147$	Holistic Intuition	-.134	-1.176	.243
	Inferential Intuition	<b>.351</b>	3.129	.002
	Affective Intuition	<b>.215</b>	1.996	.049
Loyalty/Betrayal Foundation $R^2=.017$	Holistic Intuition	-.078	-.638	.525
	Inferential Intuition	.097	.801	.425
	Affective Intuition	.095	.818	.416
Authority/Subversion Foundation $R^2=.044$	Holistic Intuition	-.176	-1.457	.149
	Inferential Intuition	-.046	-.391	.697
	Affective Intuition	.110	.968	.336
Sanctity/Degradation Foundation $R^2=.113$	Holistic Intuition	-.198	-1.707	.092
	Inferential Intuition	-.176	-1.540	.128
	Affective Intuition	.177	1.610	.111
Holistic Intuition $R^2=.095$	Harm/Care Foundation	.178	1.126	.264
	Fairness/Cheating Foundation	-.166	-1.070	.288
	Loyalty/Betrayal Foundation	.183	1.143	.257
	Authority/Subversion Foundation	-.142	-.909	.366
	Sanctity/Degradation Foundation	-.273	-1.938	.056
Inferential Intuition $R^2=.174$	Harm/Care Foundation	-.091	-.602	.549
	Fairness/Cheating Foundation	.293	1.982	.051
	Loyalty/Betrayal Foundation	.266	1.739	.086
	Authority/Subversion Foundation	-.115	-.767	.445
	Sanctity/Degradation Foundation	<b>-.283</b>	-2.102	.039
Affective Intuition $R^2=.260$	Harm/Care Foundation	<b>.631</b>	4.406	.000
	Fairness/Cheating Foundation	-.185	-1.320	.191
	Loyalty/Betrayal Foundation	-.221	-1.527	.131
	Authority/Subversion Foundation	.164	1.156	.251
	Sanctity/Degradation Foundation	.105	.827	.411

\*Bolded betas are significant at the 0.05 level.



Table 3

Descriptive statistics and correlations for Study 2.

Measure	M	SD	1	2	3	4	5	6	7	8	9
1. Harm/Care Pretest	22	3.814	—	.34	.34	.34	.34	.34	.34	.34	.24
2. Fairness/Cheating Pretest	21.235	3.577	.602**	—	.34	.34	.34	.34	.34	.34	.24
3. Loyalty/Betrayal Pretest	15.441	3.807	-.048	-.455**	—	.34	.34	.34	.34	.34	.24
4. Authority/Subversion Pretest	15.824	3.966	-.250	-.567**	.694**	—	.34	.34	.34	.34	.24
5. Sanctity/Degradation Pretest	13.559	4.627	-.307	-.462**	.644**	.825**	—	.34	.34	.34	.24
6. Holistic Intuition	21.088	3.370	.108	-.037	-.133	.006	.034	—	.34	.34	.24
7. Inferential Intuition	30.765	3.358	.078	-.101	-.108	-.033	-.001	.345*	—	.34	.24
8. Affective Intuition	25.971	4.988	-.167	.060	-.167	-.178	-.165	-.117	.180	—	.24
9. Cognitive Reflection	.222	.321	.206	.161	-.077	-.124	-.031	.231	.261	.216	—

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).

Table 4

Factorial ANOVAs on Moral Foundations.

	Harm/Care $\Lambda$ , F(1,32)	Fairness/Cheating $\Lambda$ , F(1,32)	Loyalty/Betrayal $\Lambda$ , F(1,32)	Authority/Subversion $\Lambda$ , F(1,32)	Sanctity/Degradation $\Lambda$ , F(1,32)
Time	1, .000	.996, .132	.795, 8.244**	.815, 7.248*	.765, 9.815**
Condition	0, .180	0, .608	0, .329	0, .386	0, .005
Time X Condition	.996, .126	.952, 1.622	.999, .037	.988, .401	.992, .245

\* $p < .05$  \*\* $p < .01$

## Appendix A

## Moral Foundations Questionnaire

*Part 1. When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking? Please rate each statement using this scale:*

[0] = not at all relevant (This consideration has nothing to do with my judgments of right and wrong)

[1] = not very relevant

[2] = slightly relevant

[3] = somewhat relevant

[4] = very relevant

[5] = extremely relevant (This is one of the most important factors when I judge right and wrong)

- \_\_\_\_\_ 1. Whether or not someone suffered emotionally
- \_\_\_\_\_ 2. Whether or not some people were treated differently than others
- \_\_\_\_\_ 3. Whether or not someone's action showed love for his or her country
- \_\_\_\_\_ 4. Whether or not someone showed a lack of respect for authority
- \_\_\_\_\_ 5. Whether or not someone violated standards of purity and decency
- \_\_\_\_\_ 6. Whether or not someone was good at math
- \_\_\_\_\_ 7. Whether or not someone cared for someone weak or vulnerable
- \_\_\_\_\_ 8. Whether or not someone acted unfairly
- \_\_\_\_\_ 9. Whether or not someone did something to betray his or her group
- \_\_\_\_\_ 10. Whether or not someone conformed to the traditions of society
- \_\_\_\_\_ 11. Whether or not someone did something disgusting
- \_\_\_\_\_ 12. Whether or not someone was cruel
- \_\_\_\_\_ 13. Whether or not someone was denied his or her rights
- \_\_\_\_\_ 14. Whether or not someone showed a lack of loyalty
- \_\_\_\_\_ 15. Whether or not an action caused chaos or disorder
- \_\_\_\_\_ 16. Whether or not someone acted in a way that God would approve of

*Part 2. Please read the following sentences and indicate your agreement or disagreement:*

[0]	[1]	[2]	[3]	[4]	[5]
Strongly disagree	Moderately disagree	Slightly disagree	Slightly agree	Moderately agree	Strongly agree

- \_\_\_\_\_ 17. Compassion for those who are suffering is the most crucial virtue.
- \_\_\_\_\_ 18. When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.
- \_\_\_\_\_ 19. I am proud of my country's history.
- \_\_\_\_\_ 20. Respect for authority is something all children need to learn.
- \_\_\_\_\_ 21. People should not do things that are disgusting, even if no one is harmed.
- \_\_\_\_\_ 22. It is better to do good than to do bad.
- \_\_\_\_\_ 23. One of the worst things a person could do is hurt a defenseless animal.
- \_\_\_\_\_ 24. Justice is the most important requirement for a society.

