

**Exploring the utility of state-level wise reasoning:  
New assessment and facilitation methods**

by

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## **Examining Committee Membership**

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### **Author's Declaration**

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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## **Statement of Contributions**

Studies 1-4 are currently under review (Brienza, Kung, Santos, Bobocel, & Grossmann, under review). Study 5 has been published in Nature Human Behaviour (Grossmann, Brienza, & Bobocel, 2017). Studies 6-8 are currently under review (Brienza, Kung, & Chao, under review).

## **Abstract**

Wisdom is considered the apex of human development, exemplified in various cultural traditions by optimal, balanced judgment and decision making that benefits others and the self.

Contemporary psychological accounts suggest that practicing wisdom through reasoning (i.e., intellectual humility, recognition of uncertainty and change, consideration of the broader context at hand and perspectives of others, integration of these perspectives/compromise) can help people to adaptively navigate everyday social challenges, yet large-scale empirical investigation on this topic is lacking. In this dissertation, I introduce and validate a new method to assess situation-specific wise reasoning. To encourage future research on the topic, I establish an initial nomological network of individual differences around wise reasoning and show its relations to fundamental constructs, including increased cooperation and reduced bias. I also show that experimentally enhancing wise reasoning can result in more cooperative, balanced attitudes and emotions (e.g., reduced attitude polarization; greater tolerance for outgroups). The findings presented in this dissertation suggest that wise reasoning can help people to navigate everyday social challenges. Implications for theory, future research, and practical applications for wise reasoning are discussed.

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## INTRODUCTION

People from virtually every culture consider wisdom the apex of human development. Wisdom is generally thought of as acquisition of knowledge, discernment, insight, and just judgment into the qualities and relationships in life's challenges (e.g., Merriam-Webster Dictionary). Often associated with historical sages and leaders (e.g., King Solomon; The Buddha; Rāhula, 1974; Weststrate, Ferrari, & Ardel, 2016), wisdom manifests itself as balance in thinking and emotion, unbiased judgment, and motivation toward others' well-being (Baltes & Smith, 2008a; Birren & Svensson, 2005; McKee & Barber, 1999; Staudinger & Glück, 2011).

Here, I provide a new approach to the empirical research on wisdom by considering cognitive (i.e., reasoning) processes that can promote wise decision making (*phronesis*; Aristotle, 2011). I suggest that these cognitive processes (henceforth, *wise reasoning*) relate to beneficial outcomes that are core to wisdom, for example, more moderate emotional reactions and greater tolerance in social challenges, and motivation that balances self-interest with concern for others (Staudinger & Glück, 2011). Large-scale empirical exploration on this topic is now imperative. Many contemporary scholars and practitioners have called for wisdom in many challenging social domains, including education, conflict resolution, leadership, and business (Baltes & Smith, 2008b; Goold & Campbell, 1998; Haque, 2010; Nonaka & Takeuchi, 2011; Rooney & McKenna, 2008; Staudinger & Glück, 2011; Sternberg, 2010). Despite broad interest in wisdom, the topic has not enjoyed large-scale empirical study, and there are glaring gaps in the research on wisdom in the literature on organizational behavior and leadership, my primary interests. I suggest that this is because extant methods to assess wisdom either prevent or discourage such study. Namely, the existing self-report methods, though efficient, suffer from validity issues. Importantly, these measures focus on self-rated global personality traits instead of the reasoning

processes that could promote wisdom. Other-rated performance methods to assess wisdom, though more valid and context-specific, require daunting administrative costs and procedures that discourage large-scale research.

A new measure that invites large-scale study is therefore required. The new measure should focus on reasoning processes that can provide the foundation for wisdom, to allow researchers to explore in detail how wisdom can be practiced and developed in different domains. It must be adaptable to different life challenges and should be designed with such adaptability in mind, to enable exploration into a broad range of contemporary challenges (e.g., conflict resolution, leadership) in which practical application of wisdom is desired. As a matter of course, it needs to be shown that people engage in wise reasoning within or about such challenges, and that doing so relates to adaptive psychosocial outcomes. In this dissertation, I show such evidence.

