

EFFECTS OF EGO DEPLETION ON MORAL JUDGEMENT

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## **DEDICATION**

For my wife, Becky, whom I love more now than the day I married.

## ABSTRACT

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Extant literature has reported conflicting findings regarding moral preferences while ego depleted. Some suggested that when self-regulatory resources are exhausted, people are more preferential toward conservatism (Eidelman, Crandall, Goodman, & Blanchar, 2012) or moral foundations related to conservatism (Van Berkel, Crandall, Eidelman, & Blanchar, 2015). Others suggested that a more left-leaning moral preference is natural when participants are ego depleted (Wright & Baril, 2011). To elucidate these contradictory findings, the present study compared depleted and non-depleted participant's scores on Moral Foundation Vignettes (MFVs; Clifford, Iyengar, Cabeza, & Sinnott-Armstrong, 2015). Additionally, researchers have struggled to find a computerized depletion task with a strong effect size. The present study attempted to offer a solution to this problem in the form of an e-crossing procedure based on Haggard and colleagues' (2016) replication report yet modified according to Baumeister and Vohs' (2016) recommendation to include an initial, habit-forming phase. Both the sequential task paradigm and performance over time showed no evidence of an ego depletion effect. Surprisingly, moral judgements were uncorrelated with political orientation. Reliable depletion tasks must be developed before correlates with moral judgement can be studied.

*Keywords:* Ego depletion, Self-regulation, Moral foundations, Moral vignettes, E-crossing procedure

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## CHAPTER I

### Introduction and Literature Review

Imagine a case in which a former CIA employee stands trial for disclosing classified information to unauthorized individuals. What type of empirical recommendations might aid the attorneys of this case? If the jury could be influenced to judge crimes involving betrayal and rebellion against authority harshly, then this would be a boon for the prosecutor. Conversely, it would be in the defender's best interest for the jury to consider the severity of the crime based on fairness or the amount of harm done. Some previous literature has suggested that as willpower becomes overwhelmed or ego depleted, (where prior actions requiring self-control worsen performance on subsequent self-regulatory tasks) moral disposition changes as well (Wright & Baril, 2011). More specifically, their exhausted participants tended to make moral judgements on the basis of fairness and harm rather than authority, loyalty, or sanctity. Could the defending attorney in the above example induce the jury to be more sympathetic to the defendant - even by actions as simple as making the jury wait for long periods of time or prompting an expert witness to testify in a highly technical manner? Consequently, the primary objective of the present research was to further elucidate the influence of exhaustion on moral predilections. Secondly, the ability of a computerized e-crossing procedure to induce ego depletion was evaluated.

#### **The Precarious Ego Depletion Effect**

In 1998, Baumeister, Bratslavsky, Muraven, and Tice published several experiments that examined the effect of initial self-regulatory tasks on successive self-regulatory tasks. For example, participants who were instructed to eat radishes and resist



eating chocolate cookies more readily gave up on unsolvable puzzles than those instructed to eat the cookies and resist the radishes. Baumeister and colleagues made the startling discovery that participants who previously completed a self-regulatory task performed worse on subsequent self-regulatory tasks. The term *ego depletion* was then coined to describe this effect. The participants who ate the radishes depleted their self-regulatory resources by refusing the tempting cookies, and this exertion seems to have caused them to be less persistent on difficult, unrelated puzzle solving.

The example of the ex-CIA employee on trial for crimes related to resistance against authority and betrayal is useful for conceptualizing the ego-depletion effect. Jurors may already be in a depleted state before the trial even begins. So long as jurors would rather be elsewhere, some willpower is inherent in the act of merely showing up. While this initial depletion effect is out of the attorney's control, are there some ways the attorney's themselves might evoke a depleted state in jury members? Past studies have shown that attention management tasks (e.g., Stroop, white bear paradigm, puzzles) exhaust self-regulatory capabilities. If an attorney were to stress the importance of an expert witness' highly technical testimony, then this may strain jurors' mental faculty. Another method might be to tax the jury's affective regulation. One of the most successful depletion methods instructs participants to control their facial features while exposed to an emotionally provocative video (Hagger, 2010). The attorney could mirror this procedure by describing some gruesome details of the defendant's crime while asking jury members to maintain a professional demeanor.

However, a number of studies have called into question the existence of an ego depletion effect (Carter, Kofler, Forster, & McCullough, 2015; Lurquin et al., 2016). Of

immediate concern, a preregistered, large-scale study involving 23 laboratories ( $N = 2141$ ) found no evidence of an ego depletion effect (Hagger et al., 2016). Hagger and colleagues called for participants to undergo a computerized e-crossing task, similar to that used in the present study, coupled with a multi-source interference task (MSIT) as a dependent measure of depletion. In the MSIT participants were shown numbers and asked to select the unique number. For congruent trials, related and easily confused criteria (e.g., number position) were in agreement with the unique number. For incongruent trials, related criteria were in disagreement with the unique number. In these incongruent trials, the impulse to respond to the conflicting, extraneous criteria must be overridden to respond correctly.

Despite Hagger and colleagues (2016) reported findings, subsequent analysis (Dang, 2016) showed that an ego depletion effect was significant for the participants who reported they exerted a great deal of effort on the e-crossing task. This could suggest a failure of the depletion task save for those who devoted exceptional effort to the e-crossing procedure.

### **Elusive Computerized Design**

Spirada and colleagues' (2014) work was used as the basis for the infamous replication report described earlier (Hagger et al., 2016). In a double-blind design, some participants were given methylphenidate (Ritalin) while others were given a placebo. All participants then underwent the e-crossing task followed by the MSIT. Those who received the placebo demonstrated greater reaction time variability on incongruent trials of the MSIT than those who received the treatment. Spirada and colleagues argued that

this indicated the attention of placebo participants suffered from reduced attentional control because of depletion via the prior e-crossing task.

