2012

The Evolution of Conservative Attitudes as a Complement to Cognitive Threat Detection Mechanisms

Russ Clay
Virginia Commonwealth University

Follow this and additional works at: https://scholarscompass.vcu.edu/etd
Part of the Psychology Commons

© The Author

Downloaded from
https://scholarscompass.vcu.edu/etd/2828
THE EVOLUTION OF CONSERVATIVE ATTITUDES AS A COMPLEMENT TO COGNITIVE THREAT DETECTION MECHANISMS

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

By: Russ Clay
B.S., Carnegie Mellon University, May, 2000
M.S., Virginia Commonwealth University, May, 2010

Director: Natalie J. Shook, PhD.,
Title: Assistant Professor of Psychology
Department of Psychology

Virginia Commonwealth University
Richmond, Virginia
July, 2012
Acknowledgements

I would like to thank my parents, Matthew and Donna Clay, and my sister, Katherine Horrell, for the unconditional support they have always shown; my fiancée, Vivian Maria Rodríguez Archilla for her unwavering love and for helping me remember, every day, what is truly important in life; Dr. Natalie J. Shook for taking a chance on me as an unknown entity when I first applied to work with her five years ago, for the unbelievable amount of support and dedication she gives to all of her graduate students (we all realize how very lucky we are), and for giving me the freedom to take on risky and challenging research coupled with the guidance that keeps me from drowning in it; my dissertation committee: Dr. Faye Belgrave, Dr. Timothy Hulsey, Dr. Kirk Brown, and Dr. Edward Millner for providing essential insight and feedback that helped to shape this project over the past 18 months; John A. Terrizzi Jr. for helping me brainstorm and develop my research ideas; and my undergraduate research assistants: Lindsay Coleman, Boglarka Vizy, Sasha Tozzi, and Maryum Ijaz, for putting in the hard work that allowed me to conduct a large amount of research in a relatively short amount of time. It would not have been possible to complete this project without all of you.
# Table of Contents

List of Tables ........................................................................................................................................ vi

List of Figures ....................................................................................................................................... vii

Abstract .................................................................................................................................................. viii

The Evolution of Conservative Attitudes as a Compliment to Cognitive Threat Detection

Mechanisms ........................................................................................................................................... 1

The Paradigm of Evolutionary Psychology ......................................................................................... 4

Modularity in Evolved Cognitive Systems ......................................................................................... 12

Cognitive Modularity and Threat Management ................................................................................. 18

Threat Detection .................................................................................................................................... 24

Individual Differences in Threat Detection Ability ........................................................................... 29

Conservative Attitudes ......................................................................................................................... 32

Conservatism as an Adaptive Threat Management Strategy .......................................................... 39

Summary ................................................................................................................................................ 43

Present Research .................................................................................................................................... 44

Computer Modeling .............................................................................................................................. 47

Flexible Parameters of the Model ........................................................................................................ 48

Core Assumptions of the Modeling Process ....................................................................................... 53

Basic Model Functionality .................................................................................................................. 55

Model Comparisons ............................................................................................................................ 58

Conclusion .............................................................................................................................................. 65

Development of a Threat Detection Paradigm .................................................................................. 67

Stimuli ...................................................................................................................................................... 71

Participants ............................................................................................................................................ 74

Procedure ............................................................................................................................................... 74

Statistical analysis ............................................................................................................................... 76
Manipulation checks ................................................................. 131
Descriptive statistics ........................................................................................................ 133
Main analyses .................................................................................................................. 136
Secondary analyses ......................................................................................................... 137
Discussion ....................................................................................................................... 139
Summary Analyses ........................................................................................................ 143
  Threat detection procedure .......................................................................................... 143
  Threat detection ability and social conservatism ......................................................... 147
General Discussion .......................................................................................................... 151
  Future Directions ........................................................................................................ 162
List of References .......................................................................................................... 169
Appendix A: Study Measures ........................................................................................ 180
Appendix B: Danger Manipulations with Accompanying Manipulation Checks ............ 193
Appendix C: Threat Detection Accuracy Manipulation Check ........................................ 202
List of Tables

1. Study 1 Means, Standard Deviations, and Reliability Statistics..........................94
2. Bivariate Correlations between Study 1 Measures............................................95
3. Regression Coefficients for Threat Detection Ability, Belief in a Dangerous World, and their Interaction as Predictors of Social Conservatism in Study 1..........................98
4. Results of the Pilot Test for the Manipulation Used in Study 2..........................106
5. Study 2 Reliability Statistics, Skewness, Kurtosis for All Variables with Means and Standard Deviations by Danger Condition.........................................................114
6. Initial Bivariate Correlations between All Study 2 Measures............................116
7. Regression Coefficients for Threat Detection Ability, Danger Manipulation Condition, and their Interaction as Predictors of Social Conservatism in Study 2..........................118
8. Responses to the Semantic Differential Items from the Pilot Test of the Danger Manipulation in Study 3.................................................................129
9. Study 3 Reliability Statistics, Skewness, Kurtosis for All Variables with Means and Standard Deviations by Experimental Condition..............................................133
10. Initial Bivariate Correlations Between All Study 3 Measures............................134
11. Signal Detection across All Studies.................................................................144
12. Bivariate Correlations across Studies 1-3.......................................................147
List of Figures

1. Basic decision structure for the detection of environmental threats………………..50
2. Decision tree representing object generation and behavioral decisions in the computer modeling simulation……………………………………………………………………..56
3. Average number of iterations survived in the base case model (AD = -10, AS = +5, AV = -3, M = 10%) using a neutral social strategy………………………………………..59
4. Average survival rate effect of a weak conservative strategy (increase avoidance by 10%) on each combination of detection accuracy and environmental danger likelihood……61
5. Average survival rate effect of a moderate conservative strategy (increase avoidance by 30%) on each combination of detection accuracy and environmental danger likelihood………………………………………………………………………………62
6. Average survival rate effect of a moderate conservative strategy (increase avoidance by 30%) on each combination of detection accuracy and environmental danger likelihood………………………………………………………………………………63
7. Example images from each stimulus category and the backwards mask image as used in the pilot study…………………………………………………………………………………..73
8. Distribution of $d'$ scores in the pilot study…………………………………………….82
9. Scree plot of eigenvalues in Study 2……………………………………………………113
Abstract

THE EVOLUTION OF CONSERVATIVE ATTITUDES AS A COMPLEMENT TO COGNITIVE THREAT DETECTION MECHANISMS

By: Russ Clay, PhD

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2012

Major Director: Natalie J. Shook, PhD., Assistant Professor of Psychology, Department of Psychology

Conservatism reflects a general attitude structure characterized by a preference for traditional social practices and an aversion to uncertainty and threat. Though the social environment undoubtedly plays a role in shaping conservative attitudes, recent studies suggest that trait-level characteristics may contribute to their development as well. The present research investigated trait-level cognitive threat detection ability as a factor which may influence the development and maintenance of conservative social attitudes. A computer simulation indicated that socially conservative attitudes may function as a strategy for increasing the survival rate of an individual with poor threat detection ability living in a relatively dangerous environment. Three studies were conducted to further investigate the hypothesis that individuals who are less accurate in detecting threats would report more conservative social attitudes, particularly when the surrounding environment is perceived to be highly dangerous. In Study 1, participants who were
less able to distinguish between images of safe and dangerous stimuli presented outside of conscious awareness tended to endorse higher levels of social dominance orientation, and participants who reported higher belief that the world is dangerous tended to endorse higher levels of social dominance orientation and right-wing authoritarianism, as well as a more conservative political ideology. In Study 2, less accurate detection of threats was associated with a more conservative political ideology. In Studies 2 and 3, experimental manipulations of participants’ dangerous world beliefs failed to produce differences in the endorsement of socially conservative attitudes. An additional experimental manipulation of participants’ perceptions of their own ability to detect threats in Study 3 did not affect the endorsement of socially conservative attitudes either. Across the three studies, the results suggest that individual differences in cognitive mechanisms associated with the ability to differentiate between safe and dangerous stimuli presented outside of conscious awareness may hold a weak but significant relation to socially conservative attitudes. Additionally, the results indicate that individuals who hold a stronger belief that the world is a dangerous place tend to endorse more conservative social attitudes; however, these views appear to be pervasive and persist in the face of short term fluctuations in perceptions of danger.
The Evolution of Conservative Attitudes as a Complement to Cognitive Threat Detection Mechanisms

People born in the United States today are expected to live a generation longer than their ancestors of only a century ago. At the turn of the 20th century, life expectancy at birth for a U.S. citizen was 49.24 years, but by 2006, this figure rose by almost 60% to 77.70 years (Arias, 2010). There are likely to be many factors that have contributed to this drastic increase. Breakthroughs in healthcare such as the advent of vaccinations, improvements in surgical procedures, and the development of advanced screening and preventative care techniques have almost certainly had a positive effect on life expectancy. Recent improvements in safety have been observed across a host of other aspects of life in the U.S. in recent years as well. From 1993 to 2010, violent crime decreased by almost 70 percent, plunging by nearly 12% from 2009 to 2010 alone (Yost, 2011). Additionally, automobile fatalities decreased by 17% from 1994 to 2009 (National Highway Traffic Safety Administration, 2011), workplace fatalities dropped to their lowest level ever in 2009 along with a 60% reduction in reported cases of injury and illness in the workplace since 1992 (United States Department of Labor, 2011), and the number of commercial airline fatalities due to accident dropped to 1 in every 333 million passengers in 2010 (Federal Aviation Administration, 2011). In short, these statistics indicate that in recent decades, the U.S. has become an increasingly safe place to live.
However, juxtaposed to these trends, there remains a significant focus on the prevalence of danger in the public discourse. Most major media outlets dedicate a portion of their reporting to the coverage of dangers, threats, and tragedies, but it can be argued that conservative politicians and news sources place considerably more emphasis on this type of content. For example, Jan Brewer, the republican governor of Arizona (Montopoli, 2010) as well as republican presidential candidate Rick Perry (Associated Press, 2011) have both recently cited the potential for violence against U.S. citizens as a reason to increase security along the U.S. – Mexico border. Additionally, Manny Alvarez, a medical contributor to Fox News™, has warned that illegal immigration may increase the risk of disease transmission to U.S. citizens (Alvarez, 2010), furthering the push to tighten U.S. border security. Fox News™ also devotes entire subsections of their Website to the topics of ‘Terror’ and ‘Disasters’, providing daily updates on the potential dangers that residents of the United States face.

These threat-based messages have resonated with U.S. residents. Glenn Beck’s daily television show, in which he frequently discussed conspiracies and threats that he warned placed U.S. citizens at risk, drew an estimated 2.2 million daily viewers in January of 2009. At the time, this made his show the third most watched program on cable news (Gold, 2009). Ratings for conservative talk radio have been strong as well. Rush Limbaugh currently has the nation’s highest rated radio show, just ahead of Sean Hannity’s daily program (Ortiz, 2011), both of which focus regularly on potential threats that face U.S. citizens.
In sum, there appears to be a discord between statistical trends which indicate that life in the U.S. has become increasingly safe, and the popular conservative perspective which maintains a strong focus on the many potential threats facing U.S. citizens. The current research was aimed at investigating this phenomenon in order to build a better understanding of why individuals who have access to the same objective information about the safety of their environment differ in their subjective perceptions, and why these perceptions seem to fall along ideological lines. It is argued that individual differences in the ability to accurately detect threats in the environment may play an important role in this relation, making some individuals more likely to adopt conservative attitudes than others.

The pervasive view in the social sciences literature has historically been that conservative attitudes result from the influence of the surrounding social environment (Allsop & Weisberg, 1998; Helzer & Pizarro, 2011; Niemi & Jennings, 1991). More specifically, there is a commonly accepted view that conservative attitudes are passed down from parent to child or transmitted during social interactions between peers or through social information (originating from authority figures in social institutions, literature, or social media). However, studies in behavioral genetics (Alford, Funk, & Hibbing, 2005; Hatemi, Gillespie, Eaves, Maher, Webb, Heath, Medland, et al., 2011) and developmental psychology (Block & Block, 2006) have called this view into question. These recent studies have led to an emerging new perspective on conservatism; one that proposes that conservative attitudes develop out of a combination of trait-level characteristics and social learning mechanisms rather than solely from social influence.
In this vein, the current research examined the possibility that evolved cognitive systems, and specifically cognitive threat detection mechanisms (psychological mechanisms responsible for distinguishing between safe and dangerous objects in the environment), may play an important role in influencing perceptions of threat and uncertainty. As such, these mechanisms may have a hand in the development of conservative attitudes. Minor differences in the ability to detect threats are likely to impact one’s general ability to successfully navigate dangers in their environment. An individual who is highly accurate at detecting threats is likely to be more successful in avoiding danger, thus experiencing the world as more predictable and less threatening. On the other hand, an individual who is less accurate at detecting threats is likely to encounter more potential harm, and as a result, may develop a more cautious approach toward indications of potential danger in the social environment. Consequently, individual differences in the ability to accurately detect threats hold the potential to have a pervasive downstream impact on attitudes and beliefs about the social world. The current research sought to explore this theory; that socially conservative attitudes are a partial product of individual differences in the ability to accurately detect threats in the environment.

The Paradigm of Evolutionary Psychology

The ability to effectively manage threats is essential to human survival. It is likely that this capability has been subject to strong natural selection pressures throughout history and has thus been shaped by the process of biological evolution. As such, the current research proposal follows the paradigm of evolutionary psychology, an emerging approach to psychological
research that draws from the existing literature in evolutionary biology. Evolutionary psychology is intended to be consistent with empirical knowledge stemming from all other domains in the natural sciences. Thus, psychological theories following an evolutionary approach should be compatible with existing knowledge in the fields of biology, chemistry, and physics and should also take into consideration evidence and theoretical perspectives from the social sciences such as history, anthropology, economics, and sociology (Tooby & Cosmides, 1992). More specifically, psychological theories following an evolutionary approach must not violate what is currently accepted as empirical knowledge stemming from other scientific areas. By building psychological theories based on existing knowledge in biology concerning evolution by the process of natural selection, psychological research can serve as a bridge between the natural sciences and the social sciences by providing a more unified framework in which to operate.

Natural selection acts at the level of individual genes, and genes direct the development of all forms of biologic life (Dawkins, 1976/1989). Genes that increase the likelihood of their own replication tend to become more prevalent within a species. This is generally accomplished by directing the development of biological structures which promote the survival and reproductive success of the larger organism. In such cases, these biological structures are said to have high adaptive value. Conversely, structures that decrease the chances of the replication of their associated genes are said to have low adaptive value. These structures tend to become less prevalent within a species and are eventually eliminated altogether.
The adaptive value of any given biological structure is dependent on the ‘fit’ between the structure and its surrounding environment. Some structures may be highly advantageous to survival and reproduction in one environment, but may provide little or no adaptive advantage in another. For instance, the caudal fin (tail fin) of a fish is highly adaptive in an aquatic environment as it is useful for propulsion, allowing the fish to move quickly through water in pursuit of food or to escape predators. However, the same structure is significantly less advantageous on land where the fish is no longer buoyant and the caudal fin cannot be used to help the fish move efficiently. Thus, the adaptive value of any biological structure, such as the caudal fin of a fish, should only be considered relative to the environment in which it operates and not in any absolute manner.

At the core of the evolutionary approach to psychology is the proposition that all psychological processes stem from biological structures in the brain. As a biological organ, the brain is subject to natural selection pressures in the same manner as all other biological organs. Additionally, as psychological processes are inherently linked to biological brain processes, psychological processes are inherently subject to the influence of natural selection (Tooby & Cosmides, 1992). From this standpoint, it is expected that human psychological mechanisms which have historically exhibited high adaptive value are likely to have become more prevalent in the species to the point that they are considered a normally occurring trait.

A classic example of a psychological process that is likely to have evolved due to natural selection pressures is the ability to recognize faces (Kanwisher, McDermott, & Chun, 1997).
The recognition of other humans based on the distinctive characteristics of their facial features is extraordinarily important for human social interaction in that it can promote coalitional bonding, motivate the avoidance of known cheaters and rivals, and allows for the development of complex mating strategies based on recognition and recall of past interactions. Thus, cognitive face recognition mechanisms have high adaptive value in that they are likely to contribute to the survival and reproductive success of the organism.

The evolutionary approach to human psychology stands in stark contrast to the standard social science model (SSSM) which has been the dominant perspective in the social sciences for most of the past century. Proponents of the SSSM view of psychology argue that the human mind is a content general mechanism which consists of little in the way of meaningful innate organization, and which is shaped in large part through environmental experience (Geertz, 1973; Kirkham, Slemmer, & Johnson, 2002; Rakison & Yermolayeva, 2011). This view suggests that the mind which is present at birth in human infants is essentially identical across individuals, and that the variability that exists between individuals in adulthood is almost entirely the result of cultural influence. This point is made emphatically by Geertz (1973):

Becoming human is becoming individual, and we become individual under the guidance of cultural patterns, historically created systems of meaning in terms of which we give form, order, point, and direction to our lives…as culture shaped us as a single species – and is no doubt still shaping us – so too it shapes us as separate individuals (p. 52).
As Tooby and Cosmides (1992) point out, the SSSM perspective views the individual person to be a passive recipient of cultural information. That is, according to the SSSM, the mind is a general information processor for which the content is largely determined by cultural influence. Consequently, the study of human psychology should be an investigation of the manner in which cultural information is learned and processed by the mind. According to the SSSM perspective, if evolution played a role in the development of the human mind, it was primarily in the evolution of the human capacity to learn. As such, a deep understanding of the human capacity to learn would be sufficient to explain all other (acquired) characteristics of human psychology.

The problem with a content-general theory of the human mind is that it provides an extremely weak system for solving adaptive problems. Again, following the reasoning of Tooby and Cosmides (1992), content general information processing systems would seem to provide limitless flexibility that would be ideal for surviving in an ever-changing environment. However, the perceived advantage of a flexible information processing architecture would be, in reality, a curse. This is primarily due to the fact that there are limitless interpretations for the complex perceptual information that is extracted from the environment. However, only a small subset of these possibilities will ever be relevant in guiding an individual toward appropriate behavioral actions. A content-general information processor would be extremely limiting in that it would have to search through such a large number of possible interpretations of social
information in order to reach one that is appropriate. Only luck would determine whether an appropriate interpretation was arrived at quickly and efficiently.

Conversely, content-specific psychological mechanisms would convey an advantage by restricting the set of possible interpretations of environmental information to a subset that, based on evolutionary history, is likely to be relevant. This would allow the organism to interpret and respond to environmental information much more rapidly, in a manner that has been historically advantageous. It is for this reason that an evolutionary approach is appropriate in the study of cognitive threat detection mechanisms. Rapid detection of threats is essential for survival, and a threat detection system that went through an exhaustive set of possible interpretations in order to determine whether some environmental information should be perceived as a threat would be extremely inefficient and would potentially jeopardize survival.

As views consistent with the SSSM approach are often taken for granted in current social science research, several important assumptions should be made clear in order to ground the theoretical considerations of the current research: 1) The human mind results from the functioning of the brain, and as such, the two are fundamentally linked by physical processes. 2) Evolved psychological processes tend to be specialized and domain-specific such that they are activated based on a restricted range of informational input and are most efficient in solving the problems that natural selection shaped them to solve. 3) In many cases, the characteristics of the information (especially the perceptual information) that can serve to activate a given psychological system are more relevant than the meaning that tends to be applied to this
information from a contextual standpoint. For example, it has been shown that a human face is not a necessary input to trigger facial recognition processes. Rather, various patterns of shapes and markings that are organized in the same basic configuration of a human face, such as the headlights and intake grill of an oncoming car, can trigger the same perceptual mechanisms; a phenomenon known as pareidolia (Hadjikhani, Kveraga, Naik, & Ahlfors, 2009). Thus, it is important to consider the characteristics of the information used by evolved psychological mechanisms separately from the meaning that is applied to that same information in a post-hoc manner, outside of the operating parameters of the mechanism.

Relative to the human lifespan, evolution is an extremely slow process. Evolution requires random genetic mutations during the process of copying DNA in order for change to occur in biological systems which can then be used as a basis for natural selection, and such mutations are very rare. Mutation rates vary depending on a range of factors, but Nachman and Crowell (2000) estimate that on average, DNA mutations only occur once in every 250,000,000 copies. Additionally, most mutations are neutral or deleterious in terms of their adaptive value, and thus there is not strong pressure for them to spread throughout the species. Only a small subset of these mutations will provide an adaptive advantage, and such adaptive gains are likely to be very minor in scale. Coupled with the fact that successful reproduction is required in order for an adaptive trait to spread, it is clear that many generations are required for a mutation to spread through the population to the point where it becomes a species-wide trait. As an example of the time scale by which the evolutionary process works, one of the most recent evolved
biological traits in the human species is the ability to digest milk past childhood. It is estimated that this trait arose approximately 30,000 years ago and is still absent in roughly 65% of the human population (Itan, Jones, Ingram, Swallow, & Thomas, 2010).

Because of the relatively slow timescale of human evolution, when considering the selection pressures that shaped the development of human psychological mechanisms, the current human environment is likely to provide a misleading model. It is only in recent decades that modern computing technology has begun to exert a strong influence in day-to-day human life; only the past few centuries that industrialization has had an influence on the human condition; and only the past few thousand years that humans have dealt with the adaptive challenges of living in large, organized societies. By comparison, The Pleistocene Epoch, which was dominated by relatively small hunter-gatherer tribes which did not establish permanent settlements, existed for more than two million years until roughly 12,000 years BCE (Gradstein, Ogg, Smith, Bleeker, & Lourens, 2004; International Union of Geological Sciences, 2009), and is generally accepted as the era in which the biological and psychological characteristics of modern humans evolved. For this reason, when considering the pressures that would have shaped human psychological threat detection mechanisms, the adaptive problems that were commonly faced by our hunter-gatherer ancestors (e.g., predation, competition for resources, outbreaks of disease) should garner the focus of scientific research, as opposed to the problems raised by modern, industrialized life (Tooby & Cosmides, 1992).
Modularity in Evolved Cognitive Systems

An important conceptual detail in psychological theories working within the framework of evolutionary psychology is the stance that the mind is modular in its architecture. At a general level, the premise of modularity states that the human mind consists of specialized modules that accept specific informational inputs and promote specific behavioral outputs. This view stands in stark contrast to the SSSM perspective that the mind consists of domain-general problem solving mechanisms and is boundlessly flexible in the types of information that it can process and the types of problems that can be solved. The argument of modularity proved highly controversial when first put forth by Fodor (1983) and is still heavily debated. Therefore, several conceptual clarifications should be made in order to precisely define the theoretical stance being taken in the current research.

Fodor’s (1983) original argument for modularity of the mind was very narrow in its conceptualization. His view was that modular structures are only activated based on a specific range of perceptual input and that modular information processing is encapsulated; meaning that information in one module is isolated from use by other modules. He additionally proposed that modular structures are automatic in the sense that once perceptual information initiates processing within a module, the processing will continue to completion without interruption. In the decades since its initial publication, these points have been hotly debated, and Fodor (2000) himself has conceded that the narrow conceptualization that he initially outlined was likely to be misguided.
The view of modularity that is most influential in evolutionary psychology today is guided by the premises of functional specialization and massive modularity (Barrett & Kurzban, 2006). Functional specialization refers to the proposition that cognitive structures evolved to solve particular adaptive problems. Functionally specialized cognitive modules, therefore, accept a specific range of informational input and process this information in a manner appropriate for solving these adaptive problems. An example of a functionally specialized cognitive module is the Theory of Mind Mechanism (TOMM; Baron-Cohen, 1995), a psychological system which is responsible for solving the problem of inferring the mental states of others. The TOMM facilitates social functioning by making predictions about what others are likely to be thinking, feeling, or observing. This has the effect of making the future behavior of others considerably more predictable. Without the TOMM, the behavior of others - based solely on observable information - might make very little sense. The modular conceptualization of the TOMM stems from neuroscience research demonstrating that specific brain regions are activated when individuals think about the mental states of others, but not when they think about their own mental states (Saxe & Powell, 2006). It has been proposed that the characteristic symptoms of autism (impaired social development, inability to make intuitive inferences about the intentions of others, trouble with communication) stem from dysfunction localized in the TOMM, while other psychological mechanisms in individuals with autism exhibit normal functioning. Accordingly, a close examination of the characteristics of autism spectrum disorders reveals that
it is typically processes that rely on the ability to draw inferences about the mental states of others that are impaired (Baron-Cohen, 1995).

Although early Fodorian views of functional specialization took the premise to mean that information was compartmentalized for problem solving, and was not integrated with any additional information in later-stage processing, more recent conceptualizations discard this view of information sorting as unlikely and instead favor a massive modularity approach. Massive modularity refers to the notion that significantly greater information processing efficiency can be realized when a system utilizes a large number of simple, functionally specialized systems compared to what would be possible with a small number of complex, domain-general systems (Barrett & Kurzban, 2006). The reason for this is that when a sufficiently large amount of information needs to be organized in a complex manner, there are infinite ways in which this information can be interpreted, and therefore a domain general system which is responsible for all aspects of this interpretation would be highly inefficient in determining which specific interpretation was appropriate.

For example, in visual processing, the two-dimensional perceptual information that is received as it enters the eye can be interpreted in almost limitless ways in order to form a three-dimensional representation of the world. The task of interpreting this information becomes exponentially easier given functionally specialized mechanisms for detecting things like edges, colors, motion, and relative proximity. Once this information is interpreted at functionally specialized levels, there exists a much more limited set of possibilities for how all of these
components can fit together in a manner consistent with known representations of the environment. Additionally, the computational resources required to make these interpretations are significantly reduced compared to what would be necessary in a general information processor tasked with assembling all relevant information efficiently and effectively in order to inform appropriate behavioral responses. Thus, a massively modular information processing architecture can act to quickly assemble individual features of perceptual information into summary interpretations which have historically been advantageous ways to infer meaning from the social environment. Through this assembly process, the possible summary interpretations of this information are restricted to those that have historically been evolutionarily advantageous to the social functioning of the individual.

Thus, the current conceptualization of modularity (e.g., Barrett & Kurzban, 2006) provides a view of the architecture of the human mind that is much more plausible from an information processing standpoint than alternate views proposing that the information processing capabilities of the mind are largely domain-general. Considering the computational requirements that are necessary to efficiently solve adaptive challenges such as the ability to detect environmental threats, a functionally-specialized modular architecture of the human mind is considered the most plausible means of accomplishing these tasks in a biological organ. Additionally, a modular architecture is considerably more likely than a domain general mechanism to have evolved from natural selection as it could conceivably arise as a result of incremental gains in processing efficiency that were selected for over a long stretch of
evolutionary history. By contrast, even if a domain general system did arise at a given point in evolutionary history, there would be strong pressure for the system to become increasingly domain specific over time particularly given any degree of environmental stability, in order to achieve increases in processing efficiency.

Examples of evolved modular systems. To date, considerable empirical evidence supports the existence of several evolved psychological mechanisms that operate based on content-specific information in order to solve problems of an adaptive nature. The mechanisms that have been identified to date are considered to be too complex and functionally specialized to have arisen by chance alone or to be the result of domain-general processing. Thus, these examples serve to illustrate the potential for complexity to arise from an evolutionary process.

Mate preference mechanisms have perhaps received the most attention in the evolutionary psychology literature. Buss and Schmitt (1993) originally proposed Sexual Strategies Theory to explain patterns of mating in both males and females that have been proposed to maximize reproductive fitness (the likelihood that genes will be passed to the next generation of surviving offspring). Consistent with this theory, meta-analytic evidence suggests that across generations and cultures, females tend to prefer mates with characteristics such as financial resources and child-rearing skills that will maximize the survival likelihood of their children (Feingold, 1992). Conversely, males tend to prefer characteristics such as fertility and youth which are indicative of reproductive capacity (Buss, 1992; 2006). These findings tend to be consistent with cultural models of mate-selection preferences as well and indicate that
culturally specific patterns of mate preference may stem from biological factors that were originally shaped by evolutionary processes (Feingold, 1992).

Evidence also indicates the existence of a collection of psychological disease avoidance mechanisms referred to as the behavioral immune system (BIS) which promote the avoidance of potential sources of disease causing pathogens (Schaller, 2006). The BIS is specifically sensitive to information such as foul odors or body disfigurement which have historically indicated the presence of harmful contagions. Upon encountering such stimuli, the BIS promotes a disgust response which motivates the avoidance of the potential source of contamination. This system reduces the probability that humans will contract contagious diseases, thus increasing the likelihood of survival and ultimately, chances for reproductive success.

Additionally, Hauser, Chomsky, and Fitch (2002) argued that human language is highly likely to be comprised of several interrelated subsystems (the sensory-motor system, the conceptual-intentional system, and the recursion system) that each evolved to solve specific adaptive problems. In support of this proposal, previous research has shown that language mechanisms are activated specifically in the presence of visual (hand signals or sign language) or auditory (spoken word) cues and function to decipher the language signals into their symbolic meaning in an extremely efficient manner (Pinker & Bloom, 1992). This ability develops naturally in human children, even if no predominant parent language is present (Creole language). Because this is a level of intricacy and specificity that is very unlikely to have arisen by chance and because the level of computational complexity associated with human language
would be next to impossible for a domain general system to ‘learn’ from scratch, it is highly likely that human language is modular and is the result of evolutionary processes.

Considering the view of the human cognitive process outlined thus far, the current research seeks to explore the functionality associated with cognitive mechanisms which have been theorized to have evolved to solve the adaptive problem of detecting environmental threats. Such a capability is a key first step in successfully mitigating the risk of harm from environmental dangers (e.g., predators, disease, and competition from conspecifics); a capability that is essential for survival. A host of theoretical and empirical work supports the likely existence of these functionally specialized cognitive threat management systems which draw attention to dangers in the environment and motivate appropriate protective behavioral responses to environmental threats.

**Cognitive Modularity and Threat Management**

Consistent with modular theories of cognition, several researchers have proposed that specialized cognitive structures have evolved which are specifically sensitive to threat relevant environmental stimuli, and which serve to motivate appropriate behavioral responses to environmental dangers. LeDoux (1995) first outlined the ‘fear system’ which was described as “…a system that detects danger and produces responses that maximize the probability of surviving a dangerous situation in the most beneficial way” (p.128). According to this view, the emotional experience of fear is an outgrowth of the threat detection processes of the fear system. These processes motivate appropriate defensive responses to threatening objects that are
encountered in the environment in order to reduce the likelihood that an individual experiences harm.

Similarly, Öhman and Mineka (2001) proposed the existence of a fear module which is structured to promote rapid detection of environmental threats and to motivate fear responses in order to prepare an individual for appropriate action (fight, flight, or freeze). One important implication outlined in the fear module theory is that individual differences are likely to exist in the specific sensitivity of the fear system such that some individuals may experience more intense fear responses than others when exposed to the same environmental stimuli. The authors propose that an over-sensitivity associated with this system may underlie the disordered behavior associated with specific phobias.

