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Jeffrey Glas

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MENTAL EFFORT AND POLITICAL PSYCHOLOGY: HOW COGNITIVE RESOURCES  
FACILITATE COLLECTIVE ACTION AND POLITICAL REASONING

by

JEFFREY M. GLAS

Under the Direction of Toby Bolsen, PhD

ABSTRACT

Political scientists have largely overlooked the issue of effort. It is a seemingly simple concept with great implications for the study of political behavior. With intuition alone we can often classify behaviors as more or less effortful. And many of the behaviors that interest political scientists concern this fundamental concept, but, somehow, we have failed to formally incorporate *effort* into our theories. Indeed, normatively speaking, citizens will engage the democratic process effortfully, not effortlessly. But what makes a behavior more or less effortful? How does the amount of effort expended in pursuit of a behavior affect the likelihood of actualizing that behavior? To answer these questions I have developed a resource model of political cognition which posits that effortful behaviors are essentially fueled by a limited, but renewable, supply of cognitive resources. In this dissertation I report the results of a series of experiments in which I apply the resource model to collective action behaviors as well as information processing. The results suggest that these behaviors, and mostly likely others as well, are, to a significant degree, dependent upon the sufficient availability of cognitive resources.

INDEX WORDS: political cognition, collective action, motivated reasoning, heuristic processing

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by

JEFFREY M. GLAS

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

in the College of Arts and Sciences

Georgia State University

2015

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2015

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## DEDICATION

*for Christina*

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# 1      **CHAPTER 1: INTRODUCTION: TOWARD A RESOURCE MODEL OF COGNITION**

Democracy is not an easy goal for a People to accomplish. And this may be, in large part, because citizens are human; a condition that carries with it limitations, both physiological and psychological. For any democracy to form and sustain itself a critical portion of a public must be willing and engaged in the political process. But life in such a society is not solely based on that society's politics. For a vast majority of the public in any advanced nation-state politics are a peripheral interest, at best, that is prioritized somewhere after the workload accompanying any occupation, education, parenthood, and recreation. Underlying all of these social and political behaviors, though, is cognition. Cognition comes in many forms; this dissertation, and the theory advanced throughout, focuses on the role effort and the availability of cognitive resources, which are literally conceptualized in this theory as a form of fuel which facilitates effortful psychological processes, affect collective action behaviors and political reasoning. And this is of great importance considering the participatory demands and thought processes involved in democratic life: they can be difficult for many individuals to overcome. At the end of the day, after meeting life's demands, the average person will largely be depleted of their cognitive resources and not able to devote the amount of effort to political life that normative theories of democracy proscribe. And when aggregated across a population it is truly a miracle that entire nations have sustained democratic forms of government for any period of time.

Political science has largely overlooked the issue of effort (Kuklinski et al 2001; Lavine et al 2012). Classifying behaviors as effortful or effortless is nothing new in political psychology. Even within research programs it is not difficult to intuitively classify some behaviors as effortful and others as effortless, relatively speaking (Leeper and Slothuis 2014). For example, most of the more normatively appealing models of political reasoning, like rational choice theories of decision making,

assume that people conduct in-depth information searches, carefully weighing and considering evidence/information, and discounting extraneous details in the process of forming an opinion about a political actor or policy or when they are deciding whether or not to vote in an upcoming election (Downs 1957; Riker and Ordeshook 1968; Habermas 1994). Certainly some people may try to behave this way some of the time, but doing so is a very effortful enterprise that does not realistically explain individual-level political behavior. What has increasingly become clear is that people commonly figure out ways to expend little effort, effectively simplifying their reasoning processes (Markus and Converse 1979; Quattrone and Tversky 1988; Lupia, McCubbins, and Popkin 2000; Lau and Redlawsk 2006). Many of the behaviors that interest political scientists concern this fundamental concept, but, somehow, we have failed to formally incorporate *effort* into our theories. But what makes something more or less effortful? How does the amount of effort expended in pursuit of a behavior affect the likelihood of committing to such a behavior?

Dictionary.com (2014) defines effort, foremost, as the “exertion of physical or mental effort,” but also, more mechanically, as “the force or energy that is applied...for the accomplishment of useful work.” More effortful behaviors should result in the expenditure of more energy (cognitive resources) than less effortful behaviors. Just as running a mile burns more energy than sitting on the couch and watching television, so too should more effortful mental/psychological activities expend more energy than less effortful activities. This should mean that effortful behavior is dependent on resources availability. In this dissertation I develop a theory of resource based cognition in which political behaviors, such as cooperation and political reasoning, are facilitated by the availability of cognition resources. And, theoretically, any effortful behavior relies on the availability of these cognitive resources; the more effortful a behavior, the energy (cognitive resources) must be devoted toward the actualization of that behavior. Consequently, though, the availability of cognitive resources should significantly influence the types of behaviors

people actually perform. Such behaviors as cooperation and elaborate political reasoning should rate as relatively high on a hypothetical continuum of effort. Being among the most important of behaviors in democratic society, the role cognitive resources play in fueling such behaviors should be of great interest to political scientists. In the following section of this chapter I elaborate upon the *resource model of political cognition*, citing research from various literatures I have used to construct the theory. And in the last section of this introduction I offer an overview of the empirical chapters of this dissertation.

### **1.1 *The Resource Model of Political Cognition***

The idea of resource based cognition is not exactly a novel idea. Cognitive resources have been proposed to fuel psychological activities for decades, but a comprehensive theory has never quite been pieced together to offer a clear picture of what cognitive resources are and how they work. Cognitive resources are essentially a form of fuel that powers effortful psychological processes. Just as the calories a person consumes fuel physical activity, cognitive resources fuel mental activity. And similar to calories and physical activity the relationship between cognitive effort and energy consumption is assumed to be positive; that is, the more energy available the more effort a person is capable of putting forth and more effortful behaviors expend more energy than relatively effortless behaviors. Unlike calories, however, cognitive resources are not directly measurable<sup>1</sup>; like many other concepts in psychological research they are instead inferred by their manipulation in experimental research and subsequent changes in observable behavior. One of the intriguing things about cognitive resources is that researchers can experimentally manipulate an individual's cognitive resource levels upward or downward in addition to observing people in their natural states of cognitive depletion, replenishment, or normality. But the resource model of

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<sup>1</sup> Though recent work in physio-psychology has made some promising advances linking blood-glucose levels and self-regulatory behavior (Gailliot and Baumeister 2007; Gailliot, Baumeister, and DeWall 2007; Masicampo and Baumeister 2008).

political cognition is primarily interested in explaining how effort and cognitive resources affect political behavior and draws from the findings of self-regulation research, cognitive load theory, and the cognitive miser tradition that has gained so much traction in social science research. The result of this endeavor is the development of a theory of cognition based on the availability of scarce, but replenishable, cognitive resources, which are expended by psychological/mental effort and strategically used. In the paragraphs below I will begin with an explanation of the limited strength model of self-control as well as its merits and deficiencies. I will then outline how the resource model applies to a broad scope of behaviors, paying close attention to existing psychological theory that has informed the development of the resource model.

Self-regulation is most commonly defined as the individual's ability "to override natural and automatic tendencies, desires, or behaviors; to pursue long-term goals, even at the expense of short-term attractions; and to follow socially prescribed norms and rules" (Bauer and Baumeister 2011, pp. 65). The primary interests of researchers in this area are the conditions under which individuals will succeed or fail to effectively self-regulate their behavior. Many of the ills of society, such as the drug and obesity epidemics, academic underachievement and interpersonal aggression, are rooted in the aggregation of individual self-regulation failures<sup>2</sup> (Tangney et al 2004). Often these issues are only thought of in terms of individual choices and the consequences people pay for their actions, or inaction, but social scientists have become ever more aware of the stress placed on public infrastructure when these 'individual issues' reach critical levels in the population. Democratic governance relies heavily on the ability of citizens to self-govern. Indeed, the freedom to self-govern is one of the attributes that distinguishes democratic from totalitarian forms of government. In this sense self-governance and self-regulation are often synonymous. But when large groups of individuals fail to self-regulate we collectively suffer the consequences in the form of higher costs

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<sup>2</sup> Self-regulation failures (or self-regulatory failure) refer to individual failures to behave in accord with stated goals, social norms, and socially desirable ways.

associated with accessing/providing the infrastructure that makes modern life possible: healthcare, energy, clean air and water, safe neighborhoods, and an educated workforce and citizenry, just to name a few. In other words, self-regulation behavior, when aggregated across individuals in a community, plays pivotal role in the smooth functioning of society:

“effective self-regulation is also necessary to restrain selfish wishes that could threaten group interests, to curb aggressive impulses that can undermine prosocial goals, and to overcome natural proclivities that are inherently self-interested for a greater collective good” (Bauer and Baumeister 2011, pp. 64).

The limited strength model posits that effective self-regulation relies heavily on the availability of sufficient *self-regulatory strength*, or, more colloquially, *willpower*. This model of self-control recognizes that most people are not oblivious to personal and social standards, but they often fail to “live up” to those standards. There are many reasons why this may be, but at least some of the time self-regulatory failure simply occurs because the individual lacks the willpower necessary to act as intended. In this literature, willpower is conceptualized as literally a type of energy, or fuel, that people expend when engaging in self-regulatory behaviors. After an act of self-regulation one’s store of willpower is at least partially depleted, this phenomenon is referred to in the literature as *ego-depletion*: *ego* as in Freud’s term for the “self,” *depleted* as in reduced capacity (reduced regulatory strength). Thus, when someone is ego-depleted they have a temporarily “diminished capacity to regulate their thoughts, feelings, and actions” because they have less regulatory strength available to use for self-regulatory behaviors (Baumeister and Tierney 2011, pp. 29). As an analogy, the ego-depletion phenomenon is often compared to the use of a muscle: just as a muscle becomes fatigued and will fail to work at optimal levels after a period of exercise, so too does an individual’s self-regulatory strength begin to fail after it is used. After exercising self-control in one situation one

is left with less strength to exercise self-control in a subsequent situation; the expectation being an increased likelihood of self-regulatory failure in the second situation.

There are some desirable qualities to the limited strength model research agenda, indeed it has been the primary inspiration for the development of the resource model of political cognition, but there are also issues that remain unresolved. The published research consistently demonstrates the validity of the limited strength model, but in recent years these researchers have begun to stretch the concept of self-regulation in a way that does not entirely make sense. This has happened in two different ways: first, researchers of the limited strength model have begun to use alternative, physiological, manipulations to vary regulatory strength in participants; secondly, the dependent behaviors observed in experimental and observational settings have broaden considerably. Both of these developments carry implications for the study of human behavior beyond self-regulation. The physiological manipulations referred to above involve the researchers manipulating attributes that are not, in and of themselves, acts of self-control. These experimental treatments involve the depletion, maintenance, or replenishment of blood-glucose levels. These particular studies began with the publication of Gailliot et al (2007) in which the researchers accidentally<sup>3</sup> made a connection between an individual's blood-glucose level and their ability to self-control. One of the major conclusions I have drawn from this study, and the dozens that have followed, is that this abstract concept of *ego*, or self-regulatory strength, is not the only thing that impacts an individual's ability to engage in acts of self-control. If acts of self-control as well as blood-glucose levels have such a significant impact on self-regulation, then why shouldn't other behaviors have a similar depleting effect? Moreover, why should this phenomenon be limited to self-regulation? Masicampo and

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<sup>3</sup> Researchers back then would often measure the amount of a good or bad tasting beverage a participant was willing to eat/drink to gauge levels of self-control. It just so happened that the 'good' tasting beverages all contained sugar (glucose) while the 'bad' tasting beverages did not. Subsequent analysis showed that sugar was a confounding factor after which the causal link between blood-glucose levels and acts of self-control became formally established with the Gailliot et al (2007) study.

Baumeister (2008) used blood-glucose variation to show how people can be influenced into exhibiting the attraction effect<sup>4</sup>. An earlier study by Schmeichel et al (2003) suggests that ego-depletion results in impaired cognitive performance on logical reasoning tasks, as measured using Graduate Record Examination problems. These two examples, which happen to be the only two in the limited strength model literature, demonstrate that more than just self-regulation behavior is affected by regulatory strength.

Cognitive resources are also replenishable. It stands to reason that if cognitive resources are finite and are consumed when psychological effort is exerted then they must be replenishable. Sleep, relaxation, and nourishment have been shown to replenish cognitive resources for future use (Muraven et al 1998; Oaten and Cheng 2006; Gailliot, Plant, Butz, and Baumeister 2007; Baumeister and Tierney 2011). And this intuitively makes sense. Cognition is fundamentally a brain function; so while cognition is psychological it is simultaneously a physiological function. Without adequate rest and nutritional nourishment the brain cannot function at optimal levels and cognition suffers (Roman et al 2005; Isaacs and Oates 2008; Deak and Stickgold 2010; Kerkhof 2010). And observational research on self-regulation often takes advantage of the regularity with which the events of everyday life depletes cognitive resources. Taking the form of “natural” experiments these studies use the time of day as a proxy for whether participants should, on average, be more or less depleted of their cognitive resources (Danzinger et al 2011; Aaroe and Petersen 2013). Other experimental researchers use fasting or food-consumption treatments to vary the nourishment received by participants (Gailliot et al 2007). The results of these studies consistently conform to the expectations of self-regulation theory, and thus to the expectations of the resource model of political cognition: when resources are replenished, through nutrition or rest, one’s ability to perform mental tasks are temporarily restored.

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<sup>4</sup> The attraction effect refers to a phenomenon from decision-field theory in which people can be influenced to make choices that violate the transitive preferences assumption of rational choice theories (Huber, Payne, and Puto 1998).

Self-regulation researchers have a habit of trying to frame every behavior in terms of self-regulation. This is problematic for at least two reasons: first, doing so often results in conceptual stretching. The *attraction effect* and performance in logical reasoning exercises are completely tangential to self-regulation, at best, and no justification is offered in these studies as to why they should be considered as such. Secondly, and perhaps more problematic, is that the failure to adopt new, less domain specific, terminology and update the theory limits the generalizability of this valuable research agenda. What I propose more broadly considers the summary findings of the research on the limited strength model and drawing more broadly from psychological research to generate a theory that not only explains the ego-depletion effect in self-regulation research, but why cognition appears to be affected as well. Clearly researchers of the limited strength model are onto something: 20 years of consistent experimental results cannot be entirely discounted. But the recent findings of a physiological connection to acts of self-control as well as the findings that ego-depletion affects cognition do not quite fit into the theory behind the limited strength model. This is one area in which I anticipate the resource model of political cognition will contribute to our understanding of political and psychological behavior.

Behaviors other than acts of self-control should be cognitively depleting, leaving fewer cognitive resources available for other mental activities in the immediate future, just as cognitive resources should be depleted by behaviors other than self-regulation. In a sense, I expect every effortful mental activity a person engages in should be cognitively depleting; however apparent to the subject under observation, the inevitable result of effortful cognition should be some level of cognitive fatigue. One of the most redeeming qualities of the limited strength model of self-control is the ease with which researchers have manipulated self-regulatory strength in participants. Now, I disagree that ‘self-regulatory strength’ is actually the causal mechanism at play in this research. It is an overly abstract concept, even for a latent construct. To realign this phenomenon with the

resource model I expect that the depletion and replenishment tasks employed in self-regulation research are actually manipulating cognitive resource levels. Nevertheless, self-regulation behaviors, which can be considered effortful behaviors, as well as just about any other effortful behaviors should result in the depletion of cognitive resources as these resources are expended by effortful psychological processes. What is so intriguing about manipulating cognitive resource levels is that we can take advantage of this empirical regularity to test hypotheses about the role of cognitive resources in various behavioral processes and phenomenon. By comparing people who are in a state of relative cognitive fatigue to a control group of people with ‘normal’ cognitive resource levels we can tease out the ways in which cognitive resources affect behavior.

Researchers in other fields have touched upon concepts that are related to, or even synonymous with, the ego-depletion phenomenon and cognitive resources. The “cognitive miser” tradition (Fiske 1981; Fiske and Taylor 1991) has made invaluable contributions to the social sciences and especially political science. The cognitive miser tradition theorizes “that people are limited in their capacity to process information, so they take shortcuts whenever they can” (Fiske and Taylor 1991, pp. 13). These mental shortcuts work to conserve psychological resources, by reducing the amount of effort and time needed to process information. This theory stands in stark contrast to the *naïve scientist* theories<sup>5</sup> that dominated much psychological research since the late 1950s, which warrants a review in light of how the cognitive miser tradition has influenced political science research. The failure of this model of cognition (the naïve scientist model) to explain attribution biases and why people regularly commit simple logical fallacies led many to question the validity of this model and eventually led to the development of cognitive miser theory, which focuses primarily on how people do not put equal amounts of effort into all thought processes. As intimated in my explanation of the resource model above, theories of the cognitive miser place

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<sup>5</sup> Naive scientist theories painted people as dispassionate information processors that expended as much effort as needed to arrive at correct conclusions about their social environment.

effort and the energy needed to fuel mental effort at the forefront of our understanding of human behavior. And this understanding of cognition has contributed greatly to research in political behavior as well as behavioral research more generally.

As stated above, cognitive miserliness can often result in error: rather than expending the resources necessary to arrive at a correct conclusion, individuals simplify their cognitive processes by opting instead for a sufficient conclusion. Distally, however, this is the result of cognitive resource scarcity. To paraphrase Lupia et al (2000, pp 1): “there are more ways to spend [cognitive resources] than there are [cognitive resources] to spend...As a result, people lack the time and energy to pursue all possible opportunities.” Were cognitive resources in infinite supply there would be no need to act as a “miser” since any, and all, cognitive demands could be sufficiently supplied. And despite their renewability, cognitive resources should still be considered scarce since in any one situation that produces a cognitive demand may exceed the supply of cognitive resources available. But cognitive miser theory, as well as the limited strength model of self-control, is defined by scarcity; the results of which are all too often mental shortcuts (with the increased potential for cognitive bias) and self-regulatory failure, respectively. Indeed, the effect of cognitive resource scarcity and, following Lavine et al (2012), the strategic use of cognitive resources will often result in error, most often documented in terms of attribution bias.

This is perhaps demonstrated best by Tversky and Kahneman’s work on heuristic processing, which served as a catalyst for the formation of alternatives to naïve scientist and other rational decision-making models of cognition, and has since been appropriated into political science research on information processing. Heuristic-processing refers to the phenomenon in which individuals take judgmental/computational shortcuts to arrive at decisions rather than using an exhaustive information search, weighting scheme, consideration of the transitivity of preferences, and selection of an optimal outcome. Like most every behavior, heuristic processing is conditional:

when the stakes are low, or when individuals are not highly motivated to make a correct decision, these short-cuts can be used to make a ‘good-enough’ decision (Chaiken and Maheswaran 1994). The resource-model of political cognition would suggest another condition: the availability of cognitive resources. In this sense, and as the central hypothesis of Chapter 4 in this dissertation, individuals may use heuristic-processes as a coping mechanism when they are relatively low on cognitive resources and are unable, or unwilling, to put forth the effort needed to successfully pursue other behaviors.

John Zaller’s (1992) version of memory based information processing as well as the online processing models proposed by others (McGraw, Lodge, and Stroh 1990; Redlawsk 2002) are predicated on the assumption that people often form evaluations of candidates to political office with low levels of effort. Before Zaller’s seminal work memory based information processing models looked a lot like naïve scientist models: citizens were expected to conduct extensive information searches into the recesses of their memory, carefully weigh all information available, and arrive at a cold, calculated evaluation of political objects under consideration. Zaller broke with this tradition by positing that people simply generate evaluations of candidates, and other political objects, based on considerations<sup>6</sup> that are readily accessible; those considerations that are at the “top of the head.” In other words, Zaller’s ‘top of the head’ model of memory based information processing is relatively effortless, expending few cognitive resources, whereas previous models essentially assume people made decisions like scientists: considering every detail and following a logically sound approach to reaching a decision. A similar relationship between effort and information processing is clearer in the online-processing model, wherein cognitive effort is minimized by conceptualizing citizen evaluations as a running-tally in which descriptive information in memory is not even accessed by people. Instead of engaging in the cognitively taxing

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<sup>6</sup> “Any reason that may induce an individual to decide a political issue one way or the other” (Zaller 1992, pp. 40).

efforts of encoding, memory retrieval and evaluation, people instead are theorized to evaluate the political world based on their impressions of political actors and objects. When information is encountered, rather than remembering it, online-processors incorporate their positive or negative impressions into an online judgment that is regularly updated (McGraw, Lodge, and Stroh 1990). Despite the differences between these two models of information processing, one commonality between them that is of interest here is that they are models of political behavior that minimize the amount of effort a person expends thus conserving cognitive resources for future use.

Cognitive resources are probably never fully depleted, but they may drop to levels insufficient for the cognitive demand of some mental task faced by an individual, but the notion that the “gas tank” is ever completely empty seems far-fetched. Self-regulation research is consistently clear that the result of confronting a demanding task with insufficient cognitive resources increases the likelihood of self-regulatory failure. Insofar as the resource model is concerned, however, when a person’s resources are low it is still possible to successfully complete mental tasks, except one is likely to do it differently and probably less well. To deal with cognitive depletion and continued cognitive demand people may have the option of employing low-effort processes as something of a coping mechanism. This would be consistent with Lavine et al’s (2012) suggestion that cognitive resources may be used strategically rather than simply hoarded away for later use as suggested by the cognitive miser tradition.

The literature often refers to these effort(resource)-saving processes, using the language of dual process theory, as system 1 processes (Kahneman 2011; Leeper and Sloothus 2014). Dual-process theory is a theoretic framework used in psychology to differentiate behaviors based on the amount of control an individual has over the behavior. Some behaviors are unconscious and not explicitly under the control of the subject (system 1), whereas other behaviors are consciously selected into by the subject (system 2). Another way to consider this distinction is in terms of effort:

System 1 processes are relatively effortless, but system 2 processes are effortful. And what is really interesting is that by employing a low-effort behavior/process in a state of cognitive depletion people can attempt to actualize outcomes associated with high-effort behaviors/processes. Thus, insofar as political reasoning goes, cognitively depleted individuals should be less capable of engaging in elaborate forms of political reasoning when forming considerations and on policies or candidates and, as a result, should be more likely to employ computational short-cuts during the opinion formation process. Though the difference between high-effort and low-effort information processing may not result in a preference reversal, the means by which opinions are arrived is still of fundamental interest to political scientists. Especially if the resulting behavior is one in which cognitive errors are systematically committed or people are making decisions they otherwise would not make if a more effortful process were employed. Heuristic processing/reasoning, for example, is one potential coping mechanism that the resource depleted can use to make inferences and arrive at conclusions. And, party cues aside<sup>7</sup>, the use of heuristic processing increases the risk of arriving at undesirable, and unintended, outcomes.

Another resource based theory from which I draw is cognitive load theory, which refers to the amount of mental effort exerted during psychological activity (Miller 1956; Sweller 1988). When processing information or engaging in other cognitively taxing activities, such as logical reasoning, problem solving, or recalling memories, people are under a cognitive load. In other words, they are engaging in an activity that consumes cognitive resources. Like cognitive resource levels, different people have varying capacities for cognition and when cognitive load is great people often commit psychological errors related to problem-solving. This particular conceptualization of cognitive resources is most commonly found in education psychology research which has consistently demonstrated how students fail to correctly answer test questions or learn new material after a

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<sup>7</sup> A party-cue is a highly reliable piece of information from which one can reasonably draw consistent conclusions without falling prey to the vagaries (biases) which often arrive when employing a representativeness heuristic.

period of heavy cognitive load (Sweller 1988; Paas 1992; Mousavi et al 1995), but other research has also demonstrated that heavy cognitive load can result in psychological error more generally. For example, Gilbert's (1989) research demonstrates that people are more likely to commit a fundamental attribution error after a period of heavy cognitive load. Like the research in cognitive miser theory, cognitive load theory is built upon the assumption that cognitive resources are scarce and once they are consumed the individual's ability to supply their cognitive demand is compromised, however temporarily.