Accordingly, the starting point in my dissertation research will be to describe the design of a new measure of wise reasoning that is both valid and allows for efficient, large-scale exploration. The new measure uses the event-reconstruction method (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004; Schwarz, Kahneman, & Xu, 2009) to minimize biased responding and improve accuracy of assessment. The event-reconstruction also allows for *context-specific* assessment of wise reasoning, an important factor in making the measure adaptable to different life challenges. I describe the design of the new measure, examine the extent to which people use wise reasoning in their own life challenges, and test whether wise reasoning represents a reliably testable, unitary construct. I test the construct validity of wise reasoning. I establish an initial nomological network (Cronbach & Meehl, 1955) of individual differences, consistently shown to relate to positive individual and social outcomes, around wise

reasoning. Next, I expand this network to show that wise reasoning relates to affective and motivational variables that are critical to relational and societal well-being. Specifically, I show that wise reasoning is associated with improved cooperation, reduced intergroup bias, and greater tolerance and support for outgroups. Finally, on the notion of practice and development, it is important to show that wise reasoning is not reserved only to certain rare individuals. Thus, I show that wise reasoning can be experimentally enhanced via simple instructions, with results that mirror those of naturalistic or individual differences in wise reasoning. Facilitating wise reasoning effectively reduced intergroup bias, and led to greater tolerance and more cooperative motivations toward outgroups. Below, I provide a brief discussion on wise reasoning. I then describe my dissertation research. I conclude by discussing future directions for research and practice in wise reasoning.

### **Introduction to Wise Reasoning**

Wisdom concerns the ability to master life's challenges, primarily ill-defined social dilemmas without easily-discernable optimal solutions. According to contemporary perspectives, mastering life's challenges includes reasoning broadly and deeply on self, others, and the world, effective emotion regulation and tolerance for ambiguity and different values, and motivation that transcends immediate self-interest (Ardelt & Ferrari, 2014; Staudinger & Glück, 2011). My research is focused on reasoning processes that can promote wisdom when navigating life's challenges.

What kinds of reasoning processes promote wisdom? Philosophers and psychological scientists view possession of general knowledge or cognitive ability as insufficient for wisdom (Ardelt, 2004; Baltes & Kunzmann, 2004; Baltes & Smith, 2008; Baltes & Staudinger, 2000; Jeste et al., 2010; Kekes, 1983; McKee & Barber, 1999; Sternberg, 1998; Vervaeke & Ferraro,

2013). Rather, or in addition, context-sensitive reasoning is particularly important for flexibly navigating life's uncertainties (Baltes & Kunzmann, 2004; Baltes & Smith, 2008b; Baltes & Staudinger, 2000; Berry & Irvine, 1986; Grossmann, Na, Varnum, Kitayama, & Nisbett, 2013; Grossmann, 2017). Such uncertainties often originate from intrapersonal, interpersonal, and/or extra-personal (i.e., intergroup) conflicts experienced in everyday life (Sternberg, 1998).

Reasoning wisely is proposed to strike a balance between these conflicting interests (Rāhula, 1974; Staudinger & Glück, 2011; Sternberg, 1998).

Beginning to address wise reasoning processes, Clayton (1975, 1982) defined wisdom as acknowledging and accommodating the paradoxes and contradictions that mark social challenges, guided by the principle of dialecticism. Part of the foundation of wise reasoning, dialectical thinking involves juxtaposing opposed ideas, such as varying perspectives, in the service of resolving apparent conflicts or revealing underlying truths. Invoking dialecticism allowed Clayton to distinguish between wisdom and domain-general cognitive abilities that characterize rational/analytical thought (e.g., intelligence). Specifically, domain-general abilities draw on symbolic rules and procedures such as propositional logic (Gigerenzer & Hug, 1992) that are (better) suited for solving *well-defined* problems. In contrast, *ill-defined* problems (e.g., those involving values trade-offs, or those with missing information about initial or end/goal states, or means to a solution; Jonassen, 1997; Simon, 1973) are more complex and dynamic, and therefore less amenable to resolution via processes like logic (e.g., Haugeland, 1989). Rather, ill-defined problems require more open, tolerant, flexible reasoning about relevant (i.e., context-specific) information (Clayton, 1982; Hieronymi, 2013; Sinnott, 1984, 1989). Importantly, the problems encountered in social challenges are ill-defined (Allaire & Marsiske, 2002; Frensch & Funke, 2014; Mienaltowski, 2011) and should therefore benefit from wise reasoning, over and