Yet another theoretical framework for a cognitive system which evolved to deal with environmental threats is the security motivation system (SMS) proposed by Szechtman and Woody (2004). According to the SMS model, perceptual threat cues trigger anxiety which is intended to alert an organism of potential danger and which also serves as a signal to initiate appropriate behavioral responses intended to protect the organism from harm. The objective knowledge that these protective actions have been taken is then fed back into the SMS, producing a subjective sense of ‘knowing’ that appropriate behavioral action has occurred (termed ye dasentience). This sense of knowing reduces anxiety, tempering the motivation to continue to engage in additional protective behaviors. Based on this theoretical framework, the authors propose that the symptomology associated with obsessive-compulsive disorder (OCD)
may reflect dysfunction in the feedback process following protective behavioral responses to threats. More specifically, it is proposed that although sufferers of OCD tend to have objective knowledge that they have taken appropriate countermeasures (e.g., hand-washing) to combat a potential environmental threat (e.g., the presence of disease-causing pathogens), the yedasentience is absent. Sufferers of OCD lack the subjective ‘feeling of knowing’ that serves to reduce the motivation for continued protective behaviors. As such, anxiety remains high and the individual is motivated toward compulsive protective behavior (continued hand-washing) even though there is objective knowledge that the threat has been mitigated.

Along similar lines, Boyer and Liénard (2006) proposed the hazard management system (HMS) which they theorized was a core cognitive system responsible for the prevalence of ritualized behavior. The conceptualization of the HMS is similar to that of the SMS; however, the authors focused on ritualized behavior as the main phenomenon that can be explained as a consequence of HMS functionality. More specifically, Boyer and Liénard suggested that all ritualized behavior including religious practices, children’s rituals, and life-stage relevant ritual thoughts (e.g., ritualized behavior associated with pregnancy and parenthood) are instinctive outgrowths of the HMS which are intended to mitigate the risk associated with environmental threats.

It is theorized that the HMS was shaped by natural selection to specifically defend against rare but highly dangerous environmental threats such as natural disasters or attacks from large predators. The characteristics of these rare threats are such that they may not be readily
detectible through obvious perceptual cues, but the costs associated with failing to detect them may be severe. Therefore, it is economically beneficial to devote resources to protection against these rare threats even if there is no objective information to indicate their presence. Evidence in support of the HMS, which demonstrates that humans tend to err on the side of false-positive identification of environmental threats, is abundant in the social psychology literature (Correll, Urland, & Ito, 2006; Hock, Krohne, & Kaiser, 1996; Payne, 2001; Wiens, Peira, Golkar, & Öhman, 2008; Windmann & Krüger, 1998).

Cognitive threat management systems, as conceptualized above, are likely to be vastly complex. There is a large range of stimuli that might signal a threat and an even larger range of behavioral responses which may be appropriate as protective responses in a given context. An organism may encounter direct input indicating a threat (e.g., coming face to face with a predator, hearing a snake rattle nearby, observing a sick neighbor) or may be presented with more indirect information (e.g., noticing the fresh tracks of a dangerous animal, hearing a rustling in the bushes, being told by a neighbor about a growing flu pandemic). In most cases this information must be processed contextually (the sound of explosions are likely to be processed very differently on July 4th in the United States than they would be in an active war zone) and will be interpreted according to a standard set of expectations about what one is likely to encounter in the environment. This level of complexity indicates that, consistent with the massive modularity approach of Barrett and Kurzban (2006), an evolved threat management system is likely to be comprised of a host of more functionally specialized subsystems. Each of
these subsystems will likely play an important role in the overall process of efficiently managing threats and minimizing the risk of harm to the organism.

**Evidence for Modularity in Threat Management Systems.** Considerable empirical evidence supports the proposal that dedicated neural structures are involved in the detection and processing of threat-relevant information. Blanchard and Blanchard (1988) summarized neurobiological evidence from human and animal research indicating that specific neural pathways are implicated in the detection of environmental threats. Their review indicates that the amygdala is most likely the information hub for the identification and classification of threat-relevant information. Once a threat has been identified, signals are passed from the amygdala to regions in the hypothalamus and midbrain which have been shown to be essential in the regulation of emotion and in the initiation of defensive behavioral responses. Davis and Whalen (2001) provide additional evidence from multiple studies indicating the existence of neural structures dedicated to fear conditioning involving connections between the basolateral amygdala and the central nucleus of the amygdala along with additional connections from the central nucleus to the brainstem.

Research has begun to investigate the basic cognitive and behavioral correlates of psychological mechanisms associated with threat management systems as well. The perception of threat relevant information has been shown to prioritize attention (Carlson, Fee, & Reinke, 2009; Notebaert, Crombez, Van Damme, De Houwer, & Theeuwes, 2011; Öhman, Flykt, & Esteves, 2001), as well as inhibit disengagement of attention (Brosch & Sharma, 2005).
Additionally, increases in skin conductance rates have been shown to accompany the perception of threat-relevant stimuli (Flykt, Esteves, & Öhman, 2007; Michael, Blechert, Vriends, Margraf, & Wilhelm, 2007), and the perception of a potential contagion (a dirty diaper) has been shown to induce increases in heart rate and anxiety which are not reduced until appropriate protective action (hand washing) can be taken (Hinds, Woody, Drandic, Schmidt, Van Ameringen, Coroneos, et al., 2010).

The results of these empirical studies suggest that specialized cognitive processes function for the purpose of managing environmental threats in an efficient manner, and that specific physiological and behavioral responses are initiated automatically when a threat is detected in order to protect the individual from harm. Thus, it can be reasoned that threat management processes have a direct impact on the expected well-being of an individual. It is likely that this ability to effectively manage threats depends on multiple sub-processes, and that each of these sub-processes has an independent impact on the overall effectiveness of the system. Therefore, in order to develop a more grounded empirical understanding of the process of threat management systems and how these processes relate to social behavior, it is important to investigate the sub-processes of the system separately. In doing so, an accurate model of the information processing components of threat management can be constructed. The initial - and arguably most important - component in the threat management process is threat detection. If a threat is not accurately detected, downstream processes that serve to manage threats will be limited in their effectiveness. Thus, the current proposal aims to develop a program of research
that will isolate the threat detection mechanism from other threat management components in order to understand how this particular subsystem relates to conservative social attitudes.

**Threat Detection**

The first step in an effective threat management process is accurate threat detection. The ability to use perceptual cues in the environment to accurately detect danger provides a distinct advantage for survival and reproduction. At the most basic level, threat detection involves the processing of perceptual information in order to categorize environmental objects as ‘dangerous’ or ‘safe’ at a sufficient level of accuracy. *Sufficient* accuracy in such a system is characterized by the relative costs associated with deploying defense mechanisms as well as the benefits associated with avoiding harm. Though perfect accuracy would be beneficial in making judgments about potentially threatening objects, optimization is not essential in order for a threat detection system to have high adaptive value. A detection mechanism which, on average, serves the survival interests of the organism can be considered adaptive even if biases exist which lead to systematic errors in detection, provided that these errors do not reduce the overall likelihood of survival in the organism beyond the harm that would be expected if a less efficient system was in use.

In general, it is expected that a sufficiently accurate system will minimize the number of threats it fails to detect (with the optimal number of misses being zero), limiting the exposure of the organism to harm. Additionally, a sufficiently accurate system will limit false alarms so as not to waste considerable energy avoiding non-existent dangers. More precisely, the aggregated
cost of the false alarms should not exceed the cost of the harm that is to be avoided in the first place. This is commonly referred to as the ‘Smoke Detector Principle’ (Nesse, 2005). Although detection of threats is only the initial stage of an effective threat management system, accuracy in detecting threats can help the organism ensure that later defense processes - which are more costly in terms of energy and resources - are deployed in an efficient manner. Thus, accurate threat detection should ultimately increase the long term survival prospects of an organism.

Beyond accuracy, the overall effectiveness of a threat detection mechanism is likely to depend on several environmental factors as well. The level of danger that is likely to be present in the environment, the cost of failing to detect a threat, the cost (in energy and lost resources) associated with taking protective action in response to a perceived threat, and the potential benefits that can be extracted from non-threatening aspects of the environment are all factors that can influence the impact that threat-detection mechanisms can have on overall survival outcomes. Thus, it is important to develop a set of grounded expectations with regard to the costs and benefits associated with evolved threat detection mechanisms.

**The economics of threat detection.** At its core, defensive behavior associated with managing threats can be modeled in terms of a basic decision tree that is executed when an organism encounters any object in the environment. At the most general level, any object that is encountered can be classified as *dangerous* or *safe*; dangerous if the object has the potential to cause harm to the individual, and safe if it does not. Additionally, the behavior of an organism that encounters an object in the environment can be classified as either *approach* or *avoidance*. 
Approach behavior is any behavior in which the organism chooses to interact with the object (or at least remains in a proximate location so that the object is able to interact with the organism), and avoidance behavior is any action taken so as not to interact with the object. As such, any instance of an interaction between an organism and an object in its environment can result in one of exactly four outcomes: A safe object can be approached, a safe object can be avoided, a dangerous object can be approached, or a dangerous object can be avoided.

It can be assumed that each of these outcomes is associated with an expected value (or utility), and that the behavioral response to any object that is encountered in the environment will be based on expectations about the probable utility of the outcome of this action. Thus, assuming that negative outcomes will be associated with dangerous objects and positive outcomes will be associated with safe objects, it is expected that a decision maker will attempt to avoid all objects that are perceived to be dangerous, and will approach all objects that are perceived to be safe.

If, from an evolutionary standpoint, survival is the ultimate goal that motivates behavioral decisions, a system that directs behavior associated with this goal is not likely to be structured so as to maximize the benefits that can be extracted from the environment. Rather, it is expected that in the evolution of a threat detection system, natural selection would have rewarded characteristics that minimized the losses associated with encountering environmental danger. Non-optimization associated with gaining benefits would be perfectly acceptable as long as losses which lead to harm (and potentially the demise) of the larger system are minimized.
Certain parameters will impact the ability of an individual to survive in an environment in which potentially dangerous stimuli are present. The overall prevalence of danger in the environment (the likelihood that any given object that is encountered is dangerous) as well as the relative ability of the organism to accurately detect dangerous objects, will have important implications for survival. However, to determine the adaptive value of any threat detection mechanism, these two parameters must be considered concurrently. In a sufficiently safe world (low likelihood of danger), the ability to accurately detect threats will not matter much because most objects that are encountered will be safe. In other words, if the goal is simply to survive (and not to maximize resources) accuracy would not provide a considerable advantage in an extremely safe world because even a highly inaccurate organism will not encounter much danger. Similarly, in an extremely dangerous world, accuracy will be advantageous from the standpoint that it will prolong the inevitable; however, this advantage will be modest at best, as most organisms in a highly dangerous environment will not survive for long. In other words, if avoiding danger even requires a small amount of energy, and most objects in the environment are dangerous, then even an organism that is highly accurate at detecting danger will be constantly expending energy to avoid threats, and will not last much longer than an organism that is less accurate. However, between these two extremes, the ability to detect threats accurately will allow an organism to avoid harm and allocate energy to the avoidance of danger only when necessary. From an evolutionary standpoint, this ability is likely to be highly important in order
to increase the expected rate of survival. As such, individual differences in the ability to detect threats would play a key role in influencing longevity and reproductive success.

It is assumed that throughout human history, the world has neither been extremely safe (accidents, natural disasters, disease, and violence result in injury and loss of life on a daily basis throughout the world) nor extremely dangerous (a large proportion of the population has consistently survived beyond their reproductive years). As such, it is expected that threat detection accuracy does indeed play an important role in promoting survival in humans. However, just as individual differences exist in other functionally specialized cognitive mechanisms such as the behavioral immune system (Terrizzi, Shook, & Ventis, 2010), mate preference mechanisms (Buss, Shackelford, & LeBlanc, 2000), and face detection mechanisms (Vigil, 2010), individual differences are likely to exist in threat detection mechanisms as well. These differences presumably result in some people being able to detect threats in the environment better than others. Because threat detection ability is likely to influence survival rates, individual differences in this ability may have important downstream behavioral consequences. If an individual does not possess a strong ability to detect threats, alternative behavioral strategies such as an increased tendency to avoid situations where safety is in question might be necessary in order to minimize the negative effects of sub-standard threat detection ability. Thus, individual differences in threat detection and their downstream impacts to social behavior were the focus of the present research.
Individual Differences in Threat Detection Ability

Multiple studies have demonstrated variability in the accuracy with which threat-relevant visual stimuli can be detected across a range of presentation times. Specifically, research has demonstrated the existence of individual differences in the accuracy associated with the detection of threatening words presented outside of conscious awareness (Windmann & Krüger, 1998), in the accuracy with which threat-relevant images are able to be detected when participants expect an associated punishment (an aversive shock) (Mermillod, Droit-Volet, Devaux, Schaefer, & Vermulen, 2010), and in participants’ ability to detect intentionally threatening motions of others under typical as well as degraded (visual noise and distortion added to video) visual conditions (Parasuraman, deVisser, Clarke, McGarry, Hussey, Shaw, & Thompson, 2009). Additionally, multiple studies have demonstrated individual differences in the response time associated with detecting the presence of a threat relevant image among a matrix of distracters (Blanchette, 2006; Fox, Griggs, & Mouchlianitis, 2007; Lipp, 2006; LoBue, 2010; Öhman et al., 2001).

Research has also demonstrated individual differences in physiological responses to threatening stimuli. Globisch, Hamm, Esteves, and Öhman (1999) demonstrated that individuals who reported higher levels of animal fear tended to show exaggerated startle (eye-blink) responses relative to non-fearful controls after being exposed to pictures of snakes and spiders. These startle responses were accompanied by increased skin conductance, increased heart rate, and increased blood pressure, indicating an association between subjectively reported fear, exposure to feared stimuli, and automatically activated physiological responses. As indicated
previously, the emotion of fear serves to motivate the avoidance of perceived threat and therefore, this research provides indirect support for a link between threat detection processes and physiological processes that serve to motivate behavior. Individual differences in fear were predictive of differences in physiological responses after exposure to (and thus detection of) a threat relevant stimulus object.

Individual differences in threat detection ability may also have implications for social interactions and behavior. Marsh, Kozak, and Ambaday (2007) reported evidence across three studies that individual differences in the ability to recognize the expression of fear in photos of adult faces predicted individual differences in prosocial behavior. Specifically, participants who were better able to recognize the fear expression indicated higher levels of willingness to help another person and also judged the actions of others to be more indicative of prosocial behavior. The recognition of the fear expression is peripherally related to threat detection-mechanisms as noticing fear in another person is an important signal that danger may be near. One possible interpretation of this research is that participants who are better able to discriminate fear expressions in others may act in a prosocial manner because they are better able to infer others’ motives (and are thus less likely to be taken advantage of by someone pretending to be afraid) whereas participants who are less able to discriminate fear expressions in others withhold prosocial behavior so as to decrease the chances that they unnecessarily devote time and resources to others when it is not needed.
More generally, individual differences in the ability to perceive and respond to threats may have implications for how an individual interprets and interacts with the social environment. All else being equal, an individual with less accuracy in detecting threats will experience danger more often (as a result of failing to detect threats) compared to an individual whose threat detection ability is highly accurate. Thus, it is theoretically plausible that individual differences in threat detection accuracy may lead people to experience the same world in subjectively different ways. Even minor differences in the ability to detect environmental threats may impact social attitudes and behaviors.

An individual who is highly accurate at detecting threats should, on average, avoid more dangers compared to an individual who is less accurate. This may lead the more accurate person to perceive the world as less dangerous, more predictable, and ultimately, more controllable. Conversely, an individual who is less accurate at detecting threats is likely to encounter dangers more frequently. These individuals may perceive the world as a more dangerous place with greater uncertainty in the environment. The perception of increased danger and uncertainty may promote more negative expectations about the world, and may motivate these individuals to seek the safety of familiar environments rather than risking the uncertainty of more novel environments. In other words, an individual who is less accurate in detecting threats may be able to minimize the likelihood of encountering dangers by avoiding unfamiliarity and sticking to environments that are known to be safe. From this perspective, an approach to social life that reduces the likelihood of encountering threats would serve to minimize the liability associated
with inaccurate threat detection. Thus, it is plausible that individual differences in threat detection ability may motivate differences in general attitudes and perspectives about the social world in a manner that limits an individual’s overall exposure to threats.

**Conservative Attitudes**

One social approach that might reduce the likelihood of encountering danger has been referred to in the social sciences literature as conservatism. Conservative political or social attitudes tend to reflect a favorable evaluation of tradition, established social norms, and conformity to the status-quo. According to Wilson (1973), conservatism is characterized by four main dimensions: resistance to change, the avoidance of risks, quantification of the ‘generation gap’ (the difference between older and younger generations in their typical beliefs about what constitutes ‘normal’ social behavior, with the views of older generations being more conservative), and internalization of ‘parental’ prohibitions (a quantification of the degree to which one holds a view that there exists an appropriate, normative pattern of social behavior). Similarly, Haidt, Graham, and Joseph (2009) proposed that ideologies map to moral underpinnings and that social conservatism reflects support of strong patriotism, authority associated with a traditional social role structure, concerns over sexual morality, and endorsement of reciprocity as a means to fairness (i.e., transgressions should be punished). Both of these perspectives tend to conceptualize conservatism as a preference for social conformity over social diversity and for the traditional and familiar over the unfamiliar.
Conservatism has typically been viewed in the social sciences literature as a general attitude structure that is primarily influenced by social factors. Supporting this perspective, Allsop and Weisberg (1988) provided evidence that shifts in party identification during the 1984 presidential election occurred in response to campaign events. Similarly, Niemi and Jennings (1991) argued that while initial political attitudes are the result of parental influence, shifts in political attitudes during adulthood are more likely to be related to policy preferences.

Additionally, more recent empirical work has indicated that cues from the environment that reminded participants of cleanliness tended to influence a conservative shift in political attitudes (Helzer & Pizarro, 2011).

Particularly relevant to the present research, Jost, Glaser, Kruglanski, and Sulloway (2003) provided meta-analytic evidence that resistance to change and justification of social inequality are the two defining characteristics of a politically conservative ideology. Based on this evidence, the authors developed a model of conservatism stemming from social-cognitive motives. Specifically, the model predicts that environmental stimuli associated with fear, threat, and uncertainty promote three types of motives: epistemic motives (dogmatism, uncertainty avoidance, need for structure), existential motives (self-esteem maintenance, loss prevention, terror management), and ideological motives (rationalization of self-interest, group-based dominance, system justification). These motives, in turn, serve to motivate conservative attitudes and are behaviorally observable as a heightened resistance to change and an endorsement of social inequality. Thus, meta-analytic evidence supports the existence of a
framework in which the experiences of fear, threat, and uncertainty ultimately influence the development of conservative attitudes. This evidence illustrates the ability of social factors to influence the development of conservative attitudes; however, underlying biological factors are almost certain to play a role in the development of conservatism as well. Specifically, cognitive threat detection processes influence the subjective experiences of fear, threat, and uncertainty by either motivating (or failing to motivate) the avoidance of environmental danger. As the meta-analysis by Jost and colleagues (2003) indicates, these subjective experiences ultimately play a key role in the development of conservative attitudes.

It is likely that threat detection accuracy influences, to some extent, the probability that an individual will experience danger on a day-to-day basis. Given any level of danger in the environment, low threat detection ability should increase the likelihood that an individual will fail to detect a threat and will thus encounter danger compared to an individual with relatively high threat detection ability. Threat detection mechanisms, as currently defined, use perceptual information as an input and as such, there is not an objective standard by which people can know their own relative accuracy in detecting threats. Threats are either detected at the time of perception or they are not, and compensation for any lack of accuracy must occur after the process of detection. Therefore, it is not likely that individual differences in threat detection ability are typically perceived (i.e., it is unlikely that an individual with low (or high) threat detection ability would perceive themselves as such). Rather, individuals with lower levels of threat detection ability, who tend to experience more danger in the world relative to people with
higher levels of threat detection ability, are likely to perceive the world itself as more dangerous instead of perceiving their ability to detect threats to be less accurate. In other words, due to the lack of an objective standard by which to compare one’s own ability to detect threats and given equivalent levels of danger in the environment, an individual with low threat detection ability should perceive the world as a more dangerous place as a result of their experiences compared to an individual with high threat detection ability.

These perceptual and experiential differences are the link between cognitive processes and social attitudes. Given the increased perception of the world as dangerous, individuals with low threat detection ability must find a way to compensate and guard themselves against the relatively higher levels of danger that they perceive. Conservative attitudes provide a means to accomplish this goal. Conservatism places high value on adherence to tradition and social conformity, traits which promote behaviors that should steer people towards historically safe and predictable environments in which the overall likelihood of danger is perceived to be a known quantity. Indeed, political conservatives tend to be more avoidant of novel, unfamiliar stimuli than political liberals (Shook & Fazio, 2009). This is not to say that unfamiliar environments will always be more dangerous than known, traditional environments; rather, the argument is that the predictability of the known environment should be preferred over the risk of the unknown when the ability to detect threats is low, and that conservative social attitudes tend to motivate a preference for predictable, known environments.
In sum, though social influence and social learning mechanisms undoubtedly play a key role in the development of conservative social attitudes, there appears to be strong theoretical grounds to expect an association between trait-level cognitive threat detection accuracy and socially conservative attitudes as well.

**Empirical support for the proposed relation.** Though few studies have directly examined the relation between social conservatism and threat detection accuracy, several have provided initial evidence to inform the current research. There is evidence of increased levels of amygdala activity (the brain area theorized to be the hub of threat-management processes) in Republicans, but not Democrats, when asked to make a risky decision (Schreiber, Simmons, Dawes, Flannigan, Fowler, & Paulus, 2009). Additionally, Ojha and Sah (1990) found that conservatism was positively correlated with anxiety, intolerance of ambiguity, and insecurity, suggesting a relation between conservatism and safety concerns. Along these lines, research has shown that participants in the United States who self-identified as Republican interpreted ambiguous faces as more threatening compared to participants who identified as Democrats (Vigil, 2010). This may indicate that in the face of uncertainty, conservatives tend toward assumptions of negativity, perhaps as a strategy to avoid potential encounters with danger.

Individual differences in physiological responses to threat have been related to conservative attitudes as well. Specifically, conservatives tend to show stronger physiological responses (increased skin conductance, more prominent eye-blink startle responses) when exposed to threatening images compared to liberals (Oxley et al., 2008). At first glance, this
research seems to indicate that conservatives may be more sensitive to threatening information; however, one key finding may indicate that this increased sensitivity stems from lower levels of threat detection ability. Evidence from a review by Davis and Whalen (2001) indicates that when encountering a potentially threatening stimulus object, amygdala activity is highest and vigilance at its peak when threat information is ambiguous. This results in the allocation of more attentional resources to the task of determining whether a threat is truly present in the environment. For individuals with lower accuracy in threat detection, threat information is likely to be perceived as ambiguous more often, resulting in higher average levels of amygdala activity and stronger physiological responses when confronted with threat relevant information. Thus, it is possible that previous findings indicating that conservatives demonstrate higher levels of amygdala activity and stronger physiological responses when encountering threat relevant information may have resulted from reduced accuracy (and therefore, increased ambiguity) in the threat detection process.

In line with this perspective, perceptions of the world as a dangerous place have been found to be predictive of a more conservative self-reported political orientation (Jost, Napier, Thorisdottir, Gosling, Palfai, & Ostafin, 2007). Therefore, if the perception that the world is dangerous stems – at least in part – from low accuracy in threat detection, then a relation would be expected between threat detection accuracy and conservative attitudes.

Additional evidence from developmental research indicates that conservative attitudes can be predicted from traits which are observable at a young age, supporting the notion that
conservative attitudes may be partially influenced by biological factors. Following a 20-year longitudinal study, Block and Block (2005) reported that ideological disposition in adulthood was reliably predicted from pre-school traits measured 20 years prior. Children whose teachers described them as being uncomfortable with uncertainty, susceptible to guilt, and rigid when experiencing distress tended to subscribe to a more conservative ideology in adulthood, whereas children who were described as resourceful, autonomous, expressive, and self-reliant reported a more liberal ideology later in life.

Finally, conservative attitudes also appear to have a heritable component. Alford, Funk, and Hibbing (2005) found that a common genetic factor was likely to account for between 18% and 41% of the variance in self-reported political attitudes across a set of 28 politically relevant topics. Additionally, in a recent genome wide association study (GWAS), Hatemi and colleagues (2011) found evidence strongly suggesting an association between N-methyl-D-aspartate (NMDA) receptors and self-reported political ideology assessed using a 50-item survey of attitudes towards contemporary ideological issues. It should be cautioned that these findings are not necessarily suggestive of a direct link between genetics and ideology. A more likely explanation is that genetic factors influence psychological factors which make the adoption of conservative attitudes more or less likely, a point originally put forward by Jost (2009) and echoed by Hatemi and colleagues (2011) as well. Supporting this view, previous animal studies have found NMDA receptors to be functionally important in fear conditioning (Gewirtz & Davis,
1997), which is consistent with the proposed link between ideology and cognitive threat management mechanisms.

As prior research has indicated a relation between conservative attitudes and psychological processes associated with threat and fear, it may be that genetic factors determine individual differences in cognitive threat detection mechanisms which then play a key role in influencing experiences with danger and threat relevant information. Research to date that has examined conservative attitudes indicates that conservatism represents a very broad-based framework for interacting with the social world in a manner defined by a preference for tradition, resistance to change, and endorsement of social inequality. These preferences have been shown to stem from increased perceptions of uncertainty and threat and in turn, motivate increased avoidance of environments or situations that deviate from social norms. This is consistent with the model put forth by Jost and colleagues (2003) which proposes that environmental signals of threat and uncertainty motivate the development of conservative attitudes. Additionally, evidence demonstrating physiological and genetic correlates of conservative attitudes indicates that conservatism is likely to have a biological basis as well. One construct that might link these two findings is threat detection accuracy.

**Conservatism as an Adaptive Threat Management Strategy**

Differences in biological brain structures that affect threat detection accuracy may lead to differences in the amount of danger that is encountered in the environment. Lower levels of threat detection accuracy may lead to more dangerous encounters, and a perception that the
world is dangerous and unpredictable. This may motivate a more conservative attitude structure relative to individuals with higher levels of threat detection accuracy in order to avoid danger and uncertainty. From an evolutionary standpoint, if conservative attitudes have historically led to higher survival rates in individuals who perceived danger and uncertainty in their environment, it is expected that conservatism would persist in the human species as an adaptive survival trait. If conservative attitudes are evoked by perceptions of danger, they should tend to manifest more readily in individuals that have lower levels of threat detection accuracy, as a more cautious strategy would compensate for a reduced ability to successfully detect environmental threats. From this perspective, conservative social attitudes can be thought of as strategy for managing environmental danger which is motivated by the perception of danger in the surrounding environment. This perception could be a result of actual high levels of danger, or it may stem from moderate levels of danger coupled with inaccuracy in the ability to detect threats. In both instances, conservative attitudes are likely to promote increased survival by reducing the likelihood that danger is encountered, and therefore can be considered to be an adaptive strategy.

This theoretical conceptualization of conservatism is consistent with previous research which has found evidence of a ‘conservative shift’ in individuals who are exposed to high levels of danger during a traumatic event (Bonanno & Jost, 2006; Nail & McGregor, 2009). These studies have demonstrated that exposure to highly traumatic events such as the terrorist attacks of September 11, 2001 result in an increase in the endorsement of conservative attitudes. If
conservative attitudes are motivated by the perception of danger, it can be reasoned that the same psychological mechanisms responsible for conservative shifts following highly salient, traumatic events could promote more persistent levels of conservatism given chronic exposure to slightly elevated levels of danger, as would be expected in individuals with low accuracy in detecting environmental threats. Thus, consistent with the motivated social cognition model of conservatism (Jost et al., 2003), lower levels of threat detection accuracy may predispose some individuals toward conservative social attitudes because they are more likely to encounter danger, and thus perceive the world as more dangerous.

A conservative strategy should reduce the likelihood for mistaken encounters with danger. However, for individuals with higher levels of threat detection accuracy, a conservative strategy might not convey the same advantages. If threats can be detected at a fairly high rate of accuracy, conservative attitudes will inflate the type II error rate (mistakenly classifying a safe object as dangerous) much more than they will reduce the number of type I errors (failing to detect a dangerous object), as type I errors would already be very low to begin with. Therefore, it should be less likely for conservative attitudes to manifest in individuals who are highly accurate at detecting threats.

According to the Smoke Detector Principle (Nesse, 2005), as long as the cost of defending oneself from a threat is less than the likely cost of harm that would result from the threat, multiplied by the probability that this harm will actually occur, it is expected that defensive actions will be taken. Because avoidance is likely to represent a low cost defense
mechanism across a range of potential threats, a general strategy of avoidance of unfamiliarity might be viewed as appropriate, if there is a perception that more than a minimal probability of danger exists in the environment or that the harm stemming from an encounter with danger, no matter how unlikely, would be particularly severe. This tendency would be especially beneficial for individuals who are less accurate at detecting threats as it would reduce the chances that these individuals will mistakenly encounter harm. This supports the notion that socially conservative attitudes may represent an adaptive strategy for managing threats.

In our modern environment, the probability of harm associated with many historical threats such as predatory animals, rival individuals, disease, and natural disasters has been greatly reduced; however, the tendency for conservatism to persist is likely if conservative attitudes are motivated by the perception of threats and danger. The advent of modern media allows humans to encounter signals of danger from a much broader area and on a more frequent basis than ever before. As such, many individuals may perceive the world to be more dangerous (based on the frequency with which information indicating the prevalence of danger is encountered) than it truly is. It may be that these signals of danger continue to activate threat detection mechanisms, motivating conservative social strategies that originally evolved to manage threats in the immediate environment. In other words, though the true probability of danger in the modern environment is likely to be considerably lower than it was in the evolutionary past of humans, it may be likely that the world is perceived to be as dangerous (or more dangerous) than it was in the past based on the increased availability of threat-relevant
information. If conservative social strategies evolved to respond to perceptions of danger, particularly in individuals with low threat detection ability, such strategies would be expected to remain prevalent in our modern environment, despite the relative decline in objective danger in recent decades.

Summary

Throughout the course of history, selection pressure is likely to have promoted the development of cognitive threat-management systems that increased the likelihood that individuals would avoid harm from environmental threats. This pressure should have favored the development of sophisticated and streamlined threat detection mechanisms so that humans could selectively manage interactions in their social world and reduce their risk of encountering danger. Considerable research supports this proposal, indicating that specialized cognitive mechanisms aid in the detection of potential sources of threat in the immediate environment, presumably reducing the likelihood that an individual will experience harm. Additionally, there is evidence of variability in the ability to detect threats at the level of individual differences such that some individuals detect threats more accurately than others. This would seem to indicate that individuals who are highly accurate at detecting threats have a distinct survival advantage over individuals who are less accurate. However, it is plausible that a complementary mechanism may have evolved that helped improve the survival odds of early humans. Specifically, conservative social strategies may be an effective means of limiting exposure to threats when the environment is perceived to be highly dangerous. Such a strategy would be
particularly beneficial for individuals with relatively lower levels of threat detection accuracy as it would likely limit their exposure to dangers by promoting a preference for tradition along with an avoidance of uncertainty and potential threats. This approach to social life is likely to limit the potential liability of low threat detection accuracy.

**Present Research**

The goal of the present research was to pursue direct evidence of the association between threat detection ability and socially conservative attitudes. Additionally, the present research explored the role that perceptions of environmental danger play in this relation. Threat detection is the primary, and arguably the most important component of managing threats and avoiding danger. Inaccurate threat detection processes will result in increased encounters with danger (because of failure to detect threats) as well as wasted energy and resources (resulting from the mistaken classification of safe objects as dangerous). From this perspective, a conservative social strategy, which would promote avoidance of unfamiliar situations and adherence to traditional social practices, is likely to decrease the overall chance that a threat will be encountered when detection accuracy is low and would be expected to be utilized when the environment is perceived to be highly dangerous.

