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Activating analytic thinking enhances the value given to individualizing moral foundations



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ABSTRACT

Two central debates within Moral Foundations Theory concern (1) which moral foundations are core and (2) how conflict between ideological camps stemming from valuing different moral foundations can be resolved. Previous studies have attempted to answer the first question by imposing cognitive load on participants to direct them toward intuitive and automatic thought. However, this method has limitations and has produced mixed findings. In the present research, in two experiments, instead of directing participants toward intuitive thought, we tested the effects of activating high-effort, analytic thought on participants' moral foundations. In both experiments, analytic thought activation caused participants to value individualizing foundations greater than the control condition. This effect was not qualified by participants' political orientation. No effect was observed on binding foundations. The results are consistent with the idea that upholding individualizing foundations requires mental effort and may provide the basis for reconciliation between different ideological camps.

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1. Introduction

Moral Foundations Theory (MFT; [Graham et al., 2013](#); [Haidt, 2007](#)), by defining morality through evolved intuitions, emerged as a critique of monolithic approaches to morality that emphasize reasoning (vs. emotion and intuition) and care/fairness concerns (see [Kohlberg, 1969](#)). According to MFT, morality, which has been previously defined through care and justice, reflects a rather Western and liberal understanding. However, only a small minority of societies in the world approaches morality in this way ([Henrich, Heine, & Norenzayan, 2010](#); [Shweder, Much, Mahapatra, & Park, 1997](#)). MFT argues that the human species evolved to possess at least five distinct moral foundations: *Care/harm* is based on the instinct to protect and care for offspring and weak members of one's community. *Fairness/cheating* serves the need to detect cheaters and those who offend against norms of justice. *Loyalty/betrayal* concerns being loyal to and sacrificing the self for ingroups. *Authority/subversion* functions to defend authority and social order within a hierarchical structure. *Sanctity/degradation* corresponds to physical and spiritual cleanliness, valuing sacredness, and suppressing worldly desires. While political liberals define morality primarily

on the basis of care/harm and fairness/cheating, conservatives value all five dimensions equally ([Graham, Haidt, & Nosek, 2009](#)). [Graham et al. \(2009\)](#) called care/harm and fairness/cheating "individualizing foundations" because they emphasize individual rights while they called the other three "binding foundations" because they strengthen group ties and discourage selfish behavior in group contexts.

A central debate within MFT concerns which moral foundations are more basic (or core). Core values are "moral sentiments that are consistently applicable across time, place, and contexts" ([Napier & Luguri, 2013, p. 755](#)). [Haidt and Kesebir \(2010\)](#) argue that, due to evolution, all members of the human species possess the five foundations and that the above-mentioned differences between liberals and conservatives emerged during Enlightenment as a result of liberals narrowing their definition of morality by suppressing their binding foundations. As evidence for these arguments, they offer the finding that under cognitive load or distraction, liberals' personal attributions concerning victims become more like those of conservatives ([Skitka, Mullen, Griffin, Hutchinson, & Chamberlin, 2002](#)). Even though this research does not measure moral foundations, it shows that liberals make attributions like conservatives when they are prevented from thinking effortfully. Likewise, [Van de Vyver, Houston, Abrams, and Vasiljevic \(2016\)](#) found, in two representative samples tested 6 weeks before and 1 month after the 2005 London suicide

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bombing, that the loyalty foundation generally became stronger while fairness became weaker. Such change occurred more strongly in liberals than conservatives. In addition, liberals' increasing prejudice against Muslims and immigrants was explained by this change in moral foundations. Since it is known that terrorist attacks like September 11 have an effect similar to mortality salience manipulations (Landau et al., 2004) and that mortality salience in turn acts as a kind of high cognitive load (Trémolière, De Neys, & Bonnefon, 2012), it can be argued that terrorist attacks cause people to adopt an intuitive cognitive style and create corresponding changes in their moral foundations. Therefore, Van de Vyver et al.'s (2016) research suggests that liberals resemble conservatives when they adopt a more intuitive cognitive style (see also Cohen, Ogilvie, Solomon, Greenberg, & Pyszczynski, 2005; Nail, McGregor, Drinkwater, Steele, & Thompson, 2009).¹ Moreover, Graham (2010) found that the discrepancy between explicit and implicit moral foundations was greater for liberals than conservatives. Such findings can be seen as support for the idea that liberals in fact value binding foundations but suppress them using mental effort when asked to report on their foundations at the explicit level. Indeed, while liberals (appear to) value binding foundations less than conservatives at the explicit level, this difference between liberals and conservatives decreases at the implicit level or when cognitive resources are depleted (see Graham, 2010).