above general cognitive abilities. Indeed, theoretical and empirical work has suggested that general cognitive ability is not sufficient for dealing with ill-defined problems, and that this may be because intelligence is not sufficient for overcoming egocentric biases in thinking and reasoning (Stanovich & West, 2008; West, Meserve, & Stanovich, 2012). Thus, although higher cognitive abilities are necessary, they are not sufficient for wisdom (Grossmann et al., 2013; Grossmann, Sahdra, & Ciarrochi, 2016; Staudinger, Lopez, & Baltes, 1997; Sternberg, 1998).

Another common conceptual feature uniting wise reasoning is transcendence (i.e., surpassing; going beyond) from immediate egocentrism (i.e., myopic focus on one's own immediate opinions, perspectives, outcomes, concerns, or desires on an issue). Transcendent reasoning includes taking a broad and multifaceted purview of situations, and acknowledgement and tolerance for contrasting views. Such reasoning bolsters dialectical thinking with prosociality by attenuating egocentrism and amplifying the relevance of others' viewpoints and needs. As such, transcendent thinking and reasoning has often been argued by notable wisdom scholars, and different cultural knowledge traditions in general, to boost wisdom and promote emotional and motivational balance (Berry & Irvine, 1986; Frankl, 1966; Grossmann & Kross, 2014; Kross & Grossmann, 2012; Le & Levenson, 2005; Levenson, Jennings, Aldwin, & Shiraishi, 2005; Rāhula, 1974; Vervaeke & Ferraro, 2013).

Uniting the concepts of dialectical thinking and transcendence, contemporary wisdom theorists cite an amalgum of wise reasoning processes: i) *recognition of the limits of one's own knowledge*, ii) *recognition of uncertainty and change*, iii) *consideration of multiple ways a situation could unfold*, iv) *recognition of others' perspectives*, v) *consideration of/search for compromise*, vi) *recognition of the importance of conflict resolution*, and vii) *application of an outsider's viewpoint* (Baltes & Smith, 2008b; Baltes & Staudinger, 2000; Basseches, 1980;

Clayton, 1975; Grossmann et al., 2010; Grossmann, 2017; Helson & Wink, 1987; Kitchner, 1983; Kramer, 2002; Meeks & Jeste, 2009; Ryff & Heincke, 1983; Ryff & Keyes, 1995; Vervaeke & Ferraro, 2013; Wink & Helson, 1997). Consistent with the theoretical connection between these forms of reasoning and the concept of wisdom, empirical studies have shown evidence from the contents of people's narratives about social challenges that individuals nominated as wise tend to exhibit greater wise reasoning than others (e.g., Baltes, Staudinger, Maercker, & Smith, 1995). Further, different aspects of wise reasoning tend to converge under a common 'wisdom' construct (e.g., Grossmann et al., 2010, 2013), and the use of individual aspects of wise reasoning can increase the use of the others (Grossmann & Kross, 2014; Kross & Grossmann, 2012).

### **General Overview**

Several points are worth noting in summary. First, wisdom appears to center on *how* one thinks, specifically about difficult and ill-defined social challenges (e.g., Staudinger & Glück, 2011). Therefore, wise reasoning should be assessed within or about such challenges. Second, wisdom scholarship suggests that wisdom has its foundations in an amalgam of thinking processes. Thus, different aspects of wise reasoning ought to converge under a unitary construct. Third, the core benefits of wise reasoning include psychological processes or states that relate to well-being, for example, more moderate emotional reactions in life challenges, greater tolerance, and motivation that balances self-interest with care for others. I designed a new measure of wise reasoning with these points in mind, and tested the relations between wise reasoning and theorized benefits of wisdom, in order to provide a launching point for empirical investigation on the practice and development of wisdom.