In the present research it was predicted that individual differences in threat detection ability would predict differences in socially conservative attitudes. Specifically, it was hypothesized that lower levels of threat detection ability would be associated with stronger endorsement of socially conservative attitudes. Conservative social strategies (increased
avoidance of unfamiliarity and adherence to tradition) should be expected when the benefit of avoiding additional harm by engaging in the conservative strategy exceeds the expected cost associated with mistakenly encountering dangers. This makes it particularly likely that conservative strategies will be beneficial when the environment is perceived to be dangerous, and when threat detection ability is low. Conversely, in an environment that is perceived to be relatively safe (the likelihood of encountering a threat is low), there would not be a severe penalty for inaccuracy in threat detection, and conservative social strategies would not convey a significant benefit.

Evidence in support of the predictions of the present research would have a broad range of applications for scientists investigating the influence of social media. In general, evidence supporting that individual differences in threat detection ability are predictive of conservative social attitudes would indicate that attitude formation and attitude change may depend not only on the content of social information, but also on innate, trait-level cognitive processes as basic as perceptual ability. Prior research supports this perspective, as individual differences in trait level characteristics such as the need for cognition have been shown to moderate the effects of environmental information on social attitudes (Petty, DeMarree, Briñol, Horcajo, & Strathman, 2008).

Additionally, findings that reveal a link between basic cognitive process and social attitudes would highlight the need to ensure that social policies are based on objective information, as differences in basic cognitive processes may manifest as subjective biases at the
individual level. For example, if individual differences in threat detection ability lead to predictable differences in socially conservative attitudes and perceptions of how safe the average U.S. citizen is in the modern world, policy decisions about how much federal spending should be devoted to a potential protective mechanism such as defense against terrorism should be based on objective measures of risk as opposed to subjective feelings of fear in order to avoid systematic biases stemming from individual cognitive differences. This same reasoning might also be applied to other policy domains such as immigration reform and prison reform.

To test the predictions of the present research, a computer model was created which simulated the effect of conservative social strategies (increased avoidance) on survival at various levels of threat detection accuracy and at varying levels of environmental danger. Furthermore, a new research paradigm was developed to assess individual differences in the ability to accurately discriminate between dangerous and safe stimuli. Additionally, three research studies were conducted to investigate the relation between threat detection accuracy and socially conservative attitudes in human subjects.
Computer Modeling

Prior to investigating the relation between threat management processes and socially conservative attitudes in human subjects, a computer program was developed which modeled the theoretical assumptions of the current research. The program was constructed using the C++ programming language and was designed to compare the expected survival rates of an organism based solely on threat detection ability with expected survival rates based on social behavior that followed a conservative strategy (increased avoidance of objects).

The program simulates the behavior of an organism which iteratively encounters objects in the environment that are either safe or dangerous. Upon encountering an object, the organism must choose to approach or avoid it. Thus, four outcomes are possible: a safe object is approached, a safe object is avoided, a dangerous object is approached, or a dangerous object is avoided. Each of these behavioral outcomes affects the survival of the organism by increasing or decreasing the organism’s ‘survival resources’ (a point value that must maintain a level above 0 for the organism to survive and continue to the next iteration of the model).

Of main interest to the present research, the program includes a feature which allows for an investigation into the effect of conservative attitudes on survival rates. This feature works by simulating an increase in the propensity of the organism to avoid objects above what would be expected based on threat detection accuracy rates alone. Using this feature, the model allows for a comparison between social strategies that are based on accuracy alone and strategies that incorporate varying levels of conservatism.
Flexible Parameters of the Model

The program is an exploratory tool that can be used to help make informed predictions about the effect of conservative attitudes on survival. As such, several key parameters that can influence the expected survival rate of the simulated organism are allowed to vary. A brief overview of each of these parameters follows:

**Threat detection accuracy.** The accuracy associated with correctly discriminating between dangerous and safe objects in the environment can be set between a lower bound of .50 and an upper bound of .95. An accuracy level of .50 (50%) would represent an ability to discriminate between dangerous and safe objects at a chance level, whereas an accuracy level of .95 (95%) would indicate high accuracy in the ability to discriminate between dangerous and safe objects.

**Likelihood of environmental danger.** The likelihood that any object in the environment is dangerous can be set between a lower bound of .05 (5% likelihood of danger) and an upper bound of .95 (95% likelihood of danger).

**Utility of behavioral outcomes.** The impact associated with the four possible behavioral outcomes (approaching a dangerous object [AD], approaching a safe object [AS], and avoiding a safe or dangerous object [AV]) on the survival resource value of the organism can be set by the experimenter. For the purposes of the current analysis, AD ranged from -6 to -15, AS was always set to +5, and AV ranged between -3 and 0 (see Figure 1 for an example of the utilities...
that were assumed in the base case of the model). The utility of behavioral outcomes varied in this manner in order to examine the sensitivity of overall survival rates to the parameters that had the ability to reduce the resource value.¹

**Mortality likelihood (M).** The mortality likelihood simulates the possibility of rare but extremely dangerous environmental threats associated with approaching a dangerous object. This likelihood represents the probability that resource values are immediately reduced to 0 (simulating death of the organism) if a dangerous object is approached. For the purposes of the current analysis, the mortality likelihood varied between .01 (1%) and .15 (15%) in accordance with the assumption that mortality threats, while important, would be sufficiently rare.

¹ The following models and associated parameter values were tested in order to explore the effect of conservative attitudes on survival rates during computer modeling. Initially, a base case model was tested which incorporated what were considered to be the most typical values for the utility of behavioral outcomes. Several other models were tested in order to explore the sensitivity of the survival rate to changes in the utility value associated with behavioral outcomes as well as the mortality rate. These alternate models yielded little deviation in the effect that conservative attitudes had on the average survival rate; therefore, the discussion in the present research is focused on the general effect of conservative social strategies across all of the models that were developed rather than examining the effects associated with each individual model.

<table>
<thead>
<tr>
<th>Model</th>
<th>AD</th>
<th>AS</th>
<th>AV</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Model</td>
<td>-10</td>
<td>+5</td>
<td>-3</td>
<td>10%</td>
</tr>
<tr>
<td>Minimize AD</td>
<td>-6</td>
<td>+5</td>
<td>-3</td>
<td>10%</td>
</tr>
<tr>
<td>Strong AD</td>
<td>-15</td>
<td>+5</td>
<td>-3</td>
<td>10%</td>
</tr>
<tr>
<td>Mortality Alt 1</td>
<td>-10</td>
<td>+5</td>
<td>-3</td>
<td>1%</td>
</tr>
<tr>
<td>Mortality Alt 2</td>
<td>-10</td>
<td>+5</td>
<td>-3</td>
<td>5%</td>
</tr>
<tr>
<td>Mortality Alt 3</td>
<td>-10</td>
<td>+5</td>
<td>-3</td>
<td>15%</td>
</tr>
<tr>
<td>Minimize Negativity</td>
<td>-6</td>
<td>+5</td>
<td>0</td>
<td>1%</td>
</tr>
</tbody>
</table>

Key: AD = Approach Dangerous, AS = Approach Safe, AV = Avoid, M = Mortality Likelihood
Figure 1. Basic decision structure for the detection of environmental threats.

Note. The key assumption in the payoff matrix is the proportion of the outcome values relative to one another. The values themselves can be considered to be arbitrary, and should be assigned according to the overall utility structure to be modeled.
**Social strategy.** Model simulations can be run under one of four possible social strategies: A neutral social strategy indicates that approach and avoidance decisions are based on threat detection accuracy alone. A weak conservative strategy increases the likelihood of avoidance by 10% over what would be expected based on threat detection accuracy; a moderate conservative social strategy increases avoidance by 30%; and a strong conservative social strategy increases avoidance by 50%.

Running a simulation under one of the three conservative social strategies updates the probability that any object is avoided. The updated probability of avoidance, $P'(\text{Avoid})$ is a function of the probability of avoidance based on accuracy alone, $P(\text{Avoid})$, coupled with the increase in avoidance due to conservatism, $AV_{\text{conservative}}$. The updated probability is computed according to the following formula:

$$P'(\text{Avoid}) = P(\text{Avoid}) + AV_{\text{conservative}} \times (1 - P(\text{Avoid}))$$

For example, an organism with an accuracy rate of 75% is 75% likely to avoid any dangerous object in its environment and is 25% likely to avoid any safe object. If the organism is also following a weak conservative social strategy that promotes a 10% increase in avoidance behavior, then the updated likelihood of avoiding a dangerous object, $P'(\text{Avoid} \mid \text{Dangerous})$ can be represented as:

$$P'(\text{Avoid} \mid \text{Dangerous}) = 0.75 + 0.1 \times (1 - 0.75) = 77.5\%$$
Also, because a conservative social strategy reflects an overall increase in avoidance behavior, the updated likelihood of avoiding a safe object, \( P'(\text{Avoid} \mid \text{Safe}) \) can be represented as:

\[
P'(\text{Avoid} \mid \text{Safe}) = .25 + .1 \times (1 - .25) = 32.5\%
\]

Likewise, the updated likelihood of approaching a dangerous or safe object decreases according to the following two formulas, respectively:

\[
P'(\text{Approach} \mid \text{Dangerous}) = 1 - P'(\text{Avoid} \mid \text{Dangerous}) = 22.5\%
\]

\[
and
\]

\[
P'(\text{Approach} \mid \text{Safe}) = 1 - P'(\text{Avoid} \mid \text{Safe}) = 67.5\%
\]

Using these formulas for updating behavior based on conservative social strategies, the probability of any of the 4 possible behavioral outcomes will always remain between 0 and 1, and the behavioral probabilities associated with either type of object (dangerous or safe) will always sum to 1.

**Number of simulations.** The program was designed to accept as a parameter the number of times to simulate a specified model at each combination of threat detection accuracy and likelihood of environmental danger in order to calculate the average survival likelihood. For the purpose of the current analysis, the number of simulations was always set to 1000, meaning that the survival rates presented in the analysis represent the average number of iterations survived across 1000 simulations of the model.
Core Assumptions of the Modeling Process

Given the flexible parameters that are incorporated into the modeling program as indicated above, a set of overarching assumptions guided the development of the models used in the current analysis:

Assumption 1. Threat detection processes do not change over time. More specifically, approach and avoidance probabilities are not updated based on experience. It is assumed that learning mechanisms influence processes in a threat management system that occur post-threat detection, such as the development of effective response strategies. Threat detection processes, however, are assumed to exist at the entry point of perceptual information and thus because information must be detected before it can be acted upon, detection mechanisms as theorized should be isolated from learning mechanisms.

Assumption 2. Using a similar rationale as in assumption 1, it is assumed that organisms are not explicitly aware of the accuracy of their own threat detection ability. Again, if it is granted that detection processes exist at the informational input level and operate in an automatic fashion, the true accuracy of the input signal cannot be objectively known to the organism. An inaccurate categorization of a threat (categorization of a dangerous object as safe) which results in an encounter with the threat is assumed to result in the perception that the environment is more dangerous than expected (as opposed to the perception that one’s ability to detect threats is less accurate than had been assumed). Similarly, an inaccurate categorization of a non-threat (categorization of a safe object as dangerous) which results in avoidance of the non-threat will
not be subject to feedback from direct experience. Thus, it is expected that at the level of information processing relevant to the current study, organisms perceive their perceptions (i.e., threat detection mechanisms) to be accurate 100% of the time and behave according to these perceptions unless influenced otherwise by a social strategy.

**Assumption 3.** On average, the expected cost of encountering a dangerous object will be higher in magnitude than the expected benefit of encountering a safe object. Because the value of an accurate threat detection system is in minimizing harm (as opposed to maximizing benefit), losses are more costly than gains are beneficial. In other words, because there is a finite lower limit (death), but a theoretically infinite upper limit to the possible resource values that can be achieved by an organism interacting with the environment, encountering something dangerous is assumed to – on average – have a higher impact on survival than encountering something safe.

**Assumption 4.** The risk of sudden mortality should remain relatively small. The likelihood of such a catastrophic event may be higher in some environments (active war zones, natural disaster areas, highly populated areas during a disease outbreak) than others; however in general, a chronically high likelihood of sudden mortality is a rare condition in human societies and would be a more likely subject of study as a special circumstance rather than a standard characteristic of the human environment. Thus, the current models used 15% as the highest possible probability rate of sudden mortality.
Basic Model Functionality

In any given simulation, the organism starts with a resource value of 50, and this value is updated following every iteration of the model’s decision sequence. A decision sequence starts with the program generating an environmental object which is either dangerous or safe according to the likelihood of environmental danger. In other words, if the likelihood of danger, P(D), is 75%, then the probability that the program generates a safe object, P(S) is determined by:

\[ P(S) = 1 - P(D) = .25 \]

The program then simulates a behavioral decision (approach or avoid) by the organism based on the combination of threat detection accuracy and any additional likelihood of avoidance as indicated by the social strategy as input by the user.

For example, if threat detection accuracy is set to 60%, the organism is following a moderate conservative social strategy, and a dangerous object is generated, then the probability that the organism avoids the dangerous object is:

\[ P'(\text{Avoid} \mid \text{Dangerous}) = .6 + .30 \times (1 - .6) = 72\% \]

Additionally, the probability that the organism approaches the dangerous object is:

\[ P'(\text{Approach} \mid \text{Dangerous}) = 1 - P'(\text{Avoid} \mid \text{Dangerous}) = 28\% \]

Based on the utility associated with the behavioral outcome (AD, AS, AV, M), the resource value is updated, and the process repeats (see Figure 2 for a decision tree representing all possible decision paths in the model, associated probabilities, and behavioral outcomes). This cycle continues until the resource value reaches zero or until 100 iterations of the decision
Figure 2. Decision tree representing object generation and behavioral decisions in the computer modeling simulation (probabilities are noted for each path segment). Key: $P(D)$ = Likelihood of environmental danger, $AV_{conservative}$ = increased rate of avoidance due to social strategy, $P(A|D)$ = Probability that a dangerous object will be approached, $P(A|S)$ = Probability that a safe object will be approached.

Note. $1 - P(A|D) = P(A|S)$ = Threat Detection Accuracy
sequence have occurred. Thus, the maximum length of survival in any simulation is 100 iterations and any simulation that ends prior to 100 iterations indicates that the resource value of the organism has reached zero (i.e., death).

When the simulation is complete (the organism dies or survives for 100 iterations), the program stores the number of iterations that the organism survived. Then, a new simulation begins using the same threat detection accuracy and likelihood of environmental danger, provided that the user defined number of simulations (1000 for all models in the current analysis) has not yet been reached. Once 1000 simulations of the model have been completed at a given combination of threat detection accuracy and likelihood of environmental danger, the average survival rate over the course of all simulations is calculated. Running a large number of simulations of the model in this manner prevents a single instance of sudden mortality from distorting the overall expected survival rate, but also allows for the combined effect of sudden mortality, threat detection accuracy, and environmental danger on the rate of survival to be accurately assessed.

The program begins by computing the average survival rate at a threat detection accuracy level of .5 and a likelihood of environmental danger of .05. Once 1000 simulations of the model have concluded and the average survival rate has been calculated at this combination of values, the danger likelihood is increased by .05, and the process repeats. This continues to a maximum danger likelihood of .95. Then, threat detection accuracy is increased by .05 (to .55), the danger likelihood is reset to .05, and the entire process repeats. This continues until the simulation has
been run for all combinations of threat detection accuracy (from .5 to .95) and likelihood of environmental danger (from .05 to .95). Thus, during one model run, a matrix of 190 survival likelihood values (10 threat detection accuracy values and 19 danger likelihood values) is generated. This matrix represents the range of average survival rates associated with a specific set of behavioral outcome utilities and a user-defined social strategy (see Figure 3 for the matrix of survival likelihoods generated in the base case model).

**Model Comparisons**

The average survival rate associated with each of the three conservative social strategies was compared to the neutral social strategy. For example, in order to calculate the effect of a weak conservative social strategy on survival rates, the matrix of survival rates under the neutral social strategy was subtracted from the matrix of survival rates under the weak conservative social strategy, resulting in a matrix of values indicating the overall effect on survival rate (in
<table>
<thead>
<tr>
<th>Danger Likelihood</th>
<th>0.95</th>
<th>0.9</th>
<th>0.85</th>
<th>0.8</th>
<th>0.75</th>
<th>0.7</th>
<th>0.65</th>
<th>0.6</th>
<th>0.55</th>
<th>0.5</th>
<th>0.45</th>
<th>0.4</th>
<th>0.35</th>
<th>0.3</th>
<th>0.25</th>
<th>0.2</th>
<th>0.15</th>
<th>0.1</th>
<th>0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.71</td>
<td>8.09</td>
<td>8.51</td>
<td>9.38</td>
<td>9.98</td>
<td>11.16</td>
<td>11.77</td>
<td>13.57</td>
<td>15.39</td>
<td>17.54</td>
<td>7.96</td>
<td>8.47</td>
<td>9.18</td>
<td>10.13</td>
<td>10.92</td>
<td>12.21</td>
<td>13.55</td>
<td>14.76</td>
<td>17.41</td>
</tr>
</tbody>
</table>

**Figure 3.** Average number of iterations survived in the base case model (AD = -10, AS = +5, AV = -3, M = 10%) using a neutral social strategy.
average number of additional trials survived) of the weak conservative social strategy. Positive values indicated that conservatism benefitted survival (the organism tended to survive for a greater number of iterations under the conservative social strategy) whereas negative values indicated that conservatism reduced the average number of iterations survived compared to the neutral social strategy.

Comparisons were made for each level of conservative social strategy and were averaged across all models, resulting in a weak (Figure 4), moderate (Figure 5), and strong (Figure 6) conservative strategy matrix. Examining the comparison matrices, there was substantial variability as to whether a conservative social strategy was beneficial or detrimental to survival and this effect depended on the combination of threat detection accuracy and danger likelihood. Given this finding, three general patterns were apparent:

First, a conservative social strategy was consistently beneficial when threat detection accuracy was low and the likelihood of danger was high. This outcome is indicated in the top left quadrant of each of the matrices in Figures 4-6.

Second, conservative social strategies could be beneficial or harmful to survival rates given the same level of danger in the environment, depending on detection accuracy of the organism. For example, Figure 5 demonstrates that at a danger likelihood level of 75%, a conservative strategy benefitted survival when detection accuracy was 75% or lower, but reduced survival rates when detection accuracy was greater than 75%. This indicates that in a relatively dangerous world, multiple social strategies can serve as a valid mechanism for
Table: Average survival rate effect of a weak conservative strategy (increase avoidance by 10%) on each combination of detection accuracy and environmental danger likelihood. Positive numbers indicate a weak conservative social strategy increased the survival rate, whereas negative numbers indicate a weak conservative social strategy decreased the survival rate. Color shading illustrates the magnitude of the effect of the weak conservative strategy according to the following key:

**Figure 4.** Average survival rate effect of a weak conservative strategy (increase avoidance by 10%) on each combination of detection accuracy and environmental danger likelihood. Positive numbers indicate a weak conservative social strategy increased the survival rate, whereas negative numbers indicate a weak conservative social strategy decreased the survival rate. Color shading illustrates the magnitude of the effect of the weak conservative strategy according to the following key:
### Figure 5

Average survival rate effect of a moderate conservative strategy (increase avoidance by 30%) on each combination of detection accuracy and environmental danger likelihood. Positive numbers indicate that a moderate conservative social strategy increased the survival rate, whereas negative numbers indicate that a moderate conservative social strategy decreased the survival rate. Color shading illustrates the magnitude of the effect of the moderate conservative strategy according to the following key:

<table>
<thead>
<tr>
<th>Danger Likelihood</th>
<th>Detection Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>0.2</td>
<td>0.55</td>
</tr>
<tr>
<td>0.15</td>
<td>0.60</td>
</tr>
<tr>
<td>0.1</td>
<td>0.65</td>
</tr>
<tr>
<td>0.05</td>
<td>0.70</td>
</tr>
<tr>
<td>0.0</td>
<td>0.75</td>
</tr>
<tr>
<td>-0.1</td>
<td>0.80</td>
</tr>
<tr>
<td>-0.2</td>
<td>0.85</td>
</tr>
<tr>
<td>-0.25</td>
<td>0.90</td>
</tr>
<tr>
<td>-0.3</td>
<td>0.95</td>
</tr>
</tbody>
</table>

- **Green**: > 1 and < 5 iterations
- **Light Green**: > -1 and < +1 iterations
- **Yellow**: < -1 and > +5 iterations
- **Orange**: < -5 and > -10 iterations
- **Red**: < -10 and > -15 iterations
- **Dark Red**: < -15 iterations

<table>
<thead>
<tr>
<th>Detection Accuracy</th>
<th>Danger Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.95</td>
<td>2.57</td>
</tr>
<tr>
<td>0.9</td>
<td>2.70</td>
</tr>
<tr>
<td>0.85</td>
<td>3.00</td>
</tr>
<tr>
<td>0.8</td>
<td>3.01</td>
</tr>
<tr>
<td>0.75</td>
<td>3.04</td>
</tr>
<tr>
<td>0.7</td>
<td>3.05</td>
</tr>
<tr>
<td>0.65</td>
<td>3.08</td>
</tr>
<tr>
<td>0.6</td>
<td>3.10</td>
</tr>
<tr>
<td>0.55</td>
<td>3.12</td>
</tr>
<tr>
<td>0.5</td>
<td>3.15</td>
</tr>
<tr>
<td>0.45</td>
<td>3.18</td>
</tr>
<tr>
<td>0.4</td>
<td>3.20</td>
</tr>
<tr>
<td>0.35</td>
<td>3.23</td>
</tr>
<tr>
<td>0.3</td>
<td>3.25</td>
</tr>
<tr>
<td>0.25</td>
<td>3.28</td>
</tr>
<tr>
<td>0.2</td>
<td>3.30</td>
</tr>
<tr>
<td>0.15</td>
<td>3.32</td>
</tr>
<tr>
<td>0.1</td>
<td>3.34</td>
</tr>
<tr>
<td>0.05</td>
<td>3.36</td>
</tr>
<tr>
<td>0.00</td>
<td>3.38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Detection Accuracy</th>
<th>Danger Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.00</td>
</tr>
<tr>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Note:** The table above shows the survival rate effect of a moderate conservative strategy on each combination of detection accuracy and environmental danger likelihood. Positive numbers indicate an increase in survival rate, while negative numbers indicate a decrease. The color key illustrates the magnitude of the effect, with green indicating > 1 and < 5 iterations, light green indicating > -1 and < +1 iterations, yellow indicating < -1 and > +5 iterations, orange indicating < -5 and > -10 iterations, and red indicating < -10 and > -15 iterations.
### Strong Conservative Strategy

<table>
<thead>
<tr>
<th>Detection Accuracy</th>
<th>0.95</th>
<th>0.90</th>
<th>0.85</th>
<th>0.80</th>
<th>0.75</th>
<th>0.70</th>
<th>0.65</th>
<th>0.60</th>
<th>0.55</th>
<th>0.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger Likelihood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.95</td>
<td>5.43</td>
<td>5.26</td>
<td>6.20</td>
<td>6.53</td>
<td>7.09</td>
<td>6.85</td>
<td>7.00</td>
<td>3.81</td>
<td>1.61</td>
<td>0.07</td>
</tr>
<tr>
<td>0.90</td>
<td>5.63</td>
<td>5.87</td>
<td>6.38</td>
<td>6.77</td>
<td>6.85</td>
<td>5.96</td>
<td>4.66</td>
<td>2.13</td>
<td>0.49</td>
<td>-1.25</td>
</tr>
<tr>
<td>0.85</td>
<td>6.01</td>
<td>6.35</td>
<td>6.79</td>
<td>6.27</td>
<td>6.79</td>
<td>4.84</td>
<td>2.67</td>
<td>0.69</td>
<td>-1.12</td>
<td>-3.30</td>
</tr>
<tr>
<td>0.80</td>
<td>6.31</td>
<td>6.50</td>
<td>6.94</td>
<td>6.01</td>
<td>5.46</td>
<td>3.02</td>
<td>1.31</td>
<td>-1.18</td>
<td>-2.71</td>
<td>-6.47</td>
</tr>
<tr>
<td>0.75</td>
<td>6.65</td>
<td>6.65</td>
<td>6.15</td>
<td>4.94</td>
<td>3.42</td>
<td>1.47</td>
<td>-0.42</td>
<td>-2.99</td>
<td>-5.91</td>
<td>-12.29</td>
</tr>
<tr>
<td>0.70</td>
<td>7.01</td>
<td>5.97</td>
<td>5.48</td>
<td>3.65</td>
<td>1.65</td>
<td>-0.41</td>
<td>-2.07</td>
<td>-6.29</td>
<td>-11.46</td>
<td>-21.12</td>
</tr>
<tr>
<td>0.65</td>
<td>6.51</td>
<td>5.22</td>
<td>3.93</td>
<td>1.71</td>
<td>-0.01</td>
<td>-2.56</td>
<td>-5.45</td>
<td>-10.87</td>
<td>-18.66</td>
<td>-32.53</td>
</tr>
<tr>
<td>0.6</td>
<td>5.22</td>
<td>3.59</td>
<td>2.41</td>
<td>-0.01</td>
<td>-1.95</td>
<td>-5.37</td>
<td>-9.27</td>
<td>-17.57</td>
<td>-27.15</td>
<td>-42.07</td>
</tr>
<tr>
<td>0.55</td>
<td>4.15</td>
<td>1.85</td>
<td>0.61</td>
<td>-1.93</td>
<td>-4.51</td>
<td>-9.48</td>
<td>-15.50</td>
<td>-24.53</td>
<td>-33.67</td>
<td>-43.67</td>
</tr>
<tr>
<td>0.5</td>
<td>2.32</td>
<td>0.16</td>
<td>-1.61</td>
<td>-4.90</td>
<td>-8.96</td>
<td>-14.73</td>
<td>-21.50</td>
<td>-30.41</td>
<td>-36.73</td>
<td>-39.89</td>
</tr>
<tr>
<td>0.45</td>
<td>0.48</td>
<td>-1.98</td>
<td>-3.99</td>
<td>-8.64</td>
<td>-13.26</td>
<td>-20.18</td>
<td>-26.32</td>
<td>-32.08</td>
<td>-33.69</td>
<td>-35.05</td>
</tr>
<tr>
<td>0.4</td>
<td>-1.39</td>
<td>-4.49</td>
<td>-8.30</td>
<td>-13.71</td>
<td>-18.89</td>
<td>-25.31</td>
<td>-28.25</td>
<td>-30.88</td>
<td>-29.45</td>
<td>-29.01</td>
</tr>
<tr>
<td>0.2</td>
<td>-21.61</td>
<td>-27.39</td>
<td>-27.77</td>
<td>-27.58</td>
<td>-24.27</td>
<td>-21.00</td>
<td>-14.01</td>
<td>-10.26</td>
<td>-4.75</td>
<td>-3.63</td>
</tr>
<tr>
<td>0.1</td>
<td>-36.70</td>
<td>-34.11</td>
<td>-28.32</td>
<td>-23.47</td>
<td>-15.00</td>
<td>-10.55</td>
<td>-4.53</td>
<td>-2.29</td>
<td>-0.34</td>
<td>-0.17</td>
</tr>
<tr>
<td>0.05</td>
<td>-39.01</td>
<td>-34.33</td>
<td>-27.05</td>
<td>-19.99</td>
<td>-11.57</td>
<td>-7.30</td>
<td>-2.14</td>
<td>-0.91</td>
<td>0.15</td>
<td>0.04</td>
</tr>
</tbody>
</table>

**Figure 6.** Average survival rate effect of a moderate conservative strategy (increase avoidance by 30%) on each combination of detection accuracy and environmental danger likelihood. Positive numbers indicate that a strong conservative social strategy increased the survival rate, whereas negative numbers indicate that a strong conservative social strategy decreased the survival rate. Color shading illustrates the magnitude of the effect of the strong conservative strategy according to the following key:
reducing the likelihood of mortality, and the appropriate strategy depends on the ability to detect threats in the environment.

Finally, the magnitude of the conservative social strategy affected the magnitude of the impact on survival rates. A relatively weak conservative strategy (increasing avoidance by 10%) was broadly beneficial, but had a minimal overall effect on survival rates (Figure 4). In the conditions that benefitted from a weak conservative social strategy, the magnitude of the benefit was always less than 2 iterations. A weak conservative strategy reduced survival likelihoods over a range of cases as well (yellow shaded cells), but the effect never reached a reduction of 10 iterations, and only came close to that level of magnitude when detection accuracy was extremely high. By comparison, both moderate and strong conservative social strategies increased the magnitude of beneficial as well as detrimental effects. In Figure 5 (moderate conservative strategy), 35% of cases reflect an increased survival rate of more than 1 iteration (light green shading), and 20% of cases reflect a decrease in survival rates of more than 10 iterations (red and dark red shading combined). Likewise, in Figure 6 (strong conservative strategy), 17% of the cases reflect an increase in the survival rate of 5 iterations or more (dark green shading) and 35% of cases represent a survival rate reduction of more than 15 iterations over what was observed when decision making was based purely on accuracy (dark red shading). This illustrates that as conservative strategies get stronger, they tend to convey a higher magnitude of benefits, but only in increasingly specified cases. As reflected in the model, these benefits tend to be localized to regions where threat detection accuracy is low and the likelihood
of environmental danger is high. Conversely, as conservative strategies get stronger, they tend to be increasingly detrimental to a subset of cases as well. In particular, the range of combinations of detection accuracy and environmental danger likelihood running from the lower left to the upper right portion of Figures 4-6 tend to be negatively affected by conservative social strategies. This may indicate that when threat detection accuracy is sufficiently high relative to the likelihood of danger in the environment, conservatism violates the Smoke Detector Principle, meaning that the cost of increased avoidance exceeds the expected cost of mistakenly encountering a dangerous object, given the organism’s level of accuracy in detecting threats.

Conclusion

In support of the current research, the computer modeling simulation demonstrated that conservative social strategies, which increased general avoidance tendencies, conveyed a relatively consistent survival benefit to organisms with low threat detection accuracy when these organisms were in high-danger environments. This general pattern held up across multiple configurations of utility values that modeled the effects of approach and avoidance decisions on survival rates.

Given these results, it is plausible to theorize that selection pressure would have favored the evolution of conservative social attitudes in order to promote survival, especially if it is assumed that at least a moderate level of danger (stemming from predators, disease, or rival conspecifics) existed in the ancestral environment of humans. If individual levels of conservatism tend to be higher when the environment is perceived to be more dangerous, and if
conservatism promotes an increase in behavioral avoidance tendencies, then conservative attitudes may serve to minimize the likelihood that individuals mistakenly encounter harm.

Thus, individuals with lower levels of threat detection accuracy, who are likely to encounter (and thus perceive) higher levels of danger in the environment, would be expected to develop more conservative social attitudes than those with higher rates of accuracy in detecting threats. The results of the computer modeling simulation reflect this perspective, and support the predictions of the current research that conservative attitudes which motivate increased avoidance behavior can serve to reduce the liability of inaccuracy in threat detection. This would decrease the likelihood that an individual will mistakenly encounter danger and would thus be beneficial to survival when the environment is sufficiently dangerous.
Development of a Threat Detection Paradigm

Threat detection represents the initial step of the threat management process. As such, it is dependent on early stage perceptual information and is likely to be highly automatic in nature. That is, the ability to detect threats (independent of any conscious reasoning or response behavior) is most likely based on unconscious processes, or processes that are unintentional and which act outside of conscious awareness to influence behavior (Bargh & Morsella, 2008). Thus, to isolate threat detection processes from later, downstream threat management processes to the greatest extent possible, research paradigms that investigate threat detection ability should investigate the ability to discriminate between threats and non-threats at an unconscious level.