A counterargument comes from Jost, Glaser, Kruglanski, and Sulloway's (2003) "conservatism as motivated social cognition" approach. Instead of arguing that liberals suppress binding foundations via mental effort, this model suggests that everyone possesses two core foundations (care and fairness) and that conservatives enhance the importance they give to binding foundations in order to satisfy their resistance to change and opposition to equality motives (see also Jost, 2012). In research that directly pits these two viewpoints against each other, Wright and Baril (2011) examined whether people's moral foundations would shift under cognitive load or when cognitive resources are depleted. They found that conservatives in the cognitively distracted group (compared to the control condition) experienced a decrease in the value they gave to binding foundations. This supports the argument that conservatives enhance the value they give to binding foundations using mental effort. However, in two separate studies, these findings failed to replicate (reported in Graham et al., 2013). In addition, this research was criticized on methodological grounds (e.g., see Van Berkel, Crandall, Eidelman, & Blanchar, 2015). Van Berkel et al. (2015) found that, contrary to Wright and Baril, participants under cognitive load (vs. not) placed more value on care and authority dimensions, but that there was no change in the other foundations. In addition to these studies, Napier and Luguri (2013) relied on the distinction between concrete and abstract thinking in Construal Level Theory and attempted to uncover participants' core moral foundations by manipulating abstract thinking. They reported an increase in the value given to individualizing foundations and a decrease in the value given to binding foundations for both liberals and conservatives as a result of the abstract (vs. concrete) thought manipulation. Similarly, Luguri, Napier, and Dovidio (2012) showed that tolerance toward value-violating groups increases for conservatives engaged in abstract (vs. concrete) thought. However, the absence of a true neutral condition prevents one from knowing the precise locus of the effect in these studies (cf. Napier & Luguri, 2013). In addition, it is not clear whether abstract thinking corresponds to high-effort, and concrete thinking to low-effort thought.

Regardless of how viable an approach it seems to impose cognitive load on participants to uncover their core moral foundations, this approach results in an artifact because agreeing (vs. disagreeing) with any given statement is more likely under intuitive thought (e.g., Knowles & Condon, 1999) and the Moral Foundations Questionnaire (MFQ) lacks reverse-coded items. Thus, participants under cognitive load should tend to score higher on the MFQ because they should be more likely to respond with "strongly agree" and "extremely relevant" to the statements provided. In other words, because the MFQ lacks reverse-coded items, higher scores under cognitive load (vs. no load) could emerge as a methodological artifact rather than having theoretical significance.

In fact, the findings of Van Berkel et al. (2015) discussed above could be seen as supporting this interpretation because under cognitive load, they observed a significant increase in both care and authority—two unrelated dimensions. Even though there was no significant difference on the other foundations, the high-load group scored always higher than the low-load group. It thus seems unsuitable to examine differences in MFQ scores under cognitive load (vs. no load) to try to answer the question of which moral foundations are core and which foundations should be central (taken as a basis) for resolving the disagreement between ideological camps because such differences may occur as experimental artifacts rather than indicate theoretical significance.

1.1. The issue of 2 vs. 5 foundations and resolving ideological disagreement

Haidt (2012) argued that the basic source of ideological disagreements lies in different moral foundations being valued by people in different ideological camps and reviewed empirical evidence demonstrating such moral foundation differences. According to MFT, these differences are based on intuitions and cannot be resolved rationally. Thus, resolving disagreements is only possible if each camp (i.e., liberals and conservatives) recognizes the moral foundations valued by the other. Accordingly, since conservatives already recognize foundations valued by liberals, the resolution of disagreements rests on liberals' recognizing binding foundations.² However, Sauer (2015) argues that this approach is normatively asymmetrical and that the two camps already agree on two foundations. Therefore, disagreements should be resolved by conservatives decreasing the value they place on binding foundations, instead of liberals extending their foundations to include all five of them. In other words, rationally, moral principles that the two camps agree on are sufficient to establish social harmony. Additionally, some findings suggest that possessing a wider range of moral convictions is associated with more rigid-mindedness and prejudiced attitudes (see Goodwin & Darley, 2012; Skitka, Washburn, & Carsel, 2015; see also Yilmaz & Bahçekapili, 2015). Thus, one group extending their moral foundations may increase the possibility of conflict, whereas there already exists agreement on two foundations. For instance, one consequence of belief in objective morality, which is positively related to having a wider range of moral convictions, is closed-mindedness, which in turn is related to intuitive thought. Objectivists tend to view people who they disagree with as immoral and socially distance from them (Goodwin & Darley, 2012). It is also known that high-effort, analytic thought is positively related to belief in subjective morality (Goodwin, 2009, as cited in Goodwin & Darley, 2010), which itself is probably negatively related to having a wider range of moral convictions. Likewise, high-effort thought is negatively related to the tendency to make wrongness judgments

¹ However, it must be noted that since Van de Vyver et al. collected their data before MFQ was developed, it used a less reliable measure of moral foundations.

² Actually, what is meant here by "recognition of the moral foundations of conservatives" is seeing these foundations as morally relevant because liberals still see loyalty as the extension of nationalism and communitarianism, authority as an indication of submissiveness, and sanctity as a sign of being sexually repressed.

in moral dilemmas (Pennycook, Cheyne, Barr, Koehler, & Fugelsang, 2014). Therefore, it makes more sense to seek evidence for core moral foundations or at least the moral foundations that can be the basis, analytically, for political agreement by placing participants in high-effort (analytic), instead of low-effort, mode of thought. Before elaborating on this, we will place low- versus high-effort thinking in context using the dual-process model of the mind.

1.2. Dual-process model of the mind

Dual-process model of the mind essentially argues that the human mind functions on the basis of two types of systems (Evans & Stanovich, 2013). Type 1 corresponds to automatic, low-effort, intuitive thought processes. We rely on this system while, for instance, driving a car on an empty road as an experienced driver or effortlessly identifying an angry face in a crowded environment. Type 2 corresponds to a set of uniquely human thought processes that are analytic, high-effort, and controlled in nature. We rely on this system while, for instance, focusing on the voice of a specific person in a noisy room or constructing complicated scientific arguments (Kahneman, 2011).