Chapter 1 details the design of the new wise reasoning measure and presents evidence for its reliability and factor structure. Chapter 2 shows evidence for the convergent and discriminant validity of wise reasoning. Chapter 3 focuses on wise reasoning and individual-level outcomes, showing that it relates to constructs that relate to improved psychological well-being. Chapter 4 focuses on wise reasoning and interpersonal-level outcomes, showing that it relates to cooperation—balancing self-interest with concern for others. Chapter 5 focuses on wise reasoning and group-level outcomes, showing that it relates to reduced intergroup bias, greater tolerance and support for others, and motivation to associate with outgroup members. Chapter 5 also demonstrates that wise reasoning can be experimentally facilitated, suggesting that it can be practiced and developed. The data used in this dissertation has been reported in Brienza, Kung, Santos, Bobocel, & Grossmann (under review; Chapters 1-3), Grossmann, Brienza, & Bobocel (2017; Chapter 4), and Brienza, Kung, & Chao (under review; Chapter 5).

## CHAPTER 1: A NEW METHOD TO ASSESS WISE REASONING

Chapter 1 summarizes the development of the situation-specific method to assess wise reasoning. As noted briefly above, extant measures of wisdom tend to suffer from a number of issues that I aimed to avoid in developing the new measure of wise reasoning. At one end of the spectrum, current self-report wisdom scales are efficient. However, they suffer from serious validity issues, namely socially desirable responding (Taylor et al., 2011), because they attempt to assess the highly desirable quality (Glück, König, NaschenIng, Redzanowski, Dorner, Straßer, et al., 2013) at an abstract level, as a personality trait. Although wisdom may include trait-like characteristics, the abstract focus *in measurement* also presents a conceptual issue in that it glosses over *how* people navigate through challenging situations, which is one of the primary functions of wisdom, instead assessing what people think about themselves. This trait-style approach to assessing wisdom therefore lacks context-sensitivity and does not permit researchers to explore the reasoning processes that promote wisdom.

At the other end of the spectrum are observer-rated performance measures of wisdom. These measures are more valid than trait-style measures because they are context-sensitive, and because they avoid socially desirable responding, being scored by independent raters. However, observer-rated performance measures require substantial time and labor investments to administer (e.g., Grossmann et al., 2010; Staudinger et al., 1997; Staudinger, Smith, & Baltes, 1994), and are therefore not efficient for large-scale investigation on wisdom.

I aimed to overcome the above limitations. I avoided the psychometric features that tend to invalidate self-report measures (i.e., focusing on decontextualized abstract views about desirable qualities) while maintaining their efficiency (i.e., using easy to understand self-reports). By doing so, I also avoided the time-intensive methodological features that make observer-rated



wise performance assessments impractical, while maintaining their source of context-sensitive validity. Further, to minimize biased responding and to improve the accuracy of the wise reasoning assessment, I adopted the event-reconstruction method (Kahneman et al., 2004; Schwarz et al., 2009) which facilitates participants' objective recall of a specific situation, including their thinking and reasoning at the time.

First, I designed a set of 46 items (Appendix A), each meant to assess an aspect of wise reasoning. I then conducted principal components analyses and principal axis factoring to trim the number of scale items. Last, I tested whether each aspect of wise reasoning would covary reliably under a latent wise reasoning construct, using confirmatory factor analyses. I expected that the reduced set of items would exhibit good reliability and that the individual aspects of wise reasoning would covary reliably under a single latent wise reasoning construct.

## **Study 1**

### **Method**

#### **Participants and Procedure**

**Item reduction and initial confirmatory factor analysis.** Sample A was used for initial item tests and initial confirmatory factor analysis (sample characteristics are presented in full, in Table 1). Participants were recruited from Amazon.com's Mechanical Turk (MTurk) to take part in an online survey, and were compensated US\$.50 for their time. I recruited participants who were native English speakers to avoid issues with comprehension of items for my initial item tests. Because conflicts are common in the workplace, in Sample A, I assessed participants' wise reasoning about a conflict they experienced at their job, and requested participants who were currently employed full-time. Participants were employed in a broad range of occupations (e.g., service, health-care, research). Participants first completed the wise reasoning assessment,

described below and in Appendix B. They then responded to a number of other measures, detailed in following Chapters.