Theoretically, presenting stimuli outside of conscious awareness should minimize the chances that measurements of threat detection ability reflect conscious judgments or other cognitive processes that occur in response to the detection of a threat (or non-threat). For example, it is expected that an image of a snake would be classified as threatening based on initial threat detection mechanisms, as snakes have historically represented a source of potential danger. However, given the opportunity to consciously reason over the image of a snake in a laboratory setting, it is plausible that some participants may classify the snake image as non-threatening because they feel that snakes make interesting pets, or because they may interpret the specific type of snake to be non-threatening to humans. By using a threat detection paradigm that presents stimuli at an unconscious level, the possibility that conscious reasoning would influence classifications in this manner should be considerably reduced.
Along these lines, Windmann and Krüger (1998) assessed automatic threat detection mechanisms by asking participants to distinguish words from non-words that were presented for a very brief time (28ms). Accuracy in this discrimination task served as the main measure of interest in the study, and the authors found that participants responded with a higher bias toward a ‘word’ response for non-words that resembled threatening words compared to non-words that resembled neutral words. Although this finding provides some insight into the automatic nature of cognitive categorization processes, the use of words to represent environmental threats presents issues for the study of individual differences in threat detection ability. Words are symbolic in their representation of threats, and therefore, assessment of the ability to detect threats using words as target stimuli incorporates the functionality of cognitive language mechanisms which must act to correctly interpret the symbolic meaning of the words that are presented. Words do not represent actual threats that need to be avoided or defended against; therefore, it is possible that a paradigm which uses words as target stimuli might not directly assess the processes that would have been shaped by evolutionary forces to detect environmental threats in order to promote survival. Instead, such a paradigm must assess mechanisms which extract meaning through language to determine whether a threat is being represented.

In a separate study, Wiens and colleagues (2008) assessed automatic threat detection ability by presenting participants with standardized grayscale images one at a time followed by a backward masking image. Backward masking involves presenting a second image (in this case, an image composed of randomly re-shuffled 10 pixel x 10 pixel sections from the original target
images) immediately after the first image, limiting the extent to which the target image can be held in short term memory and consciously perceived. The authors presented each image for 12 ms and varied the onset of the presentation of the backward masking image between 12 ms and 200 ms to investigate the extent of the exposure required to show differences in threat detection ability. Participants were told that each image belonged to one of four possible categories (snakes, spiders, mushrooms, or flowers), and were given as much time as they wanted in order to categorize the images once they were displayed. The main measure of threat detection ability was a signal detection index ($d'$) which is a standardized measure of accuracy in categorizing images which controls for response bias. The $d'$ statistic represents the difference between the hit rate (correct categorization of threats) and the false alarm rate (categorization of a non-threatening image as threatening) after both of these rates have been standardized using the inverse of the normal distribution transformation. Wiens and colleagues (2008) found that individual variation in threat detection ability was best assessed when the backwards masking stimuli was presented between 24ms and 36ms after the onset of the target stimulus (floor effects for detection were found at faster presentation times, and ceiling effects were found at slower presentation times). Using this paradigm, the authors determined that individual differences in disgust sensitivity were positively correlated with participants’ ability to accurately detect snake and spider images (and was not related to the ability to detect flower and mushroom images), but that self-reported snake fear and spider fear were unrelated to the ability to detect threatening images.
Although this threat detection paradigm is likely to have separated the process of perceptually-based threat detection from later stage response processes, and does not rely on symbolic interpretation, a few aspects of the paradigm may limit the external validity of the findings as they relate to cognitive threat detection mechanisms. First, by presenting the images in grayscale, the authors excluded information that may be relevant to threat detection. Color may be an important feature that triggers threat detection mechanisms, and therefore, presenting images in grayscale may not fully assess evolved threat detection mechanisms. As such, the increased experimental control provided by presenting images in grayscale may sacrifice external validity more than would be desired when assessing individual differences in threat detection ability.

Second, participants were made aware of the image categories ahead of the threat detection procedure. By providing this information ahead of time, the procedure may have primed the target categories and activated cognitive mechanisms that compared the target images to exemplar categories, making detection of threats (or non-threats) more likely. Along these lines, the presentation of target images for 12 ms may be inadequate for assessing individual differences in threat detection ability if participants are not aware of the potential image categories ahead of time. Indeed, Wiens and colleagues (2008) found that the ability to distinguish threats from non-threats at this presentation rate only differed from chance when the onset of the masking stimulus was delayed by 24 ms or greater. A recent set of studies by de la Rosa, Choudhery, and Chatziastros (2011) further supports this proposition, demonstrating a
considerable increase in signal detection ($d’$) beyond chance levels when the presentation time of
a backward masked target image was increased from 7 ms to 28 ms.

Based on this review, it was determined that prior procedures for assessing threat
detection ability were insufficient for the assessment of individual differences in threat detection
in the present research. Therefore, adaptations were made to the Wiens and colleagues (2008)
procedure for assessing threat detection ability and the updated procedure was pilot tested. The
goal of this adapted procedure was to assess threat detection ability in a manner that was
independent from later stage threat management processes (e.g., threat response and threat
learning mechanisms) as well as independent from mechanisms that rely on symbolic
interpretation. An additional goal in developing the current paradigm was to retain as much
external validity as possible by using color images.

In the current paradigm, participants were not told ahead of time what categories of images they
would be exposed to, only that images would represent objects that were either dangerous or
safe. This was done to eliminate the possibility that participants would be primed to notice
specific characteristics of the images they were presented with based on a priori knowledge of
the stimulus categories. Thus, the current threat detection paradigm assessed individual
differences in the ability to distinguish between dangerous and safe images that were presented
outside of conscious awareness.

**Stimuli**
Stimuli were 40 color images categorized as dangerous \((n = 20)\) or safe \((n = 20)\). Within the category of dangerous stimuli, there were 4 different sub-categories (dangerous mammals, guns, snakes, and spiders). Similarly, within the category of safe stimuli, there were also 4 different sub-categories (butterflies, books, flowers, and leaves). Five images were selected to represent each of these lower-level categories. All images were selected from an online search of Google\textsuperscript{™} images. Adobe Photoshop\textsuperscript{™} was used to isolate the main figure from each image on a dark grey background and to adjust all images to a standard size (400 pixels by 280 pixels). Prior to incorporating these images into the threat detection paradigm, the images were evaluated by 10 participants (undergraduate students volunteering prior to class) who rated each image on a scale from 1 \textit{(safe)} to 9 \textit{(dangerous)}. The 20 images intended to represent threats were categorized as being significantly more dangerous \((M = 7.89, SD = .70)\) than the 20 images intended to represent non-threats \((M = 1.41, SD = .58)\), \(t(9) = 22.41, p < .001\). The range of the average individual image scores within the categories of dangerous images \((7.40 \text{ – } 8.80)\) and safe images \((1.10 \text{ – } 2.30)\) indicated that no individual images were viewed as unrepresentative of their intended category.

In addition to the 40 images, a backward mask of colored dots was created and standardized to the same image size. Examples of stimuli from each category as well as the masking stimuli can be found in Figure 7. All stimuli were presented to participants on a 17” Dell M781p CRV monitor using Medialab\textsuperscript{™} software running on a desktop PC with an Intel\textsuperscript{™} dual core, 2.39 GHz processor with 1 GB of RAM.
Figure 7. Example images from each stimulus category and the backwards mask image as used in the pilot study
Participants

Forty-three participants (66% female) participated in the pilot study in exchange for course credit. Participants’ average age was 22.77 years (SD = 4.02). All participants volunteered for the study titled “Identifying Threats” after reading a short description on the psychology department’s research participation Website. The description of the study read as follows:

*In this study, you will be presented with a series of pictures. Some of these pictures will represent things that could be dangerous to you, and some of these pictures will represent things that are safe. Each picture will be presented one at a time and for each picture, your job is to determine whether the picture represents something dangerous or not.*

Procedure

Upon arrival, participants were asked to sign a consent form acknowledging their voluntary participation in the study. Participants were then seated at individual workstations and were given a brief overview of the purpose of the study. Each workstation was located in a separate cubicle and a maximum of 5 workstations could be occupied by participants during a single research session. A piece of twine was affixed across the front of the cubicle at a height of 117 cm above the floor and at a distance of 43 cm from the workstation monitor. Prior to beginning the pilot session, all participants were instructed to adjust their seats so that the twine
lightly touched their forehead just above eyebrow level. This was intended to standardize the viewing experience across all participants to the maximum extent possible.

First, participants completed the threat detection paradigm. Participants were told that they would be presented with a series of trials on the computer screen. At the start of each trial, an ‘X’ was displayed in the center of the computer screen for 2 seconds as a focal image. The ‘X’ was immediately followed by the target image which was presented for 30ms. Previous research has indicated that a backward masked stimulus presentation time of roughly 30ms is sufficient for eliciting greater-than-chance signal detection while stimulus awareness remains largely outside of conscious awareness (de la Rosa et al., 2011; Wiens et al., 2008). Participants were instructed that this target image was the image that they were to try and identify, but that it was likely that they would not be able to consciously perceive it. Following the target image, the backward mask was presented for 60ms. After this series of images, participants were asked to indicate whether they thought the target image was something dangerous (something that could potentially harm them) or something safe (something that would not be likely to cause them any harm).

In order to assess conscious awareness of the stimuli, participants were then asked to indicate their level of confidence in their classification on a scale from 1 (not sure at all) to 7 (completely sure). After indicating their confidence, participants were asked to write down (in a free response format) what they thought the target image had been on a separate sheet of paper. After writing down what they thought the target image was, participants pressed the space bar to
begin the next trial. This process was repeated for all 40 stimulus images, which were presented in random order. Prior to beginning the procedure, it was stressed to all participants that they would very likely not be able to see the target image, but that they should trust their instinct in attempting to make an accurate classification of the target, even if they were not consciously aware of its valence.

At the conclusion of the procedure, participants completed several demographic questions (gender, age, and whether or not they had a prescription for and were wearing corrective lenses) and were also asked to report their impressions of the threat detection procedures in an open-ended format. Finally, when all participants had finished, the experimenter gave everyone a final opportunity to ask questions and provide feedback about the procedure. At this point, the most common question asked by participants was whether or not they had actually been presented with images during the procedure, as most of them had not been consciously aware of the target stimuli.

Statistical analysis

Signal detection analysis (Macmillan & Creelman, 2005) was used to assess the ability of participants to discriminate a dangerous object from a safe object in the threat detection procedure while accounting for response bias using the same data reduction method as Wiens and colleagues (2008). Using this procedure, four raw statistics were tabulated for each participant: hits (# of trials in which a threatening image was correctly categorized as ‘dangerous’), misses (# of trials in which a threatening image was incorrectly categorized as
‘safe’), false alarms (# of trials in which a safe image was incorrectly categorized as ‘dangerous’), and correct rejects (# of trials in which a safe image was correctly categorized as ‘safe’). Using these raw counts, a hit rate (number of hits divided by the total number of threatening images) and a false alarm rate (number of false alarms divided by the total number of safe images) was calculated for each participant after dropping trials in which the participant reported conscious detection of the target image. In calculating these rates, half a trial was added to the numerator (hits and false alarms) and a whole trial was added to the denominator (total number of dangerous or safe images) so that these rates would never be 0 or 1 (undefined in the standard distribution used for signal detection analysis).

After calculating the hit rate and false alarm rate for each participant, these values were standardized according to the inverse of the normal distribution function (by using the NORMSINVERSE function in Microsoft™ Excel). This function converts hit rates and false alarm rates of .5 to a standardized score of 0. Hit rates or false alarm rates that are higher than .5 will result in a positive standardized score, whereas hit rates and false alarm rates that are lower than .5 will result in a negative standardized score (Macmillan & Creelman, 2005).

Using these standardized scores, the $d'$ (signal detection) index and the $C$ (response bias) index were calculated. As stated previously, the $d'$ index is a score representing the difference between the standardized value of the hit rate and the standardized value of the false alarm rate. Thus, $d' = z_{hit\ rate} - z_{false\ alarm\ rate}$. A $d'$ value of zero represents chance ability to discriminate dangerous images from safe images, whereas more positive values of $d'$ indicate a greater ability
to correctly identify dangerous images after accounting for response bias. For example, a hit rate of .75 paired with a false alarm rate of .75 would indicate that the participant is no better than chance at distinguishing a dangerous image from a safe image, and in this case, the $d'$ score would be 0. Even though the participant was correct on 75% of the trials, the participant mistook safe pictures for dangerous 75% of the time as well, indicating that the accuracy associated with the hit rate was due to response bias, and did not reflect a true ability to distinguish dangerous images from safe images. Conversely, a participant with a hit rate of .25 and a false alarm rate of .05 would have a $d'$ score of .97, indicating a good ability to distinguish dangerous stimuli from safe stimuli, even though the overall hit rate of 25% was fairly low. In this latter case, it is likely that the participant was less willing to make a false positive response, and thus had a bias toward answering ‘safe’ unless there was a high certainty that the stimulus was dangerous. This type of response pattern would be viewed as more accurate than the participant with both a hit rate and false alarm rate of 75%.

The $C$ index is a standardized score which represents a participant’s overall tendency to respond to images as either ‘dangerous’ or ‘safe’. $C$ is defined as $-0.5 * (z_{hit\ rate} + z_{false\ alarm\ rate})$. Thus, a positive $C$ index indicates a bias toward a ‘safe’ response, and a negative $C$ index indicates a bias toward a ‘dangerous’ response.

The reason for using standardized scores (as opposed to raw hit rates and false alarm rates) in the calculation of the $d'$ and $C$ indices is that the standardized scores provide sensitivity to the extent to which hit rates and false alarm rates deviate from neutral (.5). For example, if
two individuals are compared, one of whom demonstrates the ability to differentiate between two stimuli at a hit rate of .8 and false alarm rate of .4, and the second of whom demonstrates a hit rate of .5 and a false alarm rate of .1, simply subtracting the hit rate from the false alarm rate will indicate that the detection ability of the two participants are equivalent (both would have a detection ability score of .4). However, using the standardized scores in the d’ calculation indicates that the detection ability of the second participant is superior to the first given their respective d’ scores of 1.095 and 1.282. Though the second participant had a lower hit rate, their false alarm rate (which exhibits the most extreme deviation from a neutral rate of .5) is weighted more heavily in the calculation of the d’ score when the standardized score is used, and indicates that the second individual has a superior ability to discriminate between the two stimulus categories compared to the first individual.

**Results and discussion**

An initial investigation indicated that the results of the pilot study did not differ based on participant sex or as a consequence of participants not wearing corrective lenses for which they had a prescription (all ps > .73). Thus, these variables were not included in the reported analyses.

First, conscious awareness of the target stimuli was analyzed to confirm that participants’ classifications were not based on overt conscious awareness of the stimuli. This was assessed by investigating participants’ confidence in their classifications as well as their conscious reports of the images that they saw. A repeated measures ANOVA revealed that confidence differed with
respect to stimulus category, $F(7, 1712) = 7.68, p < .01$. A post-hoc Tukey test revealed that participants reported higher confidence in their classification of butterfly images ($M = 3.23, SD = 2.27$) compared to all other stimulus categories (all $ps < .02$). Indeed, investigation of participants’ written reports of the images revealed that butterflies were consciously identified at a much higher rate (18%) than all other images (range: 1% to 9%; $M = 4$%). For butterfly images, confidence level was significantly correlated with classification of the image as safe, $r(213) = .42, p < .01$. Thus, conscious perception of butterfly images was significantly greater than all other image categories, and therefore it was determined that the category of butterfly images would be dropped from future studies. In order to maintain a balanced set of stimuli (equal numbers of dangerous and safe images), the category of dangerous stimuli with the highest mean confidence score (dangerous animals; $M = 2.60, SD = 1.85$) and conscious perception rate (9%) was also dropped. Thus, the remainder of the analyses are based on the results that were obtained for the remaining categories of dangerous (guns, snakes, and spiders) and safe (books, flowers, and leaves) stimuli.

Using this revised set of stimuli, participants were able to consciously detect very few of the target stimuli on average ($M = 1.02, SD = 2.11$). However, conscious detection of the target stimuli was not normally distributed throughout the sample. Most participants (65%) did not consciously detect any of the target stimuli and roughly ninety percent of participants consciously detected two or fewer of the target images. However, the remaining ten percent of participants detected three or more images, with one participant detecting six (20%) and another
detecting eleven (37%) of the target images that were presented during the procedure. Thus, conscious detection of the target stimuli was positively skewed. As the theoretical premise of the research was dependent on threat detection occurring at unconscious levels, all trials in which participants were able to consciously detect the target stimuli were dropped from further analyses.

Analyses performed on the remaining trials indicated that variability in the $d'$ statistic was relatively normally distributed across the sample (see Figure 8) despite being mildly kurtotic ($kurtosis = 2.90$) and the skewness value of the distribution fell well within the acceptable range ($skewness = -.13$). Though the average $d'$ score of the sample ($M = .08, SD = .48$) was not significantly greater than zero after dropping the trials in which conscious detection occurred, $t(42) = 1.07, p = .29$, the sample size in the pilot study was relatively small and the trend in the data indicated that the average participant may have been able to discriminate between safe and dangerous target images at levels that exceeded chance. This phenomenon was investigated further in later studies. Additionally, analysis revealed that the $C$ index ($M = .51, SD = .75$) differed significantly from zero, $t(42) = 4.45, p < .001$, indicating that participants reported a strong bias toward a ‘safe’ response during the procedure.

Taken together, the results of the pilot study suggested that the paradigm should be an appropriate measurement instrument for the assessment of individual differences in the ability to accurately distinguish between dangerous and safe images. Assessment of unconscious threat detection ability using this paradigm retained the six image categories (books, flowers, leaves,
Figure 8. Distribution of $d'$ scores in the pilot study

guns, snakes, and spiders) from the preceding analysis and was used to investigate the relation between threat detection ability and social conservatism in subsequent studies.
Study 1: Threat detection and conservatism

The first study was intended to establish the existence of the basic relation between threat detection ability and socially conservative attitudes. If individual differences in the ability to discriminate dangerous objects from safe objects in the initial stages of visual perception affect relative perceptions of danger in the social world as well as the endorsement of socially conservative attitudes, then a simple correlational study should reveal this effect. As such, the purpose of the first study was to explore initial evidence of these relations.

Individual differences in the ability to detect threats was assessed using the procedure outlined in the pilot study and was compared to a series of social conservatism measures as well as a measure assessing participants’ belief that the world is a dangerous place. It was expected that threat detection ability, as indicated by $d’$ scores, would be negatively correlated with measures of socially conservative attitudes such that participants with lower levels of threat detection ability would tend to report more conservative social attitudes compared to participants with higher levels of threat detection ability. Additionally, it was expected that threat detection ability would be negatively correlated with belief that the world is dangerous such that participants with lower levels of threat detection ability would tend to perceive the world as more dangerous than participants with higher levels of threat detection ability. Finally, it was predicted that threat detection ability would moderate the predicted positive correlations between belief that the world is dangerous and measures of social conservatism. Participants who demonstrated low threat detection ability and also reported perceptions of the world as highly
dangerous were predicted to report significantly stronger conservative attitudes than all other participants.

**Participants**

One-hundred ninety-three undergraduate students participated in exchange for one hour of course credit. Data from three participants were lost due to computer malfunction, and thus the following analyses are based on the remaining sample (N = 190). The sample was 63% female and primarily White/Caucasian (51%) with 24% of participants identifying their race/ethnicity as African-American, 13% as Asian, 8% as Latino, and 5% identifying as ‘other’. The average age of the sample was 19.70 years (SD = 4.08). A post-hoc sensitivity analysis conducted using the G*Power software (version 3.1.3; Faul, 2010) determined that a sample of this size provided 80% power to detect a significant correlation coefficient (ρ) of +/-0.20 or greater using a two-tailed test of significance. This sample size also provided 80% power to detect a significant effect at an $R^2$ value of 0.07 or larger in a random effects multiple linear regression model with four predictors (one control variable, two main effects, and an interaction term) using a two-tailed test of significance.

Participants self-selected into a study titled *Detecting Threats* after reading the following description on the SONA research page:

*In this study, you will be presented with a series of pictures one at a time. The pictures will be presented rapidly so that you might not actually be able to tell what they are. Your task will be to decide whether the picture you saw...*
represented something dangerous or something safe. Since it may be hard for you to tell what each picture actually is, we are primarily interested in your 'gut' reaction as to whether the picture represents something dangerous. After the picture task, you will be asked to fill out several related surveys.

The study description did not explicitly mention the measurement of conservative attitudes in order to minimize the likelihood of response bias during the survey portion of the study. After agreeing to participate in the study, participants were told that they could withdraw from the study at any time without penalty.

Measures

Measures of threat detection ability and social conservatism were assessed along with control variables and demographic characteristics in the following order (the full version of each measure can be found in Appendix A):

**Threat detection ability.** Threat detection ability was assessed using the procedure outlined in the pilot study. Three categories of safe (books, flowers, leaves) and three categories of dangerous (guns, snakes, spiders) stimuli were used in the threat detection procedure. The same five images were used in each category as were used in the pilot study. Thus, 30 total stimulus images were used along with a backward mask of randomly-colored dots and each image was displayed twice resulting in a 60-trial paradigm to assess threat detection ability. All images were presented at the same size (400 pixels wide by 280 pixels high) as in the pilot study.
After removing trials in which participants reported conscious awareness of the target image, signal detection analysis was used to determine each participant’s $d'$ score, which was the primary measure of interest in assessing threat detection ability. This analysis also produced measures of response bias (labeled as ‘$C$’) for each participant such that positive $C$ scores indicated a bias toward a ‘safe’ response and negative $C$ scores indicated a bias toward a ‘dangerous’ response. The measure of response bias was used for additional exploratory analyses.

**Conscious awareness.** Conscious awareness of the target images was assessed during the threat detection procedure by asking participants to write down what they thought the target image was after each threat detection trial. Participants were not told ahead of time what categories would be represented by the target images. Participants were given the option of circling ‘not sure’ if they truly had no idea what the target image was, but were asked to write down any idea that they had about the target image, even if they were very uncertain. These free-response reports were compared to the actual target image that was presented in each trial to determine whether the target image had been consciously perceived.

**Categorization confidence.** Participants were asked to report their confidence in their classification (‘safe’ versus ‘dangerous’) of target stimuli during the threat detection procedure on a seven point scale anchored at 1 (*not sure at all*) to 7 (*very sure*) as a secondary measure for assessing conscious awareness of the target stimuli.
**Positive Affect Negative Affect Schedule (PANAS).** The PANAS was used to control for mood. Previous research has indicated that individuals tend to show an attentional bias toward mood congruent objects (Becker & Leinenger, 2011). Thus, it was important to control for the possibility that a negative mood state might bias participants toward detection of dangerous images, and a positive mood state might bias participants toward detection of safe images. The PANAS scale measures state levels of positive and negative affect (mood) by asking participants to indicate the extent to which they are experiencing each of 20 emotional feelings at the present moment using a 5 point scale anchored at 1 (*Very slightly or not at all*) and 5 (*Extremely*). Ten items in the scale represent positive mood states (e.g., *interested*) and ten items from the scale represent negative mood states (e.g., *distressed*).

**Right-Wing Authoritarianism (RWA) Scale.** The RWA is a 20 item scale that was used to measure participants’ level of endorsement of conservative, authoritarian views (Altemeyer, 1998). Participants indicated the extent to which they agreed with each statement on a nine point scale anchored at 1 (*Strongly disagree*) and 9 (*Strongly agree*). Ten of the scale items are phrased such that agreement indicates stronger authoritarian views (e.g., *The "old-fashioned ways" and "old-fashioned values" still show the best way of life*) and ten items are phrased such that agreement indicates weaker authoritarian views (e.g., *There is no "ONE right way" to live life; everybody has to create their own way*) which were reverse scored so that higher scores on all items indicated higher levels of RWA.
Social Dominance Orientation (SDO) Scale. The SDO is a 14-item scale that measures participants’ tendency to view statements about societal equality or inequality as positive or negative. Each item represents a belief statement and participants are asked to report the extent to which they view each statement to be positive or negative on a seven point scale anchored at 1 (Very negative) and 7 (Very positive). Seven items are phrased so that more positive responses indicate higher endorsement of social dominance (e.g., Some groups of people are simply not the equals of others) and seven items are phrased so that more positive responses indicate lower endorsement of social dominance (e.g., In an ideal world, all nations would be equal). The latter seven items were reverse-scored so that higher average scores across the 14 items indicate higher levels of SDO (Pratto et al., 1994).

Political ideology. To assess political ideology, participants were asked to report their level of agreement with each of 12 belief statements which reflect common partisan issues. Agreement was assessed on a 5-point scale anchored at -2 (disagree strongly) and 2 (agree strongly). The statements were phrased to reflect either a conservative (e.g., Gun control violates people’s constitutional right to bear arms) or liberal (e.g., Gay people are entitled to the same constitutional rights as heterosexuals) stance on each item. During data analysis, all liberally phrased items were reverse-scored so that higher scores reflected a more conservative attitude. In addition to the 12 belief statements, participants completed a single-item self-identification measure of political ideology, in which they classified themselves along a 7-point continuum ranging from 1 (liberal) to 7 (conservative).
Belief that the World is Dangerous. The 12-item dangerous world scale (Altemeyer, 1988) was used to assess participants’ belief that the world is dangerous and is deteriorating toward a state of anarchy. Participants indicated their agreement with each item on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Six of the items are phrased so that agreement indicates a belief that the world is a dangerous place (e.g., Any day now, chaos and anarchy could erupt around us. All the signs are pointing to it), and six items are phrased so that agreement indicates a belief that the world is a safe place (e.g., Despite what one hears about ‘crime in the street’, there probably isn’t any more now than there ever has been). These latter items were reverse-scored so that higher scores on the scale indicated a stronger belief that the world is dangerous.

State-Trait Anxiety Inventory (STAI). The STAI was used to control for both state (in the moment) and trait (chronic) levels of anxiety in participants. The inclusion of anxiety as a control measure was considered necessary as previous research has shown anxiety to be associated with a bias toward classifying ambiguous images as threatening (Britton, Lissek, Grillon, Norcross, & Pine, 2010). The separate subscales of the STAI are each 20-item self-report questionnaires which ask participants to rate how anxious they feel at present moment (state measure; ‘I feel calm’) or in general (trait measure; ‘I lack self-confidence’), using a scale ranging from 1 (not at all) to 4 (very much so). Items that were phrased positively were reverse-scored so that higher scores on each scale indicated higher levels of anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs 1983).
**Demographics.** To obtain demographic characteristics of the sample, participants reported biological sex, age, and race/ethnicity. As additional control measures for threat detection ability, participants were asked whether they had a prescription for corrective lenses, and if so, if they were wearing their corrective lenses at the time of the study. Participants were also asked to indicate whether they were colorblind.

**Procedure**

Upon arriving at the lab and completing the consent form, participants were seated at individual workstations and adjusted the height of their seats so that their forehead lightly touched the piece of twine that had been appended to the cubicle according to the same procedure as in the threat detection pilot study. Participants were told that the purpose of the study was to assess their ability to correctly categorize dangerous and safe images that are displayed very rapidly. They were also told that there would be a related survey following the threat detection procedure that would assess their opinions about various social issues. After giving participants the opportunity to ask any questions, the threat-detection procedure was administered.

In each trial of the threat detection procedure, participants were asked to categorize the target image as either ‘safe’ or ‘dangerous’. Participants then indicated their level of confidence in this categorization and were asked to write down, on a separate sheet of paper, any ideas they

---

2 Controlling for colorblindness and uncorrected vision (participants who reported having a prescription for corrective lenses but who also reported that they were not wearing the corrective lenses at the time of the study) did not influence the results of the analysis and thus these participants were retained in the sample.
had about what the target image had been in order to assess conscious awareness of the target stimuli.

Following the threat detection paradigm, participants completed the survey measures in the order listed in the Measures section. A short debriefing statement was presented to participants on the computer screen after they completed all survey measures, explaining that the true purpose of the study was to assess the relation between the ability to detect threats and social attitudes. Participants had the opportunity to ask questions of the experimenter before being dismissed, and were provided with the email address of the experimenter for any additional questions that arose after leaving.

Results

Descriptive statistics

Threat Detection Ability. As expected, participants’ ability to consciously detect the target images was extremely low. On average, participants were able to consciously detect 2.07 (SD = 3.74) of the 60 images to which they were exposed (roughly 3%). However, the conscious detection of images did not follow a normal distribution across participants (skewness = 2.87, kurtosis = 9.27) and thus this description is likely to be an overestimate of the relative ability of the average participant to detect the target images. Over fifty percent of participants did not consciously detect any of the target images, and over seventy-five percent of participants detected two or fewer images. However, ten percent of the sample consciously identified seven or more of the target images, with two participants correctly identifying twenty of the images.
during the procedure. Consistent with the pilot study, all trials in which the participant consciously identified the target image were dropped from further analyses in line with the theoretical proposal of the study, that threat detection ability – assessed at the unconscious level – would be predictive of social conservatism.

Threat detection ability ($d'$) and response bias ($C$) were calculated for each participant following the procedure outlined by MacMillan and Creelman (2005). One-sample t-tests comparing each index to zero indicated that across participants, there was a strong bias toward a ‘safe’ response ($M = .34$, $SD = .75$), $t(189) = 6.24$, $p < .001$, and that the average threat detection ability ($M = .04$, $SD = .41$) did not differ significantly from chance levels, $t(189) = 1.21$, $p = .23$. However, threat detection ability was normally distributed across participants, indicating that as anticipated, some participants were more adept at differentiating between safe and dangerous objects than others ($min = -1.44$, $max = 1.05$). Threat detection ability was not associated with participants’ average reported confidence in their classification of the target images during the threat detection procedure, $r(189) = -.02$, $p = .79$. Thus, the results indicated that participants’ $d'$ scores represented a true measure of their ability to successfully discriminate between safe and dangerous images at an unconscious level.

**Questionnaires.** Items from all questionnaire measures were assessed for reliability before creating composite scores. This analysis revealed that the 12-item political ideology scale demonstrated poor initial reliability ($\alpha = .41$). To address this, the scale was reduced to 7-items that demonstrated adequate reliability ($\alpha = .64$) and which was significantly correlated with the
self-report political ideology scale item \( r = .39, p < .001 \). All other scale measures demonstrated acceptable reliability and were converted into their respective indices. All of these indices were normally distributed with the exception of the negative mood subscale of the PANAS measure which was positively skewed \( (skewness = 1.14) \). A square-root transformation was performed which corrected for this deviation from normality. Means, standard deviations, skewness, kurtosis, and reliability statistics for all Study 1 variables can be found in Table 1.

An initial examination revealed the expected pattern of correlations between all survey measures (see Table 2). All four measures of social conservatism (RWA, SDO, Political Ideology composite and scale) were significantly positively correlated with one another.\(^3\) Additionally, the belief in a dangerous world measure was significantly positively correlated with all social conservatism measures with the exception of social dominance orientation, which exhibited a marginally significant positive relation, \( r(189) = .14, p = .06 \). This pattern of correlations indicated that, as expected, participants who believed the world to be more dangerous tended to hold more socially conservative attitudes whereas those who believed the world to be more safe tended to endorse less social conservatism.