This assertion has been contested by Baumeister and Vohs (2016) who failed to see how reaction time variance is involved in response overriding. The root of this diathesis toward disagreement can be found in the lack of a clear operational definition for self-regulatory tasks (Lurquin, & Miyake, 2017). Calls for further studies to clarify which tasks provoke a depletion effect reliable and with a large effect have been practically universal (Hagger et al., 2016). This persistent problem, along with newfound accusations of publication bias overemphasizing the ego depletion effect, (Carter, & McCullough, 2014) provoked one influential researcher to proclaim "I feel like the ground is moving from underneath me and I no longer know what is real and what is not." (Inzlicht, 2016, para. 13).

However, Mollar, Deci, and Ryan (2006) successfully developed a semi-computerized dependent variable to measure ego depletion. They asked participants to hold down the spacebar on a keyboard while crossing out the letter 'e' on a sheet of text according to complex rules. Shorter time spent depressing the keyboard was correlated with greater ego depletion. This mirrored other designs that had participants squeeze a handgrip (Alberts and colleagues, 2007).

Schmeichel adapted his 'a' and 'n' writing task as a computerized independent variable in 2007. This task was used as a dependent variable in the present study. Participants in the depletion group were asked to write a story without using the letters 'a' or 'n' while those in the non-depletion group were merely instructed to write

until the experimenter told them to stop. Those who had to inhibit their responses by avoiding certain letters subsequently recalled fewer digits in reverse order.

In a 2016 study, Maranges, Schmeichel, and Baumeister studied some of the differences between cognitive load and ego depletion effects with a computerized task. Some participants were asked to describe a trip they recently took without using the letters 'a' or 'n' then to describe the day's events without using the letters 'i' or 'o.' Participants spent five minutes writing for each of these tasks and afterward matched target words (e.g., dentist) with either an affectively associated word (e.g., suffering) or a semantically associated word (e.g., brush). The effectiveness of the ego depletion task was not discussed, though if participants wrote significantly fewer characters during the 'i' or 'o' task it would have been indicative of a potential ego depletion effect. Despite the lack of a method check, a significant difference was found where participants who completed the 'a' or 'n' task were more likely to match negative words affectively rather than semantically while positive words were more often matched according to semantics rather than affective associations. Maranges and colleagues used these results to argue that ego depletion primed participants to disinhibit unconscious affective associative mechanisms.

In a recent Master's thesis, Allmond (2013) attempted to demonstrate an ego depletion effect with a modified e-crossing task. He presented participants with a body of text and asked them to re-type the text while following certain rules. Some were instructed to retype 'e' characters that were not adjacent or one letter away from being adjacent to another vowel. Others were told to avoid retyping all occurrences of 'e' characters. This adaptation suffers from the same design flaws (i.e., no simple habit

establishment before the introduction of the complex rules) as Hagger and colleagues (2016) multilab replication. Allmond assessed the effects of his e-crossing task in two ways: by asking participants (1) to depress a key for as long as they liked and (2) to list as many words as they could that began with certain letters. Just as Hagger and colleagues found, there were no significant ego depletion effects.

### **The Nature of Morality**

Cardinal moral theorization proposed that people make choices based on a rational analysis of justice (Kohlberg, 1973). Kohlberg suggested six stages through which people gain increasing rationality. Firstly, the preconventional level is composed of punishment and consequence driven morality (stage one) along with self-interest incentives (stage two). Next, the conventional level comprises those who are motivated to be perceived well (stage three) and those following social convention (stage four). Lastly, the post-conventional level describes individuals who base morality on social contracts for the greater good (stage five) and morality derived from rational, universal ethical principles (stage six). More recent scholars have criticized the monist approach (i.e., the belief that the only force behind moral decision making is a rational analysis of justice) as overly idealistic (Graham et al., 2013).

For example, people are generally able to produce reasons for moral judgements in response to dilemmas involving harm or fairness yet struggle to explain their judgements in response to situations involving sanctity or bizarre behavior (e.g., eating a chicken carcass that had been previously used for sexual gratification; Haidt & Hersh, 2011). This lack of conscious, rational explanation for moral judgements contradicts Kohlberg's paradigm.

Consequently, pluralistic models have been produced in the interest of pragmatically describing moral behavior without regard to how people *ought* to act. One analysis of interviews with Indian informants revealed moral concerns related to three dimensions: autonomy, community and divinity (Shweder, Much, Mahapatra, & Park, 1997). For example, one anecdote described someone getting a job not based on qualification, but because of familial relation. This represented a violation of autonomy, harm, rights, or justice. Another situation relating to trespasses against community (including inter-dependent duty and hierarchy) was described as a father opening and reading a letter addressed to his son without the son's knowledge. Lastly, another informant reported that one of their family members ate beef regularly which represented a sacrilegious transgression against Indian divinity, sacred order, or natural order.

This study along with others (Brown, 1991; Fiske, 1991; Schwartz & Bilsky, 1990; de Waal, 1996) lead to a recent pluralistic paradigm that described five moral foundations (Graham et al., 2011). The affective intuitions of care/harm, fairness/cheating, authority/subversion, loyalty/betrayal, and sanctity/degradation were theorized to be rooted in evolution yet expressed in culturally specific ways. This model proposed that moral actions are largely determined by feelings or intuitions, while logic primarily functions to rationalize past decisions.

To measure these moral foundations, Graham and colleagues (2011) developed the Moral Foundations Questionnaire (MFQ). The MFQ uses two subscales to assess moral opinion: moral relevance (e.g., for care/harm: "When you decide whether something is right or wrong, to what extent do you consider whether or not someone

suffered emotionally?") and moral agreement (e.g., for purity/sanctity: "I would call some acts wrong on the grounds that they are unnatural").