**Large-scale confirmatory factor analyses.** For these tests, I included only responses focused on a similar context (i.e., conflicts with a close friend; Samples A and B excluded) and that were collected in a similar survey format (i.e., wise reasoning instrument presented first; Samples G-K excluded). Thus, samples C-F were used for large-scale confirmatory factor analyses. Participants ( $n = 1,708$ ) were recruited from MTurk and compensated US\$ .50 for their time. In these samples, I assessed participants' wise reasoning about a conflict they experienced with a close friend (Appendix B). Participants first completed the wise reasoning assessment, and then responded to a number of other measures, detailed in following studies.

### **Wise Reasoning Assessment**

**Event reconstruction.** Participants reconstructed a specific and recent real life experience before responding to the scale items. My instructions used event-reconstruction methods to facilitate accurate recall (Kahneman et al., 2004; Schwarz et al., 2009). First, participants recalled a difficult situation—an acute conflict situation or disagreement, rather than a recurring problem—that happened with a workmate or with a close friend, depending on the sample (see Table 1) in the past few months. Participants reflected on what they thought and felt during their conflict experience. To increase accuracy of recall, participants were guided with questions that helped them to reconstruct the context of their experience, such as who the conflict was with, where they were at the time, and day of the week (see Appendix B for the full measure).

**Scale items.** After the event reconstruction task (and after being reminded of anonymity and confidentiality to minimize social desirability influence; Paulhus & Vazire, 2007; Podsakoff,

MacKenzie, & Podsakoff, 2012), participants responded to the statement, “While this situation was unfolding, I did the following ...” by rating 46 (9 reverse-worded) wise reasoning items on a 5-point scale (1 = *Not at all*, 3 = *Somewhat*, 5 = *Very much*). Items focused on one of the following aspects of wise reasoning: *recognition of the limits of one’s own knowledge* (e.g., “Looked for any extraordinary circumstances before forming my opinion”; 10 items), ii) *recognition of uncertainty and change* (e.g., “Looked for different solutions as the situation evolved”; 8 items), iii) *consideration of multiple ways a situation could unfold* (e.g., “Believed the situation could lead to a number of different outcomes”; 6 items), iv) *recognition of others’ perspectives* (e.g., “Made an effort to take the other person's perspective”; 6 items), v) *consideration of/search for compromise* (e.g., “Tried my best to find a way to accommodate both of us”; 6 items), vi) *recognition of importance of conflict resolution* (e.g., “Tried to anticipate how the conflict might be resolved”; 5 items), and vii) *application of an outsider’s viewpoint* (e.g., “Tried to see the conflict from the point of view of an uninvolved person”; 5 items). Complete list of initial items is presented in Appendix A.

## Results

### Item Reduction

I first conducted a preliminary principal components analysis<sup>1</sup> on all items, using eigenvalues > 1 and promax rotation, to determine the presence of any problematic items or conceptually unrelated components (e.g., results of psychometric artifacts rather than latent psychological factors such as wise reasoning; Jolliffe, 2002). This process revealed 8 components, two of which clearly identified only the initial reverse-worded items, and not any

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<sup>1</sup> Principal components analysis was selected for this test because it makes no assumptions about latent psychological constructs driving responses but only reveals patterns in the response data, allowing me to uncover unwanted anomalies such as psychometric artifacts.

particular aspect of wise reasoning, indicating that the negative wording of these items was exerting undue influence on responses. Reverse-worded items were therefore removed from further analyses.

Next, I conducted iterated principal axis factoring<sup>2</sup> to reduce the scale to 2-4 items per aspect of wise reasoning, each of which best represented just one aspect of wise reasoning (Child, 2006; Floyd & Widaman, 1995; Furr & Bacharach, 2014). I imposed a 7-factor solution to reveal items that loaded strongly onto only one aspect, and utilized oblique rotation to allow factors to correlate. At each iteration, I removed items that did not load strongly onto a single factor (i.e., coefficients < .40; e.g., Cohen, Wolf, Panter, & Insko, 2011) or that cross-loaded substantially on more than one factor (< .20 difference between loadings on different factors). This process was repeated until all remaining items loaded > .40 on a single factor (i.e., to allow approximately equal weighting of aspects), resulting in 27 items explaining 62.02% of the total variance.