Examination of the control variables indicated a marginally significant correlation between threat detection ability and state anxiety, \( r(189) = .12, p = .10 \), such that higher levels of anxiety were associated with more accurate discrimination between safe and dangerous images at

\(^3\) A priori, it had been planned to combine these measures into a single index of social conservatism; however, the reliability of these measures did not reach an acceptable threshold to justify the creation of this index (Cronbach’s \( \alpha = .66 \)).
an unconscious level. However, state anxiety did not exhibit a significant relation with any of the measures of social conservatism, and it was therefore unnecessary to control for any of the mood or anxiety measures in any of the analyses investigating the main hypotheses of the study. Analyses also revealed sex differences in participants’ belief in a dangerous world such that

Table 1

Study 1 Means, Standard Deviations, and Reliability Statistics

<table>
<thead>
<tr>
<th></th>
<th>$M$</th>
<th>$SD$</th>
<th>$skewness$</th>
<th>$kurtosis$</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belief in a Dangerous World</td>
<td>4.01</td>
<td>.88</td>
<td>.01</td>
<td>-.13</td>
<td>.79</td>
</tr>
<tr>
<td>Right Wing Authoritarianism</td>
<td>3.64</td>
<td>1.26</td>
<td>.14</td>
<td>-.29</td>
<td>.88</td>
</tr>
<tr>
<td>Social Dominance Orientation</td>
<td>2.28</td>
<td>.84</td>
<td>.65</td>
<td>.22</td>
<td>.80</td>
</tr>
<tr>
<td>Political Ideology Composite$^\dagger$</td>
<td>2.49</td>
<td>.69</td>
<td>.34</td>
<td>.07</td>
<td>.64</td>
</tr>
<tr>
<td>Political Ideology Scale$^\dagger$</td>
<td>3.49</td>
<td>1.58</td>
<td>.21</td>
<td>-.25</td>
<td>-</td>
</tr>
<tr>
<td>PANAS – Negative</td>
<td>1.32</td>
<td>.26</td>
<td>.82</td>
<td>-.15</td>
<td>.86</td>
</tr>
<tr>
<td>PANAS – Positive</td>
<td>2.67</td>
<td>.75</td>
<td>.32</td>
<td>-.48</td>
<td>.84</td>
</tr>
<tr>
<td>State Anxiety</td>
<td>2.07</td>
<td>.57</td>
<td>.67</td>
<td>.23</td>
<td>.91</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>2.13</td>
<td>.48</td>
<td>.38</td>
<td>-.50</td>
<td>.89</td>
</tr>
<tr>
<td>Threat Detection Ability (d’)$^{\dagger\dagger}$</td>
<td>.04</td>
<td>.41</td>
<td>-.41</td>
<td>.65</td>
<td>-</td>
</tr>
<tr>
<td>Response Bias (C)$^{\dagger\dagger\dagger}$</td>
<td>.34</td>
<td>.75</td>
<td>.47</td>
<td>.84</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. $^\dagger$Higher numbers indicate a more conservative political ideology
$^{\dagger\dagger}$Threat detection ability was calculated after removing trials in which conscious detection of the target image occurred
$^{\dagger\dagger\dagger}$Higher numbers indicate a bias toward a ‘safe’ response
### Table 2

**Bivariate Correlations between Study 1 Measures**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 190</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Threat Detection Ability (d’)</td>
<td>-</td>
<td>-.18*</td>
<td>.09</td>
<td>.07</td>
<td>-.14+</td>
<td>.07</td>
<td>.04</td>
<td>.04</td>
<td>-.04</td>
<td>.12+</td>
<td>.07</td>
</tr>
<tr>
<td>2. Response Bias (C)</td>
<td>-</td>
<td>-.13+</td>
<td>-.02</td>
<td>-.02</td>
<td>.05</td>
<td>.01</td>
<td>-.14+</td>
<td>-.22**</td>
<td>-.13+</td>
<td>-.12</td>
<td></td>
</tr>
<tr>
<td>3. BDW</td>
<td>-</td>
<td>.53***</td>
<td>.14+</td>
<td>.39***</td>
<td>.22**</td>
<td>.11</td>
<td>.00</td>
<td>.09</td>
<td>.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. RWA</td>
<td>-</td>
<td>.27***</td>
<td>.72***</td>
<td>.42***</td>
<td>.10</td>
<td>.09</td>
<td>.04</td>
<td>-.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SDO</td>
<td>-</td>
<td>.15*</td>
<td>.24***</td>
<td>.05</td>
<td>.18*</td>
<td>-.09</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PI-Comp</td>
<td>-</td>
<td>.39***</td>
<td>.08</td>
<td>.02</td>
<td>.01</td>
<td>-.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. PI-Scale</td>
<td>-</td>
<td>.01</td>
<td>.13+</td>
<td>-.04</td>
<td>-.15*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. PANAS Neg</td>
<td>-</td>
<td>.13+</td>
<td>.69***</td>
<td>.40***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. PANAS-Pos</td>
<td>-</td>
<td>-.12+</td>
<td>-.15*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. SAI</td>
<td>-</td>
<td>.54***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. TAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. BDW = Belief in a Dangerous World, RWA = Right Wing Authoritarianism, SDO = Social Dominance Orientation, PI-Comp = Political Ideology Composite, PI-Scale = Political Ideology Scale, PANAS-Neg = Negative Mood (Root Transformed), PANAS-Pos = Positive Mood, SAI = State Anxiety, TAI = Trait Anxiety

+ p < .10, *p < .05, **p < .01, ***p < .001
women reported significantly higher levels of belief that the world is dangerous ($M = 4.13$, $SD = .86$) compared to men ($M = 3.80$, $SD = .89$), $t(188) = -2.56$, $p = .01$. Thus, all analyses involving belief in a dangerous world controlled for participants’ biological sex.

**Main Analyses**

There were three primary hypotheses for Study 1. First, negative correlations were predicted between threat detection ability and all measures of social conservatism. Analysis revealed a marginally significant association in the predicted direction between threat detection ability and social dominance orientation, $r(189) = -.14$, $p = .06$, such that lower levels of threat detection ability were associated with higher endorsement of SDO. No significant associations were found between any of the other measures of social conservatism and threat detection ability (all $ps > .32$). An ancillary investigation of the relation between response bias and the social conservatism measures indicated no significant relations between response bias and any of the measures of social conservatism (all $ps > .53$).

The second prediction of the study was that threat detection ability would be negatively correlated with belief in a dangerous world which would indicate that participants who were less able to discriminate between safe and dangerous images at an unconscious level would perceive the world to be more dangerous. As mentioned previously, belief in a dangerous world was a significant predictor of all social conservatism measures; however, belief in a dangerous world was not significantly related to threat detection ability after controlling for sex differences, $r(189) = .09$, $p = .22$. Supplementary analysis revealed a significant relation between response
bias and belief in a dangerous world after controlling for sex differences, $r(189) = -0.14, p = .05$, such that increased bias toward a ‘safe’ response was associated with less belief that the world is dangerous.

Finally, hierarchical linear regression modeling was used to test the prediction that threat detection ability would moderate the significant relations that were observed between belief in a dangerous world and socially conservative attitudes after controlling for participant sex. Separate models were run using each measure of social conservatism as the dependent variable and all models controlled for sex differences. Participant sex (coded $0 = \text{male}, 1 = \text{female}$) was entered in the first step of each model as a control variable. Threat detection ability and belief in a dangerous world were entered into the second step of each model to investigate main effects, and the interaction term was entered into the third step of each model. The results of these analyses are presented in Table 3. The analyses did not indicate any evidence that threat detection ability moderated the relation between belief in a dangerous world and social conservatism. In each of the models, belief in a dangerous world was a strong predictor of social conservatism after controlling for sex differences, but this relation did not depend on individual differences in threat detection ability. The model predicting social dominance orientation was unique in that it revealed the predicted main effects for both threat detection ability and belief in a dangerous world. However, the lack of any significant interaction effects in this model indicated that the effects of each construct were independent from one another and each accounted for unique portions of variance in the SDO measure.
Table 3

Regression Coefficients for Threat Detection Ability, Belief in a Dangerous World, and their Interaction as Predictors of Social Conservatism in Study 1

<table>
<thead>
<tr>
<th>DV</th>
<th>Threat Detection Ability</th>
<th>BDW</th>
<th>TD x BDW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>t</td>
<td>β</td>
</tr>
<tr>
<td>SDO</td>
<td>-.15*</td>
<td>-2.14</td>
<td>.17*</td>
</tr>
<tr>
<td>RWA</td>
<td>.03</td>
<td>.40</td>
<td>.52***</td>
</tr>
<tr>
<td>PI Composite</td>
<td>.03</td>
<td>.46</td>
<td>.39***</td>
</tr>
<tr>
<td>PI Scale</td>
<td>.02</td>
<td>.29</td>
<td>.21**</td>
</tr>
</tbody>
</table>

Note. Participant sex was entered into the first step of the regression model as a control variable. Threat detection ability (TD) and belief in a dangerous world (BDW) were entered into the second step of the regression model to investigate main effects. The interaction term was entered in the third step of the regression. SDO = Social Dominance Orientation, RWA = Right Wing Authoritarianism, PI = Political Ideology, BDW = Belief in a Dangerous World, TD = Threat Detection Ability

* p < .05, **p < .01, ***p < .001

Discussion

The findings from Study 1 were mixed with respect to the hypotheses. The predicted effect of threat detection ability on social conservatism was only found with one out of the four social conservatism indices (social dominance orientation), and this effect only reached a marginal level of significance. As such, it was unclear whether this was a spurious correlation or whether the predicted effect of threat detection ability holds specifically for social dominance orientation (but not right-wing authoritarianism or political ideology). It is also worth noting that the political ideology measure demonstrated low reliability in the current study and as such, interpretations of the findings (or lack thereof) with regard to political ideology should be viewed with caution. The low reliability in the initial political ideology measure and the subsequent
reduction in the total number of items that were used in creating the political ideology composite item limit the extent to which it can be concluded that this measure truly reflects participants’ ideological worldviews. In Study 2, the political ideology measure was revised to address these issues.

Belief in a dangerous world (BDW) was consistently related to the measures of social conservatism as expected, even after controlling for observed sex differences in BDW. Participants who believed the world to be more dangerous reported higher levels of right wing authoritarianism, social dominance orientation, and political ideology (measured as the composite of several belief statements as well as with a single-item self-report measure). Contrary to the predictions of the study, however, no relation was observed between belief in a dangerous world and threat detection ability. It was expected that participants who demonstrated higher levels of threat detection ability would endorse less belief that the world is a dangerous place. The results of the present study did not support this prediction, as no significant relation was found between the two constructs.

The predicted role of threat detection ability as a moderator of the relation between belief in a dangerous world and social conservatism was also not observed in Study 1. This may indicate that the effect does not exist as predicted. Alternatively, this first study was simply a cross-sectional investigation of participants’ attitudes which intentionally did not place a great deal of emphasis on extant levels of danger. Thus, because environmental danger was not a highly salient aspect of the study, any moderating effects of threat detection ability may have
been somewhat weak and the study may not have had the power to detect them. Another possibility for the lack of effects supporting the hypotheses of Study 1 is that individual differences in threat detection ability may not moderate the relation between more chronic, trait-level beliefs that the world is dangerous and socially conservative attitudes, but may have a more significant impact on how new information regarding the presence of danger in the environment is processed. Study 2 was designed to investigate this possibility further by providing participants with new information pertaining to the relative level of danger in the world and by making the level of environmental danger a highly salient aspect of the study.

It is worth noting the finding stemming from supplemental analysis with regard to the relation between response bias and belief that the world is dangerous. Participants who indicated stronger beliefs that the world is dangerous tended to be biased toward a 'dangerous' response during the threat detection procedure. Though somewhat intuitive, future research should take into consideration the direct evidence that extant beliefs about the level of danger that exists in the social world may influence assumptions about ambiguous aspects of the environment. In other words, the results of Study 1 suggest that existing beliefs about the level of danger that exists in the world may serve to bias judgments toward objects in the environment when it is not clear whether these objects represent a danger or a threat. Though this specific prediction was not an aspect of the main hypotheses of the present research, this potential relation was investigated further in subsequent studies.
Study 2: Threat Detection, Danger, and Conservatism

The purpose of Study 2 was to address the limitations of Study 1 as well as to replicate the findings of the first study. In Study 1, the political ideology measure of social conservatism demonstrated poor initial inter-item reliability and several items had to be dropped from the measure in order to achieve adequate reliability for the construct. In dropping these items, it is quite possible that the resulting construct did not provide as robust a measure of political ideology as was initially intended, and the revised construct that was used in the analyses of Study 1 may not have assessed social conservatism as originally conceptualized. To address this, an updated measure of political ideology was used in Study 2 which included all items that were used in Study 1 as well as thirteen additional items from prior research which investigated relations between socially conservative political attitudes and sensitivity to disgust (Terrizzi, Shook & Ventis, 2010) and twelve other items that had been used in prior unpublished exploratory work.

A second potential limitation from Study 1 was that only relations between trait-level unconscious threat detection ability and existing socially conservative attitudes were investigated. It may be the case that threat detection ability does not moderate the relation between existing perceptions of danger and socially conservative attitudes, but may moderate the extent to which new information about social danger leads to changes in conservative social attitudes (i.e., individuals with low threat detection ability may be more likely to adopt stronger conservative attitudes upon being presented with new information regarding danger as part of a
cautious social strategy, in line with the theoretical framework of the present research). Additionally, danger was not a highly salient aspect of Study 1, and as such, any moderating effects of threat detection ability on the relation between dangerous world beliefs and social conservatism may have been difficult to detect.

To address these potential limitations, Study 2 sought to investigate whether individual differences in threat detection ability moderated the effect of new information about potential danger in the environment on socially conservative attitudes. In Study 2, the perceived level of environmental danger was experimentally manipulated in participants prior to investigating the relation between perceptions of danger, trait level differences in the ability to detect threats, and conservative social attitudes. Experimentally manipulating participants’ perceptions of danger made danger a highly salient aspect of the study, and allowed for a more controlled investigation of the relation between threat detection ability, belief in a dangerous world, and socially conservative attitudes.

Three hypotheses were made for Study 2. First, it was once again predicted that weaker threat detection ability would be associated with higher levels of social conservatism at the level of individual differences. Although initial evidence to support this hypothesis was limited in Study 1, the hypothesis was retained and re-tested in Study 2 in order to seek replication of the relation between threat detection ability and social dominance orientation. Also, an updated version of the political ideology questionnaire, which demonstrated better reliability than the measure that was used in Study 1, was incorporated to test the hypothesis.
A second hypothesis of Study 2 was that participants in the high danger condition were expected to endorse significantly stronger conservative social attitudes than participants in the low danger condition. This hypothesis was specifically aimed at investigating the ability of social information to influence state-level changes in socially conservative attitudes.

Finally, an interaction between threat detection accuracy and experimental condition was predicted such that participants in the high danger condition who were also low in threat detection ability were expected to report stronger conservative social attitudes than all other participants. This hypothesis was specifically aimed at investigating threat detection ability as a moderator of the effect of dangerous world beliefs on socially conservative attitudes in a context that made danger a much more salient aspect of the research design than it had been in Study 1.

Participants

One-hundred seventy-three undergraduate students were recruited for participation according to the same procedure outlined in Study 1. Data from seven participants were lost due to computer malfunction (data loss was comparable across experimental conditions); thus, all analyses are based on the remaining 166 participants. The sample was 51% female and racially diverse (44% White, 30% African-American, 12% Asian, 6% Latino, and 8% reporting their race as ‘other’). The average age of participants was 19.96 years (SD = 3.85). Participants were randomly assigned to a high danger (n = 76) or low danger (n = 90) condition. A post-hoc

---

4 Differences in the number of participants across experimental groups resulted from random assignment of participants to experimental conditions as they entered the study. Assignment was randomized using the RANDBETWEEN function in Microsoft Excel™ to assign an
sensitivity analysis conducted using the G*Power software (version 3.1.3; Faul, 2010) indicated that a sample of this size provided 80% power to detect a significant coefficient of determination, $R^2$, of .08 or larger in a random effects multiple linear regression model with four predictors using a two-tailed test of significance (assumes $\alpha = .05$).

**Danger Manipulation**

In the high danger condition, participants read a fictitious news article which indicated that the threat of crime in the United States had increased drastically in recent years. The manipulation was intended to prime participants with the perception of a high likelihood of danger in their social world. For the low danger condition, the news article was altered so that instead of indicating that violent crime has risen dramatically in recent years, the article indicated that it has dropped considerably. The essays were exactly the same with the exception that in the low danger condition, any words indicating a rise in crime (e.g., rise, higher, increase) were changed to indicate a decrease (e.g., drop, lower, decrease), and all statistics presented in the article were changed to be consistent with this language (see Appendix B for the full text of the fictitious news articles used for the manipulation). Previous research has indicated that similar experimental condition (1 or 2) a priori to each participant ID number. As participants arrived for the study, participant ID numbers were assigned in sequential order and thus participants were assigned to the experimental condition associated with the participant ID number to which they had been given. Because participants were able to sign-up for the study as little as 2 hours before a scheduled session, and sessions were scheduled at least 1 week in advance, the exact number of participants that would constitute the final sample was unknown, and it was not possible to adjust condition assignments as the study proceeded to avoid the differences in sample sizes across experimental groups that resulted.
mortality salience manipulations have an effect on measures of political conservatism
(Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989).

**Pilot test.** Twenty-five undergraduate students from an introductory statistics course were randomly assigned to either the high danger or low danger condition as part of a lesson on independent-samples t-tests (participants were not told that this was the purpose of the activity nor that they had been assigned different articles to read until after the pilot test had been completed). After reading the fictitious news article, they were asked to respond to a series of semantic differential items that were each scored on a seven-point scale. These scales were distributed across several categories in order to evaluate specific dimensions of participants’ reactions to the article. Specifically, the students were asked to rate the article itself on 15 separate dimensions; were asked to indicate how they felt that the article portrayed life in the United States across six dimensions; were asked to rate their perception of life in Richmond, Virginia across seven dimensions; and were asked to respond to two items examining their belief that the facts presented in the article were accurate and consistent with their previous beliefs. A full overview of each of these dimensions along with means, standard deviations, and the results of independent samples t-tests are presented in Table 4. In general, participants evaluated the high danger article as more dangerous and threatening compared to the low danger article. Additionally, participants perceived the high danger article to depict life in the United States as more dangerous and threatening compared to the low danger article. As expected, participants did not differ across conditions in terms of how accurate or truthful they found the articles to be.
Table 4

*Results of the Pilot Test for the Manipulation Used in Study 2*

<table>
<thead>
<tr>
<th>Article ratings</th>
<th>Low Danger (n = 14)</th>
<th>High Danger (n = 12)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Dangerous</td>
<td>3.36</td>
<td>1.34</td>
<td>4.27</td>
</tr>
<tr>
<td>Non-Threatening</td>
<td>4.79</td>
<td>1.37</td>
<td>3.33</td>
</tr>
<tr>
<td>Harmless</td>
<td>4.85</td>
<td>1.07</td>
<td>3.17</td>
</tr>
<tr>
<td>Alarming</td>
<td>3.43</td>
<td>1.09</td>
<td>5.00</td>
</tr>
<tr>
<td>Worrying</td>
<td>3.07</td>
<td>1.33</td>
<td>4.58</td>
</tr>
<tr>
<td>Positive</td>
<td>4.29</td>
<td>.73</td>
<td>2.25</td>
</tr>
<tr>
<td>Happy</td>
<td>4.14</td>
<td>1.10</td>
<td>2.50</td>
</tr>
<tr>
<td>Bad</td>
<td>3.36</td>
<td>1.15</td>
<td>4.47</td>
</tr>
<tr>
<td>Inaccurate</td>
<td>4.14</td>
<td>1.23</td>
<td>4.08</td>
</tr>
<tr>
<td>True</td>
<td>3.86</td>
<td>1.46</td>
<td>4.08</td>
</tr>
<tr>
<td>Unconvincing</td>
<td>4.00</td>
<td>1.24</td>
<td>3.33</td>
</tr>
<tr>
<td>Interesting</td>
<td>3.64</td>
<td>1.86</td>
<td>4.75</td>
</tr>
<tr>
<td>Weak</td>
<td>3.77</td>
<td>1.67</td>
<td>3.67</td>
</tr>
<tr>
<td>Uninteresting</td>
<td>4.00</td>
<td>1.52</td>
<td>2.92</td>
</tr>
<tr>
<td>Uninformative</td>
<td>2.36</td>
<td>1.22</td>
<td>2.42</td>
</tr>
<tr>
<td>Evaluations of the article’s portrayal of life in the United States</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dangerous</td>
<td>3.17</td>
<td>1.03</td>
<td>4.83</td>
</tr>
<tr>
<td>Non-Threatening</td>
<td>4.42</td>
<td>1.38</td>
<td>3.25</td>
</tr>
<tr>
<td>Harmless</td>
<td>4.08</td>
<td>1.44</td>
<td>3.08</td>
</tr>
<tr>
<td>Alarming</td>
<td>3.92</td>
<td>1.38</td>
<td>4.83</td>
</tr>
<tr>
<td>Worrisome</td>
<td>3.58</td>
<td>1.31</td>
<td>5.17</td>
</tr>
<tr>
<td>Inaccurate</td>
<td>3.50</td>
<td>1.08</td>
<td>3.75</td>
</tr>
<tr>
<td>Perceptions of life in Richmond, VA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dangerous</td>
<td>4.92</td>
<td>1.24</td>
<td>4.17</td>
</tr>
<tr>
<td>Non-Threatening</td>
<td>3.25</td>
<td>1.06</td>
<td>3.50</td>
</tr>
<tr>
<td>Harmless</td>
<td>3.92</td>
<td>.29</td>
<td>3.83</td>
</tr>
<tr>
<td>Positive</td>
<td>3.83</td>
<td>1.11</td>
<td>4.08</td>
</tr>
<tr>
<td>Bad</td>
<td>3.50</td>
<td>1.38</td>
<td>4.00</td>
</tr>
<tr>
<td>Alarming</td>
<td>4.00</td>
<td>1.13</td>
<td>3.67</td>
</tr>
<tr>
<td>Interesting</td>
<td>4.08</td>
<td>2.23</td>
<td>4.50</td>
</tr>
<tr>
<td>Agreement with the conclusions of the article</td>
<td>4.00</td>
<td>1.60</td>
<td>4.17</td>
</tr>
</tbody>
</table>
In reality, there is more crime in the U.S. than the article described.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.83</td>
<td>1.19</td>
<td>4.92</td>
<td>1.51</td>
</tr>
</tbody>
</table>

Note. All items were evaluated on a 7-point scale.

\[ +p < .10, \*p < .05, \**p < .01, \***p < .001 \]

Based on these results, it was determined that the manipulation was effective and was appropriate for use in Study 2.

Measures

**Threat detection ability.** Threat detection ability was measured using the same procedure as in Study 1 in which participants categorized each of 60 target images as either ‘safe’ or ‘dangerous’, provided their level of confidence in this categorization, and were asked to write down, in free response format, what they believed the target image to be. Threat detection ability was determined by calculating participants’ \( d' \) scores after dropping all trials in which conscious perception of the target image was reported. A measure of response bias (C) was also calculated according to the same procedure as in Study 1. The only difference in the threat detection procedure in Study 2 was with regard to the response keys. Participants were randomly assigned to one of two response conditions; one in which the ‘danger’ response key was located under the participant’s left hand (with the ‘safe’ response key under the right hand) or an alternate condition in which the positioning of the keys was reversed. These conditions were added to the procedure as a means to test whether the strong bias toward a ‘safe’ response that was observed in the Pilot Study and in Study 1 was due to the ‘safe’ response key being located under participants’ right hand (the dominant hand for most participants in the study).
Social conservatism. Participants completed the same RWA and SDO measures that were used in Study 1 as assessments of social conservatism.

Political ideology. In order to address the reliability issues that were found in Study 1, twenty-five additional items were added to the previous political ideology measure. Thirteen of these items were taken from research by Terrizzi, Shook, and Ventis (2010) and an additional twelve items were added that had been used in prior exploratory research. Thus, the updated scale contained 37 ideological statements to which participants responded with their level of agreement on a -2 (strongly disagree) to +2 (strongly agree) scale, as well as a single-item self-report measure of political ideology anchored at 1 (Liberal) and 7 (Conservative). The list of additional items is presented in Appendix A and is distinguished from the items that were only used in Study 1.

Control measures. The PANAS and STAI measures that were used in Study 1 were incorporated to control for the effects of mood and anxiety in the assessment of the relation between threat detection ability and social conservatism.

Manipulation checks. Participants completed several measures as checks of the effectiveness of the danger manipulation during the study. Immediately after reading the fictitious news article associated with their experimental condition, participants completed the same belief in a dangerous world measure that was used in Study 1. Additionally, after all other survey measures were completed and prior to completing the demographics questions, participants were asked to report how big of a problem they felt that violent crime was in the
United States; how big of a problem they felt that violent crime is where they live, specifically; how safe from violent crime the felt in the city of Richmond; how safe from violent crime they felt on campus; how surprised they felt about the information they had read in the article; whether the article was consistent with what they already knew about violent crime in the Richmond; and how accurate they felt that the information in the article was, based on what they had already known about the crime rate in the United States.

**Procedure**

Upon arriving for the study, all participants completed a consent form, were randomly assigned to an experimental condition, and were seated at individual workstations. After receiving instructions for the study and having the opportunity to ask questions, participants began the experiment by completing the threat detection procedure. Following this procedure, participants were asked to read the news story associated with their experimental condition and then completed the survey measures in the following order: BDW (as a manipulation check), PANAS, RWA, SDO, Political Ideology, STAI, the additional manipulation check items, and demographics. At the completion of the surveys, participants read a short debriefing statement and were dismissed.

**Results**

**Manipulation Checks**

An independent-samples t-test indicated that participants in the high danger condition reported significantly higher levels of belief in a dangerous world ($M = 4.33, SD = 1.00$)
compared to participants in the low danger condition ($M = 3.81, SD = .84$), $t(164) = 3.69, p < .001$, immediately following the manipulation. Additional independent-samples $t$-tests revealed that participants in the high danger condition saw violent crime as a significantly bigger concern in the United States, $t(164) = 5.66, p < .001$, a significantly greater problem where they lived, $t(164) = 4.11, p < .001$, and reported feeling marginally less safe on campus, $t(164) = -1.82, p = .07$, compared to participants in the low danger condition when asked at the end of the study.

Participants did not differ between experimental conditions when asked to report how safe from violent crime they perceived themselves to be in the city of Richmond, $t(164) = -.53, p = .60$. It should be noted that participants in the low danger condition reported being significantly more surprised about the information that was presented in the news article, $t(164) = 2.98, p = .003$, and perceived the statistical information presented in the article to be significantly less accurate, $t(164) = -2.15, p = .03$, compared to participants in the high danger manipulation condition.

However, there were no significant differences between the two groups when asked whether they felt that the article presented information that was consistent with what they already knew about the crime rate in Richmond, $t(164) = .45, p = .65$. Although significant differences were observed in the perceived accuracy of the information presented in the articles and the extent to which participants reported being surprised by the information in the articles, the manipulation appeared to have the intended effect, particularly with regard to the observed differences between experimental conditions in the BDW measure.
Descriptive Statistics

Threat detection. In Study 2, there was a replication of the basic pattern of results that was found in Study 1 with regard to threat detection ability. Participants, on average, were able to consciously detect very few target images during the threat detection procedure ($M = 2.03, SD = 3.95$), and as in Study 1 conscious detection was not normally distributed in the sample ($skewness = 3.71$, $kurtosis = 17.67$). Again, over fifty percent of the sample did not consciously detect any images during the procedure and more than seventy-five percent of the sample detected two items or less. However, slightly fewer than ten percent of participants were able to consciously detect six or more images, with one participant consciously detecting twenty-seven images (45%) and another participant consciously detecting twenty-six images (43%). As in Study 1, all trials in which conscious detection of the target image occurred were dropped from further analysis.

A one-sample t-test comparing the response bias statistic to zero (representing no response bias) indicated that there was a significant bias toward a ‘safe’ categorization across all participants ($M = .57, SD = .77$), $t(165) = 9.50, p < .001$. Independent samples t-tests indicated that key placement did not have an effect on response bias, as participants who completed the threat detection procedure with the dangerous key assigned to their left hand ($M = .53, SD = .75$) did not differ in response bias from participants who completed the procedure with the ‘dangerous’ key assigned to their right hand ($M = .61, SD = .80$), $t(164) = -.71, p = .48$. 
Additionally, a one-sample t-test indicated that in Study 2, the average threat detection ability in the sample significantly exceeded chance \((M = .07, SD = .42)\), \(t(165) = 2.25, p = .03\). After removing trials in which conscious detection of the target image occurred, threat detection ability was not associated with participants’ reported confidence in their classifications, \(r(165) = .05, p = .49\), providing additional evidence that the threat detection measures were not influenced by conscious awareness of the target images.

**Questionnaires.** Factor analysis using the updated set of items which comprised the political ideology composite measure suggested the presence of a single dominant factor indicated by a large first eigenvalue (13.59) coupled with a much smaller second eigenvalue (4.39). Investigation of the associated scree plot (see Figure 9) indicated that a 2 or 3 factor solution was plausible; however, examination of the rotated factor loadings associated with these solutions did not reveal theoretically relevant loading patterns across the individual items. As such, all items were combined into a single factor indicating participants’ political views for the analyses in Study 2.

Reliability statistics indicated that all questionnaires had acceptable reliability and were also normally distributed with the exception of the PANAS-negative mood measure which was positively skewed \((skewness = 1.43)\) and positively kurtotic \((kurtosis = 1.83)\). As in Study 1, a square root transformation addressed both of these issues. Basic statistics for all Study 2 measures including means and standard deviations, split by experimental condition, can be found in Table 5.
Figure 9. Scree plot of eigenvalues in Study 2
Table 5

Study 2 Reliability Statistics, Skewness, Kurtosis for All Variables with Means and Standard Deviations by Danger Condition

<table>
<thead>
<tr>
<th></th>
<th>$\alpha$</th>
<th>skewness</th>
<th>kurtosis</th>
<th>Low Danger ($n = 90$)</th>
<th>High Danger ($n = 76$)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belief in a Dangerous World</td>
<td>.81</td>
<td>.45</td>
<td>.41</td>
<td>3.81</td>
<td>.84</td>
<td>4.33</td>
</tr>
<tr>
<td>Right Wing Authoritarianism</td>
<td>.90</td>
<td>.05</td>
<td>-.57</td>
<td>3.92</td>
<td>1.32</td>
<td>1.00</td>
</tr>
<tr>
<td>Social Dominance Orientation</td>
<td>.86</td>
<td>.65</td>
<td>.29</td>
<td>2.61</td>
<td>.92</td>
<td>2.32</td>
</tr>
<tr>
<td>Political Ideology Composite†</td>
<td>.81</td>
<td>-.20</td>
<td>-.38</td>
<td>-.41</td>
<td>.42</td>
<td>-.31</td>
</tr>
<tr>
<td>Political Ideology Scale†</td>
<td>.81</td>
<td>-.17</td>
<td>-.45</td>
<td>3.53</td>
<td>1.45</td>
<td>3.91</td>
</tr>
<tr>
<td>PANAS – Negative</td>
<td>.83</td>
<td>1.08</td>
<td>.59</td>
<td>1.21</td>
<td>.20</td>
<td>1.28</td>
</tr>
<tr>
<td>PANAS – Positive</td>
<td>.88</td>
<td>.38</td>
<td>-.14</td>
<td>2.68</td>
<td>.88</td>
<td>2.65</td>
</tr>
<tr>
<td>State Anxiety</td>
<td>.89</td>
<td>.59</td>
<td>-.15</td>
<td>1.88</td>
<td>.46</td>
<td>1.98</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>.87</td>
<td>.04</td>
<td>-.51</td>
<td>2.00</td>
<td>.43</td>
<td>2.08</td>
</tr>
<tr>
<td>Threat Detection Ability (d’)</td>
<td>-</td>
<td>.36</td>
<td>1.09</td>
<td>.10</td>
<td>.42</td>
<td>.04</td>
</tr>
<tr>
<td>Response Bias (C)††</td>
<td>.67</td>
<td>-.08</td>
<td>.54</td>
<td>.77</td>
<td>.78</td>
<td>.61</td>
</tr>
</tbody>
</table>

Note. †Higher numbers indicate a more conservative political ideology. ††Positive numbers indicate a bias toward a ‘safe’ response and negative numbers indicate a bias toward a ‘dangerous’ response.