- \_\_\_\_\_ 25. People should be loyal to their family members, even when they have done something wrong.
- \_\_\_\_\_ 26. Men and women each have different roles to play in society.
- \_\_\_\_\_ 27. I would call some acts wrong on the grounds that they are unnatural.
- \_\_\_\_\_ 28. It can never be right to kill a human being.
- \_\_\_\_\_ 29. I think it's morally wrong that rich children inherit a lot of money while poor children inherit nothing.
- \_\_\_\_\_ 30. It is more important to be a team player than to express oneself.
- \_\_\_\_\_ 31. If I were a soldier and disagreed with my commanding officer's orders, I would obey anyway because that is my duty.
- \_\_\_\_\_ 32. Chastity is an important and valuable virtue.

## Appendix B

## Types of Intuition Scale

We are interested in how you make decisions and solve problems in your life. Read each of the following statements and rate the extent to which you would agree that that statement is true of you using the scale below. These items have no right or wrong answers; just respond based on what is true for you.

1	2	3	4	5
Definitely false	Mostly false	Undecided (neither true nor false)	Mostly true	Definitely true

- \_\_\_\_\_ 1. When tackling a new project, I concentrate on big ideas rather than the details.
- \_\_\_\_\_ 2. I trust my intuitions, especially in familiar situations.
- \_\_\_\_\_ 3. I prefer to use my emotional hunches to deal with a problem, rather than thinking about it.
- \_\_\_\_\_ 4. Familiar problems can often be solved intuitively.
- \_\_\_\_\_ 5. There is a logical justification for most of my intuitive judgments.
- \_\_\_\_\_ 6. I rarely allow my emotional reactions to override logic.
- \_\_\_\_\_ 7. I tend to use my heart as a guide for my actions.
- \_\_\_\_\_ 8. My intuitions come to me very quickly.
- \_\_\_\_\_ 9. I would rather think in terms of theories than facts.
- \_\_\_\_\_ 10. My intuitions are based on my experience.
- \_\_\_\_\_ 11. I often make decisions based on my gut feelings, even when the decision is contrary to objective information.
- \_\_\_\_\_ 12. When working on a complex problem or decision I tend to focus on the details and lose sight of the big picture.
- \_\_\_\_\_ 13. I believe in trusting my hunches.
- \_\_\_\_\_ 14. I prefer concrete facts over abstract theories.
- \_\_\_\_\_ 15. When making a quick decision in my area of expertise, I can justify the decision logically.
- \_\_\_\_\_ 16. I generally don't depend on my feelings to help me make decisions.
- \_\_\_\_\_ 17. If I have to, I can usually give reasons for my intuitions.
- \_\_\_\_\_ 18. I prefer to follow my head rather than my heart.
- \_\_\_\_\_ 19. I enjoy thinking in abstract terms.
- \_\_\_\_\_ 20. I try to keep in mind the big picture when working on a complex problem.
- \_\_\_\_\_ 21. When I make intuitive decisions, I can usually explain the logic behind my decision.
- \_\_\_\_\_ 22. It is foolish to base important decisions on feelings.
- \_\_\_\_\_ 23. I am a "big picture" person.

## Appendix C

## Cognitive Reflection Test

1. A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost? \_\_\_\_\_ cents. [Correct = 5 cents; Intuitive = 10 cents]

Were you familiar with the answer to this question before this study? Yes\_\_\_No\_\_\_

2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? \_\_\_\_\_ minutes [Correct = 5 minutes; Intuitive = 100 minutes]

Were you familiar with the answer to this question before this study? Yes\_\_\_No\_\_\_

3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? \_\_\_\_\_ days [Correct = 47 days; Intuitive = 24 days]

Were you familiar with the answer to this question before this study? Yes\_\_\_No\_\_\_

## Appendix D

## Moral Scenarios

Please indicate where on the scale you would fall when making a decision about the following scenarios.

1. Imagine that you are in the Army. Your commanding officer tells you that you must leave an injured soldier behind in order to make it to your next destination on time. You know that this soldier is suffering and will likely die without any medical assistance. You decide to...

\_\_\_\_\_ follow the orders from your commanding officer

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ help the injured soldier

2. The state requires two local high school, School A and School B, to combine into one high school. The students from School A do not welcome the students from School B, take the best food from the cafeteria line so the students from School B do not get much to eat, and take up all of the outside tables so the students from School B are forced to sit inside. As a student from School A, you...

\_\_\_\_\_ participate in the activities of the School A students because you are loyal to your own school

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ start a petition to guarantee that the students from School B are treated fairly and are able to enjoy all of the same amenities as the students of School B

3. You are setting the table for your friends who are coming over for dinner. All of a sudden, you feel very sick and throw up on one of the plates. You wash the plate, but must set it on the table for dinner. You decide to...

\_\_\_\_\_ set the plate for one of your friends to use

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ take the plate for yourself