### **Relationship Between Moral Foundations and Political Orientation**

Moral foundations theory can be used to explain differences in political opinion. For liberals, the individual is the foremost moral objective. Individual's safety and ability to thrive are given precedence, even at the cost of group cohesion. For this reason, liberals tend to score highest on the care/harm and fairness/cheating foundations. Graham and colleagues (2011) dubbed these foundations the individualizing set.

Conservatives tend to favor social cohesion and order along with individual rights and, therefore, score more evenly across Graham and colleagues' (2011) five foundations. The three foundations of authority, loyalty, and sanctity that tended to differentiate conservatives and liberals were called the binding set since they function to bind individual's together into a stable group.

More recently a sixth foundation has been theorized: liberty (Iyer et al., 2012). Iyer and colleagues compared libertarians with liberals and conservatives on a number of different moral scales. Libertarians were found to be fiscally conservative yet socially liberal. On the MFQ, libertarians were modestly guided by the individualizing set while largely disregarding the binding set. However, libertarians rated two liberty foundation scales (economic and lifestyle) as far more important than any of the other five. Conservatives also rated the two liberty scales as important, yet liberals only tended to agree with the lifestyle liberty scale. Iyer and colleagues concluded that libertarian morality was unique in several respects from either liberals or conservatives.

## **Contradictory Effects of Ego Depletion on Moral Intuitions**

Recent research on moral decision making has focused on how temporal, affective, or implicit factors influence ethical proclivity (Miller, 2008). For example, one study asked participants to rate the morality of actions described in hypothetical dilemmas (Schnall, Haidt, Clore, & Jordan, 2008). Researchers placed some of the participants in environments that evoked disgust (e.g., a filthy desk or foul smelling area). These researchers thereby examined the influence of affective disgust on responses to moral vignettes. Participants in the disgusting environment expressed more vehement judgements.

Although the link between emotions like disgust and moral responses have been well studied (Ben-Nun Bloom, 2014), only one prior study, to my knowledge, has examined the effect of ego depletion on the MFQ. Wright and Baril (2011) found that depletion decreased conservative participants' scores on authority, loyalty, and sanctity foundations, yet ego depletion did not affect the scores of liberal participants. The authors used these results to propose that conservative ideology might not arise innately, but rather as a form of social cognition. Furthering this claim, they also found that cognitive load also resulted in suppression of the binding set of moral foundations for conservative participants.

If liberalism is more native than conservatism, as Wright and Baril (2011) claimed, then similar methods of assessing implicit impulses should reveal a liberal inclination. Participants intoxicated with alcohol, instructed to respond in a cursory manner, or those rushed by a time limit should more greatly endorse political liberalism. Eidelman, Crandall, Goodman, and Blanchard (2012) tested each of these



categories and found they each resulted in greater endorsement of political conservatism. Furthermore, Eidelman and colleagues also found that cognitive load increased endorsement of conservative ideology. It does not make sense that cognitively overwhelmed participants would endorse explicitly conservative ideology while responding to moral issues in a typically liberal way.

### **The Present Study**

The goals of the present study were to: further examine the influence of ego depletion and political orientation on moral judgement and appraise the presence of a computerized ego depletion effect. The e-crossing procedure was used as the independent variable while moral foundation vignettes (MFVs; Clifford, Iyengar, Cabeza, & Sinnott-Armstrong, 2015) assessed subsequent moral judgement. Schmeichel's 'a' and 'n' task (2007) was used as a dependent measure of the ego depletion effect.

Considering the similarity between designs, Wright and Baril's (2011) findings were expected to be replicated with depleted conservatives scoring lower on the binding set of foundations compared to non-depleted conservatives. Furthermore, I expected for the e-crossing procedure to produce evidence of an ego depletion effect as this is a prerequisite for the previous hypothesis.

## CHAPTER II

### Methods

#### Participants

Two hundred thirty-six college students, 18 and older, consented to participate in a study “designed to test how fatigue, moral judgement, and moral behavior relate to one another” for class credit. Participants met at an on-campus computer lab in group sizes between 10 and 35 students.

Planned power analysis determined that a sample size of 278 participants would be necessary to reveal a small effect ( $d = .3$ ; Cohen, 1988) with an 80% likelihood for a one-tailed  $t$ -test with two groups.

Exclusionary criteria were largely the same as used by Hagger and colleagues (2016): participants who were under 18 (none), participants who did not complete the study or fail to follow instructions (19 from control group and 14 from experimental group, midway through the study), who experienced equipment failure or experimenter error (eight exclusions), and who did not report English as their first language (18 exclusions). However, unlike Hagger and colleagues who instituted a rule that participant sex ratios be no more biased than 20%, gender ratios were not relevant to data collection cessation.

Demographic data for the final post-exclusion sample of 177 ( $M_{age} = 19.2$ ,  $SD = 1.76$ ) is listed in

Table 1. Although, a sample of 210 was used to make comparisons on the ego depletion effect, which was tested before 33 participants failed to finish the remaining survey items.

Table 1  
*Participant Demographic Frequencies*

Demographic	Descriptor	<i>n</i>
Age	18	94
	19	35
	20	23
	20-29	25
Gender	Female	136
	Male	41
Ethnicity	African American	58
	Asian American	2
	White, Hispanic	44
	White, non-Hispanic	67
	Other	6
Religion	Christianity	136
	Islam	2
	None (atheism)	26
	Other	12
	Paganism	1

(continued)

Demographic	Descriptor	<i>n</i>
Political identity	very liberal	14
	liberal	28
	slightly liberal	21
	moderate/middle of the road	31
	slightly conservative	11
	conservative	18
	very conservative	5
	don't know/not political	41
	libertarian	5
	other	3

### Measures and Materials

Psytoolkit (Stoet, 2010; 2017) was used to conduct the present study. Psytoolkit is a website used to design and host experiments and is freely available for non-commercial researchers. Informed consent was obtained and the following information was disseminated to participants according the American Psychological Association code of ethics (2010): duration, procedure, and purpose of the research, rights of the participant, potential risks and benefits of participating, confidentiality, contact information for further questions or complaints, and a statement that participants are able to stop whenever they like without losing any benefits to which they would otherwise be entitled.