### **Model Fit**

Next, I conducted confirmatory factor analyses (CFA; Furr & Bacharach, 2014) to assess the fit of the 7-factor model of wise reasoning on Sample A responses. I assessed model fit with standard criteria: standardized root-mean-square residual (RMSR; < .10), root-mean-square error of approximation (RMSEA; < .08), comparative fit index (CFI; > .95), and probability of close fit (PCLOSE; > .05) (Hu & Bentler, 1999; Meyers, Gamst, & Guarino, 2006). According to these guidelines, CFA on the initial 7-factor model showed that it could be improved (i.e., PCLOSE < .01). I removed one item that had clustered in an unplanned factor (item 14) and five items that

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<sup>2</sup> Principal axis factoring was selected for this test because it does make assumptions about latent psychological constructs, which I imposed via forced 7-factor solution.

exhibited highest frequency of standardized residual covariance  $> .40$  with other items (items 4, 6, 8, 24, and 42; Gaskin & Happell, 2014; Hoelter, 1983). After removing these 6 items, CFA on the resulting 21-item model indicated good fit,  $\text{RMSR} = .046$ ,  $\text{RMSEA} = .036$ ,  $\text{CFI} = .983$ ,  $\text{PCLOSE} = .997$ .

Next, I conducted a large-scale CFA on responses from Samples C-F. These were independent from the responses used for item-reduction and selection, and all focused on conflicts with a close friend. I tested the 7-factor model, which exhibited good fit,  $\text{RMSR} = .061$ ,  $\text{RMSEA} = .048$ ,  $\text{CFI} = .966$ , and  $\text{PCLOSE} = .876$ . However, I questioned whether a more parsimonious model (i.e., fewer latent factors) would also exhibit good model fit. Further, there is considerable conceptual overlap between some wise reasoning aspects, for example, i) *multiple outcomes* and *change*, and ii) *compromise* and *resolution*, potentially justifying their combination. Thus, I combined multiple outcomes with change, and compromise with resolution, to form two equally-weighted aspects of wise reasoning. This new 5-factor model exhibited slightly better fit,  $\text{RMSR} = .057$ ,  $\text{RMSEA} = .046$ ,  $\text{CFI} = .969$ , and  $\text{PCLOSE} = .990$ , than the 7-factor model. Thus, on the basis of parsimony and near equivalence in item-weighting per aspect of wise reasoning, the 5-factor model was accepted as the final model (Figure 1). Reliability of the measure was consistently high: Cronbach's  $\alpha$  in every sample and every version of the measure always met or surpassed the .90 mark. Notably, despite claims that wisdom-related characteristics may be rare (Baltes & Smith, 2008), I observed a normal distribution ( $M = 3.08$ ,  $SD = .74$ ) with no skewness ( $\text{Skew} = -.21$ ) of wise reasoning scores.

### **Chapter 1 Summary**

Chapter 1 presented evidence that the new, situation-specific wise reasoning measure is highly reliable—internal consistency of items was high and model fit indices were good. I also

found that the individual aspects of wise reasoning covaried reliably under a unitary wise reasoning construct. In Chapter 2, I move beyond tests of reliability to present initial validity tests.

## CHAPTER 2: INITIAL VALIDITY TESTS

In Chapter 2, I present initial validity tests. Specifically, I examine the convergent and discriminant validity of wise reasoning. Examining convergent validity, I compared wise reasoning to scores on three extant self-report, trait-style measures of wisdom: Self-Assessed Wisdom Scale (Webster, 2003), Three-Dimensional Wisdom Scale (Ardelt, 2003), Adult Self-Transcendence Inventory (Levenson et al., 2005). I then examined whether people show correspondence between the extent to which they use wise reasoning about their own challenges versus larger-scale societal conflict. For this test, I adapted the wise reasoning measure to focus on reasoning about a societal conflict that was heightened at the time,<sup>3</sup> comparing these scores to those from the original (interpersonal) wise reasoning measure. I also tested whether wise reasoning about the societal conflict corresponds with participants' open-text wisdom performance scores, as rated by outside observers (Grossmann et al., 2010, 2013). To examine this question, I asked participants to respond via open-text to several questions about the societal conflict. Across all of these tests, I expected that wise reasoning would show good convergent validity by exhibiting positive, small-to-medium relations with the extant trait-style wisdom measures, the adapted intergroup wise reasoning measure, and observer-rated wisdom performance.