According to the dual-process model of the mind, religious belief is mostly the product of Type 1 because people acquire religious beliefs typically during their socialization in the community that they were born into, while religious disbelief relies more on logical inquiry. Recent research has provided empirical support for this argument (Gervais & Norenzayan, 2012; Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Pennycook, Ross, Koehler, & Fugelsang, 2016; Shenhav, Rand, & Greene, 2012; Yilmaz, Karadöller, & Sofuoğlu, 2016; Yilmaz & Saribay, 2016). Social conservatism has also been explained from the perspective of the dual-process model. Research has shown that there is a negative relationship between social conservatism and analytic thought (Deppe et al., 2015; Iyer, Koleva, Graham, Ditto, & Haidt, 2012; Pennycook et al., 2012; Saribay & Yilmaz, 2017; Talhelm et al., 2015; Yilmaz & Saribay, 2016, 2017a; but see Kahan, 2013; Landy, 2016). In addition, experimentally directing people toward low-effort thought increases support for conservative policies (Eidelman, Crandall, Goodman, & Blanchard, 2012; see also Talhelm et al., 2015; Yilmaz & Saribay, 2017b).

1.3. Dual-process model and morality

Like religiosity and political orientation, moral judgments are also examined from the perspective of the dual-process model of the mind. One of two major approaches in the area of moral judgment is Haidt's (2001) social intuitionist approach which claims that moral judgments rely on intuitive processes and that logical reasoning is used post hoc to justify automatic moral judgments that result from such intuitive processes. For instance, when given an incest scenario that does not include harm to anyone, most people automatically think the incestuous action is wrong but, when asked why, are unable to automatically produce an explanation. When given the chance to think about the scenario, people rely on reasoning to justify their automatic answer (see Haidt, 2001).

A second approach to moral judgment, Greene's dual-process model (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001) argues for a more central role of analytic and reflective processes. Accordingly, utilitarian judgments stem from areas of the brain responsible for analytic thought while deontological (rule-based) moral judgments stem from areas of the brain responsible for emotions. For instance, producing utilitarian, compared to deontological, answers in response to personal dilemmas takes more time (Greene, Nystrom, Engell, Darley, & Cohen, 2004; Greene et al., 2001). In addition, research has found an increase in the likelihood of giving utilitarian (vs. deontological) responses after people are

directed toward analytic thought (Paxton, Bruni, & Greene, 2014). People under cognitive load also take longer to give utilitarian moral judgments (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008). Therefore, within this approach, while moral intuitions are considered important, analytic and reflective processes are seen as playing an effective role in suppressing these intuitions during decision making (but see Kahane, 2012; Kahane, Everett, Earp, Farias, & Savulescu, 2015). Consistent with this, research has found that people with a stronger (vs. weaker) tendency to think analytically are less likely to disapprove of disgust-inducing actions in the moral domain (Pennycook et al., 2014). Also, there is a negative correlation between the tendency to think analytically and the value given to binding foundations (Landy, 2016; Pennycook et al., 2014; see also Royzman, Landy, & Goodwin, 2014). In short, it is possible that analytic thought processes have a greater effect on moral judgments than that argued by the social intuitionist model (see also Jost, 2012).

1.4. The current study

Considering the literature reviewed above, we aimed to examine whether directing people to think in a high-effort manner would lead to a shift in the value they placed on moral foundations. For this purpose, in two experiments, we activated analytic thought and subsequently measured people's moral foundations.

When given the chance to think thoroughly, both liberals and conservatives explicitly report highly valuing individualizing foundations (Graham et al., 2013). Thus, we expected both groups to increase the value they place on individualizing foundations following activation (vs. no activation) of analytic thinking. Likewise, we expected that making people think in a high-effort manner would decrease the value they place on binding foundations. In addition, we aimed to test whether political orientation (left vs. right) interacts with the analytic thinking manipulation. It is possible that such manipulation only increases the value placed on individualizing foundations by liberals, but has no effect on conservatives. If, however, analytic thought activation increases the value placed on individualizing foundations by both conservatives and liberals, this would provide support for the idea that opposing ideological camps could converge on an analytic (rather than intuitive) basis and consequently, agree on individualizing foundations and attain societal harmony based on those moral principles. In this sense, the question of which moral foundations people value more when engaged in high-effort thought is practically important.

2. Experiment 1

2.1. Method

2.1.1. Participants

A convenience sample from the community was gathered by ten undergraduate research assistants who sent out invitations to their friends and acquaintances. The goal was for each assistant to collect data from as many participants as possible and stop at 40. The total number of participants was 396 (51.3% female; mean age = 29.35; $SD = 12.18$, min. = 18, max. = 75). They were randomly assigned to the CRT-first ($n = 200$) or the CRT-last ($n = 196$) conditions (see below).

2.1.2. Materials and procedure

Data collection was done by paper-and-pencil. It consisted of the manipulation, the dependent measure, and a demographic form in a fixed order (except that the manipulation involved the

experimental group taking the CRT first and the control group taking it last; see below) and took approximately 15 min.