**E-crossing depletion task.** In this task, participants were shown a series of words and asked to press a button on their keyboard depending on the presence of the letter “e”. It is called a “crossing task” because originally this procedure was done using pencil and paper where participants would physically cross out the letter (e) as it appeared according to instructions (Baumeister, Bratslavsky, Muraven, & Tice, 1998). The first computerized version of this task demonstrated a depletion effect (Sripada, Kessler, & Jonides, 2014), yet had a few differences in sample selection and procedure (Sripada, Kessler, & Jonides, 2016). In accordance with past usage (Hagger et al., 2016; Sripada, Kessler, Jonides, 2014), each word was presented one at a time for 1.5 seconds followed by a response window of 1.5 seconds.

The e-crossing task was selected to induce ego depletion in participants for two reasons: a self-regulation meta analysis (Hagger, Wood, Stiff, & Chatzisarantis, 2010) found that this task had one of the largest effect sizes among the various depletion strategies, and the usefulness of this procedure has recently been called into question.

To further investigate these complaints, the present e-crossing procedure was computerized, yet included a simple rule learning task before the complex rule was implemented. To accomplish this, a new set of 150 words was developed and matched to the old set in ratio of words containing and lacking the letter ‘e.’ Words were carefully selected to avoid affective priming as well. While other plans to replicate the ego depletion effect using the e-crossing task elected to re-use the same set of words twice (Ireland, Feger, & Wasilewicz, 2016), a novel set was used in the present study to allow for participant and control groups to take a similar amount of time on the task, better maintain participant interest, and prevent learning effects. Participants in the

experimental group first progressed through all 150 newly developed words according to simple instructions (i.e., press “e” whenever you see a word that contains the letter “e”) then through the previously developed 150 words according to the complex instructions (i.e., press “e” whenever you see a word that contains the letter “e” that is not adjacent or one letter away from being adjacent to another vowel). Participants in the control group progressed through both sets of 150 words according to the simple instructions. This design was intended to provoke participants in the experimental group to override their previously learned responses in order to accomplish the more difficult task. This method of ego depletion is similar to other habit breaking activities like removing soft drinks from a diet, completing a Stroop task, or even a garrulous jury member having to maintain confidential information.

Complex instructions can be more easily misunderstood in a computerized format (Crump et al., 2013). Therefore, in accordance with recommendations from Finley and Penningroth (2016), 20 practice trials were included after each of the two instruction screens to alleviate the risk of participants failing to understand instructions. After each practice trial, participants were presented with either the word “correct” in green or the word “wrong” in red for 1.5 seconds depending on their response.

**Moral Foundation Vignettes.** A new assessment has been developed for measuring values according to moral foundations theory (Clifford, Iyengar, Cabeza, & Sinnott-Armstrong, 2015). The MFVs describe 90 brief scenarios written from a second-person bystander’s point of view. Participants are then asked to rate the immorality of the actions being observed on a five point scale. While numerous studies have validated the MFQ (Davies, Sibley, & Liu, 2014), few studies have used MFVs. The primary

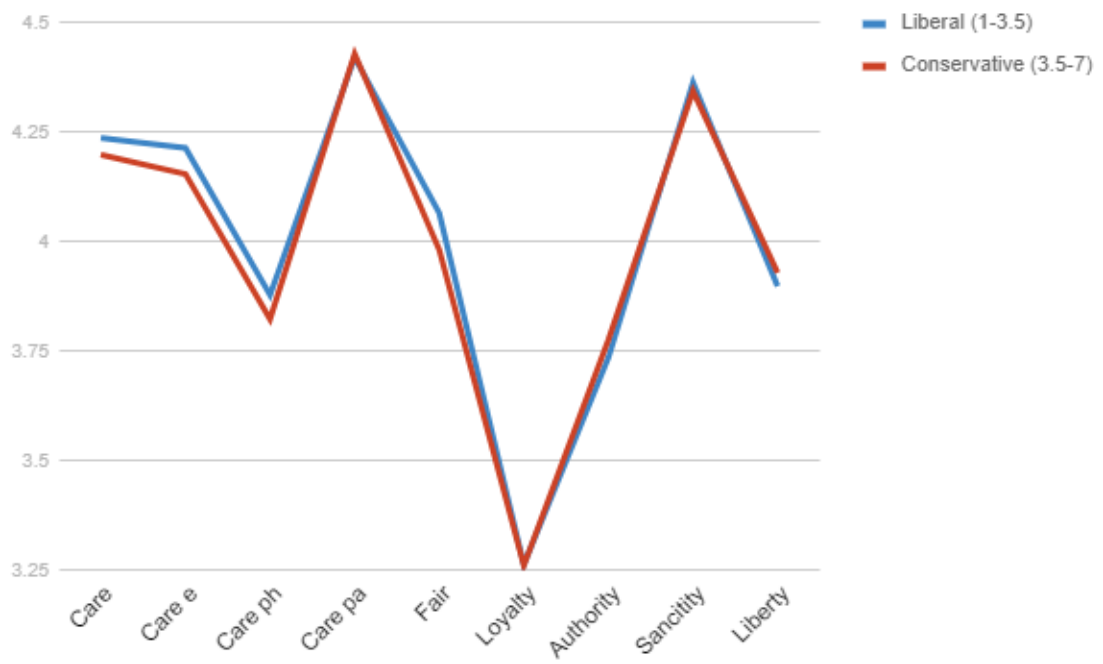
reason MFVs were chosen over the MFQ, is that the MFVs naturally includes items related to the liberty foundation. MFQ style items exist for the liberty scale, but are not naturally included in the MFQ (Iyer et al., 2012). One reason Wright and Baril's (2011) work warranted replication is because they did not measure a liberty foundation as it was not existent at the time.