These literatures have all touched on the subject of cognitive resources and have similar conjectures regarding their impact on behavior. The theories come from a diverse academic background, but they are studying the same phenomena: effort, cognitive resources, and how they affect human behavior. The cognitive miser theory explains a diverse set of behaviors as the result of a natural human tendency to conserve cognitive resources for future cognitive demands. Cognitive load theory explains learning behavior, as well as cognitive bias, in terms synonymous with cognitive fatigue. The limited-strength model of self-control predicts the necessity of cognitive resources for successful acts of self-regulation. These theories are all positing a relationship between cognitive resources and certain behaviors, but they are using their own domain specific language to make these connections and are talking past each other, never unifying a comprehensive theory of resource based cognition. In this study, and the host dissertation, I am working to unify these diverse areas of research under the resource model of political cognition.

The remainder of this chapter outlines the flow of the dissertation. I first focus on establishing a link between self-regulation theory and political science by framing cooperation and willingness to contribute to the provision of public goods as self-regulatory behaviors that are significantly influenced by cognitive resources (chapter 2). In chapter 3 I look more generally at other-regarding political behaviors, such as conservation intentions, but also use a cognitive resource

depleting experimental manipulation that does not involve self-regulation to demonstrate that cognitive resources are affected by behaviors/activities other than acts of self-regulation. This is an important step in demonstrating how the limited strength model of self-control can be expounded upon to build a model of resource based cognition. As explained above, the limited strength model of self-control is domain specific: theoretically it only applies to self-regulation behaviors; resources are depleted by self-regulatory acts and are used for acts of self-regulation. But, as I argue, cognitive resources should be affected by mental/psychological exertion more generally, and in Chapter 3 I use a reasoning task to deplete participants of their cognitive resources before measuring their self-regulatory strength. Finally, the study reported in chapter 4 demonstrates how behaviors that are not related to self-regulation (information processing and opinion formation) are affected by cognitive resource availability. This, too, is an important step in advancing the resource model of political cognition: the limited strength model of self-regulation not only suggests that acts of self-regulation are resource depleting, but that these resources are needed for further acts of self-regulation. Similar to how the experimental manipulation used in chapter 3 demonstrates that behaviors outside the scope of self-regulation are cognitively depleting, the study reported in chapter 4 demonstrates how cognitive resources are an important influence for behavior beyond the realm of self-regulation. Together these studies advance the resource model beyond the confines of self-regulation theory and provide a broader understanding of how cognitive resources affect the political behaviors under study as well as open doors for future research in political psychology. Each of these studies is more fully outlined in the pages below.

## ***1.2 Overview of Empirical Chapters***

I begin, in Chapter 2, with an examination of how certain political behaviors can be conceptualized in terms of self-regulation and the application of the limited strength model to these behaviors. I argue that prosocial political behaviors, which are behaviors directed at endowing other

individuals or groups with benefits at a personal cost, such as cooperation or contributing to the provision of public goods, are negatively affected by cognitive resource depletion. For many people, prosociality is an effortful enterprise<sup>8</sup>. Overriding natural, selfish tendencies to confer/retain benefits for one's self depends on some amount of self-control and the availability of sufficient cognitive resources. When an individual's cognitive resources are relatively low they should be less inclined to cooperate with others and less likely to contribute to the success of collective actions, like the provision of a public good, for example. I designed a laboratory experiment (n=271) that tests the effect of cognitive resource depletion (cognitive fatigue) on prosocial political behaviors. The experiment has two conditions: one treatment and a control group. Those participants who were randomly assigned to the treatment group had to complete a self-regulation exercise: a clerical task commonly used in self-regulation research in which participants follow a set of instructions that, at first, establish a behavioral routine, but then, half-way through the task, the instructions are changed<sup>9</sup>. This change of instructions requires participants to consciously override the behavioral routine they had previously established and this effort results in a depletion of cognitive resources. All participants in the study complete a survey with two behavioral indicators designed to measure their prosocial inclinations. The first measure uses a dictator game in which participants are endowed with \$8 (real cash money) and asked to divide the endowment between themselves and an anonymous other person in any way they choose. The second dependent measure is a question asking participants if they would like to donate \$1 of their remaining endowment to a public good: scientific research on human cooperation. In comparing the two groups I find that the treatment group, having gone through a cognitive resource depleting self-regulatory exercise, behaves significantly less prosocially. Not only do they (the resource depleted) behave more selfishly in the

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<sup>8</sup> Not necessarily everybody, but, on average, and consistent with self-regulation research, engaging in prosocial behaviors requires people to over-ride selfish tendencies. Especially when monetary payouts are involved and the other person is anonymous (Eckel and Grossman 1996; Haley and Fessler 2005; Engel 2011).

<sup>9</sup> See Appendix A for sample document used for this experimental treatment.

dictator game, they are also less likely to contribute to the provision of the public good under consideration (research on human cooperation). The results of the study establish a connection between self-regulation theory and collective action allowing me to more generally investigate the connection between cognitive resources, as intimated by the resource model of political cognition, and behavioral intentions to conserve common pool resources.

The study present in chapter 3 is designed to do two things: 1) build upon the findings of chapter 2 by examining how cognitive resource depletion affects the way people extract benefits from a collective good, and 2) examine how cognitively taxing activities besides self-regulation behaviors affect cognitive resource levels. With individual provision behaviors examined in chapter 2, I turn to individual conservation efforts in chapter 3. The sustainability of a collective good ultimately rests on its adequate provision and responsible use (Ostrom, Gardner, and Walker 1994). Conservation behaviors are an important class of behaviors to study as they are directly related to the amount of a collective good an individual appropriates to themselves; conservation constitutes a reduction in the amount of a collective good used by a person, thus leaving more of that good for others to use in the present and future. In this sense conservation is a cooperative behavior and the relationship between cognitive resources and conservation should be positive. Using a survey-experiment with a cognitive resource depletion task embedded at the beginning of the study I test this hypothesis. The results of the experiment, unfortunately, produced null findings, but, as detailed in chapter 3, I believe the findings were driven by measurement error: the survey asked participants about their intentions to engage in various conservation behaviors regarding their use of electricity and water. Theoretically, cognitive resources should have no bearing on behavior intentions, only on actual behaviors. Though the primary hypothesis of this chapter did not receive the empirical support expected, the secondary hypothesis did receive significant support from the experimental results: cognitively taxing activities, such as the quantitative and verbal reasoning

exercise employed as an experimental treatment, have an effect analogous to ego-depletion. That this effect was the result of effortful mental processes not related to self-regulation behavior lends support to the resource model and suggests that self-regulatory strength, as conceptualized by self-regulation researchers, is probably dependent on, or synonymous with, cognitive resources.

The resource model of political cognition contributes a broader understanding of the role cognitive resources play in human behavior than what the limited strength model of self-control offers. To reiterate an important consideration: the limited strength model is only ever applied to self-regulation behavior. Thus, it is a domain specific theory of behavior. But the theory has a great amount of intuitive appeal for other behaviors; the self-regulation literature has just never generalized the theory to behaviors outside the scope of self-regulation and dropped the domain specific vocabulary. As a first test of the resource model of political cognition I use a manipulation check from the survey-experiment reported in chapter 3. Rather than using one of the traditional self-regulation tasks regularly employed in self-regulation research I had treatment participants answer a diverse array of questions pulled from standardized tests (the SAT, the ACT, and the GRE). Consistent with research in cognitive load theory, the effort expended by answering these questions should result in the expenditure of cognitive resources which should, in turn, affect individual capacities to self-regulate. Using the state self-control capacity measure developed for survey research by self-regulation researchers the result of a formal hypothesis test demonstrates that participants in the treatment condition were significantly more depleted than participants in the control group.

Having used the study reported in chapter 2 to apply the limited strength model of self-control to political behavior and the study in chapter 3 to elaborate upon my generalization of this theory, which I have referred to as the resource model of political cognition, by using an effortful behavior that does not involve self-regulation to deplete individuals of cognitive resources, I turn to

the importance of cognitive resources for behaviors that do not involve self-regulation in Chapter 4. In this chapter I conducted a laboratory experiment to demonstrate how cognitive resources affect the way in which individuals process party-cues. Party cues can be processed in different ways. Traditionally party cues have been considered a cognitive short cut used to simplify opinion formation in terms of low-information rationality (Popkin 1993) or heuristic processing (Sniderman et al 1992; Rahn 1993). But more recent research has demonstrated that party-cues can actually facilitate motivated reasoning among partisans (Petersen et al 2013; Bolsen et al 2014). Since party identification is a form of social identity a party-cue does not simply offer a short-cut, it is laden with affective information for the partisan receiving the cue. In the face of cognitive resource depletion, however, one's ability to engage in this more elaborate mode of reasoning should be compromised. The result of this depletion, as hypothesized in chapter 4, draws from the resource model of political cognition: the state of cognitive fatigue should render individuals less capable of processing a party-cue via a motivated reasoning process; to cope with the insufficiency of cognitive resources the individual will instead process the party-cue using a heuristic-process.

The experiment reported in Chapter 4 has a total of 12 conditions (2 resources conditions, party cue conditions, and 2 motivation conditions. n=612) and uses partial replications of Bolsen, Druckman, and Cook's (2014) article on partisan motivated reasoning. One of these partial replications, the treatment group, is cognitively depleted using the same clerical task used in chapter 2; the control group simply begins the experiment as participants in Bolsen et al's study would have: by reading a brief on the Energy Independence Act of 2007, then responding to an opinion survey about the law. To reiterate a point intimated above, the limited resource model is domain specific: existing research does not adequately conceptualize cognitive resources nor does it apply this concept to behaviors beyond the narrow scope of self-regulation. Cognitive resources should be important for any number of cognitive functions that lie outside of the purview of self-regulation.

In the above section explaining the resource model I offered an explanation of how behaviors can be categorized as more or less effortful. It is a very intuitive assumption that has several analogs in political behavior. Motivated reasoning and heuristic processing are examples of a high-effort and low-effort behavior, respectively, and both processes can be facilitated by the presence of party-cues (Petersen et al 2013). That they are also different modes of information processing related to opinion formation makes the two behaviors a convenient focus for the application of the resource model of political cognition. It takes more effort to engage in motivated reasoning than it should take to process a party-cue heuristically when forming an opinion. Motivated reasoning, regardless of the goal toward which an individual is motivated, is a deliberative cognitive process laden with information retrieval and the generation of relatively more elaborate political considerations. Heuristic-processing, however, is an associative process in which the individual takes cognitive shortcuts to arrive at a conclusion. Thus, the cognitively depleted should be more inclined to employ a heuristic process when forming an opinion because their store of cognitive resources should be insufficient for more effortful behaviors such as motivated reasoning. Consistent with cognitive miser theory this is a prime example of individuals making strategic use of their cognitive resources. Indeed the resource model would suggest that employing a heuristic process can be conceptualized as a coping mechanism for the resource depleted when forming an opinion and this assumption serves as the primary hypothesis of Chapter 4. Comparing the two primary experimental groups (the resource depleted group and the control group) I find that the resource depleted participants formed their opinion about the policy more quickly than the control group and, in a content analysis of an open-ended survey question, I find that the resource depleted reported fewer considerations of the policy than the control group in addition to recalling fewer factual items about the policy. Together these results demonstrate the importance of cognitive resources to political cognition: the more elaborate and effortful a behavior is the more cognitive

resources are needed to fuel said behavior. When cognitive resources are not available in sufficient quantities people are still capable of getting by, but they do so by using alternative, less effortful, modes of cognition.

Finally, in Chapter 5 I summarize the findings of this dissertation, how they contribute to our understanding of political behavior, as well as human behavior more generally, and directions in which I would like to take this research. The behaviors studied in this dissertation, such as collective action and political cognition, are of great interest to political science, behavioral economics, and psychology. But the theory developed throughout this dissertation offers political science an empirical understanding of how the human condition affects political behavior with implications beyond the narrow confines of this single work. Indeed, the theory developed and the research reported in this dissertation is just a first step in a research agenda that reaches across behavioral phenomena in cognitive, social, and political psychology.

It is especially important that cognition and effort are more fully understood as political scientists begin to explore physiological and genetic causes of political behavior. The metaphor of a *funnel of causality* has been invaluable for our understanding of political behavior, but as Campbell et al (1960, pp. 24) warned “it becomes more misleading than clarifying if pressed to far.” Research on the genetic predicates of political behavior has become a topic of great interest to political scientists since the mapping of the human genome. Almost annually one of the “Big Three” journals in political science features a publication from one of the handful of political scientists who are qualified to write and review such work. This research has its merits, but if this dissertation is to offer a critique it would stem from the above quote from Campbell et al (2014). Genetic studies of political behavior appear to be a crown jewel in the discipline because we cannot really imagine causal mechanisms further down the causal funnel. But what about everything that happens between genes and behavior? Genes should affect physiology (genetic-physiology), which then

affects psychology (physio-psychology), which then affects political psychology, and so on. Those steps between genes and psychology have been ignored at the expense of solid causal inference, but this dissertation works to establish a solid cognitive foundation upon which physio-psychological research can build in the near future. Especially considering how simple it can be to accommodate citizens in the political process. Reforms like early voting and mail balloting give citizens more freedom to engage the political process at times that are more convenient, giving them the ability to choose to participate in the political process at a time when they are most able to devote significant amounts of effort to their voting decisions.

## **2 CHAPTER 2: COGNITIVE RESOURCES, PROSOCIALITY, AND THE PROVISION OF PUBLIC GOODS**

The study of collective action problems and the conditions under which individuals cooperate are among the most important subjects in political science and politics. One of the primary purposes of government is to coordinate individual behaviors to arrive at collectively desirable outcomes. Citizens' contributions to the provision of public goods and the sustainable appropriation of common pool resources are fundamental goals of government. But government in a free, democratic, society cannot continually monitor and direct the behaviors of its citizens. Despite the government monopoly on the legitimate use of force, democratic governance relies heavily on the idea that citizens are capable of self-governing and cooperating with each other (Putnam 1988; 1995); that we are able to see past the contents of our wallet and take action that benefits our community or country. Free-riding and abuse, however, are ever-present threats posed by citizens to the public goods that make modern democratic life possible. We know individuals cooperate in many collective action situations and that their cooperation is contingent on a variety of contextual factors: civic and political culture (Almond and Verba 1963; Inglehart 1988), social capital (Brehm and Rahn 1997; Bowles and Gintis 2002a), and social identity (Fowler and Kam 2007) are

just a few examples of how cooperation is shaped by context. New causal mechanisms shown to affect citizen cooperation are regularly discovered and refined, but researchers have only begun to scratch the surface of how social and cognitive psychology affect cooperative behaviors in political contexts. In this chapter I am interested in the question of how cognitive resources affect individual propensities to engage in cooperative behavior.

To answer this question I look to self-regulation theory. Bauer and Baumeister (2011) define *self-regulation* as “the capacity to override natural and automatic tendencies, desires, or behaviors; to pursue long-term goals, even at the expense of short-term attractions; and to follow socially prescribed norms and rules.” Self-regulation theory, as explained in further detail in the following section, is a framework in psychology research that attempts to explain why individuals may choose one class of behaviors, what we might consider *socially acceptable* behaviors, over another, what we might consider to be *socially unacceptable* behaviors. I will specifically be making use of the limited strength model of self-regulation to demonstrate how cognitive-resources, which are essentially a form of psychological fuel upon which we draw when engaging in volitive behavioral action, affect prosociality vis-à-vis cooperation.

Prosocial behaviors are a class of behaviors in which an individual makes some kind of self-sacrifice to endow another individual, or group, with some kind of benefit (McCullough and Tabak 2010). Prosociality is something of a generic term used to describe a class of behaviors that involve taking actions that benefit others. Some political scientists have used the term *altruism* to describe other-regarding behaviors and *egoism* to describe selfish behaviors (Fowler 2006; Fowler and Kam 2007). Others have used the terms *sociotropy* and *ego-centrism* to distinguish between concerns for the other or the self, respectively (Kinder and Kiewiet 1979; 1981). Regardless of the difference in terminology, what is being described by Fowler and by Kinder and Kiewiet is prosociality.

With these examples in mind we can imagine a number of political behaviors that can be categorized as prosocial. Fowler (2006) argues that voting, which can be construed as a contribution to the public good that is democracy, is a prosocial behavior. Bekkers (2005) extends the same logic to engagement in volunteer associations. Kinder and Kiewiet's idea that voters consider the well-being of their fellow citizens is more directly a manifestation of prosociality in the voting booth. Perhaps the most studied of prosocial behaviors, though, are cooperative behaviors involving individual contributions to the provision of a public good or common-pool resource (Ostrom et al 1994). What much of this body of political science research has in common, though, is the focus on individuals engaging in behaviors with an aim at endowing either the self or "the other" with a benefit, which is somewhat novel coming out of the more traditional focus on rational choice theories which assume all behavior to be self-regarding. Anytime a political actor is faced with a choice between acting in one's narrow self-interest and choosing to act in a way that confers benefits on others they face a self-regulation dilemma. As intimated further below, in a social exchange the effective self-regulator should be more inclined to choose the other over the self, but that leaves us with the question of when are individuals more likely to effectively self-regulate?

In the following section I explain the psychological foundations of self-regulation theory and insight into ways political science can benefit from researching political behavior in terms of self-regulation. The focus of this particular chapter is on prosociality and in the second section below I argue that many behaviors that interest political scientists are prosocial behaviors and by using self-regulation theory, specifically the limited strength model, we can gain greater insight into when individuals will behave prosocially. I then detail the procedures and results of a controlled laboratory experiment in which a randomly selected group of participants undergo a cognitive resource depletion task and are compared to untreated (control group) participants in their performance in a dictator game as well their contribution to a public good. The results of the study

demonstrate, as hypothesized below, that that resource depleted participants are less likely to cooperate with others and are less likely to contribute to the provision of public goods.

## **2.1 Self-Regulation Theory**

The idea of *self-control* usually invokes thoughts of someone consciously resisting temptation, which is actually correct, but this is only one type of self-regulation<sup>10</sup>. More broadly self-regulation encompasses non-conscious behaviors and automatic processes, both psychological and physiological (e.g. the regulation of body temperature, heart-rate, and breathing). Human life is replete with self-regulatory situations, some more easily recognized than others. As intimated above, self-regulation involves one's ability to assert themselves in overriding habitual or automatic behaviors; dispensing of opportunities for instant gratification when long-term goals are at stake; following social norms rather than pleasing one's self. In other words, we can frequently get by on auto-pilot by just being ourselves with no need to regulate our behavior (acting naturally), but we are often confronted with situations that require the recognition of our natural tendencies and a course-correction (James 1890). Thus, successful self-regulation requires the presence of some standard, the recognition of that standard, and the adjustment of one's behavior toward conformity with that standard (Carver and Scheier 1981, 1982, and 1998).

Self-regulatory failure (or the failure to control/regulate one's behavior) is of great interest to this study. On the clinical side of psychology failures of self-regulation often result in self-destructive behaviors. This is evidenced by a large, and growing, body of literature interested in the efficacy of substance abuse rehabilitation and health psychology. Not every dieter is able to stick to their program (Bagozzi, Moore, and Leone 2011; Herman and Polivy 2011), many recovering addicts of alcohol and other drugs (especially of tobacco products) relapse (Polivy 1976; Baumeister, Heatherton, and Tice 1994; Baumeister and Heatherton 1996; Muraven and Baumeister 2000), and

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<sup>10</sup> I will use the terms *self-control* and *self-regulation* interchangeably.

not everyone finds it easy to commit to an exercise regime. Social and cognitive psychologists further emphasize that:

“effective self-regulation is also necessary to restrain selfish wishes that could threaten group interests, to curb aggressive impulses that can undermine prosocial goals, and to overcome natural proclivities that are inherently self-interested for a greater collective good” (Bauer and Baumeister 2011, pp 65).

This passage enumerates several areas of interest for political scientists: group interests, prosociality, and collective goods. But the perspective offered by self-regulation theory has not yet been applied to political science. We know that people often fail to contribute their fair share to the provision of a public good (Dawes et al 1986; Ostrom 1998), but, in theory, at least some of the time these self-serving individuals are simply failing to effectively self-regulate. And in many political contexts, effective self-regulation is necessary in order to overcome collective action problems: in democratic society, citizens are often asked to make self-sacrifices of some kind for the collective good. Some of these behaviors, like paying taxes, are compulsory, other behaviors are more elective (e.g. engaging in conservation, volunteering in civic associations, voting), but effective self-regulation should be important for both.

Self-regulation theorists have studied several components of self-regulatory behavior: norms and self-monitoring behaviors are two major areas of research in this field that have gained some traction in political science research. Collectively the presence and recognition of social norms, the ability to self-monitor behavior, and availability of sufficient stores of cognitive resources constitute the prevailing model of self-regulation<sup>11</sup>. While norms and self-monitoring are both separately

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<sup>11</sup> In this unified model of self-regulation, social norms or personal goals provide a standard of behavior for which an individual aspires to attain, however specific or general. Self-monitoring refers to the capacity individuals have to recognize their own behavior and assess if it is consonant with the norm or goal in question, and cognitive resources

important, this chapter is interested in what is known as the [limited] strength model of self-regulation. The limited strength model of self-regulation posits that, holding norm recognition and self-monitoring behaviors constant (or ignoring their explicit role by randomly assigning participants to different resource conditions), an act of self-regulation relies on the use of psychological, or cognitive, resources. The cognitive resources used to regulate behavior are finite and renewable and research “suggests that some form of energy or strength may be involved in acts of volition” (Baumeister et al 1998). Indeed, research since the late 1990’s has eliminated much of the doubt regarding the presence and consumption of these cognitive resources and research has more recently turned to the ways in which human behavior is influenced by the presence or absence of this source of psychological energy.

A common analogy depicting this concept is the use of a muscle: using a muscle requires the expenditure of stored energy and once that energy is consumed the muscle will fail to function at optimal levels until restored. Self-regulatory behavior has been documented to work in a similar fashion. Exercising self-control leaves fewer resources available for subsequent acts of self-control (Baumeister et al 1994; Muraven et al 1998) and this resource can be restored by rest/refreshment, affirmation, and incentive as well as trained by the formation of habits through repeated encounters with a regulatory situation (Muraven et al 1999; Oaten and Cheng 2006; Gailliot, Plant, Butz, and Baumeister 2007; Baumeister and Tierney 2011). But what happens when the “gas tank” is empty? According to the strength model of self-regulation, when an individual is cognitively fatigued their ability, and their willingness, to self-regulate should be compromised (what Glass, Singer, and Friedman (1969) called a psychic cost). The main prediction derived from the strength model of self-regulation is that those who have experienced a depletion of these cognitive resources will underperform those who have not experienced such depletion in domains of self-regulation

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provide the energy necessary to keep one’s behavior in line with a norm or goal in the face of selfish impulses or to adjust one’s behavior if necessary. Each of these concepts is normally studied independently of the others.

Most people are not oblivious to personal and social standards, but they often fail to “live up” to those standards. Take concerns about climate change and conservation behaviors for example: not everyone is fully aware of their impact on the environment and some refuse to believe climate change is real (Lubell et al 2007; Bolsen et al 2014). But most are aware of climate change and many want to alter their behaviors regarding water or energy consumption and recycling. These individuals are particularly susceptible to self-regulatory failures as they will undergo a period of behavioral modification; a period in which they are trying to change old habits and develop new ones. For these people, failing to turn-off the lights when leaving a room, or forgetting to separate their garbage would constitute examples of self-regulatory failure<sup>12</sup>. There are many reasons why this may be, but some of the time self-regulatory failure occurs simply because the individual lacks the cognitive resources necessary to act as they intend. This should be the case in domains of prosociality, as explained further below, and an individual’s propensity to cooperate with others.