2.1.2.1. Manipulation

To activate analytic thought, three standard Cognitive Reflection Test (CRT: Frederick, 2005) questions were administered before or after the dependent measure (for a similar manipulation technique, see Paxton, Ungar, & Greene, 2012). CRT has been frequently used in the literature to measure cognitive style. It consists of three questions each of which have an incorrect intuitive and a correct analytic answer. A sample question is: “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?” The correct answer to this question is “5 cents.” People who are dispositionally more reflective tend to consider the problem more carefully and provide the correct answer, “5 cents.” Responses to the three questions were coded to form a total CRT correct score. In the experimental condition, CRT questions were given before the dependent measure (CRT-first) in order to have participants struggle with these questions and to in turn activate analytic thought. The control condition participants were exposed directly to the dependent measures and only then to the CRT (CRT-last).

In a separate sample, we conducted a manipulation check to provide independent evidence that this procedure successfully activates analytic cognitive style. Since most social psychological effects are of moderate size, we assumed an effect size of $f = 0.3$ which resulted in an estimated sample size of 90 to attain 0.80 power. We attempted to go beyond this estimate as much as possible and were able to gather data from 141 participants. Participants were randomly assigned to the CRT-first and CRT-last conditions. They completed a distraction task (after the CRT, for those in the CRT-first condition) in which they were given 12 outlines of human heads (with hairstyle to indicate gender) and asked to draw neutral faces inside the borders. This task took 1–2 min. They then completed six base-rate problems. Three of these involved base-rate conflict and three were neutral (see Pennycook et al., 2012; see also Experiment 2). The success of the CRT-based manipulation would be indicated by higher scores on the base-rate conflict problems whose solution is facilitated by analytic thought. Scores on base-rate neutral problems should not be affected by the manipulation (see De Neys, 2006). This is exactly what the results showed: The CRT-first group ($M = 1.41$, $SD = 1.25$; 95% CI [1.11, 1.70]) scored higher on the base-rate conflict problems than the CRT-last group ($M = 0.90$, $SD = 1.02$; 95% CI [0.66, 1.14]), $t(139) = -2.64$, $p = 0.009$, Cohen's $d = 0.45$. Scores on the base-rate neutral problems did not differ significantly, $t(139) = -0.80$, $p = 0.426$, Cohen's $d = 0.13$. The CRT-first group ($M = 2.13$, $SD = 1.04$; 95% CI [1.88, 2.37]) obtained similar scores on the base-rate neutral problems than the CRT-last group ($M = 1.99$, $SD = 1.06$; 95% CI [1.73, 2.24]). Thus, being exposed to the CRT problems appears to activate analytic thought.

2.1.2.2. Moral foundations questionnaire

Psychometric qualities of the Moral Foundations Questionnaire (MFQ) were determined by Graham et al. (2011). MFQ was adapted to Turkish by Yilmaz, Harma, Bahçekapili, and Cesur (2016). As in the original version, the Turkish version showed poor fit values, $\chi^2(390) = 3372.87$, $CFI = 0.78$, $RMSEA = 0.06$, (90% CI [0.05, 0.07]), $SRMR = 0.08$. MFQ consists of two parts and 30 items responded to on a 6-point Likert-type scale and measures how much value respondents place on 5 distinct moral foundations (Cronbach α 's for care = 0.54, fairness = 0.58; loyalty = 0.65; authority = 0.70; sanctity = 0.72). In the first part, respondents rate what they consider as morally relevant in making moral judgments (“Whether or not someone did something to betray his or her group”). In the second part, respondents rate how much they agree

with given moral judgments (“I think it's morally wrong that rich children inherit a lot of money while poor children inherit nothing”). For each foundation, a score is composed by taking the average of 6 items (3 from the first and 3 from the second part). The five foundations can also be arranged into two groups (Van Leeuwen & Park, 2009; Wright & Baril, 2011). The care and fairness foundations constitute individualizing foundations whereas loyalty, authority, and sanctity constitute binding foundations. Organizing the five foundations into two groups in this way enhances the scale's reliability (Cronbach α 's for Individualizing = 0.73, Binding = 0.88, for this experiment). The items were presented in a fixed order as in the published version of the MFQ (see www.moralfoundations.org).

2.1.2.3. Demographic form

Participants were asked several demographic questions (age, gender, SES, and self-reported religiosity from 1 (“not at all”) to 7 (“highly religious”)) including the 1 (left) to 7 (right) single-item political orientation self-placement question.

2.2. Results and discussion

An independent samples t -test showed a significant effect of the manipulation on individualizing foundations, $t(374) = 3.16$, $p = 0.002$, Cohen's $d = 0.33$. The CRT-first group ($M = 3.94$, $SD = 0.71$; 95% CI [3.84, 4.04]) had a higher individualizing score than the CRT-last group ($M = 3.70$, $SD = 0.73$; 95% CI [3.60, 3.81]). However, there was no significant difference between conditions on the binding foundation score, $t(361) = 0.137$, $p = 0.891$, Cohen's $d = 0.02$. The CRT-first group ($M = 3.31$, $SD = 0.95$; 95% CI [3.20, 3.40]) obtained similar scores on binding foundations than the CRT-last group ($M = 3.29$, $SD = 0.95$; 95% CI [3.16, 3.43]). When the foundations were analyzed separately, the effect of the manipulation was evident for both harm, $t(382) = 3.71$, $p < 0.001$, Cohen's $d = 0.37$, and fairness, $t(381) = 2.10$, $p = 0.036$, Cohen's $d = 0.22$, foundations, but not for any of the binding foundations (all p 's > 0.24).