The MFQ requires participants to think abstractly and generally, while MFVs ask for more concrete judgements. Ego depleted participants tend to prefer concrete tasks to abstract ones (Wan & Agrawal, 2011). It is unclear whether this preference would bias ego depleted participants results on MFVs relative to other assessments of moral intuition. Consequently, the presence of a dependent variable that does not further contribute to depletion effects could be beneficial in reducing dropout rates and maintaining participant interest. Lastly, there have been accusations that the MFQ artificially increases political divergence via items related to specific, controversial issues (Frimer et al., 2013). For this reason, it would be useful to have a larger set of items to reduce the potential bias that any one item represents.

**'A' and 'N' self-regulatory task.** This secondary self-regulatory task assessed the effectiveness of the e-crossing procedure. Participants were asked to describe a trip that they've taken without using the letters 'a' or 'n'. They were given a maximum of ten minutes to write as much as they like. Ego depleted participants were expected to write fewer characters than their non-depleted colleagues. The incidence of errors was also evaluated as part of exploratory analysis.

**General questionnaire.** A general demographic questionnaire concluded the experiment. Questions were related to: age, ethnicity, gender, education, family income,

and occupation. Additionally, participants were asked to rate their general, social, and economic political preference on a scale of one (strongly liberal) to seven (strongly conservative). Using this index, 82 conservatives were identified as scoring above 3.5, while 95 participants who scored between 1 and 3.5 were deemed liberals. This division was used to calculate Figure 1 and Figure 2.



*Figure 1.* Political Orientation by Moral Judgement Ratings for Control Group.



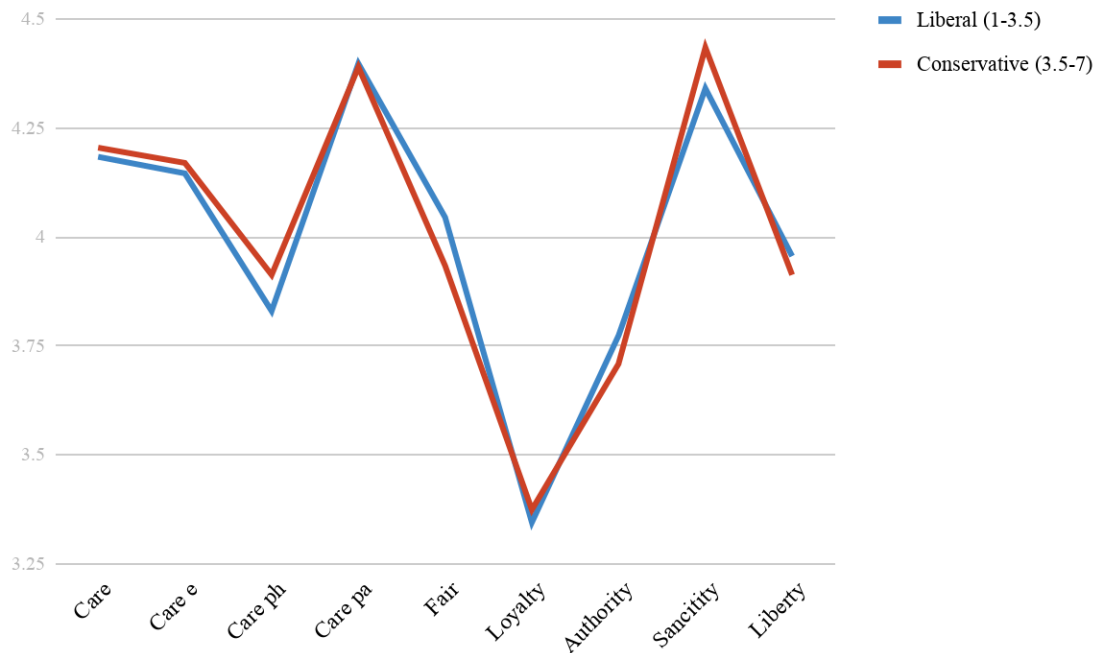


Figure 2. Political orientation by moral judgement ratings for experimental group.

It is also important to not merely use a dichotomous scale between liberal and conservative since this can disregard libertarians (Iyer et al., 2012). Therefore, participants were also asked to categorically identify themselves as either: very liberal, liberal, slightly liberal, moderate/middle of the road, slightly conservative, conservative, very conservative, don't know/not political, libertarian, or other. Unfortunately, there were not a sufficient number of libertarians ( $n = 5$ ) to conduct meaningful statistical analysis.

### Procedure

All tasks and questionnaires were presented in a computerized format; however informed consent was obtained via paper handouts so as to maintain anonymous responses. Other general benefits include: ease of administration, larger sample sizes, diverse sampling, and alacritous data collection (Finley & Penningroth, 2016).

Once participants elected to engage in the present study, they were directed to sign up for a timeslot in a reserved computer lab. Upon arrival, participants were presented with information about the experiment and given the opportunity to give consent. Along with the consent form, participants were randomly given a slip of paper that contained their seat number and a URL for the study. Two different URLs were printed on the paper slips: one for the experimental group and one for the control group. Upon typing in the URLs, they were asked their age on a sliding scale from 18 to 30 and if English is their first language to ensure they were able to participate. Next, they completed the e-crossing task and were asked to rate effort (“How much effort did you put into the task?”), difficulty (“How difficult did you find the task?”), fatigue (“How tired do you feel after doing the task?”), and frustration (“Did you feel frustrated while you were doing the task?”) on a seven point scale as a brief and commonly used manipulation check (Hagger et al., 2016).