$+p < .10, *p < .05, ***p < .001$
Prior to testing the main hypotheses of the study, bivariate correlations were run between all of the main study measures and the control variables to assess whether mood or anxiety may have had any effect on the subsequent results. A summary of these correlations can be found in Table 6. This analysis revealed a significant positive correlation between negative mood and RWA ($r = .15, p = .05$) such that participants who reported more negative mood states also reported higher levels of right wing authoritarianism. Additionally, participants differed significantly by experimental condition in their reports of negative mood, $t(164) = 2.03, p = .04$, with participants in the high danger condition reporting significantly more negative mood compared to participants in the low danger condition. Thus, in order to account for the possibility that the experimental manipulation may have had an effect on RWA because of a manipulation of mood state, negative mood was controlled for in all analysis in which differences in RWA were investigated across experimental conditions. Significant sex differences were also found with respect to the SDO measure, with males reporting significantly higher levels of social dominance orientation ($M = 2.66, SD = 1.04$) compared to females ($M = 2.31, SD = .83$), $t(164) = 2.40, p = .02$. Thus, all analyses involving SDO controlled for participant sex.

**Main Analyses**

There were three main hypotheses of Study 2. The first was that threat detection ability would predict social conservatism such that lower levels of threat detection ability would be associated with higher levels of social conservatism. The second hypothesis of the study was
Table 6

*Initial Bivariate Correlations between All Study 2 Measures*

<table>
<thead>
<tr>
<th>N = 166</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Threat Detection Ability (d’)</td>
<td>-</td>
<td>-06</td>
<td>-03</td>
<td>-10</td>
<td>-08</td>
<td>-17*</td>
<td>-14+</td>
<td>-06</td>
<td>00</td>
<td>01</td>
<td>03</td>
</tr>
<tr>
<td>2. Response Bias (C)</td>
<td>-</td>
<td>-09</td>
<td>00</td>
<td>-08</td>
<td>-01</td>
<td>-11</td>
<td>01</td>
<td>-07</td>
<td>-03</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>3. BDW</td>
<td>-</td>
<td>.37***</td>
<td>-01</td>
<td>.28***</td>
<td>.28***</td>
<td>.16*</td>
<td>.03</td>
<td>.17*</td>
<td>19*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. RWA</td>
<td>-</td>
<td>.34***</td>
<td>.77****</td>
<td>.39***</td>
<td>.15*</td>
<td>.13+</td>
<td>.02</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SDO</td>
<td>-</td>
<td>.35***</td>
<td>.22**</td>
<td>.06</td>
<td>.09</td>
<td>.06</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PI-Comp</td>
<td>-</td>
<td>.46***</td>
<td>.13</td>
<td>.10</td>
<td>.00</td>
<td>.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. PI-Scale</td>
<td>-</td>
<td>.05</td>
<td>.01</td>
<td>.05</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. PANAS-Neg</td>
<td>-</td>
<td>.16*</td>
<td>.59***</td>
<td>.42***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. PANAS-Pos</td>
<td>-</td>
<td>-.26***</td>
<td>-.22**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. SAI</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. TAI</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* BDW = Belief in a Dangerous World, RWA = Right Wing Authoritarianism, SDO = Social Dominance Orientation, PI-Comp = Political Ideology Composite, PI-Scale = Political Ideology Scale, PANAS-Neg = Negative Mood (Root Transformed), PANAS-Pos = Positive Mood, SAI = State Anxiety, TAI = Trait Anxiety

+p < .10, *p < .05, **p < .01, ***p < .001
that the danger manipulation would influence levels of social conservatism such that participants in the high danger manipulation would endorse higher levels of social conservatism compared to participants in the low danger condition. Finally, an interaction between threat detection ability and danger manipulation was predicted such that participants in the high danger condition who also were assessed as having low threat detection ability were expected to report higher levels of social conservatism compared to all other participants. These hypotheses were tested simultaneously in four separate hierarchical regression models, with each model testing the effects of threat detection ability and the experimental manipulation on a separate indicator of social conservatism. The model predicting RWA included negative mood as a covariate, and the model predicting SDO included participant sex as a covariate. Table 7 summarizes the findings of these analyses.

In regards to the first hypothesis, a significant main effect of threat detection ability in the predicted direction was found in the model predicting the political ideology composite ($\beta = -.16$, $t = -2.06$, $p = .04$), and a marginally significant effect of threat detection ability in the predicted direction was found in the model predicting the self-report political ideology scale item ($\beta = -.13$, $t = -1.69$, $p = .10$), such that participants with lower levels of threat detection ability reported more conservative political ideologies as assessed by both the composite and single-item self-report measures. A significant main effect of threat detection ability was not found in the model predicting RWA ($\beta = -.09$, $t = -1.14$, $p = .25$) after controlling for negative mood, nor was it found in the model predicting SDO ($\beta = -.10$, $t = -1.36$, $p = .17$), though the effects were in the
Table 7

Regression Coefficients for Threat Detection Ability, Danger Manipulation Condition, and their Interaction as Predictors of Social Conservatism in Study 2

<table>
<thead>
<tr>
<th>DV</th>
<th>Threat Detection Ability</th>
<th>MANIP</th>
<th>TD x MANIP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>t</td>
<td>β</td>
</tr>
<tr>
<td>RWA†</td>
<td>-.09</td>
<td>-1.14</td>
<td>.07</td>
</tr>
<tr>
<td>SDO††</td>
<td>-.10</td>
<td>-1.36</td>
<td>-.15*</td>
</tr>
<tr>
<td>PI Composite</td>
<td>-.16*</td>
<td>-2.06</td>
<td>.10</td>
</tr>
<tr>
<td>PI Scale</td>
<td>-.13+</td>
<td>-1.65</td>
<td>.11</td>
</tr>
</tbody>
</table>

Note. MANIP = Danger manipulation, TD x MANIP = Threat Detection Ability X Danger Manipulation Interaction, RWA = right wing authoritarianism, SDO = social dominance orientation, PI = political ideology.
† Negative mood was entered as a control variable in the first step of the regression
†† Participant sex was entered as a control variable in the second step of the regression
+p < .10, *p < .05

predicted direction (lower levels of threat detection ability were associated with higher levels of RWA and SDO).

In regards to the second hypothesis, a main effect of the manipulation was found in the model predicting SDO (β = -.15, t = -2.01, p = .05) after controlling for participant sex; however, the effect was not in the predicted direction. Participants in the high danger condition reported significantly lower levels of social dominance orientation compared to participants in the low danger condition. No other main effects of the experimental condition were observed (all ps > .16).

Finally, no significant interaction effects were found in any of the models (all ps > .18), indicating no support for the hypothesis that threat detection ability moderates the effect of newly-presented danger-relevant information on conservative attitudes. Additionally, the
exploratory findings with respect to response bias from Study 1 were not replicated in Study 2. Response bias was not associated with belief in a dangerous world or any of the measures of social conservatism (all \( p > .17 \)).

**Discussion**

The findings of Study 2 provide limited support for the hypothesized relations between threat detection ability, perceptions of danger in the environment, and social conservatism. First, the results indicated a more robust relation between threat detection ability and social conservatism than was found in Study 1. The relation between these two constructs was observed in the predicted direction across all measures of social conservatism, though only reached the standard level of significance for the political ideology composite measure, and was marginally significant for the self-report political ideology scale item. This may indicate that the improvement in the reliability of the political ideology construct over what was observed in Study 1 allowed for the detection of this relation. There was not a replication of the significant relation between threat detection ability and SDO that was observed in Study 1; however, this relation did follow the same directional trend. Thus, across two studies, there is mixed support for the hypothesis that lower levels of threat detection ability are associated with stronger endorsement of conservative social attitudes.

The results of Study 2 did not indicate that manipulating perceptions of danger serves to influence social conservatism. Though it did appear that the manipulation was effective in influencing participants’ perceptions of danger (as indicated by differences across experimental
conditions in the belief in a dangerous world measure), and though higher levels of belief in a
dangerous world were predictive of higher social conservatism scores across the participant sample, participants in the high danger condition did not report significantly higher levels of social conservatism compared to participants in the low danger condition. Finally, there was no evidence that threat detection ability moderated the effect of the experimental condition as no significant interaction effects were found between threat detection ability and experimental condition when predicting any of the measures of social conservatism.

Overall, the results of the study offer multiple possibilities about the nature of socially conservative attitudes and their relation with the ability to detect threats. First, threat detection ability seemed to be a small but consistent predictor of social conservatism which supports the possibility that this trait level ability influences the likelihood that socially conservative attitudes will develop. In other words, it may be that subtle differences in experience that are related to the ability distinguish dangerous from safe objects at an unconscious level may lead to systematic differences in social attitudes. However, it is essential for future research to seek additional evidence of this relation prior to drawing any strong conclusions, as the magnitude of the effect found in Study 2 was small, and the effect was only found for a single construct (social dominance orientation) in Study 1.

The results obtained in Study 2 may also indicate that socially conservative attitudes tend to be more chronic and persistent aspects of an individual’s worldview as opposed to a state-level characteristic that is sensitive to the influence of situational factors. Across the first two
studies, belief in a dangerous world was a consistent predictor of social conservatism; however, manipulating participants’ beliefs about the relative level of danger in their environment did not convey any significant effect on their endorsement of socially conservative attitudes. Thus, social conservatism may represent an attitude structure that develops over a long period of social experience and thus requires considerable social influence in order to produce change. If this is the case, it would not be surprising that the information in a single news article, although effective in influencing participants’ immediate beliefs about the level of danger in their environment, was not powerful enough to produce change in more established social attitudes.

Across the first two studies, limited evidence was found indicating that individual differences in the ability to detect threats, as well as a belief that the world is dangerous, are both predictive of socially conservative attitudes. Study 3 sought to expand on these findings by first examining the importance of perceptions of threat detection ability (as opposed to actual ability) in predicting social conservatism. Additionally, the findings from Study 2 indicated that although the danger manipulation was effective in creating systematic differences between the experimental conditions in participants’ dangerous world beliefs, these differences did not influence subsequent differences across the measures of social conservatism. This may indicate that socially conservative attitudes are relatively stable characteristics which are not subject to changes associated with short-term variability in perceptions of danger. However, the results of Study 2 would only support this conclusion in the context of perceptions of the threat of violent crime. It is plausible that different types of dangers might differentially influence socially
conservative attitudes. As such, a different fictitious news article was used to prime participants’ belief that the world is dangerous in Study 3 to determine whether the nature of the perceived threat has any bearing on the ability of the information to influence socially conservative attitudes.
Study 3: Manipulating Perceptions of Threat Detection Accuracy

The primary focus of Studies 1 and 2 was to investigate the effect of trait-level individual differences in threat detection ability on socially conservative attitudes. In Study 3, participants’ perception of their own accuracy in detecting threats was manipulated in order to determine whether this perception influences social conservatism. This investigation was undertaken in an effort to distinguish the effects of trait-level cognitive threat detection ability from more subjective perceptions of one’s own ability.

The manipulation of threat detection accuracy was accomplished by providing false feedback to participants in regards to their performance on the threat detection procedure. Threat detection ability is assumed to be an automatic, unconscious process from the standpoint that individuals tend to make judgments about the valence of stimulus objects based on the assumption that their perception of the world is accurate. However, feedback that indicates that these judgments are inaccurate may promote changes in threat management processes such as the adoption of socially conservative attitudes as a means to compensate for this perceived shortcoming. Thus, it is important to note that the third study was intended to manipulate perceptions of threat detection accuracy, and not threat detection accuracy itself.

The manipulation of the perception of threat detection accuracy was intended to simulate, in a lab setting, the subjective feeling that one is vulnerable to threats based on an inability to accurately detect them. Although Studies 1 and 2 assessed the trait level ability to detect threats and the propensity to harbor conservative attitudes, participants were not provided with feedback
regarding their accuracy during the threat detection procedure in either of these studies. Conversely, Study 3 was intended to assess the tendency to adjust conservative attitudes in response to perceptions of one’s own ability to detect threats. Perceptions of danger were also manipulated, as in Study 2, in order to examine the combined effects of perceptions of threat detection ability and the perceived likelihood of danger on the endorsement of socially conservative attitudes using a full experimental design. In Study 2, perceptions of danger associated with violent crime were manipulated by asking participants to read a fictitious news article. Though this paradigm was successful in manipulating perceptions of danger, the manipulation did not lead to systematic differences in participants’ socially conservative attitudes. To determine whether this pattern of results was specific to perceptions of danger associated with violent crime or whether these findings are likely across multiple contexts of danger, Study 3 manipulated perceptions of danger associated with disease threat. Specifically, participants were led to perceive differential levels of threat associated with the possibility of a global Swine Flu pandemic.

Three specific hypotheses were tested in Study 3. First, a main effect of the danger manipulation was predicted. Participants in the high danger condition were expected to report higher levels of social conservatism than participants in the low danger condition. Though this prediction was tested and not supported in Study 2, Study 3 re-tested the prediction by manipulating perceptions of danger in a different context (danger stemming from disease as opposed to danger stemming from violent crime). Second, a main effect of the threat detection
accuracy manipulation was predicted such that participants who received feedback indicating that they were inaccurate at detecting threats were expected to report higher levels of social conservatism than participants who received feedback that they were highly accurate at detecting threats. Finally, an interaction between the threat detection accuracy and danger manipulations was predicted such that participants in the low accuracy / high danger condition were expected to report higher levels of social conservatism than participants in all other conditions.

**Participants**

Two-hundred fourteen undergraduate students participated in Study 3 in exchange for one hour of course credit. Data from five participants was lost due to experimenter error. The research assistant who was running the study accidentally ran these 5 participants through a draft version of the Study 2 procedure instead of the Study 3 procedure. The remaining 209 participants were randomly assigned to one of four experimental conditions: low accuracy / low danger ($n = 53$), low accuracy / high danger ($n = 41$), high accuracy / low danger ($n = 58$), or high accuracy / high danger ($n = 57$). The participant sample was 55% female and predominantly White/Caucasian (56%) with 21% of participants reporting their race/ethnicity as

---

5 An additional five participants experienced a computer malfunction during the threat detection procedure; however, as the data from this procedure was not necessary for testing the main hypotheses of the study, these participants were retained after investigation of their responses to the open-ended manipulation checks and additional notes that were taken from the session indicated that the malfunctions were unlikely to have influenced the effectiveness of the manipulation. These five participants were not included in ancillary analyses that investigated relations with actual threat detection ability stemming from this procedure.

6 Differences in the number of participants across experimental groups resulted from the same random assignment process that was outlined in Study 2. Additionally, data loss due to experimenter error was comparable across all conditions.
African-American, 11% Asian, and 8% Latino (4% categorized their race/ethnicity as ‘other’).
The average age of the sample was 20.15 years ($SD = 2.81$).

A post-hoc sensitivity analysis using G*Power (version 3.1.3; Faul, 2010) indicated that this sample size provided 80% power to detect an effect size of .05 (Cohen’s $f^2$) in a fixed effects 2 x 2 ANCOVA examining main effects and interactions with the inclusion of one covariate, which represents the most complex analysis conducted in the present study.

**Threat detection accuracy manipulation**

Threat detection accuracy was manipulated by providing false feedback to participants at the conclusion of the threat detection paradigm. Participants completed the same threat detection procedure as in Studies 1 and 2; however, at the conclusion of the procedure, participants were presented with feedback about the accuracy of their performance. Participants in the high accuracy condition ($n = 115$) were told that they were 79.3% accurate at detecting threats during the procedure, whereas participants in the low accuracy condition ($n = 94$) were told that they were 19.7% accurate at detecting threats.

**Likelihood of danger manipulation**

Participants’ perceptions of the likelihood of danger were manipulated in the same manner as in Study 2, but instead of manipulating the threat of violent crime, the fictitious news articles portrayed the threat of infectious disease. Participants in the high danger condition ($n = 98$) read a fictitious news article discussing the high likelihood of a Swine Flu pandemic affecting the United States, whereas participants in the low danger condition ($n = 111$) read a
similar article indicating that the threat of Swine Flu has been all but eliminated in the U.S. (see Appendix B for the manipulation essays).

**Pilot test of manipulations**

Fifty-eight undergraduate students (52% male; $M_{age} = 20.16$ years, $SD = 2.08$) participated in a pilot test of the accuracy and danger manipulations to be used in Study 3 in exchange for course credit. Participants were randomly assigned to either the low accuracy ($n = 29$) or high accuracy ($n = 29$) condition, and either the low danger ($n = 26$) or high danger ($n = 32$) condition. All participants completed the same threat detection procedure that was used in Studies 1 and 2 which was followed by the accuracy manipulation. After the accuracy manipulation, participants read the fictitious news article associated with their danger manipulation condition and then responded to the same series of 28 semantic differential items (scored on a seven point scale) that were used in the pilot test of the danger manipulation in Study 2. Following the semantic differential items, participants were asked to rate their own performance on the threat detection task, were asked to recall the accuracy score they had been presented with at the conclusion of the task, and were then asked to rate their opinion of this score and their perception of how well they felt they had done on the threat detection task relative to other participants. All of the accuracy manipulation checks were scored on a five-point scale.

To investigate the effectiveness of the danger manipulation, independent-samples t-tests were used to compare participants’ responses to the semantic differential items after reading the
fictitious news article specific to their experimental condition. An overview of responses to the semantic differential items is presented in Table 8. When asked to rate the article itself, participants in the high danger condition consistently rated their article as conveying more threat relevant information compared to participants in the low danger condition across several semantic differential items, whereas there were no significant differences in participants’ ratings of how accurate, true, convincing, or interesting they found the article to be. This pattern held when participants were asked to rate how the article portrayed life in the United States, and when participants were asked to indicate their perception of life in Richmond. Additionally, there were no significant differences between participants in the low danger condition \((M = 3.04, SD = 1.28)\) and participants in the high danger condition \((M = 3.31, SD = 1.67)\) when asked the extent to which they agreed with the conclusions of the article, \(t(56) = 0.69, p = .49\). The responses to the semantic differential scale items represented a consistent general pattern indicating that participants viewed the high danger article as representative of a more negative and threatening view of the world compared to the low danger article, though no significant differences emerged in regards to participants’ perceived legitimacy of the articles. Thus, the danger manipulation appeared to be effective.

Investigation of participants’ responses to the checks of the accuracy manipulation indicated that participants in the high accuracy condition rated their performance on the threat detection task \((M = 3.17, SD = .89)\) as significantly better compared to participants in the low accuracy condition \((M = 1.34, SD = .48), t(56) = -9.72, p < .001\). When asked to recall their
Table 8

Responses to the Semantic Differential Items from the Pilot Test of the Danger Manipulation in Study 3

<table>
<thead>
<tr>
<th>N = 58</th>
<th>Low Danger</th>
<th>High Danger</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Ratings of the article</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe – Dangerous</td>
<td>2.54</td>
<td>1.42</td>
<td>5.19</td>
</tr>
<tr>
<td>Non- Threatening – Threatening</td>
<td>2.31</td>
<td>1.52</td>
<td>5.13</td>
</tr>
<tr>
<td>Harmless – Scary</td>
<td>2.92</td>
<td>1.52</td>
<td>5.50</td>
</tr>
<tr>
<td>Calming – Alarming</td>
<td>2.62</td>
<td>1.60</td>
<td>5.50</td>
</tr>
<tr>
<td>Relieving – Worrying</td>
<td>2.23</td>
<td>1.42</td>
<td>5.56</td>
</tr>
<tr>
<td>Inaccurate – Accurate</td>
<td>3.00</td>
<td>1.26</td>
<td>3.34</td>
</tr>
<tr>
<td>True – False</td>
<td>3.15</td>
<td>1.46</td>
<td>3.50</td>
</tr>
<tr>
<td>Convincing – Unconvincing</td>
<td>2.58</td>
<td>1.42</td>
<td>3.06</td>
</tr>
<tr>
<td>Interesting – Boring</td>
<td>3.27</td>
<td>1.69</td>
<td>2.72</td>
</tr>
<tr>
<td>Strong – Weak</td>
<td>3.81</td>
<td>1.58</td>
<td>2.88</td>
</tr>
<tr>
<td>Engaging – Uninteresting</td>
<td>3.31</td>
<td>1.41</td>
<td>2.53</td>
</tr>
<tr>
<td>Positive – Negative</td>
<td>2.15</td>
<td>1.05</td>
<td>5.75</td>
</tr>
<tr>
<td>Happy – Sad</td>
<td>2.65</td>
<td>1.23</td>
<td>5.97</td>
</tr>
<tr>
<td>Good – Bad</td>
<td>2.31</td>
<td>1.09</td>
<td>5.38</td>
</tr>
<tr>
<td>Informative – Uninformative</td>
<td>2.31</td>
<td>1.26</td>
<td>2.22</td>
</tr>
<tr>
<td><strong>Ratings of the article’s portrayal of life in the U.S.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe – Dangerous</td>
<td>2.27</td>
<td>1.15</td>
<td>4.28</td>
</tr>
<tr>
<td>Non- Threatening – Threatening</td>
<td>2.54</td>
<td>1.45</td>
<td>4.78</td>
</tr>
<tr>
<td>Harmless – Frightening</td>
<td>2.58</td>
<td>1.24</td>
<td>4.66</td>
</tr>
<tr>
<td>Calming – Alarming</td>
<td>2.35</td>
<td>1.02</td>
<td>4.94</td>
</tr>
<tr>
<td>Relieving – Worrisome</td>
<td>2.58</td>
<td>1.27</td>
<td>5.00</td>
</tr>
<tr>
<td>Accurate – Inaccurate</td>
<td>3.12</td>
<td>1.28</td>
<td>3.66</td>
</tr>
<tr>
<td><strong>Perception of life in Richmond, VA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non- Threatening – Threatening</td>
<td>3.23</td>
<td>1.34</td>
<td>3.97</td>
</tr>
<tr>
<td>Safe – Dangerous</td>
<td>3.35</td>
<td>1.32</td>
<td>3.88</td>
</tr>
<tr>
<td>Harmless – Frightening</td>
<td>3.31</td>
<td>1.38</td>
<td>3.59</td>
</tr>
<tr>
<td>Positive – Negative</td>
<td>2.88</td>
<td>1.24</td>
<td>3.44</td>
</tr>
<tr>
<td>Good – Bad</td>
<td>2.54</td>
<td>1.14</td>
<td>3.03</td>
</tr>
<tr>
<td>Calming – Alarming</td>
<td>3.35</td>
<td>1.23</td>
<td>3.88</td>
</tr>
<tr>
<td>Interesting – Boring</td>
<td>3.31</td>
<td>1.87</td>
<td>2.66</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001
accuracy score, participants in both the high \((M = 78.69, SD = 1.79)\) and low accuracy \((M = 19.39, SD = .56)\) conditions accurately recalled the false feedback they had been given following the threat detection task. High accuracy participants expressed a significantly more positive opinion of this score \((M = 3.69, SD = .71)\) compared to participants in the low accuracy condition \((M = 2.24, SD = .83)\), \(t(56) = -7.13, p < .001\), and also reported a significantly greater likelihood that they had done well on the task relative to other participants \((M = 3.10, SD = .41)\) compared to participants in the low accuracy condition \((M = 2.41, SD = .78)\), \(t(56) = -4.22, p < .001\). Based on these results, it was concluded that the accuracy manipulation was an effective mechanism for influencing participants’ perceptions of their own threat detection ability.

**Measures**

Belief in a dangerous world, social conservatism, mood, and anxiety were assessed using the same measures as in Study 2.

**Procedure**

The procedure for Study 3 was identical to Study 2 with the exception of the threat detection accuracy manipulation which occurred at the conclusion of the threat detection procedure. During the instructions that were provided at the beginning of the study, participants were told that they would receive feedback regarding their performance at the conclusion of the threat detection task.

Following the threat detection accuracy manipulation, participants received either the high danger or low danger manipulation and then completed all of the study measures according
to the same procedure outlined in Study 2. After all of the survey measures were completed, but before participants completed the demographics questions, participants were asked to complete three questions as a check of the threat detection accuracy manipulation and seven questions as a check of the danger manipulation. These questions can be found in Appendices B and C, respectively.

Results

Manipulation checks

An independent samples t-test indicated that participants in the high accuracy condition rated their performance on the threat detection task ($M = 2.82, SD = 1.11$) as significantly better compared to participants in the low accuracy condition ($M = 1.39, SD = .68$), $t(207) = -10.87, p < .001$. Participants in the high accuracy condition also reported being significantly more satisfied with their score ($M = 3.61, SD = .70$) compared to participants in the low accuracy condition ($M = 2.37, SD = .87$), $t(207) = -11.43, p < .001$, and reported significantly higher levels of confidence that they had performed better than other participants in the study ($M = 3.10, SD = .56$) compared to participants in the low accuracy condition ($M = 2.39, SD = .69$), $t(207) = -8.20, p < .001$. Based on these responses, it was determined that, consistent with the results of the pilot test, the accuracy manipulation had the desired effect of influencing participants’ perceptions of their own threat detection abilities.

Independent samples t-tests were also used to assess the efficacy of the danger manipulation. Participants in the high danger condition reported that they felt that a potential
Swine Flu pandemic was a significantly greater problem facing the United States ($M = 3.01, SD = 1.62$) compared to participants in the low danger condition ($M = 2.26, SD = 1.18$), $t(207) = -3.85, p < .001$. Additionally, participants in the high danger condition reported feeling marginally less safe from Swine Flu in the city of Richmond ($M = 5.21, SD = 1.85$) compared to participants in the low danger condition ($M = 5.67, SD = 1.55$), $t(207) = 1.92, p = .06$, and also reported feeling marginally less safe from Swine Flu on campus ($M = 5.16, SD = 1.79$) compared to participants in the low danger condition ($M = 5.56, SD = 1.66$), $t(207) = 1.66, p = .10$.

However, participants in the low danger condition reported significantly higher levels of belief that the world is dangerous ($M = 4.06, SD = .78$) compared to participants in the high danger condition ($M = 3.72, SD = .71$), $t(207) = -3.26, p = .001$. Significant differences were not observed between participants in the high danger and low danger conditions when asked how big of a problem they thought Swine Flu was where they live, $t(207) = .54, p = .58$.

Thus, it seems as though the manipulation had an effect (albeit arguably a weak effect) in the expected direction when participants were specifically asked about their perceptions of danger related to the Swine Flu. However, perceptions of the world as a dangerous place differed between the experimental conditions in the opposite direction than was expected (participants in the low danger condition reported viewing the world as significantly more dangerous compared to participants in the high danger condition). Because of this unanticipated finding, all further analyses associated with the danger manipulation were interpreted in an exploratory manner.
**Descriptive statistics**

As in Study 2, reliability statistics indicated that all questionnaire items demonstrated acceptable reliability and were normally distributed with the exception of the negative mood subscale of the PANAS measure, which was positively skewed (skewness = 1.38) and kurtotic (kurtosis = 2.08). As in Studies 1 and 2, a square root transformation addressed both of these issues. Basic statistics for all Study 3 measures including reliability measures, skewness, kurtosis, and means and standard deviations split by experimental condition can be found in Table 9.

In order to determine whether control variables would be necessary when testing the main hypotheses of the study, independent-samples t-tests were used to assess whether mood or anxiety differed across experimental conditions. These analyses did not indicate any significant differences between experimental conditions in the accuracy manipulation in reports of negative mood, positive mood, or state or trait level anxiety (all ps > .30). An independent-samples t-test did reveal a significant difference in reports of positive mood between participants in the high danger ($M = 2.46, SD = .78$) and low danger ($M = 2.71, SD = .72$) conditions, $t(207) = 2.38, p = .02$, such that participants in the high danger condition reported less positive mood compared to participants in the low danger condition. There were no other significant differences in any of the other potential control variables across danger conditions (all ps > .20).

Bivariate correlations were examined between all study variables. These correlations can be found in Table 10. As expected, all measures of social conservatism were significantly
Table 9

Study 3 Reliability Statistics, Skewness, Kurtosis for All Variables with Means and Standard Deviations by Experimental Condition

<table>
<thead>
<tr>
<th>Experimental Condition (Accuracy / Danger)</th>
<th>Low / Low</th>
<th>Low / High</th>
<th>High / Low</th>
<th>High / High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\alpha$</td>
<td>skewness</td>
<td>kurtosis</td>
<td>$M$</td>
</tr>
<tr>
<td>BDW</td>
<td>.75</td>
<td>.12</td>
<td>-.06</td>
<td>4.07</td>
</tr>
<tr>
<td>RWA</td>
<td>.92</td>
<td>.12</td>
<td>-.64</td>
<td>3.77</td>
</tr>
<tr>
<td>SDO</td>
<td>.89</td>
<td>.66</td>
<td>-.18</td>
<td>2.37</td>
</tr>
<tr>
<td>PI Composite†</td>
<td>.81</td>
<td>-.04</td>
<td>.12</td>
<td>-.45</td>
</tr>
<tr>
<td>PI Scale†</td>
<td>-</td>
<td>.37</td>
<td>-.38</td>
<td>3.66</td>
</tr>
<tr>
<td>PANAS – Neg</td>
<td>.83</td>
<td>1.00</td>
<td>.66</td>
<td>1.28</td>
</tr>
<tr>
<td>PANAS – Pos</td>
<td>.87</td>
<td>.40</td>
<td>-.05</td>
<td>2.70</td>
</tr>
<tr>
<td>SAI</td>
<td>.91</td>
<td>.37</td>
<td>-.24</td>
<td>2.00</td>
</tr>
<tr>
<td>TAI</td>
<td>.92</td>
<td>.22</td>
<td>-.53</td>
<td>2.08</td>
</tr>
</tbody>
</table>

Note. †Higher numbers indicate a more conservative political ideology

BDW = Belief in a Dangerous World, RWA = Right-Wing Authoritarianism, SDO = Social Dominance Orientation, PI = Political Ideology, PANAS – Neg = Negative Mood (Root Transformed), PANAS – Pos = Positive Mood, SAI = State Anxiety Inventory, TAI = Trait Anxiety Inventory.
Table 10

*Initial Bivariate Correlations Between All Study 3 Measures*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 209</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. BDW</td>
<td>-</td>
<td>0.34***</td>
<td>-0.06</td>
<td>0.24***</td>
<td>0.02</td>
<td>0.14*</td>
<td>0.06</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td>2. RWA</td>
<td>-</td>
<td>-</td>
<td>0.30***</td>
<td>0.74***</td>
<td>0.49***</td>
<td>0.16*</td>
<td>0.15*</td>
<td>-0.03</td>
<td>-0.13+</td>
</tr>
<tr>
<td>3. SDO</td>
<td>-</td>
<td>-</td>
<td>0.38***</td>
<td>0.36***</td>
<td>0.07</td>
<td>0.00</td>
<td>0.10</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>4. PI-Comp</td>
<td>-</td>
<td>-</td>
<td>0.55***</td>
<td>0.09</td>
<td>0.10</td>
<td>0.02</td>
<td>0.08</td>
<td>-0.05</td>
<td>-0.16+</td>
</tr>
<tr>
<td>5. PI-Scale</td>
<td>-</td>
<td></td>
<td>-</td>
<td>0.02</td>
<td>0.08</td>
<td>-0.05</td>
<td>-0.15*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PANAS-Neg</td>
<td>-</td>
<td></td>
<td></td>
<td>0.10</td>
<td>0.61***</td>
<td>0.47***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. PANAS-Pos</td>
<td>-</td>
<td></td>
<td></td>
<td>-</td>
<td>-0.32***</td>
<td>-0.31***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. SAI</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>0.70***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. TAI</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* BDW = Belief in a Dangerous World, RWA = Right-Wing Authoritarianism, SDO = Social Dominance Orientation, PI = Political Ideology, PANAS-Neg = Negative Mood (Root Transformed), PANAS-Pos = Positive Mood, SAI = State Anxiety Inventory, TAI = Trait Anxiety Inventory.