Next, I examined the discriminant validity of wise reasoning. Biased responding (e.g., self-deception and impression management), is particularly problematic for self-report wisdom measures, ostensibly because wisdom is a highly desirable trait and because the measures attempt to assess wisdom as a global character trait (Assmann, 1994; Glück et al., 2013; Taylor

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<sup>3</sup> The intergroup conflict focused on the protests and revolution in Ukraine and the Crimea referendum, with the study being conducted in March 20<sup>th</sup> – 24<sup>th</sup>, 2014.

et al., 2011). Therefore, an important goal in creating a new paradigm to measure wisdom-related thinking was that it be independent from biased responding, one of the reasons why I focused the measure on specific situations and utilized the event-reconstruction method. Thus, in Study 2, I compared wise reasoning versus extant self-report trait-level wisdom scores to scores on self-deception and impression management (Paulhus, 1984, 1988). I also compared wise reasoning and extant trait-style wisdom scores to social-cognitive bias, namely bias blind spot (i.e., the tendency to attribute greater psychological bias to others than to the self; Pronin, 2008) and attributional bias (i.e., attributing people's behavior solely to personality or situational factors; Gilbert & Malone, 1995; Grossmann & Varnum, 2011; Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006; Ross, 1977), both forms of cognitive imbalance. For both biased responding and social-cognitive biases, I expected that wise reasoning would surpass extant trait-style wisdom measures by showing null or negative relations to bias.

## **Study 2**

### **Method**

#### **Participants and Procedures**

Participants were drawn from Samples D and E. In both samples, participants were recruited from MTurk to take part in an online survey, and were compensated US\$.50 for their time. Sample D participants completed the wise reasoning measure, self-rated trait-style wisdom measures, indices of biased responding and social-cognitive bias. Sample E participants completed the wise reasoning measure and the adapted measure of wise reasoning about intergroup conflict, and they provided text responses for the observer-rated wisdom performance assessment.



## Measures

**Self-Assessed Wisdom Scale (SAWS).** The SAWS (Webster, 2003) is a 40-item measure assessing multiple wisdom dimensions: Experience (e.g., “I have overcome many painful events in my life”), Emotional Regulation (e.g., “I am “tuned” in to my own emotions”), Reminiscence/Reflection (e.g., Recalling my earlier days helps me gain insight into important life matters”), Humor (e.g., “Now I find that I can really appreciate life’s little ironies”), and Openness (e.g., “I like being around persons whose views are strongly different from mine”). Statements are assessed on 6-point scales (1 = *Strongly disagree* to 6 = *Strongly agree*). Per the author’s instructions, scores are determined by computing the mean of all items to form a total wisdom score; Cronbach’s  $\alpha = .91$ .

**Three-Dimensional Wisdom Scale (3D-WS).** The 3D-WS (Ardelt, 2003) is a 39-item measure that assesses wisdom as a composite of cognitive (e.g., “I always try to look at all sides of a problem”), reflective (e.g., “When I look back on what's happened to me, I feel cheated”), and affective dimensions (e.g., “I either get very angry or depressed if things go wrong”). Statements are assessed on 5-point scales (1 = *Strongly agree* to 5 = *Strongly disagree* or 1 = *Definitely true of myself* to 5 = *Not true of myself*). Scores are determined by computing the mean of each of the three dimensions and taking the mean of these three dimensional scores;  $\alpha = .87$ .