Next, participants rated the morality of various vignettes. The vignettes were presented semi-randomly with 15 vignettes per page. Each page always contained the same vignettes, yet the order they were listed on the page was randomized for each participant. If one of the participants finished this task before the others they were directed to wait and not take out their phones or open any other computer tabs. Following this measure of moral judgement, participants completed the 'a' and 'n' task. A demographic questionnaire followed the experimental tasks to measure political orientation among other general attributes. The presentation of all demographic questions was randomized for each participant.

## CHAPTER III

### Results

Though Wright and Baril (2011) found greater reliability in removing social political orientation from the political orientation index, Cronbach's alpha ( $\alpha = .91$ ) was greatest for our data when including all three measures: general, social, and economic,  $M = 3.5$ ,  $SD = 1.6$ .

#### Ego Depletion

First, a one tailed, between groups  $t$ -test failed to reveal a significant difference between those who were shown complex e-crossing instructions ( $M = 262$ ,  $SD = 127$ ) and those who were merely shown simple e-crossing instructions ( $M = 246$ ,  $SD = 118$ ) on number of characters typed during the 'a' and 'n' task,  $t(208) = -.96$ ,  $p = .34$ ,  $d = .13$ . Despite this, significant differences between ratings of effort, difficulty, and frustration were present between complex and simple task groups as described in Table 2. Ratings of fatigue and the number of errors that participants made on the writing task (i.e., including an 'a' or an 'n') did not differ significantly between control and experimental groups.

Table 2  
*Mean Comparison on Effectiveness of Ego Depletion Task*

		<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
Effort	control	109	4.51	1.93	-3.75	.000	0.524
	experimental	101	5.45	1.65			
Difficulty	control	109	1.76	1.24	-12.07	.000	1.661
	experimental	101	4.10	1.56			
Tired	control	109	4.22	2.12	-1.52	.130	0.209

(continued)

		<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
	experimental	101	4.65	2.00			
Frustrated	control	109	2.71	1.91	-6.80	.000	0.940
	experimental	101	4.51	1.92			
Total errors	control	109	4.90	7.68	.13	.900	0.018
	experimental	101	4.77	6.87			

Furthermore, following Dang (2016), multiple regressions were used to compare the interaction of the manipulation check items (effort, fatigue, difficulty, and frustration) and depletion condition on character count. No significant interactions or main effects were found.

To test the hypothesis that depleted participants may have been writing the same amount as control participants, yet with an increased error rate, a method was devised to discount the number of characters written. Seventeen characters were deducted from participant's scores on the 'a' and 'n' task for every error they made. This amount was chosen as it is the standard deviation of number of characters written (122.16) divided by the standard deviation of the number of total errors (7.28). Scores that would have become negative as a result of this deduction were simply set to zero. A *t*-test using this discounted character count also failed to reveal a significant difference between experimental and control groups,  $t(204) = -1.1913$ ,  $p = 0.2349$ ,  $d = .17$ . Table 2 details the mean number of errors for each group.

An alternative to way to measure depletion, rather than the sequential-task paradigm, could be to measure performance in the e-crossing task over time (Madeline et al., 2017). To this end, a simple linear regression was calculated to compare reaction time on words that were correctly identified as containing a "lonely e" and the position of

that word within the task. These were the words that were shown with complex instructions after the simple, habit-forming phase for those in the experimental group. It took participants significantly longer to correctly identify these words at the beginning of the task compared to words shown towards the end of the task,  $\beta = -0.5045$ ,  $t_{(4805)} = -5.86$ ,  $p \approx 0$ ,  $R^2 = .007$ . Figure 3 displays this graphically along with the variability of the reaction time data.