## ***2.2 Self-regulation Theory and Prosociality***

The study of human behavior in the political context has yielded diverse understandings of the causes, processes, and consequences of political behavior. As political scientists we are often vexed by the question of whether citizens are competent to meaningfully engage the democratic process, but more recently our attention has begun to turn toward an understanding of “mindful” political behavior. Recent discoveries in dual-processing, automaticity, and research on implicit attitudes have markedly affected the directions from which political and social psychologists approach the study of human behavior: namely toward a study of those elements of human behavior

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<sup>12</sup> For others, however, those who are not interested in changing their consumption behaviors, failing to conserve water or energy would not constitute a regulatory failure. Indeed, self-regulation theory would focus on why these individuals might fail to update their beliefs about climate change and the human impact on the environment in the face of near unanimous evidence from the scientific community (though this has not yet been a subject researched by self-regulation theorists).

over which we have little or no control. At the heart of the matter of if and when individuals behave “mindfully” is human agency: volition, will, the use of self-control.

We already know that cooperation is context dependent. Things like group size (Taylor 1987; Oliver and Marwell 1988; Ostrom 1997), selective benefits (Salisbury 1969; Taylor 1976, 1982, 1987, and 1988; Walker 1983; Chong 1991; Baumgartner and Leech 1998), and sanctioning (Ostrom 1990; Bowles and Gintis 2002b; Fehr and Gächter 2002; Carpenter 2007) are just a few of the most studied concepts in the literature that arise as part of a political actor’s calculus when confronted with a collective action situation. When groups are large, for example, it is easier for an individual to rationalize anti-social behavior by withholding their individual contribution to a collective good since the provision of the collective good is less dependent upon their individual contribution. Or, in the case of sanctioning, other actors are given the opportunity to socially punish an individual for not acting in the best interests of the collective. While the sanctions used in the behavioral economics studies are usually economic sanctions, other social sanctions, or merely the threat of social sanctioning (such as social pressure), have been shown to sufficiently motivate prosociality in collective action situations (Gerber and Green 2008; Bolsen et al 2014).

The paradigm of self-regulation theory that I am building upon in this study is known as the limited-strength model of self-regulation. As explained above, the limited-strength model posits that self-regulatory behavior is dependent on the availability of what I have termed *cognitive resources*. When cognitive resource levels are high, self-regulation is more effective; when cognitive resource levels are low, self-regulatory failure is more likely. The self-regulatory behavior under consideration in this study is prosociality in the form of cooperation. Recently a handful of studies have focused on social exchange and cognitive resources, although from slightly different perspectives (Petersen et al 2013; Aaroe and Petersen 2014; Ainsworth et al 2014). These papers, along with this chapter, follow the same theoretical conjecture: for some individuals, perhaps most, overriding selfish

impulses by engaging in other-regarding behaviors is an effortful exercise in self-regulation and without a sufficient store of cognitive resources it is difficult to effectively engage in such prosocial behaviors (Baumeister et al. 1998).

In a recent piece on cognitive resource-depletion and trust Ainsworth et al (2014) examines the impact of cognitive resource depletion on behavior in a series of trust games<sup>13</sup>. The proposition offered by Ainsworth et al. is that *trust*<sup>14</sup> is a function of self-control: those whose cognitive resources have been depleted should be less inclined to trust others<sup>15</sup>. The results for these analyses regarding trust and resource depletion are quite clear in all three iterations of their experiment: the resource depleted participants sent fewer dollars to Player 2 suggesting that the depleted participants are less trusting than the non-depleted participants.

In a related pair of articles, Petersen et al. (2013) and Aaroe and Petersen (2014), researchers investigate how *hunger* affects social behavior. Both studies are experimental and they employ different treatments and designs. The Petersen et al (2013) study uses specific times of day<sup>16</sup> as a measure of hunger, from 11am-12pm or from 1pm-2pm, and measure anti-social behavior using a taking game. The logic behind the selection of these two one-hour intervals is that the first is the hour immediately preceding “lunchtime,” the latter (the ‘treatment’) is the hour immediately succeeding, and on average more treatment group participants will have eaten lunch (they will not be hungry). By contrast, the Aaroe and Petersen (2014) study randomly assigned participants to conditions in which they consume Sprite (treatment) or SpriteZero (placebo/control) before

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<sup>13</sup> The participants are instructed that they are Player 1 and they are playing with a second participant (Player 2). Player 1 is given \$10 and whatever amount they choose to send Player 2 will be tripled upon Player 2’s receipt of the funds. Player 2 will then be confronted with the same decisions: from the money they received in first play they can choose any amount to send back to Player 1 and it, too, will be tripled. Most of this never actually happens though: player 2 is ostensible and participants only receive course credit and \$5 for participating. What is key to this game is that the participant, Player 1, is under the impression from the outset that the endowment they receive from Player 2 will be dependent of their behavior in the first round.

<sup>14</sup> The capacity to trust another individual.

<sup>15</sup> They further posit that this relationship can be mitigated, specifically if the stranger shares biological similarity, or exacerbated by Big 5 Personality Traits such as neuroticism. Very little detail is given about these latter treatments for future replication.

<sup>16</sup> Participants were randomly selected for a lab sessions conducted at one of these times.

participating in a dictator game (which is used to measure prosociality). The Sprite, which is sweetened with a glucose based additive, provides nutritional value and reduces hunger whereas the SpriteZero contains no nutritional value and should not reduce hunger. In both studies the researchers find a negative relationship between *hunger* and prosociality.

The focus on hunger is somewhat novel, but the treatments used by Petersen and his colleagues are not. They are frequently employed in physio-psychological research by self-regulation theorists. Nutrition, especially glucose, is essential for effective cognitive as well as other functions of the brain (Galliot et al 2007). Glucose alone serves as a primary energy source for the brain and its affiliated cognitive processes. The experimental treatments in Petersen et al (2013) and Aaroe and Petersen (2014) are really manipulating the replenishment of cognitive resources, they just refer to the concept as *hunger*.

Certainly part of the reason these researchers have referred to the causal mechanism driving their results may lie in the fact that they only manipulate whether participants are replenished or not (have they eaten something recently). In fact, research on the limited resource model demonstrated that nutritional input works to fuel the brain, and hence the mind (Tice et al 2007)<sup>17</sup>. But the replenishing of cognitive resources is only one side of the coin, the other side, which I will be using in this study, is the *depletion* of resources. Instead of consuming calories to provide more energy to resist selfish impulses I will be depleting participants of resources using a clerical task to leave them with fewer resources to resist those same selfish impulses.

Cooperation describes “an act or instance of working or acting together for a common purpose or benefit” (dictionary.com). Cooperation is one example of a prosocial behavior and is one possible outcome observed in collective action scenarios. The other outcome is generally some form of defection. Free-riding behavior, for example, is a self-interested, other-disregarding, form

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<sup>17</sup> There is also evidence which suggests that rest, including sleep, does this as well (Tice et al 2007).

of defection: the free-rider acts in such a way as to incur no costs to the self, but remains able to reap benefits from the collective good for his/her self, possibly at the expense of others enjoying the fruits of said collective good. Insofar as cooperation has been studied in political science and economics, the question of self-control (regulation) has yet to be raised: behavioral models of collective action implicitly assume self-control. This is largely the result of prosociality being considered a fixed trait by some, but also from a lack of research into disconnect between behavioral intention and actualization. Consistent with the self-regulation literature I expect individuals who are relatively low on cognitive resources to be less cooperative in social dilemmas.

*Hypothesis 1:* Individuals who are relatively low on cognitive resources will behave less prosocially than individuals with greater cognitive resource levels.

Intent and action are distinct points in the behavioral process, a point of emphasis in Azjen and Fishbein's (2005) model of reasoned action and planned behavior. What lies between those two discrete events is the extent to which an individual actually regulates (i.e. controls) their behavior<sup>18</sup>. When someone fails at any juncture in the regulatory process they are more likely to actualize suboptimal outcomes. Indeed, the aggregation of self-regulatory failures across a population is the cause of many of the problems confronted by societies throughout history. Educational underachievement, the current obesity epidemic and poor health more generally, socially destructive stereotyping, substance abuse, and violence are all examples of collective outcomes associated with aggregated self-regulatory failures (Tangney, Baumeister, and Boone 2004). The failure of the vast majority of the human population to reduce the size their carbon footprint is causing anthropogenic climate change. The failure of a majority of Americans to consistently turnout to vote every election cycle has resulted in regulatory uncertainty in the United States. The political context is as replete with situations that require individuals to take to volitive action as human psychology is with

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<sup>18</sup> Other models tacitly assume behavioral control.

conditions under which behaviors are likely or unlikely to manifest. And like most situations, individuals probably do a good job self-regulating in political contexts. While the self-regulation and cooperation literatures have been separated by rigid disciplinary compartmentalization, cooperation is actually an example of effective self-regulation just as defection would be an example of self-regulatory failure.

The above examples outline a number of ways in which self-regulatory failure results in collectively undesirable outcomes. Cooperation comes in many forms, but at least one important distinction must be made in regard to this study. This study's first hypothesis works to lay a foundation linking self-regulation and cooperation vis-à-vis prosociality in a social exchange. But cooperation extends to the individual decision to contribute to the provision of public (collective) goods. It should follow, then, that individuals whose cognitive resources have been depleted should be less likely to contribute to the provision of public goods.

### ***2.3 Data and Methodology***

Consistent with the self-regulation literature I expect the resource depleted to be less cooperative than the non-depleted others. To test this hypothesis I execute a randomized laboratory experiment<sup>19</sup> involving a resource depletion task as the experimental manipulation and using a dictator game embedded within a survey instrument to measure prosociality. Participants for this study were recruited from the Political Science Research Pool at Georgia State University (n=270). This experiment has two conditions: a resource depletion condition (the treatment) and a control group. Those assigned to the resource depletion condition performed a clerical task designed to reduce their store of cognitive resources before completing the survey instrument; the control group, on the other hand, simply began completing the survey instrument immediately upon entering the laboratory.

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<sup>19</sup> Using the computer lab in Langdale Hall 505.

The clerical task I use to experimentally manipulate participant cognitive resource levels downwards is commonly used in the self-regulation literature. Self-regulation theorists often employ such tasks to deplete participants of their resources and alternatively self-reflection tasks or social-interaction tasks are also used to deplete cognitive resources, but I opted for the use of a clerical task out of concern for potential confounds and cost. Clerical tasks are easily employed, require less instruction, and are less costly than other resource depletion tasks (which require the hiring of confederates). In this study, when participants arrived they were given a page of text and instructions to cross out each occurrence of the letter *e*. After completing the first page they were given a second page with the instructions to cross out every occurrence of the letter *e* unless it was followed by another vowel or embedded in a word in which a vowel appears two letters earlier<sup>20</sup>. The effect of this task is the depletion of cognitive resources stemming from the establishment of a baseline behavior, crossing out every occurrence of the letter *e*, followed by an instruction to change their behavior, crossing out only certain occurrences of the letter *e*. By definition the change of behaviors constitutes an instance of self-regulation and should be resource depleting (Bauer and Baumeister 2011). On average participants took approximately 25 minutes to complete this task.

Prosociality, the dependent variable in this study, has been measured in a number of ways: self-reports of behavioral preferences (Tabak and McCollough 2010; Knack 1992), common-pool resource games (Cardenas and Ostrom 2004), and dictator games (Fowler 2006; Fowler and Kam 2007; List 2007; Aaroe and Petersem 2014). The exchange games are particularly attractive in the sense that they offer a behavioral indicator of prosociality that is generally accepted across academic disciplines, but each of these games has advantages and disadvantages. In this study my preference is to use a dictator game to measure prosociality. My preferences for a dictator game are explained in the following paragraph, but my preference for using an exchange game in general stems from the

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<sup>20</sup> See Appendix A for sample document used for this experimental treatment.

fact that it provides an opportunity to observe an actual behavior rather than an individual's indication of how they would behave in a hypothetical scenario. These participants receive real money and are asked to make real decisions and this provides a distinct advantage to behavioral intention measures. Indeed, as explained above, behavioral intention and action are separate events (Ajzen and Fishbein 2005). What separates these two points on the path of reasoned and planned behavior is what Ajzen and Fishbein refer to as 'actual behavioral control,' which is theoretically synonymous with self-regulation and dependent upon the availability of cognitive resources. In an exchange game, or any collective action situation, there is always the potential for 'cheap talk' (Wilson and Sell 1997; Ostrom 2000)<sup>21</sup>.

The dictator game is the most studied exchange game in existence and has a well-documented history of use as a measure of prosociality and altruism (see Forsythe et al. 1994). It is also relatively easy to execute and for participants to understand (Bardsley 2008). In this study, since the responder is anonymous and unable to communicate with the dictator, every participant will be playing the role of the 'dictator' and, upon entering the game, will be briefed about how the game works, of their role, and given \$8 to split, in any way they choose, between himself/herself and the other, ostensible 'player' in the game. The amount of money given by the dictator to the responder will be used as a measure of prosociality; the remaining money will be disbursed to them after their participation is complete<sup>22</sup>. Since the participants in the treatment condition should, on average, have fewer cognitive resources available to override selfish impulses, I expect that the participants in the resource depletion condition will behave less prosocially than the participants in control group. To restate hypothesis 1 in operational terms: participants with fewer cognitive resources (the

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<sup>21</sup> Cheap talk refers to an insincere commitment offered by an individual to contribute or cooperate with the intention of endowing the self with greater benefits at the expense of the others. By definition this is a classic act of anti-social behavior. While it is an interesting subject, it lies outside the scope of this study as I would first like to establish a foundation demonstrating the relationship between cognitive resource-based self-regulation and cooperation.

<sup>22</sup> These are research funds I received from a dissertation enhancement award from the Department of Political Science, Georgia State University.

treatment group) will give less of their endowment to the responder (the ostensible player 2) in the dictator game than participants whose cognitive resources were not manipulated downward (the control group).

Prosociality is, in and of itself, an interesting concept for political scientists to study. Linking it to political objects, however, is not quite so simple in the laboratory setting and I, admittedly, rely largely on assuming that the hypothesized relationship between cognitive resources and prosociality/cooperation will translate into real-world behaviors. Nevertheless, despite the limitations posed by the laboratory, I found a way to imbed a prosocial behavior indicator (contributing to the provision of a public good) into the survey instrument<sup>23</sup>: asking participants if they would donate \$1 of their remaining endowment from the dictator game to research on human cooperation<sup>24</sup>. An important consideration to keep in mind, here, is that where the dictator game is used to measure prosociality in the context of cooperation, this measure is of prosociality in the context of contributing to a public good: knowledge. Hypothetically the resource depleted participants should be less inclined to part ways with that \$1 than participants who did not have their cognitive resources manipulated downwards. Restating hypothesis 1 in operational terms: participants with fewer cognitive resources (the treatment group) will be less likely to donate to research on human cooperation than participants whose cognitive resources were not manipulated downward (the control group).

In addition to these dependent variables I collect data on several political (party identification and political ideology) and demographic variables (age, gender, race/ethnicity) as well as variables shown in past literature that may impact one's inclinations to behave prosocially (belief in equal treatment, belief in economic egalitarianism, authoritarianism, belief in helping those in need, support for civil rights, and moral traditionalism). Political party and ideology are both

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<sup>23</sup> See Appendix B for survey instrument used in this study.

<sup>24</sup> This question is presented to the participants with only two options: 'yes' or 'no.'

measured using 7-pt Likert scales in which participants self-report their party identification (1=Strong Democrat, 7=Strong Republican) and their political ideology (1=Very Liberal, 7=Very Conservative)<sup>25</sup>. Demographics are self-reported, and the remaining variables are measured by asking participants to rate how ‘similar the individual described is like you’ on a 4-pt Likert scale (1=Not at all like me, 4=Very much like me). Since this study is a randomized laboratory experiment such variables should not yield much meaningful insight, but several of the students who signed up to participate failed to show up on the day of the experiment and controlling for such variables may clarify the relationship between cognitive resource levels and prosociality/cooperation.

## **2.4 Results**

To test hypothesis 1 I first conduct a simple t-test comparing the means of the control and treatment conditions and find initial support for the hypothesis: participants in the treatment group ( $\mu=3.003$ ,  $\sigma=1.593$ ) were significantly less cooperative in the dictator game than participants in the control group ( $\mu=3.563$ ,  $\sigma=1.565$ ). That is, participants whose cognitive resources were manipulated downward gave player 2 less money ( $t(139)=-4.16$ ;  $p < .001$ )<sup>26</sup>. A Wilcoxon sign rank test further supports this finding ( $z=-2.987$ ;  $p < .002$ ).

Further analysis reveals that the negative relationship between cognitive resource depletion and prosociality/cooperation remains after controlling for potential confounders. The t-tests suggest approximately a 20% decline in dictator game gifts attributable to cognitive resource depletion; this relationship is reflected in regression analysis. Table 1 presents the results of several linear regressions of the experimental manipulation (resource depletion) on the amount of money (logged) given by participants to ‘player 2’ in the dictator game, controlling for political,

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<sup>25</sup> As a robustness check both of these variables were folded into dummy variables indicating whether or not the participant was a Democrat or a Liberal. The results of the analyses were neither statistically, nor substantively, different and overall model-fit declined.

<sup>26</sup> This result is robust to alternative dependent variable transformations: neither logging nor squaring the dependent variable changes the significance levels or direction of the relationship.

demographic, and other personality variables. As you can see, the effect of the resource depletion treatment is approximately a 20% decline (19% in Model III) in cooperative behavior from the dictator game regardless of how the model is specified.

Table 2.1: OLS regression models

	I	II	III
Treatment	-0.205*** (.06)	-0.203*** (.06)	-0.191*** (.063)
Party	-	.028 (.028)	.037 (.029)
Ideology	-	.027 (.025)	.03 (.028)
Age	-	.008 (.006)	.007 (.007)
Female	-	.038 (.066)	.019 (.068)
White	-	-.025 (.075)	-.018 (.076)
Equality	-	-	.002 (.034)
Civil Rights	-	-	-.031 (.023)
Egalitarian	-	-	-.005 (.019)
Charity	-	-	.01 (.021)
Authoritarian	-	-	.021 (.019)
Traditionalism	-	-	.022 (.025)
n	248	248	248
R <sup>2</sup>	.041	.046	.041

note: \*\*\* p < .01

Hypothesis 2 relies on the same theoretical conjecture regarding cognitive resource depletion and prosociality, albeit in a different context: contributing to the provision of a public good (the generation of knowledge about human cooperation). Comparing the averages between the two groups in the experiments using t-tests yields results that lend support for this hypothesis:

participants in the treatment group ( $\mu=.55$ ,  $\sigma= .499$ ) were significantly less likely to contribute toward research on human cooperation than participants in the control group ( $\mu=.65$ ,  $\sigma= .478$ ). In other words, participants whose cognitive resources were manipulated downward were less likely to contribute to the provision of this particular public good ( $t(139)=-2.461$ ;  $p < .015$ ). Moreover, the results of a Wilcoxon sign-rank test further demonstrate the negative relationship between cognitive resource depletion and cooperation: treatment participants were found to be less inclined to contribute to research on cooperation than control group participants ( $z=-4.153$ ;  $p < .001$ ).

Interestingly, a majority of participants in both conditions donated the \$1, but the t-tests indicate that the resource depleted were 10% less likely to contribute than the control group participants. Table 2 presents the results of a logistic regression analysis of cognitive resource depletion on the decision to donate along with additional model specifications. Across all three model specifications the resource depletion treatment results in a significant decline in contribution behavior. Using CLARIFY<sup>27</sup> to generate predicted probabilities these regression models indicate that the treatment causes a 13.8% decline in the probability of contributing \$1 if their remaining endowment to research on human cooperation.

Unlike the analysis of the dictator game, a couple of other variables returned significant results in this analysis. Age, belief in economic egalitarianism, and belief in helping the needy (charity) are found to have a significant positive effect on contribution behavior and each in an expected direction. Nevertheless, the relationship between resource depletion and contribution behavior remains negative and significant regardless of model specification. In fact, controlling for remaining imbalance raises the reliability of the estimates of the treatment effect.

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<sup>27</sup> Other post-estimation commands, margins and the SPOST package, provide substantively identical results.

Table 2.2: Logit regression model

	I	II	III
Treatment	-.435*	-.463*	-.557**
	(.251)	(.256)	(.274)
Party	-	-.087	-.053
		(.035)	(.128)
Ideology	-	-.113	-.057
		(.107)	(.121)
Age	-	.073*	.079**
		(.035)	(.037)
Female	-	-.41	-.519
		(.284)	(.302)
White	-	-.17	-.016
		(.314)	(.336)
Equality	-	-	-.12
			(.143)
Civil Rights	-	-	-.099
			(.099)
Egalitarian	-	-	.254**
			(.085)
Charity	-	-	.277**
			(.129)
Authoritarian	-	-	.046
			(.088)
Traditionalism	-	-	-.067
			(.109)
n	270	270	270
log-likelihood	-180.194	-174.763	-166.744

note: \*  $p < .1$  \*\* $p < .05$

## 2.5 Conclusion

Cooperating with one's fellow citizens and contributing to the public good are two of the most valuable behaviors in which citizens in a democratic society can engage. For decades political scientists have been working to better understand citizen cooperation as well as ways in which it can be fostered. This study argues that these prosocial behaviors can be understood as a form of self-regulatory behavior and are dependent upon the availability of cognitive resources. Using a laboratory experiment I have demonstrated that the depletion of cognitive resources results in

individuals becoming less cooperative in one-on-one social exchanges and that they are less likely to contribute to the provision of public goods. The clerical task used to deplete the cognitive resources of participants in the treatment group is a simple analog of real-life activity. In a day of life people regularly experience self-regulatory situations that deplete their cognitive resources. The result of this depletion should be, insofar as this study demonstrates, a decrease in the likelihood of cooperating with one's fellow citizens as well as a decrease in the likelihood of making a contribution to the provision of public goods.

After all, many, perhaps most, people put off their opportunities to engage in political activities until they are finished with more pressing issues, like work. The workday is replete with self-regulatory situations and it stands to reason that, at the end of the day, people approach their political opportunities (like voting, participating in homeowner's association meetings, PTA meetings, townhall events with elected officials) in a cognitively depleted state. Somewhat paradoxically, while depleted individuals are hypothetically less likely to participate in these political and social activities the activities themselves may actually help individuals overcome their state of depletion through self-affirmation (Schmeichel and Vohs 2009). More research is needed on how cognitive resource depletion affects participation in these important democratic activities, but the results of this study provide reason to suspect that the effects are pernicious. As stated above, these individuals may intend to vote, or voluntarily contribute to a charity, conserve or contribute to some collective good, but intention and action are not one in the same. Effective self-regulation is necessary for intention to turn into action and it is clear from this study, as well as others, that an individual's ability to self-regulate is compromised in a depleted state.

### 3 CHAPTER 3: COGNITIVE FATIGUE AND CONSERVATION INTENTIONS

Collective action issues can arise for many reasons, but at a most fundamental level they arise because a collective good is either under-provisioned, over-appropriated, or a combination of both. The adequate provisioning and appropriation of a collective good is vital for its sustainability, but individuals are often given some amount of freedom to determine how much they would like to contribute to the provision of a collective good and/or how much of a collective good they would like to consume themselves. Water and energy use are two good examples: while individuals do pay for access to, and use of, these infrastructure they are free to use, and waste, as much of it as they like. The dilemma faced by anyone who finds themselves in this position can be characterized in terms of self-regarding or other-regarding behaviors. The self-regarding, anti-social, egoist might free-ride, or otherwise withhold as much of a contribution as possible, giving little or nothing and taking what they can. Others are more cooperative; these other-regarding, prosocial, altruists give more than they take. Though these traits maybe stable, neither is fixed; everyone is capable of both self-indulgence and self-sacrifice, but there are many factors that affect individual predispositions to engage in cooperative behaviors such as contributing to a collective good or conserving it. The research reported in this chapter is interested in the question of how cognitive resources affect individual conservation efforts.