+ *p < .10, * *p < .05, ** *p < .01, *** *p < .001
positively correlated with one another. Additionally, the RWA construct was significantly correlated with positive mood ($r = .15, p = .03$) indicating that elevations in positive mood were associated with stronger authoritarian views. Based on these findings, the main analyses examining the effect of the experimental conditions on RWA controlled for positive mood as this construct differed significantly across the levels of the danger manipulation and was also significantly related to RWA, thus representing a potential confound.

**Main analyses**

A series of 2 (low accuracy vs. high accuracy) x 2 (low danger vs. high danger) between-subjects ANOVAs (ANCOVA in the case of the RWA analysis) were used to test the main hypotheses of the study. The analyses examined the main effects of the accuracy and danger manipulations as well as the interaction between the experimental conditions on each measure of social conservatism (RWA, SDO, and the political ideology composite and self report items). None of the analyses revealed a significant main effect of either the accuracy or the danger manipulation on social conservatism indices, nor were there any interaction effects (all $ps > .19$).

---

7 The reliability between the four measures of social conservatism was examined and was found to reach the accepted threshold for combination into a single index of social conservatism (Cronbach’s $\alpha = .78$). As such, an additional test of the main hypothesis of the study was conducted using the social conservatism index as the dependent variable. Analysis of covariance using the accuracy and danger manipulations as independent variables did not reveal a significant main effect of the accuracy manipulation, $F(1, 205) = .02, p = .89$, the danger manipulation, $F(1, 205) = .13, p = .72$, or the interaction between the two experimental conditions, $F(1, 205) = .64, p = .42$. 
Secondary analyses

Though the main hypotheses of Study 3 were not supported, additional analyses were conducted in order to determine whether the patterns of findings from Studies 1 and 2 with respect to threat detection ability were replicated. Specifically, the secondary analyses examined participants’ threat detection ability as well as their belief in a dangerous world and the relation between these constructs and the social conservatism indices.

Threat detection ability. In Study 3, there was a replication of the basic pattern of results that were found in Studies 1 and 2 with regard to threat detection ability. Again, participants were able to consciously detect very few target images during the threat detection procedure (M = 3.42, SD = 5.83), and conscious detection was not normally distributed in the sample (skewness = 2.74, kurtosis = 8.81). In Study 3, forty percent of the sample did not consciously detect any images, and seventy-eight percent of the sample consciously detected four images or fewer. In this sample, however, eleven percent of participants consciously detected ten images or more, with one participant consciously detecting 36 of the target images (60%) and another participant consciously detecting 31 of the target images (52%). As in the previous studies, all trials in which conscious detection occurred were dropped from further analysis.

A one-sample t-test comparing the response bias statistic to zero indicated that there was once again a significant bias toward a ‘safe’ categorization across all participants (M = .37, SD = .78), t(203) = 6.83, p < .001. Additionally, a one-sample t-test indicated that in Study 2, the
average threat detection ability in the sample significantly exceeded chance ($M = .10, SD = .45$), $t(203) = 3.10, p = .002$. Threat detection ability was not associated with participants’ reported confidence in their classifications, $r(203) = .02, p = .76$, providing additional evidence that the threat detection measures were not influenced by conscious awareness of the target images.

**Social conservatism.** Initial analysis indicated that threat detection ability was not significantly correlated with belief in a dangerous world, any of the social conservatism measures, or any of the control variables (all $p$s > .37). Belief in a dangerous world was positively correlated with RWA, $r(208) = .34, p < .001$, and the political ideology composite measure, $r(208) = .24, p < .001$, such that higher levels of belief in a dangerous world were associated with higher levels of RWA and more conservative political attitudes as indicated by the composite measure. Significant correlations were not observed between belief in a dangerous world and the SDO, $r(208) = -.06, p = .40$, or the single-item self-report ideology measure, $r(208) = .02, p = .74$.

Hierarchical linear regression models were used to assess whether threat detection ability served to moderate the relation between belief in a dangerous world and social conservatism. As in Studies 1 and 2, four separate models (one for each social conservatism measure) were tested. The first model, predicting RWA, controlled for negative mood in the first step of the regression as negative mood was significantly correlated with RWA and was marginally correlated with BDW. This model indicated a main effect of BDW ($\beta = .33, t = 4.99, p < .001$) after controlling for negative mood such that participants who believed that the world was more dangerous tended
to also endorse higher levels of right-wing authoritarianism. However, investigation of the interaction term indicated that this relation was not moderated by threat detection ability ($\beta = -.05, t = -.75, p = .45$).

The model predicting the political ideology composite item also indicated a main effect of belief in a dangerous world ($\beta = .23, t = 3.36, p = .001$) such that participants who believed that the world was more dangerous tended to endorse a more conservative political viewpoint. Once again, however, this relation was not moderated by threat detection ability ($\beta = -.07, t = -1.00, p = .32$). Additionally, no main effects or interaction effects were found in the models predicting social dominance orientation or the single-item political ideology self-report measure (all $ps > .39$).

**Discussion**

The results from Study 3 did not indicate support for any of the hypotheses. Participants’ reports of socially conservative attitudes did not differ across the conditions of the accuracy manipulation or the danger manipulation, nor was evidence of an interaction effect found between the two experimental conditions.

The manipulation checks conducted in Study 3 suggest that the accuracy manipulation had the desired effect (i.e., participants’ perceptions of their ability to detect threats in the threat detection paradigm were consistent with their manipulation condition); however, this perception did not appear to have an effect on participants’ level of social conservatism. This may indicate that explicit perceptions of threat detection ability do not directly influence socially conservative
attitudes. Put another way, the results of Study 3 may suggest that the perception that one’s ability to detect threats is below average does not necessarily prompt a compensatory response for this perceived deficit via an increase in socially conservative attitudes.

The danger manipulation in Study 3 presented a slightly more puzzling story. Participants’ responses to the manipulation check questions indicated that the manipulation had the desired (albeit weak) effect on perceptions of danger in the context of the article (i.e., participants in the high danger condition appeared to perceive a greater threat from Swine Flu compared to participants in the low danger condition). However, the measure of participants’ belief that the world is dangerous stood in contrast with the findings from the manipulation checks such that participants in the low danger condition reported a significantly higher belief that the world is dangerous compared to participants in the high danger condition; a result that was unexpected. If it were the case that participants did not view the threat of disease as representative of a ‘danger’ in their environment (i.e., it could be argued that participants might conceptualize ‘dangers’ as violent physical threats, more closely related to the manipulation in Study 2), then no significant differences would be expected between the two experimental conditions. However, the finding that participants’ dangerous world beliefs differed systematically across the experimental conditions suggests that the content of the fictitious article influenced perceptions of danger, but that the high danger article led to participants viewing their world as less dangerous compared to participants that read the low danger article. One possible explanation for such a finding would be that this difference between experimental conditions
represented a compensatory response to the information that they had been given (i.e., participants in the high danger condition responded to the perceived threat of swine flu by conceptualizing their world as significantly safer compared to participants who had not been faced with this same threat). However, such a response would seem to make little sense from the standpoint that it contradicts the ostensibly objective information presented in the news article.

Consistent with the findings from Study 2, these differences between experimental conditions with regard to belief in a dangerous world did not translate into differences in the social conservatism measures. Differences across experimental conditions failed to manifest despite the significant positive correlations that existed between belief in a dangerous world and both the RWA and political ideology composite measures. These findings further support the interpretation that socially conservative attitudes are pervasive, trait-level constructs that are not prone to short-term fluctuations stemming from variability in the surrounding social context.

Additional exploratory analyses indicated that participants were once again able to differentiate between safe and dangerous images presented outside of conscious awareness in the threat detection task at rates that significantly exceeded chance; however, threat detection ability was neither associated with any of the political conservatism indices, nor did it serve to moderate the relation between dangerous world beliefs and social conservatism.

In sum, the findings from Study 3 failed to support the hypotheses that self-perceptions of accuracy in detecting threats as well as perceptions of the level of danger in one’s social environment serve to influence socially conservative attitudes. These findings may suggest that
social conservatism is not a contextually bound attitude structure, and thus is not likely to be susceptible to short term fluctuations and manipulation through situational factors. Rather, these findings may be interpreted to suggest that social conservatism represents a more pervasive, trait-level attitude construct that remains stable (or at least changes relatively slowly) over time and across social experiences.
Summary Analyses

Considering that the threat detection paradigm used in the present research was new and provided unique insight into participants’ ability to discriminate between safe and dangerous images, summary analyses were performed combining the data across all studies to investigate the threat detection measure and the relations between threat detection ability and social conservatism. These analyses combined data from the threat detection pilot study, the threat detection accuracy manipulation pilot study, and Studies 1-3 for summary data on the threat detection procedure, and combined data from Studies 1-3 only for summary data on the relations between threat detection ability and social conservatism.

Threat detection procedure

Data from five separate studies were combined to investigate overall performance on the threat detection procedure. In the initial pilot study, participants’ threat detection ability ($d'$ index) was based on a procedure which used 30 total trials, with each image presented once. In all other studies, threat detection ability scores were based on a procedure which used 60 total trials (each image presented twice). The same set of images were used in all procedures and all other aspects of the procedure (display timing of the images, participants’ distance from the computer screen, the structure of participants’ response tasks) were exactly the same, suggesting that it is acceptable to combine data from participants across all trials. This resulted in a summary data set containing observations from 668 unique participants (participants were not permitted to sign up for more than one of the five studies that were conducted).
Consistent with what was reported in previous studies, conscious detection of the target images was not normally distributed in the summary sample (skewness = 3.58, kurtosis = 16.43). In order to provide valuable descriptive information from the summary data, the number of trials in which the target image was consciously detected was retained for all participants, but a data transformation was applied in order to correct for the non-normality so that its relation to other variables could be explored. The transformation was conducted by first adding 1 to all conscious detection scores so that the transformation would not involve division by zero. Next, the inverse of each conscious detection score was calculated which corrected for the issues of non-normality. Taking the inverse of the conscious detection scores resulted in participants with the highest number of consciously detected items having the lowest scores, so the sign of all correlations associated with conscious detection was reversed (e.g., positive correlations were changed to negative correlations and vice-versa), so that the relations could be interpreted properly.

All trials in which conscious detection of the target image was reported were dropped when calculating threat detection ability, response bias, and average confidence scores; thus, the analyses summarize threat detection ability that occurred outside of conscious awareness. Summary statistics regarding the threat detection procedures are presented in Table 11.

Analysis indicated that across all studies, participants’ ability to discriminate between safe and dangerous images that were presented outside of conscious awareness ($M = .07$, $SD = .43$) significantly differed from chance levels, $t(667) = 4.21$, $p < .001$. This is an important finding, because had the average threat detection ability in the sample not exceeded chance
Table 11

Signal Detection across All Studies

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>LCL</th>
<th>UCL</th>
<th>M</th>
<th>SD</th>
<th>LCL</th>
<th>UCL</th>
<th>M</th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD Procedure Pilot†</td>
<td>43</td>
<td>.08</td>
<td>.48</td>
<td>-.07</td>
<td>.23</td>
<td>.51</td>
<td>.75</td>
<td>.28</td>
<td>.74</td>
<td>1.02</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Study 1</td>
<td>190</td>
<td>.04</td>
<td>.41</td>
<td>-.02</td>
<td>.10</td>
<td>.34</td>
<td>.75</td>
<td>.23</td>
<td>.45</td>
<td>2.07</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Study 2</td>
<td>166</td>
<td>.07</td>
<td>.42</td>
<td>.01</td>
<td>.14</td>
<td>.57</td>
<td>.77</td>
<td>.45</td>
<td>.69</td>
<td>2.03</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>Study 3 Pilot</td>
<td>65</td>
<td>.07</td>
<td>.43</td>
<td>-.04</td>
<td>.18</td>
<td>.42</td>
<td>.64</td>
<td>.26</td>
<td>.58</td>
<td>4.46</td>
<td>1</td>
<td>44</td>
</tr>
<tr>
<td>Study 3</td>
<td>204</td>
<td>.10</td>
<td>.45</td>
<td>.04</td>
<td>.16</td>
<td>.37</td>
<td>.78</td>
<td>.26</td>
<td>.48</td>
<td>3.42</td>
<td>1</td>
<td>36</td>
</tr>
<tr>
<td>All Trials</td>
<td>668</td>
<td>.07</td>
<td>.43</td>
<td>.04</td>
<td>.10</td>
<td>.43</td>
<td>.76</td>
<td>.37</td>
<td>.48</td>
<td>2.64</td>
<td>1</td>
<td>44</td>
</tr>
</tbody>
</table>

Note. \( d' \) = Threat Detection Ability, \( C \) = Response Bias (positive numbers indicate a bias toward a ‘safe’ response, and negative numbers indicate a bias toward a ‘dangerous’ response). Both statistics represent only trials in which the target stimulus was not consciously detected.

†Pilot study based on 30 total trials with each image viewed once. All other studies based on 60 total trials with each image viewed twice.
levels, it could be argued that the individual differences that had been found within each sample only represented random fluctuations in a normally distributed construct akin to statistical noise. Had this been the case, any associations that were found between threat detection ability and social conservatism would likely have represented spurious associations.

Threat detection ability was not associated with reported confidence in classifications of the target stimuli, \( r(667) = .03, p = .48 \), further suggesting that the classifications were not based on conscious awareness. However, threat detection ability was related to the number of target images that were consciously detected, \( r(667) = .20, p < .001 \), indicating that participants who were more accurate at distinguishing between safe and dangerous images which were presented outside of conscious awareness tended to detect more images consciously as well. Detection ability did exhibit a weak negative correlation with response bias, \( r(667) = -.10, p = .01 \), such that participants with better threat detection ability demonstrated less of a bias toward a ‘safe’ response.

There was a strong bias across all participants toward a safe response \((M = .43, SD = .76), t(667) = 14.51, p < .001\), and response bias was positively correlated with participants’ reported confidence in their responses, \( r(667) = .18, p < .001 \). Thus, participants who were more biased toward a ‘safe’ response tended to be more confident (on average) in their classification of the target stimuli, whereas participants who demonstrated less of a bias toward classifying the target image as ‘safe’ (or more of a bias toward a classification of ‘dangerous’) tended to report less confidence in their classifications on average. Response bias was also associated with the
number of target images that were consciously detected, $r(667) = -.11, p = .004$, such that participants who consciously detected more of the target images tended to be less biased toward a ‘safe’ response. Finally, the number of images that were consciously detected was not associated with participants’ average confidence in their classifications, $r(667) = -.03, p = .51$. It should be noted that as the average confidence rating was calculated using only trials in which conscious detection did not take place, the significant relation between the two constructs indicates that though some participants were able to consciously detect more target images than others, participants who consciously detected more of the target images were no more or less confident in their classifications on trials in which they were not able to consciously detect the target compared to participants who consciously detected fewer (or none) of the target images.

**Threat detection ability and social conservatism**

Data from Studies 1-3 were combined into a single dataset in order to investigate overall relations between threat detection ability and social conservatism measures. The summary data set contained observations from 560 unique participants across the three studies. For all analyses involving the political ideology composite measure, only data from Studies 2 and 3 ($N = 375$) were used because of the poor reliability of the political ideology composite measure that was observed in Study 1.

Initial bivariate correlations were conducted between threat detection, response bias, belief in a dangerous world, all measures of social conservatism, and all control variables. These correlations are summarized in Table 12. The results indicated that across all three studies,
Table 12

*Bivariate Correlations across Studies 1-3*

<table>
<thead>
<tr>
<th>1. Threat Detection Ability (d’)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7†</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 560</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7†</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>1. Threat Detection Ability (d’)</td>
<td>-</td>
<td>-.08*</td>
<td>.20***</td>
<td>.03</td>
<td>.00</td>
<td>-.08+</td>
<td>-.05</td>
<td>-.05</td>
<td>.01</td>
<td>-.02</td>
<td>.06</td>
</tr>
<tr>
<td>2. Response Bias (C)</td>
<td>-</td>
<td>-.10*</td>
<td>-.07+</td>
<td>.06</td>
<td>-.03</td>
<td>.05</td>
<td>-.04</td>
<td>-.06</td>
<td>-.10*</td>
<td>-.08*</td>
<td>-.03</td>
</tr>
<tr>
<td>3. Conscious Detection</td>
<td>-</td>
<td>-.05</td>
<td>-.11*</td>
<td>.03</td>
<td>-.12*</td>
<td>-.03</td>
<td>.08*</td>
<td>.03</td>
<td>.04</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>4. BDW</td>
<td>-</td>
<td>.42***</td>
<td>.02</td>
<td>.26***</td>
<td>.17***</td>
<td>.14**</td>
<td>.02</td>
<td>.11*</td>
<td>.10*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. RWA</td>
<td>-</td>
<td>.31***</td>
<td>.76***</td>
<td>.44***</td>
<td>.13**</td>
<td>.13**</td>
<td>-.01</td>
<td>-.10*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. SDO</td>
<td>-</td>
<td>.38***</td>
<td>.28***</td>
<td>.05</td>
<td>.09*</td>
<td>.01</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. PI-Comp†</td>
<td>-</td>
<td>.52***</td>
<td>.11*</td>
<td>.11*</td>
<td>.01</td>
<td>-.11*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. PI-Scale</td>
<td>-</td>
<td>.01</td>
<td>.08+</td>
<td>-.05</td>
<td>-.11**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. PANAS-Neg</td>
<td>-</td>
<td>.13**</td>
<td>.64***</td>
<td>.43***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. PANAS-Pos</td>
<td>-</td>
<td>-.23***</td>
<td>-.23***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. SAI</td>
<td>-</td>
<td>.62***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. TAI</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* BDW = Belief in a Dangerous World, RWA = Right Wing Authoritarianism, SDO = Social Dominance Orientation, PI-Comp = Political Ideology Composite, PI-Scale = Political Ideology Scale, PANAS-Neg = Negative Mood (Root Transformed), PANAS-Pos = Positive Mood, SAI = State Anxiety, TAI = Trait Anxiety

+ p < .10, *p < .05, **p < .01, ***p < .001

†Correlations involving the political ideology composite variable only used data from Studies 2 and 3 (N = 375).
threat detection ability demonstrated a weak but marginally significant relation with social dominance orientation, $r(559) = -.07, p = .08$, such that lower levels of threat detection ability were associated with higher levels of social dominance orientation. However, no relation was observed across the three studies between threat detection ability and the composite measure of political ideology, $r(374) = -.05, p = .36$, the self-report single-item measure of political ideology, $r(559) = -.04, p = .30$, or RWA, $r(559) = .00, p = .92$.

Response bias demonstrated a marginally significant relation to belief in a dangerous world, $r(559) = -.07, p = .08$, such that higher levels of belief that the world is dangerous were associated with a bias toward a ‘dangerous’ response. Response bias was also significantly associated with positive mood, $r(559) = -.10, p = .02$, such that more positive mood was associated with higher bias toward a ‘dangerous’ response, and with state anxiety, $r(559) = -.08, p = .05$, such that increased anxiety was associated with a higher bias toward a ‘dangerous’ response.

Across the three studies, belief in a dangerous world demonstrated a moderate association with right-wing authoritarianism, $r(559) = .42, p < .001$, as well as a somewhat weaker association with the single-item political ideology measure, $r(559) = .17, p < .001$. Additionally, across Studies 2 and 3, belief in a dangerous world demonstrated a moderate association with the political ideology composite measure, $r(374) = .26, p < .001$. However, BDW was unrelated to social dominance orientation, $r(559) = .02, p = .58$, indicating that SDO is unlikely to stem from beliefs about the relative level of danger in the social world.
Interestingly, conscious detection of the target images was significantly correlated with right-wing authoritarianism, $r(559) = -.11, p = .01$, as well as the political ideology composite measure, $r(369) = -.12, p = .02$. Both of these relations indicated that participants who consciously detected fewer of the target images tended to endorse more conservative social attitudes.\(^8\)

\(^8\) As belief in a dangerous world was significantly correlated with both of these indices as well, follow up analyses using hierarchical regression models indicated that although conscious detection of the target images and belief in a dangerous world were both unique, significant predictors of RWA and the political ideology composite, conscious detection of the target images did not moderate the relation between dangerous world beliefs and either of the two measures of social conservatism (both $ps > .29$).
**General Discussion**

The present research sought to test the hypothesis that individual differences in the ability to detect threats are related to socially conservative attitudes such that low levels of threat detection ability were expected to predict high levels of social conservatism. It was argued that the ability to accurately detect threats in the environment is likely to have historically been a crucial mechanism in a modular cognitive architecture that would have been subject to evolutionary selection pressures. As socially conservative attitudes are characterized by an adherence to traditional social practices and the status-quo as well as avoidance of uncertainty (Wilson, 1973; Jost et al., 2003), conservative attitudes may have evolved to function as an adaptive social strategy for reducing the likelihood of encountering danger for individuals who are not highly adept at detecting and managing threats in their environment. Supporting this hypothesis, prior research has indicated that subjective experiences of fear, threat, and uncertainty are important factors that motivate the development of conservative attitudes (Jost et al., 2003). Additionally, research has shown higher levels of conservatism to be related to higher levels of anxiety, intolerance of ambiguity, and insecurity (Ojha & Sah, 1990), which is consistent with the perspective that conservative attitudes are associated with concerns about personal safety.

Overall, the present set of studies found mixed support for the stated hypothesis, indicating the plausibility that conservative social attitudes stem from trait level cognitive processes associated with the ability to detect threats. However, the limited nature of these
findings suggest that further research is necessary in order to determine, with a higher level of certainty, the true nature of the relation. Should the association between threat detection ability and social conservatism become more clearly established, additional studies are also necessary in order to develop a better understanding of the specific cognitive processes that function to influence socially conservative attitudes.

Prior to conducting studies with human participants, computer simulations were developed and run which indicated that a conservative social strategy (conceptualized as increased avoidance of objects in the social environment) is likely to increase the survival rate of an organism with low threat detection ability living in a relatively dangerous social environment. These computer simulations also indicated that a conservative social strategy was detrimental to the survival rate of an organism that was more adept at detecting threats or which was less likely to encounter danger. These results provided support for two important theoretical underpinnings of the present research. First, they indicated that socially conservative attitudes which promote the avoidance of unfamiliar objects in the environment can function as an adaptive social strategy for individuals with low threat detection ability functioning in an environment characterized by a sufficiently high level of danger. As such, this finding supports the theory that such attitudes could have evolved as an adaptive component of human psychology. Secondly, the results from the computer modeling simulations indicated that given a wide range of levels of environmental danger, different social strategies would be advantageous depending on individual levels of threat detection ability. More specifically, at any given time and place in
the social world, conservatism might be advantageous to individuals who possess a limited ability to manage threats, but might also present a disadvantage to individuals with a strong ability to manage threats, and thus it is not surprising to find varying levels of conservative social attitudes scattered throughout the population.

The hypothesis of the present research was tested further after developing a paradigm for the investigation of individual differences in threat detection ability. The threat detection paradigm evaluated participants’ ability to accurately discriminate between safe and dangerous images presented outside of conscious awareness. This methodological design was intended to isolate and measure cognitive threat detection processes operating at the initial stages of visual perception, consistent with the theoretical framework of Massive Modularity (Barrett & Kurzban, 2006).

Over the course of five studies (two pilot studies and three full research studies), the average participant in this paradigm demonstrated a better than chance ability to differentiate between safe and dangerous target images presented outside of conscious awareness. This finding lends support to the theoretical proposal that cognitive processes associated with the differentiation between safe and dangerous visual stimuli can be activated in the initial stages of cognitive processing, prior to visual information being accessible in consciousness. Across all studies, individual differences in the measure of unconscious threat detection ability demonstrated a marginally significant relation in the predicted direction with social dominance orientation such that participants who were less able to distinguish between safe and dangerous
images tended to endorse marginally higher levels of SDO. Additionally, the findings from Study 2 indicated a significant relation between unconscious threat detection ability and political ideology such that participants who were less able to distinguish between safe and dangerous images tended to endorse more conservative political attitudes. No relations were found between threat detection ability and right-wing authoritarianism.

The observed relation between threat detection ability and SDO may indicate that individuals with lower levels of threat detection ability advocate for a hierarchical social structure as a mechanism to compensate for an increased risk of encountering threats. At the very least, a hierarchical social structure would tend to make social interactions somewhat more predictable, as social roles and acceptable practices would be more clearly defined within social strata. Additionally, for members of social groups perceived to be near the top of the social hierarchy, adhering to a hierarchical social structure would likely convey additional benefits such as increased access to resources and institutional protection that might reduce the overall likelihood of encountering threats.

The observed relations between threat detection ability and political ideology that were found in Study 2 may indicate that participants with lower levels of threat detection ability tend to favor the status-quo in terms public policy, suggesting a link between cognitive threat detection characteristics and resistance to social change. However, as there was only evidence of these relations in Study 2, additional research is necessary in order to conclude that the findings do not simply represent spurious associations.
Finally, the lack of any observed relation between threat detection ability and right-wing authoritarianism was surprising considering that the RWA measure specifically targets adherence to traditional social norms and practices which were predicted to be the primary avenue by which conservatism would provide compensation for any deficiencies in the ability to detect threats. As there is a common perception that college students tend to be more liberal than the population average, it might be suggested that the lack of an observed relation may stem from restricted range in the RWA measure. However, inspection of the variable characteristics indicated no evidence of such a restricted range. It may be that threat detection ability, as measured, represents a cognitive trait that influences attitudes that are unrelated to adherence to traditional beliefs and practices. Along these lines, the results also indicated the absence of any relation between threat detection ability and belief in a dangerous world. This provides a strong indication that threat detection ability, as measured, does not influence the extent to which individuals experience their social worlds as dangerous, as was theorized. Had a relation been observed between threat detection ability and belief in a dangerous world, the predicted relation between threat detection ability and RWA may have manifested as well, as RWA is much more likely to represent a social strategy that would compensate for perceived environmental danger. Supporting this perspective, higher levels of belief in a dangerous world were consistently predictive of higher endorsement of right-wing authoritarianism across all studies.

It is important to consider, however, that the lack of consistent relations between threat detection ability and social conservatism may indicate that the current theory is wrong, and that
the hypothesized relation does not exist. At the very least, it seems likely that any relation between the two constructs is weak and separated by several layers of cognitive and social factors (e.g. conscious reasoning, levels of exposure to extant danger, exposure to social media advocating or disavowing a conservative perspective) that may moderate the degree to which threat detection ability serves to influence social attitudes. In the current set of studies, twelve separate tests of this proposed relation were carried out (four in each of the main studies), and three of these tests indicated a relation between threat detection ability and social conservatism that was significant at the \( p < .10 \) level. This is a higher percentage of significant results than would be expected to stem from chance findings if a true relation did not exist (roughly one out of the twelve tests would be expected to indicate a significant relation based on chance alone at an alpha-level of .10), and as such it does not seem appropriate to draw any definitive conclusions with regard to the proposed relation as a result of the current work.

**Threat Detection Paradigm**

It is important to carefully consider several aspects of the threat detection paradigm that have implications for the interpretation of the findings across the first two studies. Threat detection ability was operationalized as the ability to distinguish between safe and dangerous images presented outside of conscious awareness. The research paradigm was intentionally structured in this manner in order to isolate detection ability from downstream processes involving conscious reasoning in regards to the target images. In short, the goal was to approach the research assuming a functionally modular organization of the human mind, and to eliminate
the potential for contextual interpretations to influence categorizations of the target stimuli. However, in order to achieve this level of isolation, the paradigm was designed as a discrimination task in which two categories of stimuli were presented (safe and dangerous) and participants were forced to choose between these two classifications when categorizing the stimuli. Signal detection analysis allowed for the threat detection measure to account for response bias so that a true measure of participants’ ability to distinguish between the image categories could be assessed; however, this statistic only provided a measure of participants’ ability to differentiate between the stimulus classifications. Though this statistic was conceptualized throughout the research as ‘threat’ detection ability, it would be equally valid to conceptualize the statistic as ‘safe’ detection ability, as it only assessed the ability to discriminate between safe and dangerous images. In other words, it would be misleading to imply that the statistic represented participants’ sensitivity to dangerous stimuli in particular, though it is plausible that the ability to distinguish between safe and dangerous objects in the environment is conceptually equivalent to being sensitive to the presence of dangerous objects. When the ability to distinguish between two categories of a stimulus serves as a measure of sensitivity, as was the case in the present research, any measure of sensitivity to a single stimulus category is a relative construct, by definition.

Following from this point, it is possible that the current threat detection paradigm assessed a more general cognitive ability related to (but not uniquely associated with) threat detection ability. One possibility is that the paradigm assessed individual differences in visual
processing ability such that the visual information presented during the threat detection paradigm was more influential to some participants’ responses than others. If this ability only serves to influence the categorization of stimuli but does not also influence functional mechanisms for avoiding threats and danger, the lack of strong relations with the belief in a dangerous world construct would make sense. This conceptualization would still be consistent with the perspective of Massive Modularity that underlies the current theoretical framework, but it would leave open the possibility that the module being assessed in the threat detection paradigm may not be functionally specialized for the detection of threats.

A second possibility for the lack of a relation between threat detection ability and belief in a dangerous world is that the variability in participants’ prior experiences with danger was too great. If the ability to detect threats does indeed influence perceptions of danger, but the actual levels of danger in the environments of the participants studied were highly variable, this variability may have washed out the ability to detect the influence of cognitive threat detection ability on perceptions of danger (note that using the examples provided in the computer modeling paradigm, it would be considerably more difficult to determine the relative advantage of a conservative social strategy on survival across individuals of varying threat detection abilities if the level of environmental danger is not held constant or is unknown).