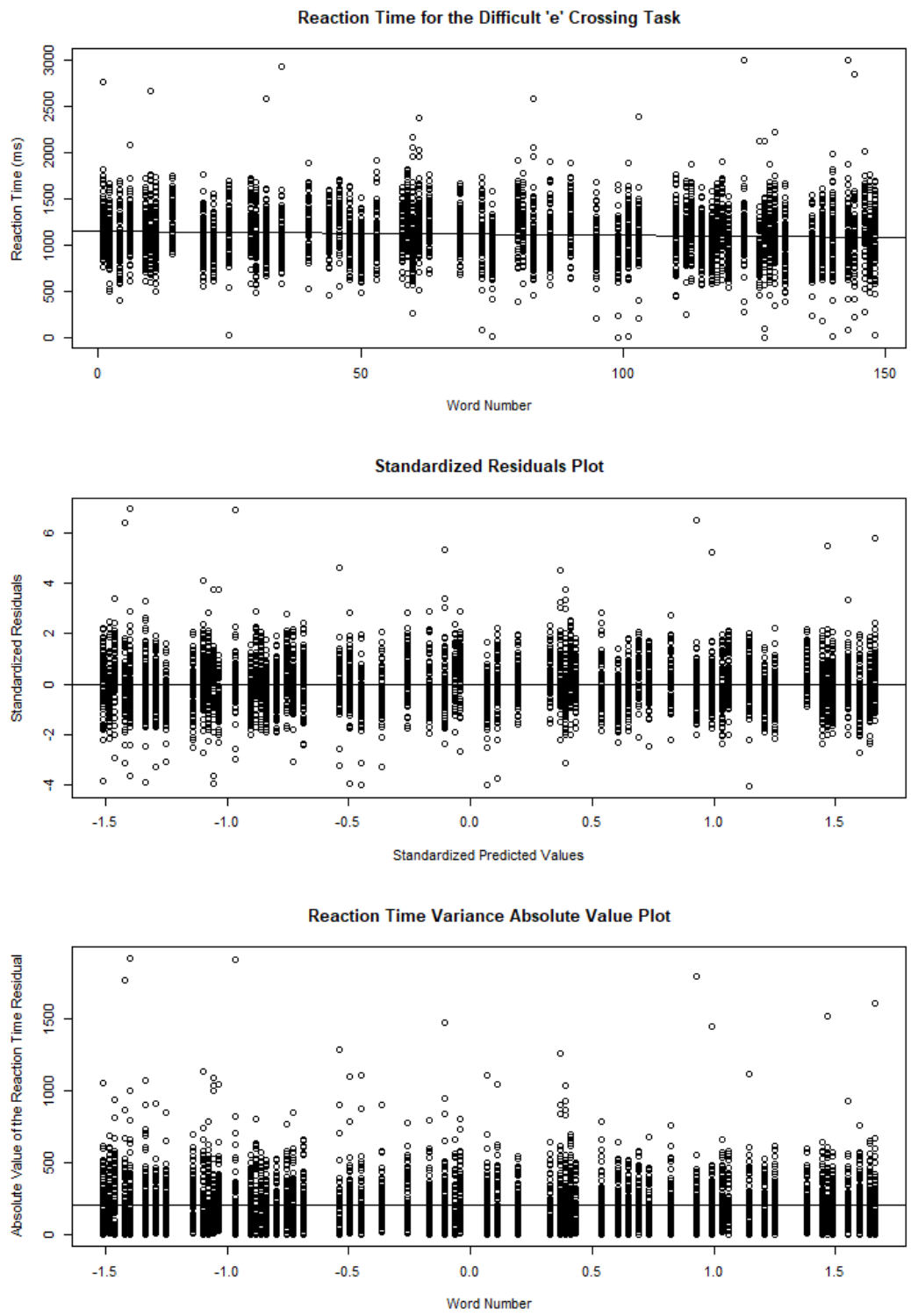


Figure 3. Reaction time and reaction time variability for words correctly recognized as containing a “lonely e”. Reaction time significantly, but with a very small effect size ( $R^2 = .007$ ), decreased over the course of the task and reaction time variability (i.e., standardized residuals) shows little change as well.

### Predictors of Moral Foundations

Next, simple linear regressions using the ordinary least squares method were used to evaluate the relationship between moral foundations and political orientation in both the control and experimental groups. Political orientation failed to be a useful predictor of ratings on any moral foundation as described in Table 3. Figures 1 and 2 also illustrates that variability between the foundations was much greater than variability between political orientation for both control and experimental conditions.

Table 3  
*Simple Linear Regressions for Moral Foundations by Condition and Political Orientation*

		Unstandard Coef.					
		$\beta$	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>p</i>	$R^2$
Care	control	0.00	0.03	-0.00	-0.01	0.99	0.000
	experimental	0.03	0.04	0.09	0.82	0.42	0.008
Care(e)	control	0.01	0.03	0.03	0.26	0.79	0.001
	experimental	0.04	0.04	0.10	0.94	0.35	0.010
Care(pa)	control	-0.01	0.03	-0.05	-0.45	0.65	0.002
	experimental	0.01	0.05	0.03	0.28	0.78	0.001
Care(ph)	control	-0.01	0.05	-0.03	-0.25	0.80	0.001
	experimental	0.04	0.06	0.08	0.77	0.45	0.007
Fair	control	-0.04	0.03	-0.13	-1.22	0.23	0.017
	experimental	-0.01	0.03	-0.02	-0.18	0.86	0.000
Loyalty	control	0.03	0.04	0.07	0.69	0.49	0.005
	experimental	0.06	0.05	0.13	1.17	0.25	0.016
Authority	control	0.01	0.04	0.03	0.25	0.81	0.001
	experimental	0.00	0.04	0.01	0.10	0.92	0.000

(continued)

		Unstandard Coef.					
Sanctity	control	-0.02	0.03	-0.05	-0.48	0.63	0.003
	experimental	0.06	0.04	0.18	1.67	0.10	0.032
Liberty	control	-0.01	0.04	-0.04	-0.40	0.69	0.002
	experimental	0.01	0.04	0.04	0.33	0.75	0.001

*Note.* Regression equations were calculated with non-zero intercepts; however, these intercepts were not included as they were not meaningful.

A multiple linear regression was calculated to predict binding set scores based on experimental grouping, political orientation, and the interaction between the two. An ANOVA failed to verify the usefulness of the model  $F(3,173) = 0.53, p = .66, R^2 = .009$ .



## CHAPTER IV

### Discussion

#### Overview of Results

The present study provided no evidence for: an ego depletion effect, a main effect of ego depletion on moral judgement, a main effect of political orientation on moral judgement, or an interaction between the two on moral judgement.

Foremost, the complex ego depletion task was frustrating, effortful, and difficult, yet it did not seem to discourage persistence on the writing task. What's more, participants actually seemed to improve their performance in the complex e-crossing task via slightly reduced reaction time which is the opposite of what we would expect had depletion been present. Participants who completed the complex e-crossing task did not write fewer words, characters, or make more errors on the subsequent 'a' and 'e' task compared to those who only received simple e-crossing instructions. Lastly, political orientation was largely uncorrelated with moral judgement.

#### Comparisons and Implications with Similar Ego Depletion Studies

Direct evidence for an ego depletion effect was not observed, despite the task including Baumeister and Vohs' (2016) recommendations. Hagger and colleagues' (2016) design differed from past usage of the e-crossing task in three ways: It did not include a habit-forming phase, it was computerized rather than on paper, and the text was the same size for both conditions. Since the present study included a habit-forming phase, this can be ruled out as an explanation for why depletion was not observed.

Several explanations can account for the lack of evidence for ego depletion. Most obvious, the ego depletion effect could be an erroneous result of publication bias (Carter

& McCullough, 2014). Participant beliefs about willpower has also been found to moderate the ego depletion effect (Veronika, Gregory, Katharina, & Carol, 2013). Finally, blood glucose has been largely rejected as a potential explanatory mechanism (Lurquin, & Miyake, 2017).

It may be that ego depletion is not easily expressed in computerized designs (Allmond 2013). Perhaps computerized designs are inherently less fatiguing than pen and paper. This has been disputed by Madeleine and colleagues (2017) who found that various computerized versions of the e-crossing task still elicited decreasing performance over time ( $\eta_p^2 > 0.22$ ).