To answer this question I look to limited strength model of self-control (Baumeister et al. 1998) and my generalization, the resource model of political cognition, to explain how cognitive resources, which can be thought of as a form of mental energy that fuels effortful cognition, affect cooperation in collective action scenarios. These psychological models of behavior posit that an individual's volitional control, or ability to self-regulate, is conditioned by the availability of sufficient cognitive resources. When cognitive resources are low, one's "capacity to override natural and automatic tendencies, desires, or behaviors; to pursue long-term goals, even at the expense of short-

term attractions; and to follow socially prescribed norms and rules” is compromised (Bauer and Baumeister 2011, pp. 65). This should mean that people who are in a state of relative cognitive resource depletion should fail to engage in such socially desirable actions as conservation.

In the following sections of this chapter I will elaborate upon self-regulation theory and the resource model of political cognition as well as explain the logic behind my hypotheses about the relationship between cognitive resources and conservation behaviors. Then I will describe the design, procedures, and results of a survey-experiment I conducted to determine what effect, if any, cognitive resources have on conservation behaviors. As you will see the results of the hypothesis tests are null findings, but I offer a post-hoc theoretical and methodological account as to why the results were null and what conclusions can be drawn from the results of the experiment.

### ***3.1 Self-Regulation Theory and the Resource Model of Political Cognition***

Of substantive interest to this chapter, a number of studies have already investigated the relationship between self-regulation, cognitive resources, and cooperative behaviors frequently associated with collective action. So there is something of a foundation upon which to build research on cognitive resources and collective action. Ainsworth et al. (2014), for example, conduct a series of trust-games to test hypotheses pertaining to the effect of ego-depletion<sup>28</sup>, personality, and trust in others. Their research consistently demonstrates a trust-deficit among the ego-depleted participants. Two related articles, Petersen et al (2013) and Aaroe and Petersen (2014), posit relationships between *hunger* and prosociality. In the Petersen et al (2013) piece the researchers designed a natural experiment in which participants were randomly recruited to participate in an experiment in either the hour before or the hour after “lunchtime.” The logic behind this design runs on the social convention that most people eat a lunch around the 12 noon hour, so those who participate before noon should be, on average, hungrier than those participants recruited after 1pm.

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<sup>28</sup> Ego-depletion refers to a diminished capacity to self-control. This concept is further analyzed in the following pages.

The result of this hunger should be an observed increase in anti-social behavior, which they measure using a taking game<sup>29</sup>. The other “hunger” study, Aaroe and Petersen (2014), uses beverages of varying nutritional value to study prosociality in a dictator game. Participants in the treatment group were given a glass of Sprite to drink, which has loads of high-fructose corn syrup (glucose), participated in a dictator game and filled out a survey, then were compared to participants in a placebo group, who were given a glass of SpriteZero (which contains no caloric value). The results of the experiment showed that the treatment group was more generous in the dictator game than the placebo group, which suggests that those who were relatively less hungry behaved more prosocially.

The causal mechanism in these studies, like studies of self-control, is really the availability of cognitive resources (as posited by the resource model of political cognition). But none of these above cited research articles<sup>30</sup> actually relates cognitive resources directly to collective action behaviors. In all three of these studies the effect of cognitive resources on collective action are inferred from results of hypothesis tests about cognitive resources and their effect on cooperative behaviors. Indeed, this oversight served as a focal point of the analysis conducted in chapter 2 of this dissertation; the results of which lend support to the hypothesis that cognitive resources have a positive relationship with cooperative behaviors measured using both a standard measure of prosociality (a dictator game) as well as making a contribution to the study of human cooperation (provision of a public good). In this chapter, though, I would like to more robustly understand the relationship between cognitive resources and appropriation behaviors, specifically resource conservation. I expect to find the same positive relationship between cognitive resources and cooperation in this study.

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<sup>29</sup> The taking game is an inversion of the dictator game. Participants are informed that an anonymous Player 2 has been given an endowment and that, as Player 1, they have to decided how to split the endowment. In other words, the participant is making a decision about how much money to take from this anonymous person, which is a self-regarding behavior (as opposed to an other-regarding behavior), also known as an anti-social behavior (as opposed to a prosocial behavior).

<sup>30</sup> Petersen et al (2013), Aaroe and Petersen (2014), and Ainsworth et al (2014).

Of the several models of self-regulation advanced since the 1960s, the model that has gained the most traction in recent psychological research is the limited strength model of self-control. Indeed, the three studies outlined above are all predicated on this particular model of self-regulation theory. This model of self-regulation posits that effective self-regulation relies heavily on the availability of, what I term, cognitive resources. The model is based on the premise that most people are not oblivious to personal and social standards, and they intend to conform, but they often fail to “live up” to those standards. There are many reasons why this may be, but some of the time self-regulatory failure simply occurs because the individual lacks the cognitive resources necessary to act as intended. In the limited strength model cognitive resources are conceptualized as literally a type of energy, or fuel, that people draw upon when engaging in self-regulatory behaviors. After an act of self-regulation one’s store of cognitive resources is at least partially depleted, a phenomenon referred to in the literature as ego-depletion: *ego* as in Freud’s term for the “self,” *depleted* as in reduced capacity. Thus, when someone is ego-depleted they have a temporarily “diminished capacity to regulate their thoughts, feelings, and actions” (Baumeister and Tierney 2011, pp. 29). This state of ego-depletion can be thought of as cognitive fatigue much the same way we might think of someone being physically fatigued after working-out or engaging in other forms of physical recreation. The ego-depleted are less likely to effectively self-control because they have fewer cognitive resources available to use for self-regulatory behaviors; they have really experienced a depletion of cognitive resource levels.

A common analogy depicting this concept is the use of a muscle: using a muscle requires the expenditure of stored energy and once that energy is consumed the muscle will fail to function at optimal levels until restored. Self-regulatory behavior has been documented to work in a similar fashion. Exercising self-control leaves fewer resources available for subsequent acts of self-control (Baumeister et al 1994; Muraven et al 1998) and this resource can be restored by rest/refreshment,

affirmation, and incentive as well as trained by the formation of habits through repeated encounters with a regulatory situation (Muraven et al 1999; Oaten and Cheng 2006; Gailliot, Plant, Butz, and Baumeister 2007; Baumeister and Tierney 2011). But what happens when the “gas tank” is empty? According to the limited strength model of self-control, when an individual is cognitively fatigued their willingness to self-regulate should be compromised (what Glass, Singer, and Friedman (1969) called a psychic cost). The main prediction derived from the strength model of self-regulation is that those who have experienced a depletion of these cognitive resources will underperform those who have not experienced such depletion in domains of self-regulation. This is not to suggest that all people are equally affected by resource depletion. Regularly, or habitually, engaging in any behavior makes successfully carrying out that behavior easier. In a sense, it requires less effort to perform a behavior with which one has much practice or even finds enjoyment.

This model of self-control has proven to be a valuable tool for understanding why individuals often fail to effectively self-regulate in contexts as diverse as dieting to cooperation in social exchanges, but, as a theory, it is domain specific and leaves many questions about cognitive resources unanswered. For example, are cognitive resources affected by other types of behaviors (behavior other than self-regulation)? Are cognitive resources important for behaviors beyond self-regulation? My expectation that the answer to both of these questions is affirmative has led me to reconsider the limited strength model and develop a broader model of cognition based on largely on research in self-regulation, but incorporates similar concepts from other literatures as well as this dissertation. The principle distinction between the limited strength model of self-control and the resource model of political cognition lies in the scope of their application of cognitive resources to behavior. The limited strength model is domain specific: cognitive resources are expended in acts of self-control and without sufficiently available cognitive resources one’s ability to exercise self-control falters. But cognitive resources should be necessary for, and expended by, other types of behavior

as well. Psychologically taxing activities, psychologically/mentally effortful behavior, should have the effect of depleting individuals of their cognitive resources much the same as self-control behaviors deplete cognitive resources<sup>31</sup>.

The research demonstrating a physiological connection<sup>32</sup> to psychological behaviors warrants new questions about the limited strength model of self-control, specifically its applicability to behavior beyond self-control. Other researchers have expressed doubt regarding what exactly self-regulation researchers are really studying considering these recent findings (Kahneman 2011). And researchers in other fields have touched upon concepts that are related to, or even synonymous with, the ego-depletion phenomenon and cognitive resources. The “cognitive miser” tradition (Fiske 1981; Fiske and Taylor 1991) that has fueled research in online-processing (Redlawsk 2002), cooperation (Orbell and Dawes 1991), the schema theory of political belief systems (Conover and Feldman 1984), and heuristics (Tversky and Kahneman 1974), is a theoretical account in which individuals possess scarce cognitive resources necessary for psychological processing. Under this particular framework cognitive resources<sup>33</sup> are conceptualized as necessary for information processing, broadly defined, and since “people are limited in their capacity to process information...they take shortcuts whenever they can” (Fiske and Taylor 1991, pp. 13). The result of this miserliness is often error: rather than expending the resources necessary to arrive at a correct conclusion, individuals simplify their cognitive processes by opting for a sufficient conclusion. Distally, however, this is the result of cognitive resource scarcity. Were cognitive resources in infinite supply there would be no need to act as a “miser” since any, and all, cognitive demands could be sufficiently supplied.

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<sup>31</sup> I test this assumption in the empirical analysis below.

<sup>32</sup> Such as Gailliot et al (2007), Petersen et al (2013), and Aaroe and Petersen (2014)

<sup>33</sup> Fiske and Taylor refer to cognitive resources as *mental resources* necessary for cognition.

Another example is cognitive load, which refers to the amount of mental effort exerted during psychological activity (Miller 1956; Sweller 1988). When processing information or engaging in other cognitively taxing activities, such as logical reasoning, problem solving, or recalling memories, people are under a cognitive load. In other words, they are engaging in an activity that consumes cognitive resources. Like cognitive resource levels, different people have varying capacities for cognitive load and when cognitive load is great people often commit psychological errors. This particular conceptualization of cognitive resources is most commonly found in education psychology research which has consistently demonstrated how students fail to correctly answer test questions or learn new material after period of heavy cognitive load (Sweller 1988; Paas 1992; Mousavi et al 1995), but other research has also demonstrated that heavy cognitive load can result in psychological error more generally. For example, Gilbert's (1989) research demonstrates that people are more likely to commit a fundamental attribution error after a period of heavy cognitive load. Like the research in cognitive miser theory, cognitive load theory is built upon the assumption that cognitive resources are scarce and once they are consumed the individual's ability to supply their cognitive demand is compromised.

These literatures have all touched on the subject of cognitive resources and have similar conjectures regarding their impact on behaviors. The theories come from a diverse academic background, but they are studying the same phenomenon: cognitive resources and how they affect human behavior. The cognitive miser theory explains a diverse set of behaviors as the result of a natural human tendency to conserve cognitive resources for future cognitive demands. Cognitive load theory explains learning behavior, as well as cognitive bias, in terms synonymous with cognitive fatigue. The limited-strength model of self-control predicts the necessity of cognitive resources for self-regulatory behaviors. These theories are all positing a relationship between cognitive resources and certain behaviors, but they are using their own research domain specific language to make these

connections. In this study, and the host dissertation, I am working to unify these diverse areas of research under the resource model of political cognition.

### **3.2 *Cognitive Resources and Collective Action***

In a broad classification of collective action issues provision is only one of two potential problems; individual appropriation behaviors also have a bearing on the sustainability of collective goods (Gardner et al 1990; Ostrom 1990; Cox et al 2013). Whereas provision behavior refers to contributions an individual makes to a collective good, appropriation behavior refers to the individual use of collective goods. In both domains a behavior can be further classified as either cooperative or not. Conservation is an example of cooperative appropriation behavior; one in which there are a variety of ways a person can conserve resources like water or energy. For everyone, conservation is a behavior in which the personal benefits procured from a collective good are voluntarily reduced to the benefit of others or costs are incurred to use collective goods more efficiently, but for many people, probably most, engaging in specific conservation behaviors would also constitute a departure from their normal behaviors. For example, turning off the lights when leaving a room, a conservation behavior endorsed by the U.S. Department of Energy (DOE 2012), is widely, but not universally practiced. For those people who do not engage in this particular conservation behavior, doing so and sticking to the practice until it becomes almost reflexive is an example of self-regulation behavior and, according to the limited strength model, should be resource dependent: without an adequate capacity for self-control actually carrying out the new behavior probably will not happen. The limited strength model can be a useful framework for the study of conservation behavior and collective action behavior more generally.

Using conservation to study appropriation behaviors is a fairly common research practice (Lubell 2002 and 2004; Schneider et al 2003; Bolsen et al 2014). It is not common to refer to certain conservation behaviors in terms of appropriations, but, intuitively, conservation is a behavior

specific to the domain of appropriations. Conservation can refer to things like the legal protection of a natural resource, but, at the level of individual behavior, conservation concerns matters of resource allocation and use. Conservation behaviors directed at reducing personal waste<sup>34</sup>, or overall consumption, have the effect of reducing the amount of a collective good used by an individual. In other words, conservation behaviors are a form of appropriation behavior: conservation is a behavior that reduces an individual's appropriation of a collective good for themselves which leaves more of the good available to others. In this study I will be examining how cognitive resource depletion affects intentions to conserve water and energy as well as willingness to pay for household products designed to more efficiently use these two resources. Insofar as collective action behaviors are concerned, conservation is an example of a cooperative (prosocial) behavior and I expect that the resource depleted will be less inclined to make this self-sacrifice.

*Hypothesis 1:* Individuals who are relatively low on cognitive resources will be less likely to engage in conservation.

This is an important consideration for research on cooperation and cognitive resources because most of the extant research examines behavior related to individuals making a contribution to a collective good leaving the use of the collective good unanalyzed. But appropriation behaviors like conservation are of fundamental interest to the study of collective action (Ostrom, Gardner, Walker 1994). With one exception, the studies reviewed above are all in some way concerned with behaviors related to provision: endowing others in a trust game (Ainsworth et al 2014), giving in a dictator game (Aaroe and Petersen 2014). The research reported in Chapter 2 examines cooperative provision behavior using a dictator game and a contribution behavior. Petersen et al's (2013) study uses an exchange game, the Taking Game, which bears some resemblance to appropriation games, is

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<sup>34</sup> Personal waste is a generic term I use here to refer broadly to behaviors that result in wasted resources. It can refer to non-recycled physical trash (refuse) or wasted electricity and water. Leaving the lights on in an unoccupied room would be an example of a way in which electricity is commonly wasted.

the exception. In the Taking Game the participant is technically instructed to appropriate for themselves some amount of another person's endowment. The "hungry" (depleted) participants in Petersen et al's (2014) experiment behaved more anti-socially: they took more money from the ostensible other player in the game. This finding is consistent with the limited strength model of self-control: ego (resource)-depletion results in self-regulatory failure; that is, a failure to behave prosocially. But like Aaroe and Petersen (2014) and Ainsworth et al (2014), the focus of these studies is not on actual behaviors toward the provision of a collective good, but rather it is on behaviors/traits associated with provision behaviors. Assuming the relationship between cognitive resources and prosociality remains stable, cognitive resource depletion should result in relatively less of an inclination to engage in conservation (to engage in excessive appropriation behavior) in the same fashion that depletion results in tightfisted provision behaviors.

### ***3.3 Data and Methodology***

To test this hypothesis I designed a post-test survey-experiment in which participants (n=671)<sup>35</sup> were randomly assigned to one of two cognitive resource conditions (resource depletion vs. control) and surveyed on their intentions to engage in various conservation behaviors and their willingness to pay for resource conservation. The experiment was administered online using Qualtrics with the cognitive resource depletion task embedded at the beginning for participants assigned to the treatment group. This resource depletion task diverges from the ego-depletion manipulations commonly used in self-regulation research. The limited strength model of self-regulation posits that acts of self-regulation are cognitively (ego) depleting and the commonly used experimental treatments (ego-depletion tasks) reflect this. The most common treatments involve the use of a routine clerical task in which participants develop a baseline behavior that they must change in a second state of the clerical task. For example, in a task used throughout this dissertation

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<sup>35</sup> Participants were recruited from the Political Science Research Pool at Georgia State University and earned 1 extra-credit point for their participation in this study.

and in dozens of psychology studies, the researcher hands each participant a sheet of paper containing a lengthy passage of text and instructs them the participants to cross out every occurrence of the letter ‘e’, then on the second page, after having spent 10-15 minutes crossing out every ‘e’ they come across, they are given a different instruction: an instruction to cross out only certain occurrences of the letter ‘e’ (e.g. cross out the each occurrence of the letter ‘e’ unless it is the first letter of the word or comes after another vowel). The result of this change in instructions is a behavioral regulation occurring every time a participant encounters the letter ‘e’ in the text they are reading. This relatively prolonged period of self-regulation is considered ego-depleting, or, more generally, cognitively depleting. And it is relatively inexpensive to use, other treatments tend to be rather costly. More recently researches have begun using treatments that involve fasting, the consumption of sugary foods, and/or the consumption of sugar-free foods. This is a radical departure from the use of laboratory tasks designed to deplete participants of their cognitive resources and has paved the way for physio-psychological research on self-regulation and the limited strength model (Gailliot et al 2007). That self-regulation is significantly affected by nutritional intake was a finding that did not go unnoticed, but what was glossed over in this body of research is that something other than an active self-regulation behavior was either ego-depleting (cognitive resource depleting), had the effect of restoring self-regulatory strength.

In this study, to manipulate cognitive resources downward, participants in the treatment group were required to respond to a series of questions pulled from standardized tests (the SAT, ACT, and GRE)<sup>36</sup>. Participants responded to a variety of questions that were originally designed to measure intellectual aptitudes by scoring such things as verbal, spatial, and logical reasoning. What is important, though, is that in testing these various mental attributes the participants are experiencing an increased cognitive load for each of these types of reasoning (Sweller 1988, 1994).

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<sup>36</sup> See Appendix C for materials used in these experimental treatments.

This is an important research consideration because aptitudes vary across individuals. Some people, for example, are better with spatial reasoning than verbal reasoning and this should mean that the cognitive load experience between the two different types of problems will vary. By testing broadly across different forms of reasoning the treatment should result in a broad, but potentially modest, depletion of participant cognitive resources. According the resource model of political cognition the treatment should result in the expenditure of cognitive resources and should leave fewer cognitive resources available for future psychological/mental exercise. It doesn't matter how correctly the participants answer the questions so long as they made some amount of effort to answer the questions. I included 27 questions to ensure that participants spent a roughly equivalent amount of time in this manipulation as they would doing one of the more traditional self-regulation tasks (25-30 minutes).

Despite all of the considerations that can go into the development of a treatment, one of the drawbacks of research on cognitive resources is that they are not directly measureable; they are inferred from observable changes in dependent measures in laboratory settings. Considering the public health and clinical applications of the limited strength model of self-control there is a great deal of interest in developing a survey measure that can reliably approximate cognitive resource levels. The most widely used is a measure called the state self-control capacity scale (Twenge et al 2004; Ciarocco et al 2004; Gailliot et al 2007)<sup>37</sup>. This scale is created from a survey battery in which participants rate, on a 7-pt scale, how well each of 25 different statements describe the way they feel, then turned into an additive index. The questions include things like "I feel mentally exhausted," "I have lots of energy," and "I feel lazy" among other questions (see Appendix D for full battery) that are designed to give researchers an approximation of a respondent's ability to self-regulate, or will themselves to engage in one behavior or another (Baumeister et al 2005). If cognitive effort, more

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<sup>37</sup> See Appendix D for survey instrument used in this study.

generally, is a resource depleting<sup>38</sup> behavior then the average participant in the treatment condition, after completing their task, should report being more fatigued than the average participant in the control group.

The dependent variables in this study are related to individual conservation behaviors. Included in the survey instrument were several questions asking participants if they intend to engage in specific acts of conservation over the course of the next month in addition to two questions designed to gauge how willing the participants would be to pay for household products designed to reduce energy and water consumption. Without research funds for this study I cannot offer participants payouts, but political science research often uses behavioral intentions as a proxy for political behaviors (Campbell et al 1960; Rosenstone and Hansen; Brady et al 1995; Gomez and Wilson 2007), including conservation (Lubell et al 2006; Bolsen 2013). Specifically, the survey asked participants how likely they were (on a 7-pt scale) to adjust their thermostat settings, turn off their lights or other appliances when not in use, and reduce the amount of time they shower over the course of the next month as a means of conserving energy and water. Participants were also asked how much money they would be willing to pay of consumer items which facilitate conservation: low-flow faucets (\$0-20) to conserve water and energy-efficient light-bulbs (\$0-\$10) to conserve energy. I choose these specific behaviors for a few reasons. The foremost of these reasons is that everyone in the student sample used in the study can reasonably be assumed to use electric lighting as well as water from public source. Secondly, conserving electricity and water is a relatively easy thing for people to do and the willingness to pay for household items designed to reduce personal consumption and waste is relatively inexpensive. Studying self-regulation behavior using highly-demanding, or expensive, behaviors is of limited value considering most people do not engage in such activities to begin with and students probably have less discretionary income to spend on such

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<sup>38</sup> Or ego-depleting to use the self-regulation specific vocabulary

things as purchasing solar panels or an electric automobile. Lastly, at least two of these measures have been reported in previous literature: intentions to conserve electricity and willingness to pay for energy efficient lighting are the primary dependent variables in Bolsen (2013) and this provides me with a research finding against which I can compare the results of this study.

The survey instrument also included a number of items designed to collect demographic and political information. These survey items include race, gender, age, year of college (not how many years, but whether they are a freshman, sophomore, junior, or senior), political party identification, and ideological self-placement. Summary statistics are provided for all of these data in Appendix E. As a randomized experiment I do not expect any of these variables to have a significant impact on the primary hypothesis of this study, but these variables are useful for validating unit-homogeneity. Presented in Appendix F are the results from a regression of experimental assignment on demographics and political variables. If randomization is successful, and the only thing selecting participants into their group is chance, then none of the independent variables should significantly predict the probability of assignment to the treatment condition. The result of the regression analysis reported in Appendix F suggests randomization was successful: none of these traits predict assignment to the treatment group and, overall, the model fit for each of the regression analyses is very poor.

### **3.4 Results**

Table 1 displays the means and standard deviations for each of the dependent variables, by experimental condition, as well as the results of t-tests and Wilcoxon sign-rank tests. With two exceptions, the treatment group does not appear all that different from the control group in their conservation intentions. The two exceptions, both of which are related to water conservation, are intentions to reduce shower times and willingness to pay for low-flow faucet technology (which also conserves water), though the first of these is only modestly different. The difference in willingness

to pay for household water conservation technology is strong and substantively significant: the control group was willing to pay about \$1.17 more than the treatment group, which amounts to a 10.8% greater willingness to pay for water conservation. Water conservation, via reducing shower times, also appears to have a modestly significant difference between groups. This variable (like all of the conservation intention measures) ranges from values of 1 (extremely unlikely) to 7 (extremely likely). With a difference between the treatment (3.517) and control group (3.687) of about 2% this finding is a matter of statistical, rather than substantive, significance. The remaining dependent behaviors had no significant differences between the treatment and control groups.