Scores on the two groups of foundations (individualizing and binding) were analyzed in separate multiple regressions. Condition (0 = CRT-last; 1 = CRT-first) was entered in the first step, the centered political orientation rating in the second step, and the interaction between these two predictors in the last step. Results are displayed in Table 1.

In the last step, condition independently predicted individualizing foundations ($\beta = 0.157$, $p = 0.002$). The analytic thought manipulation led to an increase in the value given to individualizing foundations. Political orientation had no effect on its own or in interaction with condition (all p 's > 0.51).³

When the foundations were analyzed separately, the effect of condition was evident for both care and fairness. In the last step of the regression, there was a significant effect of condition on care, $\beta = 0.182$, $p < 0.001$, and a marginally significant effect on fairness, $\beta = 0.099$, $p = 0.053$. However, in none of the analyses did condition interact with political orientation.

The results also showed that condition had no effect on binding foundations ($\beta = 0.005$, $p = 0.929$). Instead, political orientation significantly predicted binding foundations ($\beta = 0.308$, $p < 0.001$). Right-wing orientation was positively related to the value placed on binding foundations, consistent with earlier research (Yilmaz, Saribay, Bahçekapili, & Harma, 2016). There was no interaction between condition and political orientation ($\beta = 0.011$, $p = 0.872$). Thus, unlike individualizing foundations, there was no evidence

³ Results of the regression did not change when we controlled for age, gender, SES, and self-reported religiosity in the first step.

Table 1
Hierarchical regression: Standardized regression coefficients predicting individualizing foundations.

Individualizing foundations (Experiment 1)				
	Step 1	Step 2	Step 3	Adjusted R ²
Condition	0.159**	0.157**	0.157**	0.023**
Political Orientation		−0.025	0.009	0.021**
Condition * Political Orientation			−0.048	0.019*

* $p < 0.05$.

** $p < 0.01$.

that the analytic thought manipulation influenced binding foundations.⁴

Overall, the results clearly showed that experimentally inducing analytic thought leads to an increase in the value people give to individualizing, but not binding, foundations. It can be seen as a strength of the experiment that the sample was relatively diverse in terms of age and also that it was drawn from a non-Western, predominantly Muslim culture. However, regardless of the fact that this experiment employed a relatively large sample, it was conducted outside the laboratory and lacked an ideal level of experimental rigor. In addition, instead of using a direct and strong manipulation, we attempted to activate analytic thought by simply administering questions designed to measure it, similar to Paxton et al. (2012). To remedy these weaknesses and provide a converging replication, we conducted a second experiment in the laboratory using a more direct manipulation.

3. Experiment 2

3.1. Method

3.1.1. Participants

As there were not any prior meta-analysis to show the overall effectiveness of the analytic thinking manipulations and since most of the effects in social psychology are moderate in size, we estimated an effect size of 0.3 (f). With this effect size, 90 participants were required to attain statistical power of 0.80. Considering potential attritions, we collected data from 103 Boğaziçi University undergraduates. Participants were randomly assigned to the analytic thought training ($n = 52$) or the control condition ($n = 51$). They were given extra course credit in return for their participation.

3.2. Materials and procedure

The procedure was similar to that of the first experiment. However, data was collected in the laboratory in isolated computer cubicles using Medialab (Jarvis, 2012) as the experimental control software. All responses were entered by the participant using the mouse and keyboard.

3.2.1. Manipulation

In order to activate analytic thought, we exposed participants to a 10-min training (see also, Yilmaz & Saribay, 2017b). Specifically, we explained the solutions to the problems of CRT (Frederick, 2005) and Base-rate conflict (Pennycook et al., 2012)—two widely used tests measuring analytic thinking tendency. Participants were first asked to solve three CRT problems (see Experiment 1). After their attempt at each problem, they were shown the correct answer along with a detailed explanation of the logic that leads

to that correct solution. For instance, the following instructions were given after the first CRT question to direct participants toward high-effort thinking:

People tend to provide intuitive answers to these kinds of questions. Most people give “10 cents” as the answer to the question you just read. However, if this were the correct answer, then, because the difference of the two items is \$1.00, their sum would have to be \$1.20. Therefore, “10 cents” is incorrect. This problem, which taps analytic thinking, is solved correctly (“5 cents”) by most people who think carefully about it instead of providing the first answer that comes to mind. When checked logically, if the ball is \$0.05 and the difference between the ball and the bat is \$1.00, then the bat is \$1.05 and their sum is \$1.10. Therefore, instead of providing the first answer that comes to one’s mind, one must stop and examine it through the lens of analytic thought.

Subsequently, to test whether the participants understood the logic, a similar problem using different numerical information was presented. The same procedure was repeated for three Base-rate probability problems (see Pennycook et al., 2012). As in the CRT, base-rate probability problems have an incorrect intuitive and a correct analytic solution. A sample problem is:

“In a study 1000 people were tested. Among the participants there were 5 engineers and 995 lawyers. Jack is a randomly chosen participant of this study. Jack is 36 years old. He is not married and is somewhat introverted. He likes to spend his free time reading science fiction and writing computer programs. What is most likely?

a) Jack is a lawyer b) Jack is an engineer”.