Depletion studies in a lab involve face-to-face interactions with a researcher while some computerized designs do not. It seems reasonable that participants may be more obedient, open to following the suggestions of a person in front of them rather than words on a computer screen. Perhaps willpower fatigue has been conflated with experimenter goodwill from the beginning. Maybe it was not willpower but willingness to follow instructions that was being depleted.

If this is the case, then participants ought to demonstrate less observable “depletion” when they have a great deal of goodwill toward their experimenter. Goodwill could be increased by positive reinforcement like treats or could be influenced by social factors (e.g., in-group/out-group membership). Consider the example of a shopper who visits two different stores. One store offers: friendly, attractive employees, free samples, and a customer rewards program. At the other store: the employees are inattentive, the store layout is confusing, and no one recognizes the shopper despite them being a repeat customer. Would we be surprised to find the shopper cleaning up after

themselves at the first store but not the second? For example, they may decide they no longer want several goods and merely leave them at the register rather than putting them back where they got them. Slovenliness could be depicted as a lack of self-regulation, but it could also be a lack of goodwill to the store.

It may be that this e-crossing task in particular fails to elicit depletion where other tasks succeed. However, this seems unlikely as this task was chosen particularly because of its large effect size and past replications. The primary methodological differences between the present version and past usage is (a) the computerized design and (b) lack of differentiation in word readability between control and experimental groups. These differences do not seem sufficient to account for a null result, particularly without theoretical explanation as to why.

It may be that the e-crossing task successfully resulted in ego depletion, but the 'a' and 'n' task was not a useful dependent measure. Perhaps participants were discouraged from stopping early on the writing task because the alternative of waiting quietly for everyone else to finish was not appealing. Under ideal conditions (i.e., no waiting on other participants), this task should function as a fine, though untested, dependent measure of depletion. Problems in defining and explaining the tasks that provoke ego depletion leave many unanswered questions (Lurquin, & Miyake, 2017).

However, there are some scenarios that could have invalidated the present study. Many participants had to wait several minutes following the MFV questionnaire so that the entire group could start the 'a' and 'n' task together for the sake of timing. There are numerous situations that can restore someone to a non-depleted state (Tice, Baumeister, Shmueli, & Muraven, 2007). It's entirely possible this unintentionally

happened here as well. Aside from this post-depletion wait, some of the more absurd or humorous MFV items (e.g., “You see an employee at a morgue eating his pepperoni pizza off of a dead body.”) could have had the same effect. The simple version of the e-crossing task may have been too easy and therefore prompted participants to disregard instructions or put forth little effort later in the study.

### **Comparisons and Implications with Similar Moral Foundation Studies**

Neither Graham and colleagues (2011) nor Wright and Baril’s (2011) results were replicated. Liberals and conservatives scored much the same on each of the foundations. Clifford and colleagues (2015) used MFVs to replicate the positive relationship between conservatism and the binding set displayed in the MFQ. However, puzzlingly, this relationship was nonexistent in the present study. Furthermore, subsequent use (Voelkel, & Brandt, 2017) of the MFVs has confirmed the relationship,  $\beta \approx .25$ , between political orientation and the binding set. Why would other studies that used MFVs show a substantial correlation with political orientation that the present study lacks?

Perhaps differences in sampling could explain this discrepancy. Graham and colleagues (2011) and Clifford and colleagues (2015) both used an internet based, nationally represented sample. Voelkel & Brandt (2017) also only used 30 items out of the 90 total that compose the MFVs for the sake of expediency.

### **Conclusion**

The present study contributed to the body of evidence explaining when ego depletion does and does not occur. This study along with the research conducted by

Madeleine and colleagues (2017) provided evidence to reject the hypothesis that a habit forming phase is first necessary before ego depletion can occur.

Moral judgements are one particularly important area that may be influenced by ego depletion. For example, jurors and national leaders hold sway over the lives of offenders and citizens respectively. Temporary fatigue in these individuals could cause lasting harm for those subject to their moral decisions, so it's important to understand not only a mechanistic account of ego depletion but also the factors that ego depletion could moderate. However, these factors can not be reliably examined until we gain a better understanding of why and how ego depletion occurs.

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## VITA

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### Education

- Sam Houston State University** May 2018  
 Master of Arts in Clinical Psychology GPA: 3.80
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### Experience

#### **Graduate Teaching Assistant – Forensic Psychology**

- Sam Houston State University* August 2015 – May 2018
- Topics included: Mental illness in offender populations, eyewitness testimony, cognitive interviewing
  - Strengthened writing ability by grading undergraduate papers and tutoring via online discussion posts
  - Gained experience using online educational software (Blackboard and Turnitin)

#### **Resident Advisor**

- Texas A&M University* August 2013 – May 2015
- Promoted excellence and diversity through programming and individualized leadership
  - Understood and participated in duty reporting chain and on-call rotation schedule
  - Worked in a 15-person staff that addressed resident's needs as a team

#### **Library Student Worker**

- Texas A&M University* September 2011 - August 2013
- Worked as part of a team in a highly active area – Media and Reserves Desk
  - Utilized specialized classification systems in both print and digital formats
  - Responsible for preparation and management of 4 technology rooms where classes would host media viewings

### Volunteer and Leadership Experience

- Intern at Holliday Unit** Fall 2016
- Observed the process of initial psychological evaluation for offender populations
  - Diversified cultural competency by working 50 hours with a client population for which I had no prior experience
- Texas A&M Philosophy Club** 2011 - 2015
- Directed organization by holding positions of webmaster (1.5yrs) and vice-president (2yrs)
  - Presented topic / led discussion at one meeting every semester for all 7 semesters that officer position was held

### Skills:

Psychological Assessments: IQ/achievement tests, MMPI, career inventories  
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