Table 3.1: Comparison of Conservation Behaviors between Experimental Groups

Variable	Control	Treatment	t	z
Turn-off Lights	5.383 (1.683)	5.251 (1.618)	-1.405	1.557
Adjust Thermostat	4.586 (1.834)	4.523 (1.852)	-.582	-1.4
Reduce Shower	3.687 (1.619)	3.517 (1.69)	-1.74 <sup>+</sup>	-2.29*
WTP Energy Cons.	3.166 (2.113)	3.213 (2.177)	.373	-1.729
WTP Water Cons.	10.868 (5.43)	9.696 (5.547)	-3.6456***	-4.079***

note: standard deviations in parentheses. <sup>+</sup>p<.1, \*p<.05, \*\*p<.01, \*\*\* p<.001

Considering that this survey-experiment utilizes a student convenience sample and the summary statistics show how different the sample is from the public the generalizability of these results may be questionable. Nonetheless, the results of t-tests show that the treatment group ( $\mu=3.9$ ,  $\sigma=1.06$ ) reported lower average self-control capacities than the control group ( $\mu=4.12$ ,  $\sigma=1.09$ ). In other words, participants who completed a cognitive resource depletion task reported significantly lower capacities for self-control ( $t(300)=-3.6291$ ;  $p<.001$ ). Wilcoxon sign-rank tests further confirm that treatment group participants reported significantly lower self-control capacities ( $z=-5.189$ ,  $p<.001$ ). Lastly, Table 2 reports the results of three regression models in which the self-

control capacity index is regressed on assignment to the treatment. Taken as a manipulation check, the experimental intervention appears to have had the intended effect of reducing individual self-control capacities. Even controlling for the time of day in which the participant responded to the survey, how many hours of sleep they had the evening before, how recently they ate, and whether they attended class or worked before completing the survey the treatment had a strong and significant negative effect on cognitive resource levels<sup>39</sup>. But this finding also lends support to an assumption of the resource model of political cognition: cognitive resources are temporarily expended by the exertion of mental/psychological effort. The results of this manipulation check demonstrate some amount of construct validity.

Since unit-homogeneity appears to have been achieved and the manipulation successfully depleted participant's cognitive resources the results should be internally valid. The means and standard deviations presented Table 2 show how much variation there is for each of the dependent variables, by condition, and it is fairly considerable. The three intention measures roughly assume a normal distribution and the willingness to pay variables each conform to a Poisson distribution as expected<sup>40</sup>. Nevertheless, just because the sample is different from the public at-large does not mean the results are not generalizable. A growing body of methodological research is demonstrating that student convenience samples, as well as other convenience samples such as M-Turk, offer comparable results to nationally representative samples, but with predictable differences (Druckman and Kam 2011; Berinsky et al 2012; Mullinix et al [nd]). And differences between these types of

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<sup>39</sup> Each of the control variables is measured as a count of hours. With the exception of the *sleep* variable each control variable is expected to have a negative relationship with cognitive resource levels.

<sup>40</sup> This is expected because dollar amounts are technically count variables. Log-normalizing these variables does not change the results.

Table 3.2: OLS regression of Self-Control Capacity Scale on Assignment

	I	II	III
Treatment	-.223** (.086)	-	-.22** (.086)
Time of Day	-	-.058* (.028)	-.054* (.028)
Sleep	-	.078** (.027)	.079** (.027)
Food Consumption	-	-.042 (.036)	-.045 (.036)
Class/Work	-	-.064 (.09)	-.058 (.089)
n	630	625	625
F	6.67	3.8	4.37
Prob > F	.01	.005	<.001
RMSE	1.08	1.078	1.073

note: standard deviations in parentheses. \*p<.05, \*\*p<.01, \*\*\* p<.001

samples can be reasonably predicted; students for example probably don't have much, if any, discretionary income as the average American which can potentially affect their willingness to engage in, or pay for, conservation efforts. I am not entirely convinced that the sample is driving the results of this study, though. The willingness to pay for an energy efficient, compact fluorescent, light bulb (CFL bulb) dependent measure used in this study was borrowed from Bolsen (2013), which used a considerably different sample of undergraduate students at Northwestern University in addition to residents from the Chicago metropolitan area. The average willingness to pay for the CFL bulb in the Bolsen (2013) study was \$2.97 whereas the average reported in this study was \$3.18, and the standard deviations are nearly identical (a difference of .02). Accounting for inflation there is really no difference between these two averages and while it is far from a perfect test of whether the results reported in this study are generalizable the comparison lends some purchase to an argument that the results of this study are not sample specific.

Despite the fact these findings are mostly null, I think the results help develop a clearer picture of how cognitive resources affect behavior. And I expect the reason why the study did not offer positive findings has something to do with the way in which the behaviors were measured. I still expect cognitive resources will have a positive effect on conservation behaviors, but behaviors were not actually measured in this study; only behavioral intentions were measured. Participants were asked if they intend to conserve in various ways, but I did not measure an actual behavior with a behavioral indicator<sup>41</sup>. This is not simply a methodological consideration, but is a theoretical conjecture offered by the theory of planned and reasoned behavior and a consideration that bears directly on political psychology research. Intentions are the immediate antecedent to behavior, and are good predictors of behavior, but the relationship between intention and behavior is moderated by an individual's level of behavioral control (Ajzen and Fishbein 2005).

An individual's behavioral intentions and their behaviors do not always converge. This is a very intuitive premise as we have all experienced a divergence between intentions and behaviors at some point in our lives. This distinction between intention and behavior has been analyzed in depth and from different perspectives in psychological research. Ajzen (1985, 1992) and Ajzen and Fishbein's (2005) collective work in developing the theory of planned and reasoned behavior explicitly incorporates the potential for this disconnect between intention and behavior: *actual behavioral control* (also known as *volitional control*). The conceptualization of volitional control is fairly broad; "the performance of most [behaviors] depends at least to some degree on...non-motivational factors as availability of requisite opportunities and resources (e.g. time, money, skills, cooperation from others)" (Ajzen 1992, pp. 182). If a person is not given an opportunity to fulfill their intentions, then it is clear there will be a disparity between intent and behavior. This same logic applies to skill levels: if someone lacks the skills necessary to complete a behavior we can reasonably

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<sup>41</sup> In this study I opted to use intentions because I didn't have research funds to use for behavioral indicators.

expect that intended behavior will not actually happen. And like the resources described by Ajzen (1992), when cognitive resources are insufficient for a task (i.e. when they have been depleted) we are likely to see actual behaviors diverge from behavioral intentions.

Political scientists have studied some of these personal and social resources described by Ajzen (1985, 1992) and how they impact voter turnout and cooperative behavior. Reforms like early voting (Stein 1998; Gronke and Galanes-Rosenbaum 2007), vote by mail (Richey 2008), and e-voting, or internet voting (Solop 2001; Alvarez et al 2009), all give voters more opportunity, vis-à-vis time and convenience, to vote and have resulted in significant increases in aggregate turnout where employed. Verba, Shlozman, and Brady (1995) demonstrate how education and involvement in civic associations help individuals develop the civic skills needed to successfully navigate institutional barriers to political participation. Indeed, political elites can take advantage of common, group clustered, skill levels and monetary resources to erect such institutional barriers designed to prevent certain groups from participating in the political process such as Southern politicians did with the invention and selective application of literacy tests, as well as the establishment of poll taxes, in the Jim Crow era (Piven and Cloward 2000). Each of these above examples describes a way in which the resources Ajzen (1992) outlined have/can affect an individual's ability to fulfill their behavioral intentions by increasing the individual's actual behavioral control. But cognitive resources, too, should have a moderating effect on the relationship between an individual's behavioral intentions and their actual behaviors.

Our understanding as to why behaviors and intentions are not always equal is based almost exclusively on observational research. Theoretically, this is an important consideration for political science as behavioral intention is a commonly used measure in behavioral research (Bolsen 2013; Rogers and Aida 2012; Rosenstone and Hansen 1993) and all planned behaviors are logically subsequent to intentions. Behavioral intentions do predict actual behaviors very well, but the

empirical record also demonstrates a long and consistent pattern of survey respondents predicting they will engage in socially-desirable behaviors, such as voting (Miller 1952; Rogers and Aida 2012; Silver, Anderson, and Abramson 1986), or cooperating in social exchanges (Aaroe and Petersen 2013; Ostrom 1998; Palfrey and Rosenthal 1991; Wilson and Sell 1997), but when the time comes to take action they fail to show up at the polls or they act less cooperatively than signaled. While the cooperation research just cited is experimental research, it really never manipulates the moderating factors between intention and behavior: volitional control. Indeed, no research employing the theory of planned behavior, or which independently studies the resources related to political participation and cooperation, has truly manipulated volitional control in an experimental setting because it has, heretofore, conceptualized resources in terms time, money, skills, opportunity, and cooperation from others. With the exception of money, researchers cannot randomly assign participants to an income or education level or to a social capital rich community. And even the manipulation of monetary resources, by way of experimental payouts or participation incentives, is not done in such a way that the sums taken away from the experiment are so large as to have a meaningful effect on the participants' lives. Cognitive resources, on the other hand, can be easily manipulated in the laboratory and depleted<sup>42</sup> in survey research environments. In this study I used a new method of decreasing volitional control by depleting individual cognitive resource levels.

For now all of this remains theoretical. In this study I used intentions as a proxy for political behaviors, not actual behaviors. For a study to convincingly test the moderating effect of cognitive resources on the intention-behavior relationship it will have to measure both intentions and behaviors, not just one or other. The results reported in this study are specific to conservation and

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<sup>42</sup> This study demonstrates that cognitive resources can be significantly depleted by 25 minutes of answering math and verbal reasoning problems. This is an easy experimental manipulation to incorporate into an online survey and one that yields useful information about compliance with the treatment: answers to the questions and the amount of time they spent coming up with an answer to each question. But this manipulation only depletes resources, it cannot replenish resources.

generally show that cognitive resource levels do not affect behavioral intentions, but embedded in the survey were a number of other behavioral intention measures as well as willingness to pay for other public goods that yielded no significant differences between experimental groups. Intentions to vote, intentions to participate in a protest if invited, intentions to recycle, intentions to reduce automobile use, were all items on the survey-instrument used in this experiment and there were few significant differences between the control and treatment groups for any of these intention measures (see Table 3). The other willingness to pay measures focused primarily on issues related to conservation and public goods; for example, how much money they would be willing to pay in tax increases for: more public transit, more renewable energy infrastructure, and energy independence<sup>43</sup>. Like the intentions measures, the results indicate few significant differences between the experimental groups. The portrait painted by these results, when coupled with the results reported above, is that cognitive resources simply do not impact behavioral intentions.

Self-regulation research, as well as the resource model of political cognition advanced in this dissertation, has much to contribute to this particular component (volitional control) of the theory of planned behavior. Self-regulation research is principally interested in why individuals fail to live up to their behavioral intentions and the principle finding of the limited strength model is that resources have a moderating effect on the intention-behavior relationship, but this theoretical approach has yet to be taken in research using the theory of planned behavior. Without oversimplifying self-regulation theory, the entirety of this particular research agenda focuses on what Ajzen (1985, 1992) and Ajzen and Fishbein (2005) refer to volitional control. As outlined above, self-regulation refers to the individual capacity to willfully control their behavior and direct their

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<sup>43</sup> Given that I am using a student convenience sample it may seem that the individual's surveyed may not have the discretionary funds necessary to do these things and this fact may limit the generalizability of the findings. Nevertheless, given that both the randomization and manipulation were successful the results should still be internally valid. Behavioral intentions are measured on the same 7-pt scale as before, the willingness to pay measures on done on a scale from \$1-\$500.

Table 3.3: Other Behavioral Intentions and Willingness to Pay by Condition

Variable	Control	Treatment	t	z
Intent to Vote	5.095 (1.952)	5.211 (1.814)	1.108	1.532
Intent to Protest	3.074 (1.81)	3.054 (1.642)	-.214	-2.739**
Intent to Recycle	4.426 (1.832)	4.336 (1.822)	-.86	.883
Intent to Reduce Driving	4.236 (1.762)	4.027 (1.79)	-2.019*	-1.886 <sup>+</sup>
WTP Public Transit	126.68 (114.1)	127.89 (119.59)	.175	-1.214
WTP Renewable Energy	160.47 (116.55)	158.79 (121.31)	-.239	-1.609
WTP Energy Independence	156.141 (118.77)	148.69 (117.37)	-1.095	-2.477*

Note: standard deviations in parentheses. <sup>+</sup>p<.1, \*p<.05, \*\*p<.01, \*\*\* p<.001

efforts toward the attainment of personal or social goals such as good health or prosocial behaviors, respectively (Bauer and Baumeister 2011). Self-regulation researchers often refer to their research as focusing on the topic of willpower, or volition (Baumeister and Tierney 2012). Without making an intuitive leap, Ajzen and Fishbein's (2005) conceptualization of volitional control and Baumeister's (1998) pioneering work on self-regulation have a significant overlap; the sole difference is perhaps one of scope: in self-regulation research the focus is specifically self-regulatory behavior, not behavior more broadly. And, per the resource model of political cognition, in those areas of human behavior that lie outside the scope of self-regulation we should still see a moderating effect of cognitive resources on the intention-behavior relationship in general, as well as those associated with political behavior.

### 3.5 Conclusion

The primary goal of this chapter was to apply the resource model of political cognition to conservation behavior. Conservation behaviors are an important form of cooperation in which

individuals can engage to preserve the integrity of collective goods. By voluntarily reducing personal use an individual's conservation efforts leave more of a collective good available to other people and contribute to the overall sustainability of the resource for future use. Indeed, overuse and abuse contribute to the deterioration of such resources. Political scientists and behavioral economists have long studied the contextual factors that affect cooperative behaviors and conservation in particular. Here I attempted to demonstrate the negative effect cognitive resource depletion has on conservation behavior extending previous research on the relationship between self-regulation and behaviors related to cooperation.

Using a survey-experiment to test this relationship the results failed to reject the null hypothesis for nearly all of the dependent measures used in the study. Despite these null results the study did produce one important finding: the exertion of mental effort resulted in a reduced capacity for individuals to self-control. Though this finding may not be of much interest to political scientists, it lends support to my generalization of the limited strength model of self-control: the resource model of political cognition. The limited strength model of self-control is a domain specific theoretic model of behavior, but by reconceptualizing the resources used in, and expended by, acts of self-control as cognitive resources and successfully depleting these resources with a task unrelated to self-regulation this study lends empirical support to the resource model developed in this dissertation.

While the results of the study did not conform to my expectations, I believe the results are in large part affected by measurement issues. That this study used behavioral intention measure as a proxy for conservation behavior may be the reason why the hypothesis tests returned null results. Cognitive resources do not have a hypothesized relationship with behavioral intentions, only with actual behaviors. Bringing the theory of planned behavior into the fold I believe I propose a compelling argument that cognitive resources serve as a constituent factor of volitional control and

moderate the relationship between behavioral intentions and behavior itself. Like other resources, such as money, time, skills, and opportunity, cognitive resources should make the fulfillment of planned behaviors either easier or more difficult depending on their availability. Though this is a theoretical conjecture, when coupled with the results of this study and the extant self-regulation and cooperation literature, I think the argument paves a way for future research on this subject.

#### **4 CHAPTER 4: COGNITIVE RESOURCES AND POLITICAL INFORMATION PROCESSING**

For some time behavioral researchers have suggested party cues and other group endorsements serve as computational shortcuts (heuristics) that voters employ in lieu of more effortful information processing (Sniderman et al 1991; Rahn 1993; Popkin 1994; Lau and Redlawsk 2006), but recent work in political science has demonstrated that party cues can instead facilitate more elaborate and effortful modes of information processing, vis-a-vis partisan motivated reasoning (Peteresen et al 2013; Bolsen et al 2014). The study of heuristics and motivated reasoning have contributed much to our understanding of voter decision making and opinion formation, but, as noted by Druckman et al. (2009), the compartmentalization of political science research has worked against the production of knowledge regarding the linkages between these concepts. This chapter seeks to answer one question: under what conditions will people use party cues as heuristics rather than for partisan motivated reasoning? Clearly party cues facilitate both heuristic processes and partisan motivated reasoning, but we don't yet know why people opt for one mode of opinion formation over the other. In this chapter I suggest, and demonstrate, that the availability of cognitive resources influences the mode of information processing with which an individual is likely to employ when forming an opinion.

#### **4.1 Resource Model of Political Cognition**

Starting in the mid-1990s a group of social psychologists interested in the causes of socially unacceptable behavior posited what has become known as the *limited strength model of self-control* (Baumeister and Tice 1994). The limited strength model of self-control posits that controlling one's behavior is cognitively taxing and draws upon a finite store of psychological energy: what I call *cognitive resources*. This research program has broad implications for research in other areas of psychology, including political psychology. One aim of this study, and the host dissertation, is to generalize the limited strength model to behavioral areas beyond self-regulation and clarify our understanding of what cognitive resources are and how they affect human behavior. By combining existing theoretical implications about the nature of cognitive resources with empirical regularities uncovered by researchers in the fields of cognitive and social psychology I have developed what I call the *resource model of political cognition*.

There is a solid foundation of empirical support for the resource model of political cognition, but existing research has not quite been pieced together to offer a clear picture of what cognitive resources are and how they work. Cognitive resources are essentially a form of psychological fuel that powers effortful psychological processes. Just as the calories a person consumes fuel physical activity, cognitive resources fuel mental activity. And similar to calories and physical activity the relationship between cognitive effort and energy consumption is assumed to be positive. Unlike calories, however, cognitive resources are not directly measurable<sup>44</sup>; like many other concepts in psychological research they are instead inferred by their manipulation in experimental research and subsequent changes in behavior. Researchers can experimentally manipulate an individual's cognitive resource levels upward or downward as well as observe people in their natural states of cognitive depletion, replenishment, or normality. One of the key conclusions that can be

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<sup>44</sup> Though recent work in physio-psychology has made some promising advances (see Gailliot et al 2007).

drawn from the self-regulation literature is that self-regulatory failure is usually inevitable. To paraphrase Lupia et al (2000, pp 1): “there are more ways to spend [cognitive resources] than there are [cognitive resources] to spend...As a result, people lack the time and energy to pursue all possible opportunities.” In other words, cognitive resources are scarce.

The limited strength model of self-regulation posits that controlling one’s behavior is and effortful behavior is dependent on self-regulatory strength (Baumeister and Tice 1998). To reiterate an important point, cognitive resources cannot be directly measured. Researchers instead have to infer the depletion of cognitive resources from behavioral change. In the extant literature, as noted throughout this chapter, the focus has been on self-regulation with applications to behaviors as diverse as overcoming addiction or dieting to the observance of social norms. A common analogy depicting this is the use of a muscle: using a muscle requires the expenditure of stored energy and once that energy is consumed the muscle will fail to function at optimal levels until restored. The active-self, the part of the human psyche that consciously selects into one behavior over another, has been documented to work in a similar fashion. Exercising self-control leaves fewer resources available for subsequent acts of self-control (Baumeister et al 1994; Muraven et al 1998; Baumeister and Tierney 2011). Self-regulation theorists refer to this phenomenon as *ego-depletion* and, more frequently than replenishment (see below), take advantage of this empirical regularity to test hypotheses about self-control. I expect that this finding applies to many other behaviors as well and will continue to refer to it more generally as *cognitive resource depletion*. I make this change in terminology because behaviors other than self-regulation, such as problem-solving, decision making, and logical thought should be resource depleting as well (Schmeichel et al 2003; Bauer and Baumeister 2011) and ego-depletion is a self-regulation theory specific term<sup>45</sup>.

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<sup>45</sup> *Ego* meaning *self*. Thus ego depletion literally refers to the depletion of the self, or active-self.

Classifying behaviors as effortful or effortless is nothing new in political psychology. Even within research programs it is not difficult to intuitively classify some behaviors as effortful and others as effortless (Leeper and Slothuus 2014). But what makes something more or less effortful? Dictionary.com (2014) defines effort, foremost, as the “exertion of physical or mental effort,” but also, more mechanically, as “the force or energy that is applied...for the accomplishment of useful work.” More effortful behaviors should consume more energy than less effortful behaviors. Just as running a mile burns more energy than playing video games, so too do more effortful mental/psychological activities consume more energy (cognitive resources) than less effortful activities. For example, motivated reasoning should be a more effortful behavior that relies on the availability of cognitive resources, in addition to a greater expenditure of cognitive resources, than a relatively effortless behavior such as heuristic processing.

Cognitive resource levels probably cannot be fully depleted, but they may drop to levels insufficient for the cognitive demand of some mental task faced by an individual. For self-regulation researchers the result of confronting a demanding task with insufficient cognitive resources often results in regulatory failure. This assumption is the central hypothesis proposed by self-regulation researchers, but I am seeking to broaden our understanding of how cognitive resources affect behavioral processes and outcomes. Behaviors other than acts of self-control should be cognitively depleting, leaving fewer cognitive resources available for other psychological activities in the immediate future.

When one’s resources are compromisingly low it is still possible to successfully complete mental tasks, but one is likely to do it differently and probably less well. This assumption will serve as the central hypothesis of this chapter. To deal with cognitive depletion and continued cognitive demand people can employ low-effort processes as something of a coping mechanism. The psychology literature often refers to these processes, using the language of dual process theory, as

system 1 processes. By employing a low-effort behavior/process in a state of cognitive depletion people can attempt to actualize outcomes associated with high-effort behaviors/processes. For example, cognitive activities like forming and retrieving memories should be compromised when someone is low on cognitive resources. Thus, the cognitively depleted should be less capable of forming memory-based political considerations upon which to form political opinions on policies or candidates and, as a result, should be more likely to employ information short-cuts or even forms of low-information rationality during the opinion formation process. The resulting process should be different in a state of resource depletion than under conditions of cognitive resource abundance, but the results of that process may not be all that different depending upon the quality/reliability of what little information is used<sup>46</sup>.

#### **4.2 Party Cues, Opinion Formation, and Cognitive Resources**

Dual process theories<sup>47</sup> abound in psychological research, but have rarely been explicitly applied to the study of party-cues and opinion formation. Indeed, the study of political opinion formation has traditionally failed to link concepts such as heuristics and motivated reasoning due to the high degree of compartmentalization in political science research (Druckman et al 2009, pp 499). It is here that I expect cognitive resources to illuminate our understanding of political cognition. The two most prominent threads in this literature, heuristic processing and motivated reasoning, have only recently been conceived as two-sides of the same coin (Petersen et al 2013; Leeper and Slothuus 2014). Party cues can be processed heuristically or they can be processed more systematically, vis-à-vis partisan motivated reasoning. The two processes are typically distinguished by the amount of psychological elaboration afforded by the individual. I contend that, more distally, the two processes are distinguished by the amount of effort/energy an individual is able to expend

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<sup>46</sup> A party-cue, for example, is a highly reliable piece of information from which one can reasonably draw consistent conclusions without falling prey to the vagaries (biases) which often arrive when employing a representativeness heuristic

<sup>47</sup> Theoretical accounts of how a phenomenon can occur in two different ways, or as a result of two different processes (Chaiken and Trope 1999).

when forming an opinion. Elaboration takes effort, and higher levels of elaboration should expend more cognitive resources than lower levels of elaboration. Partisan motivated reasoning should be a more effortful behavior than the heuristic processing of party-cues and should, thus, require the expenditure of more cognitive energy.

As explained by Kahneman (2011), heuristic processes are implicit, automatic, low effort, associative, and unconscious (among others descriptors) as opposed to being explicit, controlled, high effort, deliberative, and conscious. In the case of party-cues the party's endorsement of a candidate or a policy essentially serves as a cognitive shortcut transmitting information sufficient for a decision to be made relatively effortlessly (Sniderman et al 1991; Lau and Redlawsk 2002). No group psychology or shared mental model is activated when party cues are processed heuristically. Heuristics are, by their nature, not elaborate. Their simplicity is the result of little effort being made, or required, to form an evaluation or opinion.