For participants in the analytic thought training condition, after they provided their answer to each problem, we explained to them that most people tend to ignore the base-rate information in favor of the stereotypical information, resulting in the logically incorrect answer. We emphasized that by using analytic thought (i.e., careful examination of the problem’s components), it should be possible to ignore the misleading stereotype and choose the correct answer, in this case, that Jack is a lawyer. Later, the participants were given a similar problem (with different numbers) to check whether they understood the logic, as in the CRT questions. We planned to exclude participants who could not correctly solve any check-points, but every participant successfully solved at least one check question. Thus, we did not exclude any participants from the analyses.

In the control condition, participants were not given any training, but were simply asked to solve three CRT and three base-rate conflict problems. The manipulation was followed by MFQ and demographics form as in Experiment 1. MFQ items were presented in individualized random order.

⁴ Contrary to previous research (Landy, 2016; Pennycook et al., 2012) there was no relationship between CRT scores and any of the moral foundations in the control group (all p s > 0.24), suggesting that the relationship between trait reflectiveness and moral foundations may not hold in Turkey.

3.3. Results and discussion

An independent samples *t*-test showed a significant effect of the manipulation on individualizing foundations, $t(101) = 2.60$, $p = 0.011$, Cohen's $d = 0.51$. The analytic thought training group ($M = 4.78$, $SD = 0.56$; 95% CI [4.63, 4.94]) scored higher on the individualizing foundations than the control group ($M = 4.46$, $SD = 0.69$; 95% CI [4.27, 4.66]). However, there were no significant differences between conditions on the binding foundations, $t(101) = 0.40$, $p = 0.693$, Cohen's $d = 0.08$. The analytic thought training group ($M = 3.19$, $SD = 0.80$; 95% CI [2.96, 3.41]) obtained similar scores on binding foundations than the control group ($M = 3.13$, $SD = 0.78$; 95% CI [2.91, 3.34]). When the foundations were analyzed separately, the effect of the manipulation was evident for both harm, $t(101) = 2.01$, $p = 0.047$, Cohen's $d = -0.39$, and fairness, $t(101) = 2.73$, $p = 0.007$, Cohen's $d = -0.54$ conditions, but not for any of the binding foundations (all p 's > 0.47).

As in Study 1, MFQ scores were combined into two groups of foundations (individualizing and binding) which were analyzed in separate multiple regressions. Condition (0 = Control; 1 = Analytic thought training) was entered in the first step, the centered political orientation rating in the second step, and the interaction between these two predictors in the last step. Results are shown in Table 2.

In the last step, condition ($\beta = 0.228$, $p = 0.015$) and political orientation ($\beta = -0.286$, $p = 0.035$) independently predicted individualizing foundations. As predicted and replicating Experiment 1, the analytic thought manipulation led to an increase in the value given to individualizing foundations. Left-wing orientation was positively related to the value placed on individualizing foundations. Also in line with the results of Experiment 1, the interaction of condition and political orientation was not significant ($\beta = -0.053$, $p = 0.691$).⁵

Examining the foundations separately, in Experiment 1, there was clear evidence that care was clearly affected by condition while the evidence for fairness was weaker (marginal significance). In this experiment, we observed the opposite: The effect of condition on fairness was significant in the last step ($\beta = 0.239$, $p = 0.009$) whereas the effect on care was marginally significant ($\beta = 0.179$, $p = 0.064$). However, in none of the analyses did condition interact with political orientation.

When the same analyses were repeated for binding foundations, consistent with Experiment 1, there was no effect of condition ($\beta = 0.078$, $p = 0.346$). There was a significant effect of political orientation ($\beta = 0.571$, $p < 0.001$). Right-wing orientation was related to the value placed on binding foundations. There was no interaction between condition and political orientation ($\beta = -0.003$, $p = 0.979$).

In sum, the findings replicated those from Experiment 1 that analytic thought training caused an increase in the value people give to individualizing foundations while it did not cause any apparent change in binding foundations. The lack of interaction effects suggests that these were true regardless of participants' political orientations.

4. General discussion

In the present research, in two experiments, we examined whether people's moral foundations would shift when they were led to engage in high-effort thinking via a brief analytic thought manipulation. Consistent with our hypotheses, in both experiments, we found that the participants in the high-effort (vs. con-

trol) condition reported placing more importance on individualizing foundations. This effect occurred for all political orientations. However, contrary to our hypotheses, there was no shift in binding foundations following analytic thought training. The findings are consistent with research showing that holding egalitarian values require mental effort (Van Berkel et al., 2015) and that the value placed on fairness concerns (Luguri et al., 2012) and individualizing foundations (Napier & Luguri, 2013)⁶ is stronger under abstract thought. Overall, these findings from the literature along with the present findings are consistent with the view that care and fairness concerns form the essence of morality (see Kohlberg, 1969; Rawls, 1971).