**Trait-Level Ability versus Perceptions of Ability**

Beyond trait-level differences in threat detection ability, the current research also investigated the relation between perceptions of one’s own ability to detect threats and socially
conservative attitudes. The manipulation that was used in Study 3 to influence participants’ perceptions of their ability to detect threats was effective, but demonstrated no relation to socially conservative attitudes. This seems to indicate that perceptions of one’s own threat detection ability, at least in the context of a laboratory study, have little bearing on socially conservative attitudes. It could be argued that individuals who suddenly perceived their ability to detect highly dangerous threats (e.g., enemy military personnel in plain clothes or a highly contagious disease that manifests no obvious symptoms before becoming deadly) to be inadequate may be much more apt to develop conservative social attitudes in order to compensate for their lack of accuracy. However, given the findings of the present research, trait-level differences in threat detection ability appear more likely to be related to conservative attitudes than perceptions of threat detection ability and as such, warrant more research attention in the near term.

Another prediction of the current research was that perceptions of danger would also influence socially conservative attitudes. As expected, there was a robust association across all studies between belief that the world is dangerous, RWA, and political ideology such that participants who believed the world to be more dangerous tended to report higher levels of RWA as well as more conservative political views (no consistent association was found between belief in a dangerous world and SDO). This result is consistent with previous research which has indicated a relation between fear and conservatism and further establishes that conservative social attitudes are linked to perceptions of the level of danger in the social environment.
However, manipulations of participants’ perceptions of danger did not significantly affect socially conservative attitudes. This result was consistent across two separate danger manipulations in Studies 2 and 3 (though the manipulation in Study 3 produced an effect on participants’ perceptions of danger in the opposite direction from what was intended, these differences still did not translate to differences in socially conservative attitudes). Combined, these findings suggest that conservative social attitudes represent trait-level characteristics which tend to be fairly stable across time, and which are not readily influenced by short-term fluctuations in environmental characteristics. As such, manipulations in future research that are intended to influence conservative attitudes would most likely need to be considerably stronger than the manipulations used in the present research in order to be effective.

The finding that conservative social attitudes are likely to be pervasive, trait-level constructs also favors the continued investigation of trait-level cognitive characteristics that function to detect and manage threats in the environment. If socially conservative attitudes are developed and maintained over long periods of time, then trait-level differences in cognitive characteristics which can shape perceptions of the world in ways that make the development of these attitudes more or less likely are an important focus of research. It may be that the current set of studies did not isolate the appropriate cognitive mechanism that would shape perceptions of the world in this manner; however, the pervasive nature of conservative social attitudes justifies the continued exploration of trait-level cognitive characteristics as a factor that potentially influences their development.
One additional limitation of the present research was the specific demographic niche that comprised the participant sample. Undergraduate college students were recruited primarily for reasons of convenience in the present sample; however, it must be recognized that such a sample is likely not to be representative of the larger populations of adults, U.S. residents, or humans in general. More specifically, undergraduate college students tend to be better educated, and wealthier than the general population (Henrich, Heine, & Norenzayan, 2010). Though the participant samples in the present research tended to be more racially diverse than would be found in many other U.S. institutions, the sample was still predominantly White and consisted almost entirely of first and second year students currently listed as Psychology majors. As mentioned previously, it is quite possible that many of these participants had not formed concrete conceptualizations of their ideological identities at the time of their participation and that their prior life experiences (particularly with respect to encounters with danger) may have been uncharacteristic of the U.S. population. These characteristics of the sample may have inhibited the ability of the research to detect the hypothesized effects.

It is also important to note that the current research placed a strong emphasis on the investigation of the relation between trait-level cognitive factors and socially conservative attitudes and largely ignored social learning factors that may contribute to the development of these same social attitudes. This was not because social learning factors are considered irrelevant in the development of social conservatism. On the contrary, the current theoretical framework views trait-level characteristics and social learning factors as two integrated
components which continuously work in tandem to influence human behavior and the development of social attitudes. Trait-level cognitive mechanisms are essential in interpreting the vast amount of social information that one encounters (and learns from) on a daily basis, and individual differences in these mechanisms must result in varied interpretations of social information. Similarly, regional and cultural differences in the prevalence of certain types of social information and the norms by which this information is interpreted will also result in variability across individuals in the information that is available to be interpreted by cognitive mechanisms. Thus, both factors (social learning and trait-level cognitive characteristics) must work concurrently to interpret social information in a manner that leads to the formation of attitudes and the production of social behavior. The present research investigated this complex set of processes from the perspective of cognitive characteristics in an effort to develop a better understanding of the effect that trait-level processes have in influencing interpretations of the social world and as a result, shaping social attitudes in a predictable manner.

**Future Directions**

The current research investigated the link between threat detection ability and socially conservative attitudes across multiple dimensions. A considerable focus of the research was on the relation between participants’ ability to discriminate between safe and dangerous images presented outside of conscious awareness and conservative social attitudes. Mixed evidence indicated a possible relation between the two constructs, but the current set of studies only scratched the surface of what should be covered by a more comprehensive program of research.
investigating the link between threat management processes and conservatism. Future research in this area should proceed along two concurrent paths: 1) a deeper investigation of the cognitive processes associated with threat detection ability, and 2) a more thorough investigation of social factors that influence the development and maintenance of socially conservative attitudes. Concurrent lines of research which isolate these two phenomena and work to develop a deeper understanding of both would contribute to the development of a more refined theoretical framework which postulates the route by which cognitive threat detection processes may relate to socially conservative attitudes. In other words, if a relation exists between threat detection ability and social conservatism, the two constructs are likely to represent opposite ends of a complex process, with many potential sources of variability existing between them. As such, working concurrently from both ends of the process may help to illuminate any paths that join them.

In regards to the investigation of cognitive threat detection mechanisms, the current research paradigm should continue to be used in future investigations of participants’ ability to discriminate between safe and dangerous images presented outside of conscious awareness. In the current set of studies, this paradigm was able to assess a normally distributed range of threat detection abilities throughout the population, with the average ability significantly exceeding chance levels. This finding is intriguing in and of itself as it indicated that even though the information contained in the target stimuli did not reach conscious awareness, it was still influential in participants’ categorization decisions. Future longitudinal studies investigating this
ability would be able to further assess whether these detection measures represent static, trait-level cognitive abilities or whether the ability to discriminate between safe and dangerous images is also subject to contextual influences.

In regards to the study of social factors which influence conservative social attitudes, additional work should examine the role that perceptions of danger play and the process by which these perceptions relate to social conservatism. In the present set of studies, participants who perceived the world to be more dangerous tended to endorse higher levels of RWA as well as a more conservative political perspective. However, manipulating perceptions of danger did not result in systematic differences in these same indices of social conservatism. This leaves open questions regarding the mechanism by which perceptions of danger and social conservatism are related.

As this relation is investigated further, it is important to consider that the current set of studies operationalized social conservatism using only a few specific measures (RWA, SDO, Political Ideology) which were predicted to be key indicators of socially conservative attitudes. However, there are many other measures that could be used to assess social conservatism. Jost and colleagues (2003) reviewed a host of measures that have been used in previous research to assess conservative political and social attitudes which are potentially relevant to the current work. Examples of such measures include the F-Scale (Adorno, Frenkel-Bruswik, Levinson, & Sanford, 1950) which assesses the extent to which the marginalization and derogation of low status minority groups is endorsed; the C-Scale (Wilson & Patterson, 1968) which assesses
resistance to change by measuring endorsement of traditional social and religious practices; or more specific assessments of attitudes toward current social issues (e.g., gay rights, immigration reform, health care reform). In order to more thoroughly investigate the specific nature of the relation between cognitive threat detection and threat management mechanisms and socially conservative attitudes, future research should be conducted using a broad range of indicators of social conservatism. This will assist in highlighting specific characteristics of attitudes or behaviors that tend to be the most closely related to the ability to detect and manage threats.

It should also be noted that the computer simulation that was developed in the present research provided a sound logical basis for the argument that threat management processes should be related to socially conservative attitudes. However, these simulations were extremely simplified in their conceptualization and the conclusions drawn from them should not be interpreted in a more specific manner than is warranted. In short, the paradigm demonstrated the advantage of a conservative strategy (increased avoidance) for organisms that experienced harm upon encountering threats. ‘Encountering threats’, in this instance, is a sufficiently loaded term. The computer simulation assumed that the organism would experience harm if a dangerous object was encountered. In the real world, dangerous objects may be encountered because they cannot be detected, but they may also be encountered because they cannot be otherwise avoided. As such, the computer simulation would provide an equivalent justification for research investigating individual differences in the ability to effectively respond to threats, and the relation between this ability and conservative social attitudes. The current research project
sought to investigate threat detection ability because it is the first step in the threat management process and a logical place to begin a program of research. However, threat detection ability is not necessarily the only place where a relation between threat management and conservative attitudes might be found. Future research should be as diligent in investigating relations between social conservatism and the ability to respond to threats as the present research has attempted to be in investigating threat detection ability.

Additionally, the computer model did not incorporate any measure of learning into the simulation. It is anticipated that the ability to learn about threats and adjust behavior accordingly might also influence the likelihood of encountering threats and the subsequent value of socially conservative attitudes in reducing this likelihood. Prior research has indicated a relation between individual differences in the learning of novel stimuli and political ideology (Shook & Fazio, 2009) such that political conservatives tended to show a bias toward learning about negatively valenced stimuli better than positively valenced stimuli. Additional differences exist in terms of how social information can influence learning, as conservatives tend to be less susceptible to evaluative conditioning with positive stimuli compared to liberals (Shook & Clay, 2011). Thus, it is plausible that a more specific relation might exist between the ability to learn about threat relevant stimuli and subsequent conservative attitudes. Future research should examine these associations as another potential trait-level cognitive difference that might influence the likelihood that danger will be encountered and as a result, how valuable conservative attitudes would be in reducing this likelihood.
Conclusion

The present research investigated the relation between cognitive differences in the ability to detect threats at an unconscious level, perceptions of extant levels of danger in the environment, and conservative social attitudes. Across three studies, the findings of the research indicated that threat detection ability was weakly but significantly related to multiple indices of social conservatism as predicted. More specifically, participants who demonstrated lower levels of threat detection ability tended to endorse higher levels of social dominance orientation as well as a more conservative political ideology. These findings indicate that trait-level cognitive characteristics related to the ability to detect threats during the initial stages of perception may play a role in the development of socially conservative attitudes; however, the findings did not emerge consistently across all studies, nor were they found across all indices of social conservatism and as such, further research is warranted.

Additionally, belief that the world is dangerous was reliably associated with social conservatism such that higher levels of belief that the world is dangerous were associated with more conservative social attitudes. However, manipulating participants’ belief that the world is dangerous did not produce systematic differences in the endorsement of conservative attitudes. This indicates that conservative social attitudes tend to be pervasive attitude structures which are not subject to contextual fluctuation, at least in the absence of a sufficiently powerful manipulation.
Given these findings, it is recommended that future research focus on the investigation of trait-level cognitive characteristics that might serve to influence the development of socially conservative attitudes over time. Though the findings in the present set of studies regarding such an association were limited, there remains a considerable theoretical justification for the investigation of the relation between threat management processes (threat detection, threat response, and threat learning) and conservative social attitudes.
List of References
List of References


International Union of Geological Sciences. (2009, June). Ratification of the definition of the base of Quaternary system/period (and top of the Neogene system/period), and redefinition of the base of the Pleistocene series/epoch (and top of the Pliocene series/epoch). London, United Kingdom: Brown, Paul R.


Appendix A: Study Measures
Right-Wing Authoritarianism Scale

Instructions: Please read each of the following statements carefully. Indicate the extent to which you agree or disagree with each statement using the scale shown below. Please fill in the number that best corresponds to your feelings about each issue. Please think carefully before answering.

1. Our country desperately needs a mighty leader who will do what has to be done to destroy the radical new ways and sinfulness that are ruining us. _____

2. Gays and lesbians are just as healthy and moral as anybody else. _____

3. It is always better to trust the judgment of the proper authorities in government and religion than to listen to the noisy rabble-rousers in our society who are trying to create doubt in people’s minds. _____

4. Atheists and others who have rebelled against the established religions are no doubt every bit as good and virtuous as those who attend church regularly. _____

5. The only way our country can get through the crisis ahead is to get back to our traditional values, put some tough leaders in power, and silence troublemakers spreading bad ideas. _____

6. There is absolutely nothing wrong with nudist camps. _____

7. Our country needs free thinkers who will have the courage to defy traditional ways, even if this upsets many people. _____
8. Our country will be destroyed someday if we do not smash the perversions eating away at our
moral fiber and traditional beliefs. _____

9. Everyone should have their own life-style, religious beliefs, and sexual preferences, even if it
makes them different from everyone else. _____

10. The “old-fashioned ways” and “old-fashioned values” still show the best way of life. _____

11. You have to admire those who challenged the law and the majority’s view by protesting for
abortion rights, for animal rights, or to abolish school prayer. _____

12. What our country really needs is a strong, determined leader who will crush evil, and take us
back to our true path. _____

13. Some of the best people in our country are those who are challenging our government,
criticizing religion, and ignoring the “normal way things are supposed to be done.” _____

14. God’s laws about abortion, pornography, and marriage must be strictly followed before it is
too late, and those who break them must be strongly punished. _____

15. There are many radical, immoral people in our country today, who are trying to ruin it for
their own godless purposes, whom the authorities should put out of action. _____

16. A “woman’s place” should be wherever she wants to be. The days when women are
submissive to their husbands and social conventions belong strictly in the past. _____

17. Our country will be great if we honor the ways of our forefathers, do what the authorities tell
us to do, and get rid of the “rotten apples” who are ruining everything. _____

18. There is no “ONE right way” to live life; everybody has to create their own way. _____

19. Homosexuals and feminists should be praised for being brave enough to defy “traditional
family values.” _____

20. This country would work a lot better if certain groups of troublemakers would just shut up
and accept their group’s traditional place in society. _____
Social Dominance Orientation Scale

Please read each of the following statements carefully. Indicate how positive or negative you find each statement using the scale shown below. Please fill in the number that best corresponds to your feelings about each issue. Please think carefully before answering.

1 Very Negative
2
3
4 Neither Negative or Positive
5
6
7 Very Positive

1. Some groups of people are simply not the equals of others. _____
2. Some people are just more worthy than others. _____
3. This country would be better off if we cared less about how equal all people were. _____
4. Some people are just more deserving than others. _____
5. It is not a problem if some people have more of a chance in life than others. _____
6. Some people are just inferior to others. _____
7. To get ahead in life, it is sometimes necessary to step on others. _____
8. Increased economic equality. _____
9. Increased social equality. _____
10. Equality. _____
11. If people were treated more equally, we would have fewer problems in this country. _____
12. In an ideal world, all nations would be equal. _____
13. We should try to treat one another as equals as much as possible. _____
14. It is important that we treat other countries as equals. _____
Political Ideology Scale

Please read each of the following statements carefully. Indicate the extent to which you agree or disagree with each statement using the scale shown below. Please fill in the number that best corresponds to your feelings about each issue. Please think carefully before answering.

+2 Agree strongly
+1 Agree somewhat
0 Neither agree nor disagree, or no opinion
-1 Disagree somewhat
-2 Disagree strongly

*Note. Only the following thirteen items were used in Study 1.*

1. Abortion is wrong, because everyone, even unborn babies, has the right to life. _____
2. The benefits of nuclear power plants outweigh its potential hazards. _____
3. If drugs were decriminalized, society would degenerate. _____
4. Some crimes are so despicable, they should be punishable by death. _____
5. Gay people are entitled to the same constitutional rights as heterosexuals. _____
6. It is women’s constitutional right to choose whether or not to have an abortion. _____
7. For safety reasons, all existing nuclear power plants should be shut down. _____
8. Censorship of music and art violates people’s constitutional rights. _____
9. Gun control violates people’s constitutional right to bear arms. _____
10. Student-led prayer should be allowed in public schools. _____
11. Quotas should be set so that more women are hired for traditionally male-dominated jobs.
12. Censorship of art is justified when the artwork is deemed pornographic or obscene. _____

13. How would you rate yourself on the following scale?

<table>
<thead>
<tr>
<th>Conservative</th>
<th>Neither one</th>
<th>Liberal</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**Note. The following items were used along with the previous items in Studies 2 and 3**

14. Congress should not increase taxes, rather they should decrease spending. _____

15. More support for AIDS research is needed. _____

16. Sex education should be taught at home by the parents, not in public schools. _____

17. The government should spend less on defense and focus more on domestic needs. _____

18. Homelessness has become an issue that requires immediate attention by the federal government. _____

19. Because the U.S. is a world leader, it cannot cut its defense spending position without losing its world position. _____

20. Environmentalists should worry less about the welfare of animals and more about people’s jobs. _____

21. An increase in taxes is needed. _____

22. Capital punishment is not an effective deterrent. _____

23. Too much money is being spent on AIDS research and not enough is being spent on research for other serious diseases. _____

24. Sex education in schools is vital, especially with the increasing concern of AIDS. _____

25. The government should adopt a stricter immigration policy

26. Homosexuals should not legally be allowed to marry.
27. Evolutionary theory should not be taught in public schools.

28. Abortion should be illegal.

29. The government should not adopt a stricter policy to protect the environment.

30. Terminally ill patients should not have the right to die.

31. There should not be a complete separation between church and state.

32. Marijuana should not be legalized for medicinal use.

33. The government should restrict stem cell research.

34. United States did the right thing by attacking Iraq.

35. The death penalty should not be abolished.

36. The government should not adopt a policy to guarantee health care to all workers and their families.

37. The minimum wage should not be raised.

38. The current pre-emptive (strike them before they strike you) foreign policy, is the most effective foreign policy.
Belief that the World is Dangerous

Instructions: Please indicate the extent to which you agree or disagree with each statement below using the following scale. There are no right or wrong answers. Please think about each statement carefully before answering.

1 – Strongly Disagree
2 – Disagree
3 – Slightly Disagree
4 – Neither Agree nor Disagree
5 – Slightly Agree
6 – Agree
7 – Strongly Agree

1. It seems that every year there are fewer and fewer truly respectable people, and more and more persons with no morals at all who threaten everyone else.

2. Although it may APPEAR that things are constantly getting more dangerous and chaotic, it really isn't so. Every era has its problems, and a person's chances of living a safe, untroubled life are better today than ever before.

3. If our society keeps degenerating the way it has been lately, it's liable to collapse like a rotten log and everything will be chaos.

4. Our society is NOT full of immoral and degenerate people who prey on decent people. News reports of such cases are grossly exaggerating and misleading.

5. The 'end' is NOT near. People who think that earthquakes, wars and famines mean God might be about to destroy the world are being foolish.

6. There are many dangerous people in our society who will attack someone out of pure meanness, for no reason at all.
7. Despite what one hears about 'crime in the street', there probably isn't any more now than there ever has been.

8. Any day now chaos and anarchy could erupt around us. All the signs are pointing to it.

9. If a person takes a few sensible precautions, nothing bad will happen to him / her. We do NOT live in a dangerous world.

10. Every day, as our society becomes more lawless, a person's chances of being robbed, assaulted, and even murdered go up and up.

11. Things are getting so bad, even a decent law-abiding person who takes sensible precautions can still become a victim of violence and crime.

12. Our country is NOT falling apart or rotting from within.
The Positive Affect Negative Affect Scale (PANAS)

Instructions: This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way RIGHT NOW, that is, at this very moment. Use the following scale to record your answers:

<table>
<thead>
<tr>
<th>very slightly or not at all</th>
<th>a little</th>
<th>moderately</th>
<th>quite a bit</th>
<th>extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

- interested
- distressed
- excited
- upset
- strong
- guilty
- scared
- hostile
- enthusiastic
- proud

- irritable
- alert
- ashamed
- inspired
- nervous
- determined
- attentive
- jittery
- active
- afraid
The following is a list of statements which people have used to describe themselves. We want you to indicate how you **feel right now**, that is, **at this moment** using the rating scale provided. There are no right or wrong answers. Do not spend too much time on any one statement, just give the answer which seems to describe your present feelings best.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Moderately so</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel calm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I feel secure</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I am tense</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I feel strained</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I feel at ease</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. I feel upset</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. I am presently working over possible misfortunes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. I feel satisfied</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. I feel heighten</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. I feel comfortable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. I feel self-confident</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. I feel nervous</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. I am jittery</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. I feel indecisive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. I am relaxed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. I feel content</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. I am worried</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. I feel confused</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. I feel steady</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. I feel pleasant</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Now please indicate how you **generally feel** using the rating scale provided. Again, there are no right or wrong answers. Do not spend too much time on any one statement just give the answer which seems to describe how you generally feel.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Moderately so</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. I feel pleasant</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. I feel nervous and restless</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. I feel satisfied with myself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. I wish I could be as happy as others seem to be</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. I feel like a failure</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26. I feel rested</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. I am “calm, cool, and connected”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28. I feel that difficulties are piling up so that I cannot overcome them</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29. I worry too much over something that really doesn’t matter</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30. I am happy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31. I have disturbing thoughts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>32. I lack self-confidence</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33. I feel secure</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34. I make decisions easily</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35. I feel inadequate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36. I am content</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>37. Some unimportant thought runs through my mind and bothers me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>38. I take disappointments so keenly that I can’t pull them out of my mind</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
39. I am a steady person

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>40. I get in a state of tension or turmoil as I think over my recent concerns and interests</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix B: Danger Manipulations with Accompanying Manipulation Checks

High Danger Manipulation #1 – Violent Crime

New Data Shows Increase in Crime Rate

The number of violent crimes rose by a surprisingly large 12 percent in the United States last year, a far bigger increase than the nation has been averaging since 2001, the Justice Department said.

The Bureau of Justice Statistics reported there were 4.3 million violent crimes last year, up from 3.8 million in 2009.

The reality is that "we're surprised to find how much it increases," Professor Alfred Wilson of Carnegie Mellon University's Heinz School said Friday.

More than 80 percent of the increase in violent crime was attributed to a spike in simple assaults, by 15 percent. Those assaults accounted for nearly two-thirds of all violent crimes in 2010.

The numbers come from the National Crime Victimization Survey, which gathers information on nonfatal crimes against people aged 12 or older by questioning a nationally representative sample of U.S. households.

Turning to rates of crime per thousand residents, which takes into account population growth over time, it's clear that the rise in violent crime is part of a long-term trend that began in 1993.

From 1993 through 2010, the rate of violent crime has increased by a whopping 70 percent and the rate of property crime rose by 28 percent.

Wilson added that "the victimization survey is basically confirming" the FBI's preliminary figures from last May on crimes reported to police during 2010. That early, incomplete FBI data showed reported crime rose across the board last year, extending a multi-year upward trend with an increase in both violent crime and property crime.

The victimization survey figures are considered the government's most reliable crime statistics, because they count crimes that are reported to the police as well as those which go unreported. Over the last decade, the government has found that only about half of all violent crimes and only 40 percent of property crimes are reported to police.
Because the survey is based on interviews with victims, it gathers no data on murder. But the FBI's crime figures, based solely on what is reported to police, do provide murder figures, and they are considered quite reliable because murder has always been the least likely crime to go unreported.

Wilson asserts that the message to be taken away from these statistics is one of caution: “These findings indicate that the average U.S. citizen faces much more danger today than they did at this time a year ago.”
Low Danger Manipulation #1 – Violent Crime

**New Data Shows Drop in Crime Rate**

The number of violent crimes fell by a surprisingly large 12 percent in the United States last year, a far bigger drop than the nation has been averaging since 2001, the Justice Department said.

The Bureau of Justice Statistics reported there were 3.8 million violent crimes last year, down from 4.3 million in 2009.

The reality is that "we're surprised to find how much it declines," Professor Alfred Wilson of Carnegie Mellon University's Heinz School said Friday.

More than 80 percent of the decline in violent crime was attributed to a plunge in simple assaults, by 15 percent. Those assaults accounted for nearly two-thirds of all violent crimes in 2010.

The numbers come from the National Crime Victimization Survey, which gathers information on nonfatal crimes against people aged 12 or older by questioning a nationally representative sample of U.S. households.

Turning to rates of crime per thousand residents, which takes into account population growth over time, it's clear that the decline in violent crime is part of a long-term trend that began in 1993.

From 1993 through 2010, the rate of violent crime has declined by a whopping 70 percent and the rate of property crime fell by 28 percent.

Wilson added that "the victimization survey is basically confirming" the FBI's preliminary figures from last May on crimes reported to police during 2010. That early, incomplete FBI data showed reported crime fell across the board last year, extending a multi-year downward trend with a decrease in both violent crime and property crime.

The victimization survey figures are considered the government's most reliable crime statistics, because they count crimes that are reported to the police as well as those which go unreported. Over the last decade, the government has found that only about half of all violent crimes and only 40 percent of property crimes are reported to police.
Because the survey is based on interviews with victims, it gathers no data on murder. But the FBI's crime figures, based solely on what is reported to police, do provide murder figures, and they are considered quite reliable because murder has always been the least likely crime to go unreported.

Wilson asserts that the message to be taken away from these statistics is one of confidence: “These findings indicate that the average U.S. citizen is much safer today than they were at this time a year ago.”
Manipulation Check #1 – Violent Crime

1. Based on the information in the news article, how big of a problem do you think violent crime is in the United States today?

   1 2 3 4 5 6 7
   Not a problem at all  Somewhat of a problem  A major problem

2. How big of a problem do you think violent crime is where you live, specifically?

   1 2 3 4 5 6 7
   Not a problem at all  Somewhat of a problem  A major problem

3. How safe from violent crime do you feel in the city of Richmond?

   1 2 3 4 5 6 7
   Not safe at all  Somewhat safe  Very safe

4. How safe do you feel from violent crime on campus?

   1 2 3 4 5 6 7
   Not safe at all  Somewhat safe  Very safe
High Danger Manipulation #2 – Disease

New Data Shows Swine Flu Pandemic is Near

The World Health Organization (WHO) has raised its pandemic flu alert level to five, signaling that a global swine flu pandemic is imminent.

WHO director-general Dr. Evelyn Wynne urged all countries to take immediate action, saying a pandemic would put "all humanity under threat".

The move came after a toddler in Texas became the first confirmed death outside Mexico from the new H1N1 swine flu strain.

The WHO said the alert level hike was a signal to governments, the pharmaceutical industry and the business community to take action.

"No matter what the situation is, the international community should treat this as a window of opportunity to ramp up their response," Dr Wynne said.

"It is really all of humanity that is under threat during a pandemic."

She also warned that current WHO antiviral stocks were too low and said the organization needed more donations from companies and governments.

Level five, one step short of a full pandemic on a six-point scale, is characterized as a "strong signal that a pandemic is imminent and that the time to finalize the planned mitigation measures is short," according to the WHO's global emergency planning.

A level five alert means human-to-human transmission has happened in at least two countries.

Nearly a week after the threat of the pandemic emerged in Mexico, that country remains the hardest hit, with up to 159 people killed.

Spain has reported its first case of the virus in a person who has not recently visited Mexico, taking the number of confirmed Spanish sufferers to 10.

Three cases in Germany, one in Austria and three more in Britain mean the flu has travelled to four European countries.
Given that the disease is showing up in most developed nations and that the supply of vaccines is currently low, countries around the world are being urged to take whatever precautions are necessary to minimize the chances that the disease will spread and develop into a full-blown pandemic.
New Data Shows Swine Flu Risk Has Diminished

The World Health Organization (WHO) has lowered its pandemic flu alert level to one, signaling that the imminent risk of a global swine flu pandemic has passed.

WHO director-general Dr. Evelyn Wynne advised that no immediate action is necessary in any country, saying that the potential for pandemic "has been avoided".

The move came after a toddler in Texas who was thought to be carrying the H1N1 swine flu strain, was found to be misdiagnosed, and was merely suffering from a more common and treatable form of the flu.

The WHO said the alert level drop was a signal that governments, the pharmaceutical industry and the business community should be recognized for their efforts.

"No matter what the situation is, the international community has shown that they are able to step forward and respond," Dr Wynne said.

"It is really all of humanity that is safer today as a result of proper planning."

She also eased concerns by stating that current WHO antiviral stocks are more than adequate and said the organization is no longer in need of donations from companies and governments.

Level one, one step above complete elimination of the disease, is characterized as a "strong signal that the swine flu is well under control and that the time to worry about the potential transmission of the disease has passed" according to the WHO's global emergency planning spokesperson.

A level one alert means that human-to-human transmission has not been reported in more than two years.

Nearly a week after the threat of the swine flu was officially declared over in Mexico, that country remains the model to the rest of the world, with no reported infections in over 159 weeks.
Spain has reported that its last case of the virus in a person has been cured, officially eliminating the threat in a country with only 10 confirmed cases overall.

Three cases in Germany, one in Austria and three more in Britain have all been cured meaning the flu has been eliminated in four more European countries.

Given that the disease has stopped showing up in most developed nations and that the supply of vaccines is currently high, countries around the world are breathing a sigh of relief, knowing that the chances that the disease will return and develop into a full-blown pandemic are minimal.

**Manipulation Check #2 – Swine Flu**

1. Based on the information in the news article, how big of a problem do you think swine flu is in the United States today?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a problem at all</td>
<td>Somewhat of a problem</td>
<td>A major problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. How big of a problem do you think swine flu is where you live, specifically?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a problem at all</td>
<td>Somewhat of a problem</td>
<td>A major problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. How safe from swine flu do you feel in the city of Richmond?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not safe at all</td>
<td>Somewhat safe</td>
<td>Very safe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. How safe do you feel from swine flu on campus?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not safe at all</td>
<td>Somewhat safe</td>
<td>Very safe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix C: Threat Detection Accuracy Manipulation Check

Accuracy Manipulation Check Items from Study 3

1. How well do you think you did in the picture detection task at the beginning of the study?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I did very poorly</td>
<td>Average</td>
<td>I did very well</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. What was your accuracy percentage in detecting threats (please give an approximate percentage if you don’t remember the exact number)?

3. Overall, what is your opinion of this score?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highly Dissatisfied</td>
<td>Dissatisfied</td>
<td>Neither satisfied nor dissatisfied</td>
<td>Satisfied</td>
<td>Highly Satisfied</td>
</tr>
</tbody>
</table>

3. How well do you think you did relative to other participants in the study?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Well below average</td>
<td>Below average</td>
<td>About the same</td>
<td>Above average</td>
<td>Well above average</td>
</tr>
</tbody>
</table>
Vita

William Russin Clay was born on February 21, 1978 in Latrobe, Pennsylvania, and is an American Citizen. He graduated from Greensburg Salem High School, Greensburg, Pennsylvania in 1996. He received his Bachelor of Science in Information and Decision Systems with a Minor in Business Administration from Carnegie Mellon University in 2000 and subsequently worked as a Project Manager in the Information Technology field for seven years before commencement of graduate studies in the fall of 2008. He earned his Master of Science in Experimental Social Psychology from Virginia Commonwealth University in 2010 and his PhD in Experimental Social Psychology from Virginia Commonwealth University in 2012. His publications include Individual Differences in Behavioral Immune System Strength and the Emergence of Cultural Systems, Interracial Roommate Relationships: A Mechanism for Promoting Sense of Belonging at University and Academic Performance, and Valence Asymmetry in Attitude Formation: A Correlate of Political Ideology. He has experience as an undergraduate instructor teaching courses in Behavioral Research Methods, Social Psychology, and Introduction to Statistics.