Motivated reasoning, on the other hand, is an effortful, systematic process in which an individual is motivated toward distinct goals: "to arrive at an accurate conclusion, whatever that conclusion may be,..[or] to arrive at a particular conclusion" (Kunda 1990, pp. 480). In other words, motivated reasoning is goal oriented and those goals are either directional goals or accuracy goals. Partisan motivated reasoning is a form of directional motivated reasoning "that is likely to occur when one is primed to pay particular attention to being consistent with his/her partisan identity" (Bolsen et al 2014, pp. 237). Indeed, given the general lack of political knowledge in the public and the strong influence party identification plays in voting and public opinion, partisan motivated reasoning is probably the default setting citizens operate under when forming opinions and making political decisions. Rather than using party-cues as cognitive short-cuts, the motivated reasoner employs a deliberative process by exerting effort to recall information, arguments, and beliefs from memory when confronted with a party-cue. The group psychology ignored by the heuristic

processor takes center-stage for the partisan motivated reasoner. And this tendency is all the more amplified, and important, when the motivated reasoning process is being used to overcome cognitive dissonance (Petersen et al 2013) and results in the generation of counterarguments and the rejection of information that is inconsistent with one's priors (Festinger et al. 1956). Partisan motivated reasoning, at least relative to heuristic processing, is more elaborate and, because of this higher level of elaboration, requires the expenditure of more cognitive effort.

But how do cognitive resources condition whether a party-cue will be processed heuristically or more systematically? This is a question not explicitly asked by the literature. The resources required to process information and form an opinion is assumed to be finite, but replenishable<sup>48</sup>. The exertion of one's mental/psychological faculties to process information is fueled by these cognitive resources, but not all behaviors consume an equal amount of energy. In fact, behaviors can be classified as low-effort/low-energy or high-effort/high-energy (Kahneman 2011). Processing party-cues heuristically is a low-energy behavior: only one consideration, the party-cue, needs to be processed by the individual and this does not require the expenditure of many cognitive resources. The behaviors in which individuals engage are not always, or even usually, well thought out or involve contemplation and deliberation, and several researchers have shown that heuristic processing of party cues is automatic (Burdein et al 2006) and implicit (Kam 2007): both of which are phenomena generally perceived as being effortless. Using party-cues to engage in partisan motivated reasoning, however, is a high-energy behavior: retrieving information and arguments from memory and developing new arguments, or counterarguments, in the face of cognitive dissonance require a greater expenditure of cognitive resources.

What I intend to show with this research is that the way people process party-cues is influenced by the availability of cognitive resources: resource levels themselves should influence the

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<sup>48</sup> The classic example of people as *cognitive misers*, for example, considers cognitive resources in a similar way: given the scarcity of cognitive resources people probably use them strategically.

cognitive style of their host individual. The central hypothesis of this chapter is that when a person is low on cognitive resources they should be more inclined to process party-cues heuristically since their ability to pursue partisan motivated reasoning is compromised. Cognitive resource depletion should undermine one's ability to directionally motivate their reasoning.

### **4.3 Data and Methodology**

To investigate the effects of cognitive resources on opinion formation I partially replicated an experiment conducted by Bolsen, Druckman, and Cook (2014) and put a twist on the original design<sup>49</sup>. As I mention above, partisan motivated reasoning can be thought of as the default setting for citizens when they form opinions, evaluate candidates and policy, and vote (Bolsen et al 2014). Using information about the Energy Independence Act of 2007 as a vehicle for their research, the researchers varied the type of party cue participants received and induced participants to motivate their reasoning processes. One of the goals of the Bolsen et al (2014) study was to identify conditions under which the citizen tendency to engage in partisan motivated reasoning is mitigated. This is in part the goal of this chapter and one of the reasons I chose to replicate the Bolsen et al (2014) paper. While Bolsen et al (2014) focused on how motivations and cross-partisan cues undermine partisan motivated reasoning, I further suggest that the availability of cognitive resources should undermine one's ability to engage in motivated reasoning more generally<sup>50</sup>.

I used the Political Science Research Pool at Georgia State University to recruit participants for this study. This resulted in the recruitment of 612 student (partisan) participants and this experiment was executed in the Department of Political Science computer lab. The experiment has a 2(resources) x3(cue) x2(motivation) design, resulting in 12 groups to which participants were

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<sup>49</sup> By replication I mean I will be using the same set up (information about the Energy Independent Act of 2007) and the same party endorsement and motivation manipulations.

<sup>50</sup> Other reasons for selecting this particular study for replication involve the study's design, which manipulates both party cues and motivations, as well as the fact that the study's materials were easily obtained for replication and that the manipulations have been checked, pretested, and employed in the field on a nationally representative sample.

randomly assigned; six of which received a cognitive resource depletion task and the other six entering the survey environment without the depletion task. Those participants who were assigned to the control groups participated in what is essentially a partial replication of Bolsen et al (2014), but those participants in the resource depletion group performed a task designed to manipulate their cognitive resource levels downward before completing the survey instrument.

Since this chapter utilizes the replication of existing published research I will present the findings in two separate sections. In the first section, *Study 1*, I cover the procedures and results for the control group: this will allow me to demonstrate how party cues and motivations normally operate in addition to demonstrating how the results of the original study, which was conducted using a nationally representative survey experiment, compare to the student convenience sample used in this study. The two samples are considerably different, but the way in which party cues and motivation inducements affect participants in the different conditions should be similar (Druckman and Kam 2012). In the second section, *Study 2*, I will cover the procedures and results for the treatment group and compare those results to the control group to demonstrate how cognitive resource levels influence opinion formation.

#### 4.3.1 *Study 1*

The original Bolsen et al (2014) study, which I partially replicate in this chapter, was designed as a survey experiment in which participants were given some information about the Energy Independence Act of 2007 with varying party cues and motivation inducements embedded as experimental manipulations in a 3x5 factorial design. The party cue manipulations involved attributing the passage of the Act to the Democratic Party, the Republican Party, a cross-party cue in which some members from each party (enough to form a majority) supported the Act in Congress, a consensus cue in which members from both parties overwhelmingly supported the Act in Congress, and a condition in which no cue is provided at all. To induce motivations the researchers followed

the conventional approach used in psychological research: embedded at the end of the policy brief on the Energy Independence Act were a couple of statements either asking the participant to weigh the policy information evenhandedly because they would be asked to justify their opinions later in the survey (accuracy motivation), or to consider the high level of party unity in Congress during the 2007 session and informing them that they would later be asked to explain why they affiliate with their political party<sup>51</sup>. Together these experimental manipulations should shed some light on when and how partisan motivated reasoning works.

Generally the results demonstrate that partisan motivated reasoning may very well be the ‘default setting’ people turn to when forming an opinion. The evidence suggests that partisan motivated reasoning is really only undermined when people seek accuracy goals or when they are unable to attribute a policy to one party or the other (the consensus condition detailed above). Providing participants with no motivational inducement or a directional inducement and/or other, more direct, party cues resulted in an increase in processing time<sup>52</sup> suggesting that partisan motivated reasoning is driving the opinion formation process. And this is substantively important in the sense that such modes of information processing are further shown by Bolsen et al (2014) to have significant effect on the direction of the opinion formed (either a positive opinion or a negative opinion depending on whether one’s own party or the opposite party, respectively, sponsored the legislation) as well as the strength of the opinion formed: opinions formed via partisan motivated reasoning are held more strongly than opinions formed when pursuing an accuracy goal.

*Hypothesis 1:* Individuals will be more likely to engage in partisan motivated reasoning in evaluating a policy when provided with an in-party or out-party endorsement.

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<sup>51</sup> The researchers also included a condition in which no motivation inducement was embedded in the policy brief.

<sup>52</sup> The amount of time spent answering survey questions designed to gauge support for the policy was used as a measure of processing time. This is a standard method of measuring the amount effort/elaboration made on behalf of the research subjects.

*Hypothesis 2:* Individuals will be less likely to engage in partisan motivated reasoning when pursuing an accuracy goal, regardless of the party endorsement.

*Hypothesis 3:* Individuals will express greater strength in an opinion if it is formed via partisan motivated reasoning.<sup>53</sup>

Instead of a full replication of the Bolsen et al (2014) I conduct a partial replication of the study. My substantive interest is on the ways in which party cues are processed, not so much the impact of partisan motivated reasoning on opinion formation. Nevertheless, replicating such aspects of the Bolsen et al (2014) study with a student convenience sample should demonstrate that any results obtained in this study are not simply driven by a biased sample. Cognitive resources and their psychological impact on information processing should affect American college students no differently than other humans. After all, college students are humans too.

To test the hypotheses regarding support for the Energy Independence Act of 2007 I use the same survey instrument employed in the Bolsen et al (2014) study. To measure party identification I used a standard 7-point measure asking participants: “Generally speaking, which of the options on the scale below best describe your party identification?” where 1=“strong Democrat” and 7=“strong Republican.” Following convention, fellow partisans were grouped together since lean partisans and strong partisans tend to behave similarly despite their professed differences in partisanship (Petrocik 1974; Bullock 2011; Bolsen et al 2014). Independents were excluded from the study as they profess to have no party identification and thus would supposedly be incapable of partisan motivated reasoning. This resulted in the recruitment of 306 participants for the partial replication.

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<sup>53</sup> This is the language used in the hypotheses by Bolsen et al (2014), not in my own words.

Table 4.1: Control group conditions and number of participants per condition<sup>54</sup>

<i>(Control Group)</i>	Accuracy Motivation	Directional Motivation
No Cue	Condition 1 (n=52)	Condition 2 (n=51)
Same Party Endorsement	Condition 3 (n=50)	Condition 4 (n=51)
Different Party Endorsement	Condition 5 (n=51)	Condition 6 (n=51)

The central dependent variable for this section of the study, again following Bolsen et al (2014), is designed to measure support for the Energy Independence Act given the information provided to the participants. Respondents were asked “Given this information, to what extent do you oppose or support the Energy Independence Act?” on a 7-point scale in which 1=strongly oppose and 7=strongly support. Additionally, the survey software used for the instrument (Qualtrics) captured the amount of time participants spent answering this question (their response latency time) to determine the level of processing involved in participant opinion formation<sup>55</sup>. Lastly, immediately following the ‘oppose/support’ question, participants were asked how strongly they felt about their opinion of the Energy Independence Act on a 7-point scale<sup>56</sup>.

#### 4.3.2 Study 1 Results

As a baseline condition in this study I follow Bolsen et al (2014) and use the group assigned to the *No Cue x Accuracy Motivation* (condition 1). Not only does this offer a normatively appealing baseline, asking participants to form an accurate opinion and not offering the lifeline of a party cue, but including the accuracy inducement should overcome the natural tendency to engage in partisan motivated reasoning when combined with the absence of a party cue (as mentioned above, partisan

<sup>54</sup> See Appendix G for text used in these experimental manipulations.

<sup>55</sup> Response latency times are frequently used by researchers to measure the level of cognitive effort put into a task and faster response latency times indicate the use of heuristics (Redlawsk 2002; Taber and Lodge 2006; Petersen et al 2013; Bolsen et al 2014).

<sup>56</sup> See Appendix H for survey experiment used in this study.

motivated reasoning is probably a default process). Using t-tests I compare the average level of support for the Energy Independence Act of 2007 (EIA of 2007) for each of the remaining five conditions against the baseline and report the result in Table 2. Hypothesis 1 suggests that support for the EIA of 2007 should be significantly higher than the baseline in the *Same Party Cue x Directional Motivation* condition (condition 4), but significantly lower in the *Opposite Party Cue x Directional Motivation* condition (condition 6). As you can see this hypothesis received partial support: while support in the *Same Party Cue x Directional Motivation* condition did increase over the baseline ( $t= 2.447$ ;  $\alpha = .02$ ), there was no significant change in when participants were given a directional motivation and the legislative endorsement of the opposite political party.

Table 4.2: Support for EIA of 2007<sup>57</sup>

	Accuracy	Directional
No Cue	4.921	5.34***
	[Baseline]	[5.027, 6.654]
Same Party	5.213	5.454**
	[4.846, 5.58]	[5.011, 5.899]
Opposite Party	5.105	5.233
	[4.623, 5.587]	[4.793, 5.672]

Hypothesis 2 suggests the opinions formed under an accuracy inducement should be relatively inhibited. That is, when pursuing an accuracy goal the individual will not be engaging in partisan motivated reasoning so the opinion that is formed should be comparatively less extreme. In other words, there should be no significant difference between those assigned to the remaining *accuracy motivation* conditions (conditions 3 and 5) and the baseline condition. T-tests comparing the level of support given to the EIA of 2007 by participants in both the *Same Party Cue x Accuracy Motivation* condition and the *Opposite Party Cue x Accuracy Motivation* condition show no significant difference from the opinions formed by those in the baseline condition. This result lends support

<sup>57</sup> For all tables in this section: \*\*\*  $p < .01$ , \*\* $p < .05$ , \* $p < .1$   
95% confidence intervals in brackets

for hypothesis 2 and generally replicates Bolsen et al's (2014) findings regarding policy support and partisan motivated reasoning.

The last hypothesis test of the replication study is in regard to the strength of opinions held by the participants across each of the conditions. Unlike the previous two hypothesis tests, though, this particular test carries no substantive meaning for this study and, here as presented, is merely a demonstration of the generalizability of the results across different samples: the student convenience sample used here and the nationally representative sample used in Bolsen et al (2014). In the original Bolsen et al (2014) article, of which this present study is only partially replicating, there were several additional conditions designed to glean insight about partisan motivated reasoning and party cues. By comparing the response latency times of their 15 conditions to determine which conditions yielded partisan motivated reasoning the researchers were able determine whether opinions formed via partisan motivated reasoning were held more strongly than those formed via heuristic processing. I will test this particular hypothesis more fully in Study 2 (comparing the results of this partial replication with the results of my twist on the replication). Despite this limitation, the *No Party Cue × Accuracy Motivation* condition can still be used as a baseline against which the remaining conditions can be compared. Theoretically, since all of the remaining conditions are motivated reasoning conditions this should result in participants holding their opinions more strongly. Table 3 contains the results of t-tests comparing opinion strength for each condition against the baseline. With one exception, the *Opposite Party Cue × Accuracy Motivation* condition, the results replicate: the opinions held by 'motivated reasoners' are, on average, held more strongly than those opinions formed otherwise.

Table 4.3: Opinion Strength on EIA of 2007

	Accuracy	Directional
No Cue	4.5 [Baseline]	4.894** [4.599, 5.189]
Same Party	5.043*** [4.756, 5.329]	4.879* [4.465, 5.292]
Opposite Party	4.5 [4.063, 4.937]	4.884* [4.442, 5.325]

### 4.3.3 Study 2

This portion of the study generally follows the same design as *Study 1*: a partial replication of Bolsen et al (2014). The key difference, though, is that participants underwent a task designed to deplete their store of cognitive resources before reading about the Energy Independence Act of 2007 and completing the survey instrument. These participants were recruited from the same research pool and participated in the study on the same days as those in the control group (*study 1*). As in *Study 1*, independents were excluded from the study as they profess to have no party identification and thus would supposedly be incapable of partisan motivated reasoning. This resulted in the recruitment of 306 participants.

Table 4.4: Treatment group conditions and number of participants per condition

<i>(Low Cognitive Resource Group)</i>	Accuracy	Directional
	Motivation	Motivation
No Cue	Condition 7 (n=52)	Condition 8 (n=51)
Same Party Endorsement	Condition 9 (n=51)	Condition 10 (n=50)
Different Party Endorsement	Condition 11 (n=51)	Condition 12 (n=51)

To experimentally manipulate participant cognitive resource levels downwards I employ a treatment commonly used in the self-regulation literature: a clerical task. Self-regulation researchers often employ such tasks to deplete participants of their resources and alternatively self-reflection tasks or social-interaction tasks are also used to deplete cognitive resources, but I opted for the use

of a clerical task out of concern for potential confounds and costs. Clerical tasks are easily employed, require less instruction, and are less costly than other resource depletion tasks. In this study, when participants arrived they were given a page of text and instructions to cross out each occurrence of the letter *e*. After completing the first page they were given a second page with the instructions to cross out every occurrence of the letter *e* unless it was followed by another vowel or embedded in a word in which a vowel appears two letters earlier<sup>58</sup>. The effect of this task is the depletion of cognitive resources stemming from the establishment of a baseline behavior (crossing out every occurrence of the letter *e*) followed by an instruction to change their behavior (crossing out only certain occurrences of the letter *e*). By definition the change of behaviors constitutes an instance of self-regulation and should be resource depleting (Bauer and Baumeister 2011). On average participants took approximately 25 minutes to complete this task.

As the results of the first study generally show, along with the findings of the original Bolsen et al (2014) study in addition to others (Petersen et al 2014), party-cues are not simply used as heuristic devices designed to reduce cognitive effort in information processing. Indeed it is difficult to imagine people engaging in partisan motivated reasoning without a party-cue available with the possible exception of political sophisticates who should be more capable of gleaning party support from policy proposals. Despite these findings there is a rich literature that has been developed since the early 1990's which suggests party-cues are used as time/energy saving devices (Sniderman et al 1991; Rahn 1993; Popkin 1994; Lau and Redlawsk 2006). This is an issue that the resource model of political cognition should clarify. 'Cognitive miser' theories have generally been used to explain why individuals will engage in heuristic processes, but these theories have typically been shown to fail in many circumstances; that party-cues facilitate partisan motivated reasoning is a good example of one of these failures. Certainly people have the capacity to behave as cognitive misers, just not all of the

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<sup>58</sup> See Appendix A for sample document used for this experimental treatment.

time. Following the assumptions of the resource model (see above) as resources become depleted the need, whether consciously recognized or not, to conserve energy (resources) actually becomes important. Thus, I expect that those who are depleted of their cognitive resources will be more likely to process party-cues heuristically rather than for partisan motivated reasoning.

*Hypothesis 4:* Individuals will be more likely to process party-cues heuristically when their cognitive resource levels are relatively low.

To test this hypothesis I will compare the response latency times for the policy support question (see *Study 1*) with those from participants in *Study 1*<sup>59</sup>.

Another set of interesting hypotheses involve other cognitive faculties related to heuristic-processing and motivated reasoning: accessible considerations and ability to recall information. And this is an important point of emphasis as response latency times do not really tell us if a person is employing a heuristic-process or a more elaborate, systematic-process; they simply allow us to compare the relative response times. Conceivably the accessibility of considerations and the ability to recall information are precluded by heuristic-processing, but are necessary components of motivated-reasoning. Those individuals who are low on cognitive resources, like those who employ heuristic-processing, should have fewer accessible considerations in mind when reasoning (which is the primary motivation behind hypothesis 1). That is, in a low cognitive resource situation an individual should be more likely to engage in online-processing schemes as opposed to memory-based information processing. When people are depleted of their cognitive resources their ability to store, encode, and retrieve information is generally compromised (Oaten and Cheng 2006; Baumeister 2011). This should result in the failure to recall information provided in the experiment and/or recalling information incorrectly. To measure these two variables, *considerations* and *item-recall*, I conducted a content analysis of an open-ended question asking participants to explain their

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<sup>59</sup> All hypotheses in *Study 2* (the treatment group) will be tested by comparing their results with those from participants in *Study 1* (the control group).

position on the Energy Independence Act of 2007. A *consideration* is “any reason that may induce an individual to decide a political issue one way or the other” (Zaller 1992). For this variable’s operationalization I count the number of considerations expressed by participants in the above mentioned open-ended question. The policy information provided to all participants upon entering the survey instrument contains three policy goals of the legislation. To measure *item recall* I count the number of these items participants recalled when answering the open-ended question.

*Hypothesis 5:* Individuals who are low on cognitive resources will express fewer considerations than others.

*Hypothesis 5a:* Individuals who are low on cognitive resources will express fewer considerations when pursuing a partisan (directional) goal than individuals whose cognitive resources have not been depleted.

*Hypothesis 6:* Individuals who are low on cognitive resources should recall fewer factual items about the policy than individuals whose cognitive resources have not been depleted.

*Hypothesis 6a:* Individuals who are low on cognitive resources will recall fewer items when pursuing a partisan (directional) goal than individuals whose cognitive resources have not been depleted.

#### 4.3.4 *Study 2 Results*

Those who have been depleted of their cognitive resources should have fewer resources remaining to engage in elaborate modes reasoning and should instead employ simpler, heuristic processes. That is, they should be more likely to use the party cue as a heuristic to reduce the effort required during opinion formation. This would mean that participants who underwent the resource depletion task should provide responses to opinion questions more quickly (they would have faster response latency times). The results reported in Table 5 demonstrate that this is generally what happened: participants in *Study 2* provided answers to questions regarding their opinions of the EIA

of 2007 much quicker than their counterparts in *Study 1*. This finding suggests that these participants, those assigned to the depletion task, employed a heuristic process in the opinion formation process rather than a more elaborate process (i.e. motivated reasoning).

Table 4.5: Response Latency Times (in seconds) for EIA 2007 Support Question.<sup>60</sup>

Study 1 Means		
	Accuracy	Directional
No Cue	11.635	12.244
Same Party	12.016	11.737
Opposite Party	12.579	12.875

Study 2 Means and Confidence Intervals		
	Accuracy	Directional
No Cue	9.058*** [8.17, 9.95]	10.119*** [9.145, 11.093]
Same Party	12.581 [9.316, 15.845]	9.245*** [7.832, 10.657]
Opposite Party	8.795*** [7.722, 9.868]	9.409*** [8.326, 10.49]

The next set of hypotheses concern other cognitive faculties related to heuristic-processing and motivated reasoning: accessible considerations and ability to recall information. To reiterate a point mentioned above, looking at alternative indicators of heuristic processing or motivated reasoning other than response latency times is important because, like many measures of the ‘black box’ that is human psychology, processing time is really a proxy for the amount of elaboration and effort put into opinion formation process and not a direct measure. Hypothetically the accessibility of considerations and the ability to recall information are precluded by heuristic-processing; which is in stark contrast to motivated reasoning which explicitly incorporates information recall and accessible considerations. Per hypotheses 5 and 6, the cognitively depleted should express fewer considerations and recall fewer items from the experimental materials. Table 6 displays the results

<sup>60</sup> For all tables in this section: \*\*\* p< .01, \*\*p<.05, \*p<.1  
95% confidence intervals in brackets

of t-tests comparing the number of *considerations* communicated by participants in the treatment and control groups. As you can see the results generally support my hypothesis: on average, the resource-depleted are forming fewer considerations than the control group. This evidence further suggests that the party-cue offered in the experimental manipulations is being used heuristically rather than being used to motivate the participants' reasoning processes because motivated reasoning processes are based upon the use of such information. Interestingly, the average number of considerations offered by participants was higher in all of the party-cue conditions than in the no-cue condition. I have yet to figure out exactly why this is, but I expect these participants are forming considerations based upon inferences they may be making about the party sponsor.

Table 4.6: Number of considerations offered to justify participant's support

Study 1 Means		
	Accuracy	Directional
No Cue	2.094	2.028
Same Party	2.325	2
Opposite Party	1.935	2

Study 2 Means and Confidence Intervals		
	Accuracy	Directional
No Cue	1.703** [1.389, 2.015]	1.521*** [1.288, 1.753]
Same Party	1.917*** [1.566, 2.267]	1.608* [1.125, 2.091]
Opposite Party	1.764 [1.431, 2.098]	1.731 [1.266, 2.195]

Table 7 displays the results of t-tests comparing the number of *items recalled* by the participants in the treatment and control groups. In general these results also lend support to my hypothesis regarding heuristic-processing and resource-depletion: on average, the resource depleted recalled fewer items from the experimental materials than the control groups participants. Notable, too, is the finding that those assigned to the accuracy motivation conditions, on average, recalled

more information than those assigned to the direction motivation conditions. Why they recall fewer items is a question worth pursuing more in depth later: did they read everything or just stop when they saw the Act was sponsored by whichever party or are they just less capable of forming memories. I believe it is the latter, but, nevertheless these findings, too, lend support to the idea that, on average, the cognitively depleted are heuristic processors.