Previous research has sought an answer to the question of which moral foundations are core by cognitively distracting people (see Wright & Baril, 2011) but yielded mixed results (see Graham et al., 2013). Instead of attempting to directly reconcile these results, we argue that this research contained a potential artifact because it is more likely for people under cognitive load to report agreement rather than disagreement with any given statement. This, in turn, occurs because to reject a statement typically requires Type 2, high-effort thinking (see Kahneman, 2011).⁷ That the MFQ does not contain any reverse-coded items may result in a methodological artifact whereby people under cognitive load (vs. no load) appear to place more value on all five foundations. In fact, Van Berkel et al. (2015) observed this, even though differences were significant only for two foundations. Thus, this strategy does not seem suitable for discovering core moral foundations. Napier and Luguri (2013) used a different strategy based on the abstract versus concrete thinking distinction and reported that both liberals and conservatives placed greater value on individualizing foundations and lesser value on binding foundations while engaged in abstract (vs. concrete) thinking. However, the lack of a control group in their study prevents one from identifying the precise locus of change (cf. Napier & Luguri, 2013; see also Luguri et al., 2012). Therefore, there is a need for alternative experimental strategies targeting the question of which moral foundations are core. This question deserves continued research attention because, in addition to the theoretical traction that it would generate, it has practical implications for which foundation(s) to focus on when attempting to reconcile ideological conflict.

According to MFT, because moral differences between ideological camps are based on intuitions, such reconciliation is possible if one group (e.g., liberals) begins to recognize moral foundations (e.g., binding foundations) that it previously did not recognize, but which is important for the other group (e.g., conservatives). In turn, since conservatives already possess all five foundations but liberals focus only on two, liberals are required to expand their moral spectrum from two to five foundations to minimize political disagreements (see Haidt, 2012). Haidt (2012) mentions that liberals' moral domain is a subset of conservatives' and describes liberals as "moral monists" because they narrow their foundations. However, as Jost (2012) also points out, to be characterized as "very conservative" in MFQ, one needs to answer all items with a "yes". Such a tendency would in turn be supported by acquiescence bias and, more fundamentally, intuitive thinking (Knowles & Condon, 1999). Thus, liberals' deemphasizing of some moral

⁶ In fact, our findings are only partially consistent with Napier and Luguri's (2013) because in their study, while abstract thinking manipulation increased the value people placed on individualizing foundations, it also decreased the value they placed on binding foundations. The present studies show that high-effort thought leads to an increase in the value people place on individualizing foundations, however, it does not result in any change regarding binding foundations.

⁷ In the chapter on "cognitive ease" in his book "Thinking, Fast and Slow," Kahneman (2011) states that it is much more likely for people to agree than to disagree with any given statement when they are thinking intuitively, because to reject a statement typically requires analytic thought.

⁵ Results of the regression did not change when we controlled for age, gender, SES, and self-reported religiosity in the first step.

Table 2
Hierarchical regression: Standardized regression coefficients predicting individualizing foundations.

Individualizing foundations (Experiment 2)				
	Step 1	Step 2	Step 3	Adjusted R ²
Condition	0.250 [*]	0.228 [*]	0.228 [*]	0.053 [*]
Political Orientation		−0.324 ^{**}	−0.286 ⁺	0.151 ^{***}
Condition * Political Orientation			−0.053	0.144 ^{***}

⁺ $p < 0.05$.

^{**} $p < 0.01$.

^{***} $p < 0.001$.

foundations does not necessarily reflect a narrowing of their moral domain. To the contrary, they may be expanding the moral domain, such as by building on the loyalty (to the ingroup) foundation to place emphasis on serving humankind or other universal values. Since showing acquiescence bias in responding to MFQ results in a “highly conservative” profile, and since such bias is linked to intuitive thought (Knowles & Condon, 1999); our finding that analytic thought causes greater value to be placed on individualizing foundations supports the idea that liberals’ sense of morality is more sophisticated and requires greater mental effort.

In addition, Sauer (2015) argued that Haidt’s approach is normatively asymmetrical and since agreement exists on two foundations already, conservatives should shrink their moral spectrum from five to two foundations instead. Political agreement is a state that can be attained on an analytic, rather than an intuitive, basis. For this reason, our finding that analytic thought strengthens individualizing foundations might be seen as partial support for the normative approach of Sauer (2015).⁸ After all, both liberals and conservatives place more value on individualizing foundations, which are already among the baseline moral foundations of both groups, under analytic thought. In addition, the finding that abstract thinking makes conservatives’ social attitudes toward value-violating groups resemble that of liberals (i.e., more tolerant; Luguri et al., 2012) and that analytic thought pushes some political opinions in the liberal direction (Yilmaz & Saribay, 2017b) converge with the implications of the present findings.

Yilmaz and Saribay (2017b) trained people to think analytically, as in the second experiment here, and observed more liberal responses on contextualized (but not stable) opinions (see also Talhelm et al., 2015). Likewise, in the present research, analytic thought training led to an increase in the value people place on individualizing foundations, which liberals value more than other political groups at baseline. Therefore, it is possible that inducing analytic cognitive style led to a strengthening of individualizing foundations through increasing liberalism. Alternatively, if moral foundations lie at the basis of political attitudes and explain political disagreements, the relationship between analytic cognitive style and liberal attitudes could be mediated by individualizing foundations. These two possibilities deserve close examination in future research.