Table 4.7: Number of factual items recalled about the EIA of 2007

Study 1 Means		
	Accuracy	Directional
No Cue	0.656	0.611
Same Party	0.7	0.6
Opposite Party	0.29	0.5

Study 2 Means and Confidence Intervals		
	Accuracy	Directional
No Cue	.459* [.243, .676]	.375*** [.209, .54]
Same Party	0.666 [.398, .936]	.304*** [.101, .508]
Opposite Party	.352 [.163, .543]	.423 [.189, .656]

#### 4.4 Revisiting Hypotheses from Study 1

Since these findings suggest that the resource depleted are processing the party cues heuristically, and not via partisan motivated reasoning, we can further test hypotheses 1 and 3 by comparing the resource depleted participants (*Study 2*) to the replication participants (*Study 1*). If the resource depleted participants were processing party cues heuristically then not only should the opinions they hold be significantly more moderated than those exhibited by the *Study 1* participants (who should have been engaging in motivated reasoning), but there should be no significant differences in support for the EIA of 2007 among the several resource depletion conditions. Using t-tests to compare support for the EIA of 2007 between the resource-depleted participants and the

replication participants, Table 8 offers evidence to support this. Participants in two of the three *Resource Depletion x Directional Motivation* conditions (conditions 8 and 10) indicated significantly lower levels of support for EIA of 2007, on average, than their counterparts in analogous *Study 1* conditions (conditions 2 and 4). This finding supports the theory of partisan motivated reasoning advanced in Bolsen et al (2014). If we were to accept the premise that the *Study 1* participants were ‘motivated reasoners’ and that the resource-depleted, *Study 2*, participants were ‘heuristic processors’ then the average level of support for the EIA of 2007 offered by participants in the *No Party Cue x Directional Motivation* and *Same Party Cue x Directional Motivation* conditions should be significantly lower among *Study 2* participants. Moreover, since partisan motivated reasoning appears to be undermined by cognitive resource depletion, there should be no significant differences between the average levels of support for the EIA of 2007 among the several *Study 2* conditions. While Table 8 was designed to display differences between *Study 1* and *Study 2*, you can see the average levels of support for the EIA of 2007 across all study conditions. Not one of the *Study 2* conditions yields a statistically significant difference in the level of support offered for the EIA of 2007<sup>61</sup>.

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<sup>61</sup> Table not displayed since the information is duplicative and result is predicted to be null.

Table 4.8: Comparison of Support for the EIO 2007 across Studies

Study 1 Means		
	Accuracy	Directional
No Cue	4.921	5.34
Same Party	4.213	5.454
Opposite Party	5.105	5.233

Study 2 Means and Confidence Intervals		
	Accuracy	Directional
No Cue	5.196 [1.414, 4.798]	5.034* [4.709, 5.358]
Same Party	5.367*** [4.872, 5.862]	5.143* [4.769, 5.517]
Opposite Party	5.111 [4.685, 5.537]	4.923 [4.487, 5.359]

Lastly, revisiting hypothesis 3, we should see the opinions held by ‘partisan motivated reasoners’ (*Study 1* participants) held more strongly than those held by ‘heuristic processors’ (*Study 2* participants). Table 9 displays the results of t-tests comparing the average opinion strength for participants by study and condition. With the exception of the *No Cue x Accuracy Motivation* condition (condition 1), the average opinion strength measured for the *Study 2* participants is significantly weaker than for *Study 1* participants; lending further support to the notion that these opinions were formed via the heuristic processing of a party cue rather than as the result of partisan motivated reasoning.

Table 4.9: Comparison of Opinion Strength about EIO 2007 across Studies

Study 1 Means		
	Accuracy	Directional
No Cue	4.5	4.894
Same Party	5.043	4.879
Opposite Party	4.5	4.884

Study 2 Means and Confidence Intervals		
	Accuracy	Directional
No Cue	4.88** [4.561, 5.204]	4.644* [4.359, 4.929]
Same Party	4.533** [4.109, 4.958]	4.714 [4.47, 4.958]
Opposite Party	4.667 [4.288, 5.045]	4.436** [4.037, 4.835]

#### 4.5 *Conclusion and Discussion*

This chapter applies what I call the resource model of political cognition to the opinion formation process. I posit that those who are relatively low on cognitive resources should be more inclined to process information heuristically during the opinion formation process. The results of this reported experiment lend support to this thesis in the sense that the cognitively depleted have faster response times to opinion questions, express fewer considerations when prompted to justify their opinion, and recall fewer factual items from a policy brief provided as part of the experiment. This is an important finding: the results of the experiment demonstrate that partisan motivated reasoning is undermined by cognitive resource depletion. Moreover, the study and theory proposed in this chapter help link motivated reasoning and heuristic processing in a way that has heretofore eluded social scientists.

Resource depletion is a common state human beings find themselves in every day. That ‘2 o’clock feeling’ referenced in countless energy drink advertisements is a perfect example of what it feels like to be cognitively depleted. Working, thinking, driving, making decisions, problem solving,

behaving in a socially desirable way are all behaviors that consume cognitive resources (Baumeister 2011). Indeed, the short period of time after meals and sleep are really the only times of day an average individual finds their store of cognitive resources close to being ‘fully-stocked.’ The remaining time of day is a gradual state of depletion. Given the participatory habits and media consumption habits of the average person, chances are that they are watching the news or listening to news radio after work, attending PTA or town hall meetings at the end of their day, voting, receiving campaign advertisements, and responding to public opinion polls in a state of depletion. This study would suggest that, on average, the millions of Americans who tune into the news or engage in political participation in a state of cognitive resource depletion may actually take little away from those programs because they are in a state of cognitive depletion.

## 5 CHAPTER 5: CONCLUSION

Understanding the forces that affect human cognition is of fundamental importance for the study of political behavior, in general, and political psychology in particular. We still have much to learn about how and why people reason about politics the way they do. The past 40 years of psychology and political behavior research has given scholars today much to work with as political science continues to extend the proverbial *funnel of causality*. Perhaps the most significant contribution from these research agenda has been the ever increasing humanity with which the subjects of our research are treated. The thick rational choice and naïve scientist theories of the past rob citizens of their humanity by ignoring the limitations of human cognition. Worse still are the negative evaluations many academics have formed of average citizens, their competency, and their ability to meaningfully engage the democratic process. Citizens are only human. And that humanity carries with it limitations: limitations on our capacity to accomplish our goals and limitations on our capacity for rational thought and action, political or otherwise. The resource model of political cognition advanced throughout this dissertation is a theoretic model which attempts to explain just

that: by recognizing the limited capacity human beings have for self-control and information processing we can more fully understand why people behave the way they do. And once we, as political scientists, come to grips with this fact we can begin to more effectively theorize about political behavior as well as unify what appears to be an increasingly disparate field in which behavioral phenomena are, all too often, conceptualized in isolation from alternative explanations.

### **5.1 Contributions and Results**

The research reported in this dissertation contributes to the study of political behavior in two ways. First, it applies a theory of self-regulation (the limited strength model of self-control) to the study of cooperative behavior and collective action. Secondly, it extends the limited strength model of self-control beyond the narrow confines of self-regulation behavior and toward a general theory of resource based cognition using political science research on partisan motivated reasoning. Beginning with Chapter 2 I applied the limited strength model of self-control to cooperation. Self-regulation research is often concerned with the conditions under which individuals behave prosocially; in other words, when are we likely to see people make self-sacrifices to endow others with some kind of benefit such as a contribution to the provision of a public good. Following the conventions employed in research on self-control I conducted a laboratory experiment in which participants were randomly assigned to either an ego-depletion<sup>62</sup> condition or a control condition. Hypothetically, the experimental treatment should decrease an individual's capacity to effectively regulate their behavior toward prosocial goals by having the participants engage in multiple acts of self-control before proceeding on to the study. Using a dictator game to assess prosociality the hypothesis received strong support, as did an additional hypothesis test which used a behavioral indicator of individual contributions to the provision of a public good: scientific research on human cooperation. This study not only replicated long-standing research connecting prosociality to

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<sup>62</sup> That is, a cognitive resource depletion condition that depletes said resources using an act of self-control.

collective action, but also establishes a connection between the dominant model of self-regulation theory and political behavior.

Chapter 3 was designed with two goals in mind. The first of these goals was to extend the findings of Chapter 2 to the domain of individual appropriations from collective goods, specifically conservation behaviors. Secondly, but by no means less important, this study was designed to demonstrate that self-regulation behaviors are not dependent on *ego*<sup>63</sup>, but rather on cognitive resources. In this study I conducted a survey-experiment in which participants were randomly assigned to a cognitive resource depletion condition or a control condition. Like Chapter 2 the dependent measures used in this study pertain to acts of self-control and prosociality: conservation. A key difference, however, is that instead of using an ego-depletion task that involves repeated acts of self-control, participants in the treatment condition answer a series of questions taken from standardized tests. Consistent with the resource model of political cognition the exertion of mental effort should be cognitive resource depleting; thus the effort put into answering these test questions, should result in a depletion of cognitive resources. These are the same resources I expect are actually be expended when individuals engage in acts of self-control and to demonstrate this I use the state self-control capacity scale developed by researchers of self-regulation as a measure of one's ability to self-regulate<sup>64</sup>. While the results of the primary hypothesis tests failed to reject the null hypothesis, I make a case that the results are driven by measurement issues: rather than measuring behaviors, I used behavioral intention measures as proxies and there is no theoretical relationship between either cognitive resources or self-regulation and behavioral intention. Despite these null findings, the results of the secondary hypothesis test, that the exertion of cognitive effort is resource depleting, received strong empirical support. This particular finding is absolutely essential for

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<sup>63</sup> Without being overly critical, 'ego' as conceptualized in self-regulation theory is overly abstract at best, and circularly defined at worst.

<sup>64</sup> In other words, this battery was designed to measure an individual's level of 'ego.'

demonstrating the validity of the resource model of political cognition and distinguishing the theory from the limited strength model of self-control. By using an activity that does not involve self-control, but the exertion of cognitive effort instead, this finding demonstrates that one's ability to self-control is not just dependent on 'ego,' but rather on cognitive resources.

Further support for the resource model of political cognition is offered in Chapter 4, which changes direction from the study of the two previous chapters, which focused on cooperation, to a political cognition study on information processing and opinion formation. Where Chapter 2 applied the limited strength model to political behavior, and chapter 3 demonstrated the dependence of self-control on cognitive resources, in Chapter 4 I apply the resource model to a set of behaviors not related to self-control: motivated reasoning and heuristic processing. In Chapter 4 I partially replicate a partisan motivated reasoning study published by Bolsen et al (2014) and put a twist on their original design to show how cognitive resource availability affects the way in which party cues are processed. The literature on this subject has evolved greatly over the past 30 years. Traditionally party cues have been considered a cognitive short cut used to simplify opinion formation in terms of low-information rationality (Popkin 1993) or heuristic processing (Sniderman et al 1992; Rahn 1993). But more recent research has demonstrated that party-cues can actually facilitate motivated reasoning among partisans (Petersen et al 2013; Bolsen et al 2014). Since party identification is a form of social identity a party-cue does not simply offer a short-cut, it is laden with affective information for the partisan receiving the cue. One key distinction between these two modes of processing party cues lies in the amount of cognitive effort each entails: motivated reasoning is a relatively high-effort behavior whereas heuristic processing is a relatively low-effort behavior. Thus, those who are in a state of cognitive resource depletion should be less capable of processing party cues via partisan motivated reasoning and should instead process party cues heuristically and this is exactly what the experiment reported in Chapter 4 demonstrates.

## 5.2 *Directions for Future Research*

It is especially important that cognition and effort are more fully understood as political scientists begin to explore physiological and genetic causes of political behavior. The metaphor of a *funnel of causality* has been invaluable for our understanding of political behavior, but as Campbell et al (1960, pp. 24) warned “it becomes more misleading than clarifying if pressed to far.” Research on the genetic predicates of political behavior has become a topic of great interest to political scientists since the mapping of the human genome. Almost annually one of the “Big Three” journals in political science features a publication from one of the handful of political scientists who are qualified to write and review such work. This research has its merits, but if this dissertation is to offer a critique it would stem from the above quote from Campbell et al (2014). Genetic studies of political behavior appear to be a crown jewel in the discipline because we cannot really imagine causal mechanisms further down the causal funnel. But what about everything that happens between genes and behavior? Genes should affect physiology (genetic-physiology), which then affects psychology (physio-psychology), which then affects political psychology, and so on. Those steps between genes and psychology have been ignored at the expense of solid causal inference, but this dissertation works to establish a solid cognitive foundation upon which physio-psychological research can build.

Throughout this dissertation I have cited numerous studies in the self-regulation literature that have made solid connections between physiology and psychology. Specifically Gailliot et al’s (2007) work, as well as numerous peer-reviewed studies that followed, in which blood-glucose is demonstrated to fuel self-regulation behaviors. I have also made a case which suggests the limited strength model of self-regulation has underconceptualized their primary causal mechanism: the active-self, or the ego. By demonstrating that cognitive resources are what drive these self-regulation behaviors, as well as cognitive functioning more generally, this dissertation establishes a

starting point for physio-psychological research in political science to really begin. Making such a connection, in addition to discovering other such phenomena, is vital if political science is to go further down the rabbit hole.

Moreover, the resource model of political cognition carries implications for several other behaviors political scientists study. Political cognition studies may find use in incorporating cognitive resource levels as an explanatory variable wherever effort or self-regulation is theorized to be of some importance. A partial list can include such things as automatic behaviors, implicit attitudes, and cognition in general. Also, those areas of political behavior which can be conceptualized as self-regulation behaviors may also find use in employing the resource model. This dissertation, as well as a few other published studies (see Chapter 2 and 3), have suggested collective action and prosocial behaviors are significantly impacted by cognitive resource levels. Furthermore, Chapter 4 of this dissertation demonstrates how cognitive resources affect information processing and opinion formation. Framing effects, persuasion, and social desirability biases may also be significantly impacted by the availability of cognitive resource levels. Ultimately, though, what may be perhaps the most intriguing aspect of the resource model of political cognition is that resource depletion is perfectly natural and humans everywhere, citizens and policy makers alike, are facing their political environment in a depleted state. That we become cognitively fatigued cannot be helped; it is one of the limitations of being human. And that this fatigue results in behavioral change is interesting and significant for our understanding of democratic citizenship.

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## APPENDIX

### ***Appendix A: Ego Depletion Task Used for Studies Reported in Chapters 2 and 4.***

*Instructions (Part 1): Using the pencil provided, cross out every occurrence of the letter E.*

But here is an artist. He desires to paint you the dreamiest, shadiest, quietest, most enchanting bit of romantic landscape in all the valley of the Saco. What is the chief element he employs? There stand his trees, each with a hollow trunk, as if a hermit and a crucifix were within; and here sleeps his meadow, and there sleep his cattle; and up from yonder cottage goes a sleepy smoke. Deep into distant woodlands winds a mazy way, reaching to overlapping spurs of mountains bathed in their hill-side blue. But though the picture lies thus tranced, and though this pine-tree shakes down its sighs like leaves upon this shepherd's head, yet all were vain, unless the shepherd's eye were fixed upon the magic stream before him. Go visit the Prairies in June, when for scores on scores of miles you wade knee-deep among Tiger-lilies- what is the one charm wanting?- Water- there is not a drop of water there! Were Niagara but a cataract of sand, would you travel your thousand miles to see it? Why did the poor poet of Tennessee, upon suddenly receiving two handfuls of silver, deliberate whether to buy him a coat, which he sadly needed, or invest his money in a pedestrian trip to Rockaway Beach? Why is almost every robust healthy boy with a robust healthy soul in him, at some time or other crazy to go to sea? Why upon your first voyage as a passenger, did you yourself feel such a mystical vibration, when first told that you and your ship were now out of sight of land? Why did the old Persians hold the sea holy? Why did the Greeks give it a separate deity, and own brother of Jove? Surely all this is not without meaning. And still deeper the meaning of that story of Narcissus, who because he could not grasp the tormenting, mild image he saw in the fountain, plunged into it and was drowned. But that same image, we ourselves see in all rivers and oceans. It is the image of the ungraspable phantom of life; and this is the key to it all.

Now, when I say that I am in the habit of going to sea whenever I begin to grow hazy about the eyes, and begin to be over conscious of my lungs, I do not mean to have it inferred that I ever go to sea as a passenger. For to go as a passenger you must needs have a purse, and a purse is but a rag unless you have something in it. Besides, passengers get sea-sick- grow quarrelsome- don't sleep of nights- do not enjoy themselves much, as a general thing;- no, I never go as a passenger; nor, though I am something of a salt, do I ever go to sea as a Commodore, or a Captain, or a Cook. I abandon the glory and distinction of such offices to those who like them. For my part, I abominate all honorable respectable toils, trials, and tribulations of every kind whatsoever. It is quite as much as I can do to take care of myself, without taking care of ships, barques, brigs, schooners, and what not. And as for going as cook,- though I confess there is considerable glory in that, a cook being a sort of officer on ship-board- yet, somehow, I never fancied broiling fowls;- though once broiled, judiciously buttered, and judgmatically salted and peppered, there is no one who will speak more respectfully, not to say reverentially, of a broiled fowl than I will. It is out of the idolatrous dotings of the old Egyptians upon broiled ibis and roasted river horse, that you see the mummies of those creatures in their huge bakehouses the pyramids.

No, when I go to sea, I go as a simple sailor, right before the mast, plumb down into the fore-castle, aloft there to the royal mast-head. True, they rather order me about some, and make me jump from spar to spar, like a grasshopper in a May meadow. And at first, this sort of thing is unpleasant enough. It touches one's sense of honor, particularly if you come of an old established family in the land, the Van Rensselaers, or Randolphins, or Hardicanutes. And more than all, if just previous to putting your hand into the tar-pot, you have been lording it as a country schoolmaster, making the tallest boys stand in awe of you. The transition is a keen one, I assure you, from a schoolmaster to a sailor, and requires a strong decoction of Seneca and the Stoics to enable you to grin and bear it. But even this wears off in time.

*Instructions (Part 2): Using the pencil provided, cross out the letter E unless it is followed by another vowel or is embedded in a word in which a vowel appears two letters earlier.*

I lay there dismally calculating that sixteen entire hours must elapse before I could hope for a resurrection. Sixteen hours in bed! the small of my back ached to think of it. And it was so light too; the sun shining in at the window, and a great rattling of coaches in the streets, and the sound of gay voices all over the house. I felt worse and worse- at last I got up, dressed, and softly going down in my stockinged feet, sought out my stepmother, and suddenly threw myself at her feet, beseeching her as a particular favor to give me a good slippering for my misbehaviour: anything indeed but condemning me to lie abed such an unendurable length of time. But she was the best and most conscientious of stepmothers, and back I had to go to my room. For several hours I lay there broad awake, feeling a great deal worse than I have ever done since, even from the greatest subsequent misfortunes. At last I must have fallen into a troubled nightmare of a doze; and slowly waking from it- half steeped in dreams- I opened my eyes, and the before sunlit room was now wrapped in outer darkness. Instantly I felt a shock running through all my frame; nothing was to be seen, and nothing was to be heard; but a supernatural hand seemed placed in mine. My arm hung over the counterpane, and the nameless, unimaginable, silent form or phantom, to which the hand belonged, seemed closely seated by my bed-side. For what seemed ages piled on ages, I lay there, frozen with the most awful fears, not daring to drag away my hand; yet ever thinking that if I could but stir it one single inch, the horrid spell would be broken. I knew not how this consciousness at last glided away from me; but waking in the morning, I shudderingly remembered it all, and for days and weeks and months afterwards I lost myself in confounding attempts to explain the mystery. Nay, to this very hour, I often puzzle myself with it.

Now, take away the awful fear, and my sensations at feeling the supernatural hand in mine were very similar, in the strangeness, to those which I experienced on waking up and seeing Queequeg's pagan arm thrown round me. But at length all the past night's events soberly recurred, one by one, in fixed

reality, and then I lay only alive to the comical predicament. For though I tried to move his arm- unlock his bridegroom clasp- yet, sleeping as he was, he still hugged me tightly, as though naught but death should part us twain. I now strove to rouse him- "Queequeg!"- but his only answer was a snore. I then rolled over, my neck feeling as if it were in a horse-collar; and suddenly felt a slight scratch. Throwing aside the counterpane, there lay the tomahawk sleeping by the savage's side, as if it were a hatchet-faced baby. A pretty pickle, truly, thought I; abed here in a strange house in the broad day, with a cannibal and a tomahawk! "Queequeg!- in the name of goodness, Queequeg, wake!" At length, by dint of much wriggling, and loud and incessant expostulations upon the unbecomingness of his hugging a fellow male in that matrimonial sort of style, I succeeded in extracting a grunt; and presently, he drew back his arm, shook himself all over like a Newfoundland dog just from the water, and sat up in bed, stiff as a pike-staff, looking at me, and rubbing his eyes as if he did not altogether remember how I came to be there, though a dim consciousness of knowing something about me seemed slowly dawning over him. Meanwhile, I lay quietly eyeing him, having no serious misgivings now, and bent upon narrowly observing so curious a creature. When, at last, his mind seemed made up touching the character of his bedfellow, and he became, as it were, reconciled to the fact; he jumped out upon the floor, and by certain signs and sounds gave me to...

**Appendix B: Survey Instrument used in Chapter 2.**

As part of this study you are asked to participate in a short game.

There are two players to the game: 'the Proposer' and 'the Responder.' The identities of the two players are unknown to each other and will never be revealed. The way the game works is simple: the Proposer is given \$8 and is asked to give some of that money to the Responder. The game ends when a decision is made. The Responder will be given the amount of money sent to them by the Proposer; the Proposer will keep what is not sent to the Responder.

At the end of the study you will receive an instruction on how to claim your pay out.

By clicking on the button below you will be assigned a role to play and begin the game.

-----PAGE BREAK-----

You have been randomly selected to play the role of the *Proposer* in the game.

This means you are asked to choose how to split an \$8 endowment between yourself and the *Responder* (player 2). You may split the money however you like: you can keep it all, give it all away, or keep some for yourself and send some to the other player.

At the end of the study you will receive an instruction on how to claim your pay out.

Using the sliding scale below, how much of the \$8 do you choose to send to the other player?

-----PAGE BREAK-----

- 1) What is your age? \_\_\_\_\_
- 2) Are you male or female?
  - a. Male
  - b. Female
- 3) Which of the following do you consider to be your primary racial or ethnic group?
  - a. White
  - b. African-American
  - c. Asian-American
  - d. Hispanic
  - e. Other
- 4) Generally speaking, do you consider yourself a Democrat, Independent, or Republican?

_____	_____	_____	_____	_____	_____	_____
1	2	3	4	5	6	7
<i>Strong</i>			<i>Independent</i>			<i>Strong</i>
<i>Democrat</i>						<i>Republican</i>

5) Which point on this scale best describes your political views?

1	2	3	4	5	6	7
<i>Very liberal</i>			<i>Moderate</i>			<i>Very conservative</i>

Please read each description and rate how much each person is or is not like you.

6) (He/She) thinks it is important that every person in the world be treated equally. (He/she) believes everyone should have equal opportunities in life.

1	2	3	4	5	6	7
<i>Not like me at all</i>			<i>Not sure</i>			<i>Very much like me</i>

7) (He/She) believes that people should do what they are told. (He/She) thinks people should follow the rules all of the time, even when no one is watching.

1	2	3	4	5	6	7
<i>Not like me at all</i>			<i>Not sure</i>			<i>Very much like me</i>

8) How important is it to you that every person in the world have the same opportunities in life?

1	2	3	4	5	6	7
<i>Not like me at all</i>			<i>Not sure</i>			<i>Very much like me</i>

Please indicate the degree to which you disagree or agree with the following statements

9) We have gone too far in pushing equal rights in this country.

1	2	3	4	5	6	7
<i>Strongly disagree</i>			<i>Not sure</i>			<i>Strongly agree</i>

10) Our society would be better off if the distribution of wealth was more equal.

1	2	3	4	5	6	7
<i>Strongly disagree</i>			<i>Not sure</i>			<i>Strongly agree</i>

11) One should always find ways to help others less fortunate than oneself.

_____	_____	_____	_____	_____	_____	_____
1	2	3	4	5	6	7
<i>Strongly</i>			<i>Not sure</i>			<i>Strongly</i>
<i>disagree</i>						<i>agree</i>

12) One of the problems of today's society is that people are often not kind enough to others.

_____	_____	_____	_____	_____	_____	_____
1	2	3	4	5	6	7
<i>Strongly</i>			<i>Not sure</i>			<i>Strongly</i>
<i>disagree</i>						<i>agree</i>

Would you like to donate \$1 of your earnings from this study to research on human cooperation?

\_\_\_Yes \_\_\_No

***Appendix C: Cognitive Resource Depletion Task used in Chapter 3.***

1) Which one of the five is least like the other four?

- a. Dog
- b. Mouse
- c. Lion
- d. Snake
- e. Elephant

2) Which number should come next in the series?

1, 1, 2, 3, 5, 8, 13, \_\_

- a. 8
- b. 13
- c. 21
- d. 26
- e. 31

3) Which one of the five choices makes the best comparison?

PEACH is to HCAEP as 46251 is to:

- a. 25641
- b. 26451
- c. 12654
- d. 51462
- e. 15264

4) Mary, who is sixteen years old, is four times as old as her brother. How old will Mary be when she is twice as old as her brother?

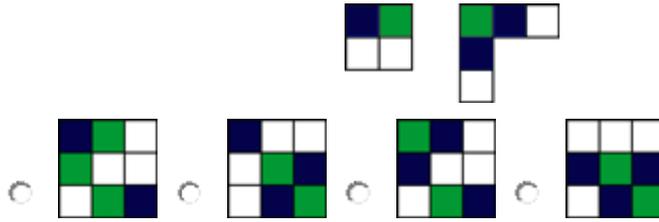
- a. 20
- b. 24
- c. 25
- d. 26
- e. 28

5) How many times does the letter 'e' occur in the passage below:

There was madness in any direction, at any hour. If not across the Bay, then up the Golde Gate or down 101 to Los Altos or La Honda...You could strike sparks anywhere. There was a fantastic universal sense that whatever we were doing was right, that we were winning.

\_\_\_\_\_ (open ended response)

6) Which larger shape would be made if the two sections are fitted together?



7) Which one of the five choices makes the best comparison  
Mason is to Stone as:

- a. Soldier is to Weapon
- b. Lawyer is to Law
- c. Blacksmith is to Forge
- d. Teacher is to Pupil
- e. Carpenter is to Wood

8) If you rearrange the letters of “CIFAIPC” you would have the name of a(n):

- a. City
- b. Animal
- c. Ocean
- d. River
- e. Country

9) Which of the below quantities is greater:

$$\frac{\text{Quantity A}}{X^2+1}$$

$$\frac{\text{Quantity B}}{2x-1}$$

- a. Quantity A is greater
- b. Quantity B is greater
- c. The two quantities are equal
- d. The relationship cannot be determined from the information given.

10) Choose the number that is  $\frac{1}{4}$  of  $\frac{1}{2}$  of 20% of 200.

- a. 2
- b. 5
- c. 10
- d. 25
- e. 50

11) John needs 13 bottles of water from the store. John can only carry 3 at a time. What is the minimum number of trips John needs to make to the store?

- a. 3
- b. 4
- c.  $4\frac{1}{2}$
- d. 5
- e. 6

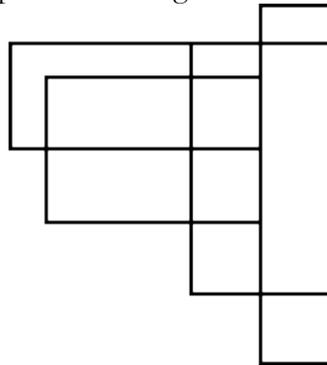
12) If you rearrange the letters “LNGEDNA” you have the name of a(n)

- a. Animal
- b. Country
- c. State
- d. City
- e. Ocean

13) Ralph likes 25 but not 24; he likes 400 but not 300; he likes 144 but not 145. Which will he like:

- a. 10
- b. 50
- c. 124
- d. 200
- e. 1600

14) How many four-sided figures appear in the diagram below?



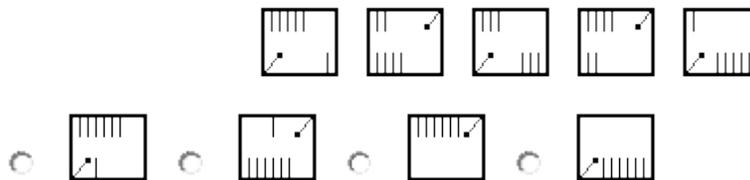
- a) 10
- b) 16
- c) 22
- d) 25
- e) 28

15) What is the missing number in the sequence show below?

1, 8, 27, ?, 125, 216

- a. 36
- b. 45
- c. 46
- d. 64
- e. 99

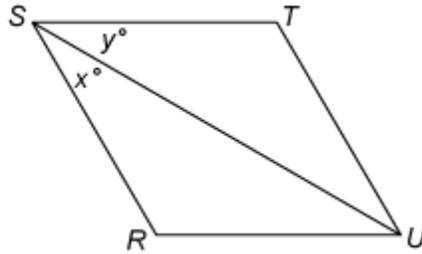
16) Which of the figures below the line of drawings best completes the series?



17) Which one of the five choices makes the best comparison?  
Archipelago is to Island as

- a. Village is to Hamlet
- b. Constellation is to Star
- c. River is to Sea
- d. Finger is to Hand
- e. Tongue is to Mouth

18) Which of the following quantities is greater?



$RSTU$  is a parallelogram.

Quantity A

$x$

Quantity B

$y$

- a. Quantity A is greater
- b. Quantity B is greater
- c. The two quantities are equal.
- d. The relationship cannot be determined from the information given.

19) If two typists can type two pages in two minutes, how many typists will it take to type 18 pages in six minutes?

- a. 3
- b. 4
- c. 6
- d. 12
- e. 36

20) The same word can be added to the end of “GRASS” and the beginning of “SCAPE” to form two other English words. What is the word?

\_\_\_\_\_ (open-ended response)

21) Look at the drawing. The numbers alongside each column and row are the total of the values of the symbols within each column and row. What should replace the question mark?

				28
				30
				20
				16
?	19	20	30	

- a. 23  
 b. 25  
 c. 28  
 d. 39  
 e. 32
- 22) Which same three-letter word can be placed in front of the following words to make a new word?

SIGN, DONE, DUCT, FOUND, FIRM, TRACT, DENSE  
 \_\_\_\_\_ (open ended response)

- 23) If it were two hours later, it would be half as long until midnight as it would be if it were an hour later. What time is it now?
- a. 18:30  
 b. 20:00  
 c. 21:00  
 d. 22:00  
 e. 23:30

24) How many times does the letter 't' occur in the following passage:

And that, I think, was the handle -- that sense of inevitable victory over the forces of Old and Evil. Not in any mean or military sense; we didn't need that. Our energy would simply prevail. There was no point in fighting -- on outside or theirs. We had all the momentum; we were riding the crest of a high and beautiful wave.

\_\_\_\_\_ (open ended response)

25) If you count from 1 to 100, how many 7's will you pass on the way.

\_\_\_\_\_ (open ended response)

26) Which letter comes next in this series of letters?

B, A, C, B, D, C, E, D, F, ?

- a. C
  - b. D
  - c. E
  - d. F
  - e. G
- 27) Two men, starting at the same point, walk in opposite directions for 4 meters, turn left and walk another 3 meters. What is the distance between them?
- a. 2 meters
  - b. 6 meters
  - c. 10 meters
  - d. 12.5 meters
  - e. 14 meters
- 28) If Don paint a wall in 30 minutes and with the help of his brother, Sam, they can paint the wall in 20 minutes, how long would it take Sam working alone to paint the wall?
- a. 30 minutes
  - b. 45 minutes
  - c. 1 hour
  - d. 90 minutes
  - e. 2 hours
- 29) Which one of the five choices makes the best comparison?  
Incoherent is to Clarity as
- a. Quiet is to Volume
  - b. Normal is to Austerity
  - c. Stagnant is to Light
  - d. Scribbled is to Writing
  - e. Tidy is to Mind
- 30) Laura has 20 coins consisting of quarters and dimes. If she has a total of \$3.05, how many dimes does she have?
- a. 3
  - b. 7
  - c. 10
  - d. 13
  - e. 16

31) Which quantity is greater?

Quantity A  
The diagonal of a  
rectangle

Quantity B  
Half the perimeter of the  
same rectangle

- a. Quantity A is greater
- b. Quantity B is great
- c. The two quantities are equal.
- d. The relationship cannot be determined from the information given.

***Appendix D: Chapter 3 Survey Instrument.***

(25 State Self-Control Capacity Battery - All items are 7 point scales: 1: Not True, 7 Very True.)

- 13) I feel mentally exhausted.
- 14) Right now, it would take a lot of effort for me to concentrate on something.
- 15) I need something pleasant to make me feel better.
- 16) I feel motivated.
- 17) If I were given a difficult task right now, I would give up easily.
- 18) I feel drained.
- 19) I have lots of energy.
- 20) I feel worn out.
- 21) If I were tempted by something right now, it would be very difficult to resist.
- 22) I would want to quit any difficult task I was given.
- 23) I feel calm and rational.
- 24) I can't absorb any information.
- 25) I feel lazy.
- 26) Right now I would find it difficult to plan ahead.
- 27) I feel sharp and focused.
- 28) I want to give up.
- 29) This would be a good time for me to make an important decision.
- 30) I feel like my willpower is gone.
- 31) My mind feels unfocused right now.
- 32) I feel ready to concentrate.
- 33) My mental energy is running low
- 34) A new challenge would appeal to me right now
- 35) I wish I could just relax for a while
- 36) I am having a hard time controlling my urges
- 37) I feel discouraged.

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- 38) What is your age? \_\_\_\_\_
- 39) Are you male or female?
  - a. Male
  - b. Female
- 40) Which of the following do you consider to be your primary racial or ethnic group?
  - a. White
  - b. African-American
  - c. Asian-American
  - d. Hispanic
  - e. Other
- 41) What is the current time?
- 42) Did you attend a class prior to completing this survey?

- 43) Are you employed?  
 a. (if yes) When did you work today, prior to completing this survey?
- 44) What was your household income last year?  
 a. Under \$25k  
 b. Between \$25k-50k  
 c. Between \$50k-75K  
 d. Between \$75k-100k  
 e. Over \$100k
- 45) On average, how of sleep do you get each night? \_\_\_\_hrs.  
 46) How many of hours did you sleep last night? \_\_\_\_hrs.  
 47) How long ago was the last time you ate something? \_\_\_\_hrs \_\_\_\_mins

48) Generally speaking, do you consider yourself a Democrat, Independent, or Republican?

1	2	3	4	5	6	7
<i>Strong Democrat</i>			<i>Independent</i>			<i>Strong Republican</i>

49) Which point on this scale best describes your political views?

1	2	3	4	5	6	7
<i>Very liberal</i>			<i>Moderate</i>			<i>Very conservative</i>

50) (He/She) thinks it is important that every person in the world be treated equally. (He/she) believes everyone should have equal opportunities in life.

1	2	3	4	5	6	7
<i>Not like me at all</i>			<i>Not sure</i>			<i>Very much like me</i>

51) (He/She) believes that people should do what they are told. (He/She) thinks people should follow the rules all of the time, even when no one is watching.

1	2	3	4	5	6	7
<i>Not like me at all</i>			<i>Not sure</i>			<i>Very much like me</i>

52) How important is it to you that every person in the world has the same opportunities in life?

1	2	3	4	5	6	7
<i>Not important at all</i>			<i>Not sure</i>			<i>Extremely</i>

*Please indicate the degree to which you disagree or agree with the following statements*

53) We have gone too far in pushing equal rights in this country.

1	2	3	4	5	6	7
<i>Strongly disagree</i>			<i>Not sure</i>			<i>Strongly agree</i>

54) Our society would be better off if the distribution of wealth was more equal.

1	2	3	4	5	6	7
<i>Strongly disagree</i>			<i>Not sure</i>			<i>Strongly agree</i>

55) One should always find ways to help others less fortunate than oneself.

1	2	3	4	5	6	7
<i>Strongly disagree</i>			<i>Not sure</i>			<i>Strongly agree</i>

56) One of the problems of today's society is that people are often not kind enough to others.

1	2	3	4	5	6	7
<i>Strongly disagree</i>			<i>Not sure</i>			<i>Strongly agree</i>

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57) How likely are you to vote in the next election?

1	2	3	4	5	6	7
<i>Extremely likely</i>			<i>Not sure</i>			<i>Extremely Unlikely</i>

58) How likely are you to participate in a political protest in the forthcoming month?

1	2	3	4	5	6	7
<i>Extremely likely</i>			<i>Not sure</i>			<i>Extremely unlikely</i>



- 67) In order to reduce energy use and U.S. dependence on foreign oil as an energy source, what is the maximum amount you would be willing to pay in overall taxes per year to fund research and development to make alternative energy resources more widely available (e.g. solar energy, wind energy, bio-fuels, etc.)? Please enter an amount ranging from \$0 to \$500.
- 68) The average shower in the United States uses 2.1 gallons (7.9 liters) of water per minute. Low-flow showerheads reduce the output of showers by an average of 50%. What is the maximum amount you be willing to pay for a low-flow showerhead? Please enter an amount ranging from \$0.50 to \$20.
- 69) One proposed solution to increase public transportation options in Atlanta is to increase sales taxes on gasoline and other luxury items such as tobacco, e-cigarettes, alcohol, tickets to sporting events and theaters, and cellular phones. What is the maximum amount you would be willing to pay in overall taxes per year to expand busing and train services in the Atlanta area? Please enter an amount ranging from \$0 to \$500.

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70) In general, how important is it to turn off lights and appliances when not in use to conserve energy?

1	2	3	4	5	6	7
<i>Not too important</i>			<i>Moderately important</i>			<i>Extremely important</i>

71) In general, how important is it to purchase energy efficient appliances?

1	2	3	4	5	6	7
<i>Not too important</i>			<i>Moderately important</i>			<i>Extremely important</i>

72) In general, how important is it to conserve water?

1	2	3	4	5	6	7
<i>Not too important</i>			<i>Moderately important</i>			<i>Extremely important</i>

*Appendix E: Summary Statistics from Chapter 3.*

Summary Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
Treatment	671	.469	.499	0	1
Self-Control Scale	630	4.017	1.085	1	7
Turn-off Lights	624	5.321	1.653	1	7
Adjust Thermostat	624	4.556	1.841	1	7
Reduce Shower	624	3.606	1.718	1	7
WTP Lightbulb	623	3.188	2.142	0	10
WTP Low Flow	624	10.308	5.513	0	20
Age	630	20.8	5.569	0	66
Female	630	.671	.47	0	1
Black	671	.401	.49	0	1
White	671	.189	.392	0	1
Asian/Pac Islander	671	.218	.413	0	1
Hispanic	671	.063	.242	0	1
Year of College	629	1.789	1.03	1	4
Democrat	625	.578	.494	0	1
Independent	625	.301	.459	0	1
Republican	625	.122	.327	0	1
Ideology	625	3.49	1.333	1	7

*Appendix F: Randomization Check for Chapter 3.*

Logistic Regression Estimation of Participant Attributes on Assignment to Treatment

	I	II	III
Age	-.018	-	-.03
	.017		.019
Female	-.047	-	-.056
	.172		.174
Black	-.082	-	-.029
	.196		.208
Hispanic	-.321	-	-.314
	.351		.361
Asian/Pac-Islander	.183	-	.229
	.227		.230
Year of College	.018	-	.043
	.09		.092
Democrat	-	-.024	.027
		.187	.193
Republican	-	.19	.207
		.292	.301
Ideology	-	-.02	-.026
		.07	.073
n	629	625	625
Log-Likelihood	-433.142	-432.273	-429.384
Prob > Chi2	.628	.91	.707
BIC	-3141.967	-3133.298	-3100.45

## ***Appendix G: Motivation and Party Cue Treatments used in Chapter 4.***

### Conditions 1 & 7

We are next going to ask you what you think about parts of the 2007 Energy Independence Act. When thinking about your opinion, try to view the policy in an evenhanded way. We will later ask that you justify the reasons for your judgment – that is, why the policy’s content is more or less appealing. The Act included the following provisions:

- Requires U.S. automakers to boost gas mileage to 35 miles per gallon for all passenger cars by 2020, which is a 40% increase.
- Funds for research and development of solar and geothermal energy, and for the increased production of biofuels.
- Provides small businesses loans toward energy efficiency improvements.

### Conditions 2 & 8

We are next going to ask you what you think about parts of the 2007 Energy Independence Act. When thinking about your opinion, consider the bill was passed during a period of divided government where fellow partisans voted together nearly 90% of the time. This was necessary to ensure coherent policy programs. We will later ask you about your party and why you affiliate with it (or why you choose to not affiliate with a party). The Act included the following provisions:

- Requires U.S. automakers to boost gas mileage to 35 miles per gallon for all passenger cars by 2020, which is a 40% increase.
- Funds for research and development of solar and geothermal energy, and for the increased production of biofuels.
- Provides small businesses loans toward energy efficiency improvements.

### Conditions 3 & 9

We are next going to ask you what you think about parts of the 2007 Energy Independence Act. When thinking about your opinion, try to view the policy in an evenhanded way. We will later ask that you justify the reasons for your judgment – that is, why the policy’s content is more or less appealing. The Act, overall, was widely supported by Democratic representatives and included the following provisions:

- Requires U.S. automakers to boost gas mileage to 35 miles per gallon for all passenger cars by 2020, which is a 40% increase.
- Funds for research and development of solar and geothermal energy, and for the increased production of biofuels.
- Provides small businesses loans toward energy efficiency improvements.

#### Conditions 4 & 10

We are next going to ask you what you think about parts of the 2007 Energy Independence Act. When thinking about your opinion, consider the bill was passed during a period of divided government where fellow partisans voted together nearly 90% of the time. This was necessary to ensure coherent policy programs. We will later ask you about your party and why you affiliate with it (or why you choose to not affiliate with a party). The Act, overall, was widely supported by Democratic representatives and included the following provisions:

- Requires U.S. automakers to boost gas mileage to 35 miles per gallon for all passenger cars by 2020, which is a 40% increase.
- Funds for research and development of solar and geothermal energy, and for the increased production of biofuels.
- Provides small businesses loans toward energy efficiency improvements.

#### Conditions 5 & 11

We are next going to ask you what you think about parts of the 2007 Energy Independence Act. When thinking about your opinion, try to view the policy in an evenhanded way. We will later ask that you justify the reasons for your judgment – that is, why the policy's content is more or less appealing. The Act, overall, was widely supported by Republican representatives and included the following provisions:

- Requires U.S. automakers to boost gas mileage to 35 miles per gallon for all passenger cars by 2020, which is a 40% increase.
- Funds for research and development of solar and geothermal energy, and for the increased production of biofuels.
- Provides small businesses loans toward energy efficiency improvements.

#### Conditions 6 & 12

We are next going to ask you what you think about parts of the 2007 Energy Independence Act. When thinking about your opinion, consider the bill was passed during a period of divided government where fellow partisans voted together nearly 90% of the time. This was necessary to ensure coherent policy programs. We will later ask you about your party and why you affiliate with it (or why you choose to not affiliate with a party). The Act, overall, was widely supported by Republican representatives and included the following provisions:

- Requires U.S. automakers to boost gas mileage to 35 miles per gallon for all passenger cars by 2020, which is a 40% increase.
- Funds for research and development of solar and geothermal energy, and for the increased production of biofuels.
- Provides small businesses loans toward energy efficiency improvements.

**Appendix H: Survey Instrument used in Chapter 4.**

ALL CONDITIONS THEN ARE ASKED THESE QUESTIONS:

PN: MEASURE RESPONSE LATENCY (IN MILLISECONDS) FOR BELOW QUESTION

74. Given this information, to what extent do you oppose or support the Energy Act?

<u>strongly</u> <i>oppose</i>	<u>moderately</u> <i>oppose</i>	<u>slightly</u> <i>oppose</i>	<u>neither oppose</u> <i>nor support</i>	<u>slightly</u> <i>support</i>	<u>moderately</u> <i>support</i>	<u>strongly</u> <i>support</i>
----------------------------------	------------------------------------	----------------------------------	---	-----------------------------------	-------------------------------------	-----------------------------------

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PN: MEASURE RESPONSE LATENCY (IN MILLISECONDS) FOR BELOW QUESTION

75. How important to you is your opinion towards the Energy Act (e.g., how strongly do you feel about your opinion)?

<u>extremely</u> <i>unimportant</i>	<u>very</u> <i>unimportant</i>	<u>somenbat</u> <i>unimportant</i>	<u>neither</u> <i>unimportant</i> <i>important</i>	<u>somenbat</u> <i>important</i>	<u>very</u> <i>important</i>	<u>extremely</u> <i>important</i>
--	-----------------------------------	---------------------------------------	--	-------------------------------------	---------------------------------	--------------------------------------

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PN: MEASURE RESPONSE LATENCY (IN MILLISECONDS) FOR BELOW QUESTION

76. How much confidence do you have that these provisions of the Energy Act allow us to use laws to address energy challenges?

<u>none at all</u>	<u>not much</u>	<u>a little</u>	<u>a moderate</u> <i>amount</i>	<u>a good</u> <i>amount</i>	<u>a great</u> <i>deal</i>	<u>complete</u> <i>confidence</i>
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77. To what extent do you disapprove or approve of the way Congress is handling its job?

<u>strongly</u> <i>disapprove</i>	<u>moderately</u> <i>disapprove</i>	<u>slightly</u> <i>disapprove</i>	<u>neither</u> <i>disapprove</i> <i>nor approve</i>	<u>slightly</u> <i>approve</i>	<u>moderately</u> <i>approve</i>	<u>strongly</u> <i>approve</i>
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78. In general, to what extent do you think Democrats and Republicans take similar or dissimilar policy positions?

<u>extremely</u> <i>dissimilar</i>	<u>very</u> <i>dissimilar</i>	<u>somenbat</u> <i>dissimilar</i>	<u>not sure</u>	<u>somenbat</u> <i>similar</i>	<u>very</u> <i>similar</i>	<u>extremely</u> <i>similar</i>
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79. Do you think disagreement between Democrats and Republicans makes it more difficult or easier for individuals, like yourself, to acquire a clear understanding of energy policy?

<u>makes it far</u> <i>more difficult</i>	<u>makes it much</u> <i>more difficult</i>	<u>make it a little</u> <i>more difficult</i>	<u>not sure</u>	<u>makes it a little</u> <i>easier</i>	<u>makes it much</u> <i>easier</i>	<u>makes it</u> <i>far easier</i>
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80. To what extent do you trust members of your political party to provide good advice about which energy policies to support? (If you do not affiliate with a party, you can leave this question blank).

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<u>not at all</u>	<u>not very much</u>	<u>a little</u>	<u>a moderate</u> <i>amount</i>	<u>a good</u> <i>amount</i>	<u>a great</u> <i>deal</i>	<u>completely</u>
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81. In a sentence or two, please explain why you feel the way you do about the previously mentioned Energy Independence Act.

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82. In a sentence or two, please explain why you affiliate with your political party or why you choose to not affiliate with a party.