⁸ As an example of how political agreement could be facilitated by high-effort thinking and individualizing foundations, consider the following: In the U.S., conservatives tend to oppose stem cell treatment on the basis of the idea that it interferes with God-given qualities of human beings (i.e., violation of the sanctity/degradation foundation), while liberals tend to support stem cell treatment on the basis of the idea that it will save human lives (i.e., support for the care/harm foundation). Therefore, because human lives are at stake, political disagreement on this issue could be decreased if conservatives view the issue from a care/harm perspective, which is a moral foundation they already possess. Indeed, the current research shows that high-effort thinking increases the value given to the harm and fairness foundations. Future research must test directly whether political disagreements such as the one mentioned here are in fact ameliorated under high-effort thinking.

4.1. Why there was no effect on binding foundations

Some previous studies reported a negative correlation between the importance given to binding foundations and the number of CRT correct responses (Landy, 2016; Pennycook et al., 2014). Indeed, our hypothesis was that manipulating participants to think in a high-effort fashion would lead them to give less value to binding foundations, compared to the control condition. This hypothesis is consistent with the literature. For instance, the value placed on binding foundations and the tendency to see the world as a dangerous place are positively related (Van Leeuwen & Park, 2009). In addition to findings showing that conservatives, compared to liberals, view the world as a more dangerous place (see Jost et al., 2003), there are also some findings that conservatives, compared to liberals, tend to think in a low-effort fashion (Deppe et al., 2015; Iyer et al., 2012; Pennycook et al., 2012; Saribay & Yilmaz, 2017; Talhelm et al., 2015; Yilmaz & Saribay, 2016, 2017a, 2017b). However, while previous studies provided correlational support for this hypothesis, the present research failed to provide evidence for a causal influence. In fact, in Experiment 1, there was no relationship between CRT scores and any of the moral foundations in the control (CRT-last) condition. This may be particular to Turkey, a predominantly Muslim country. However, it is also inconsistent, by logical inference, with other studies from Turkey. For instance, it has already been shown that Turkish leftists and rightists differ in terms of the value they give to binding foundations (Yilmaz, Harma et al., 2016; Yilmaz, Saribay et al., 2016). In addition, the left-right political groups in Turkey also differ in terms of their CRT scores (Yilmaz & Saribay, 2016). It could be that variation in sampling methods is responsible for differences between findings from experimental and correlational designs. Because the sampling procedure for Experiment 1 resembled a typical correlational study more than an experiment, one should exercise caution in interpreting these findings. However, this was not true of Experiment 2, which suggests that this lack of a causal effect of high-effort thought on binding foundations is reliable.

One could also criticize MFQ as oversimplifying moral judgments by taking them out of context. Future research should examine the effect of high-effort thinking on binding foundations using context-dependent scenarios, while maintaining the theoretical framework of MFT (for examples of such scenarios, see Clifford, Iyengar, Cabeza, & Sinnott-Armstrong, 2015).

4.2. Limitations and strengths

A major limitation of the present research was that neither of the two control conditions were ideal. The condition we used in order to manipulate analytic thought in Experiment 1 was similar to the condition we used as a control in Experiment 2. However, considering the experiments independently, it is still the case that the two conditions (i.e., analytic thought training and control) within each experiment were different in their propensity to activate analytic thought, relative to each other. Thus, the contrast between the conditions in each experiment served the purpose

of examining the causal influence of relatively high (vs. relatively low) level of analytic thought on our dependent measure. In fact, we previously attempted to use two standard analytic thought priming procedures in two separate samples but both of them failed (see Yilmaz & Saribay, 2016; Study 3a and 3b). Thus, we were forced to rely on new procedures to activate analytic thought in the present research. The low reliability values of MFQ can also be seen as a limitation for these type of experiments. However, this is typical for MFQ and not specific to these experiments. Thus, further studies can use more contextualized moral vignettes which are bound to the theoretical rationale of MFT.

In addition, Experiment 1 suffered from lack of an ideal level of experimental rigor because it was conducted outside the laboratory. However, it could be argued that the resulting deficiency in internal validity was accompanied by an increase in ecological validity owing to the especially diverse sample (cf. Henrich et al., 2010). In addition, Experiment 2 replicated the findings in the laboratory, alleviating concerns present in Experiment 1. Taken together, the two samples were quite diverse in age—a variable that is related to conservatism (Gonsalkorale, Sherman, & Klauer, 2009)—suggesting that the effects are not constrained in this way. Thus, it is a strength of the present research that it was conducted both in and outside the laboratory, employed both a student and a community adult sample, and was made up predominantly of Muslims from a non-WEIRD culture, unlike most other research in the field.

5. Conclusion

Is it possible to find common ground between people of opposing ideological convictions? In response to this challenge, Haidt and Kesebir (2010) argued that liberals must widen their moral foundations while Sauer (2015) argued that such common ground must be built on the two foundations that both liberals and conservatives already endorse. Although as a species, humans evolved strong intuitions that form the basis of our moral judgments, political agreement is a matter of analytic, rather than intuitive, thinking (see also Jost, 2012). The current findings, by showing that high-effort, analytic thought strengthens individualizing foundations, support the argument that ideological camps could reach agreement on those foundations. It must be noted that our findings do not suggest that binding foundations are not moral values or are less important generally. They only provide empirical support for the idea that individualizing foundations are better candidates for finding political common ground because adopting an analytic cognitive style increases the value one places on care and fairness. Future research must experimentally examine whether a similar relationship between high-effort thought and moral foundations will be observed in other cultural contexts (e.g., secular Scandinavian nations or the U.S.A. where religious institutions have stronger impact on society).

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Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.cognition.2017.05.009>.

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