**Adult Self-Transcendence Inventory (ASTI).** The ASTI (Levenson et al., 2005) assesses wisdom as the development of self-transcendence, using 10 items. This scale asks participants to rate themselves as they are now, compared to five years ago (e.g., “I am more likely to engage in quiet contemplation”). Statements are assessed on 4-point scales (1 = *Disagree strongly* to 4 = *Agree strongly*). Scores are determined by computing the mean of all items to form a total wisdom score;  $\alpha = .80$ .

**Observer-rated wisdom performance.** Participants provided written reflections on a recent societal conflict, which were rated by independent observers (as in Grossmann et al., 2010). Participants were surveyed following the Crimea referendum in Eastern Europe (March 20<sup>th</sup> - 24<sup>th</sup>, 2014), and read a brief summary of the ongoing socio-political conflict in the Ukraine (Appendix C). After reading the summary, participants were asked to provide their thoughts about the conflict, guided by three questions, in the following order: “How do you think the situation in Ukraine might unfold?”, “Why do you think the issue in Ukraine might unfold in the way you just wrote?”, and “What do you think should be done in the situation in Ukraine?” (Grossmann et al., 2010, 2013).

Following established procedures, two trained, hypothesis-blind raters content-analyzed participants’ narrative reflections on 5 aspects of wisdom-related thought: recognition of the limits of one’s own knowledge, recognition of uncertainty and change, recognition of others’ perspectives, consideration of/search for compromise, and importance of conflict resolution (Grossmann et al., 2010, 2013; Grossmann & Kross, 2014; Kross & Grossmann, 2012). Given that the participants were not involved in the conflict (i.e., default 3<sup>rd</sup> person perspective), I did not code responses for the application of an outsider’s viewpoint. Raters used a scale from 0 (*Not at all*) to 2 (*A great deal*). Inter-rater reliabilities for each aspect were in the medium-high range ( $.71 \leq \text{Cohen's } \kappa \leq .79$ ). As in prior research (Grossmann et al., 2010, 2016; Kross & Grossmann, 2012), the aspects of wisdom-related thought were subjected to a principal components analysis, which yielded a single component solution, with the resulting factor score used as a metric of observer-rated wise reasoning performance scores.

**Wise reasoning about an intergroup conflict.** Upon reading the summary of the Ukraine conflict and providing their thoughts about the conflict, participants completed an

adapted set of 21 wise reasoning items (Appendix D). In this measure, I asked participants to indicate the extent to which they engaged in wise reasoning as they were contemplating the Ukraine conflict and while completing their open-text responses on a 5-point scale (1 = *Not at all*, 3 = *Somewhat*, 5 = *Very much*);  $\alpha > .93$ .

**Biased responding.** The 20-item Self-Deception and 20-item Impression Management subscales of the BIDR (Paulhus, 1984, 1988) was used. Self-deception assesses overconfidence in oneself (e.g., “I never regret my decisions”), and impression management assesses the tendency to over-report desirable and under-report undesirable behavior (e.g., “I never cover up my mistakes”). Statements were assessed on 7-point scales (1 = *Strongly disagree* to 7 = *Strongly agree*). A score of 1 is assigned for each item for which the participant scores an extreme score (i.e., 6 or 7), and a score of 0 for each item that is scored otherwise. Following Paulhus (1984, 1988), item scores for each sub-scale were summed, resulting in a total range from 0 (low desirable responding) to 20 (high desirable responding);  $\alpha s > .70$ .

**Bias blind spot.** The paradigm developed by Pronin et al. (2002) was used. Participants read a description of the “self-serving bias” and were asked about their own susceptibility to this bias (i.e., “To what extent do you believe that you show this effect or tendency?”) and about the susceptibility of the average American to this bias (i.e., “To what extent do you believe the average American shows this effect or tendency?”), on 9-point scales (1 = *Not at all* to 9 = *Strongly*). Presentation order was counterbalanced. Scores were computed by calculating a difference score between participants’ ratings of others’ vs. their own susceptibility to the self-serving bias. Higher scores represent greater bias blind spot.

**Biased (vs. balanced) attributions.** Participants read four vignettes which depict an individual who performed either a desirable or an undesirable action under some extenuating

context (see Appendix E; Grossmann & Varnum, 2011; Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006). After reading each vignette, participants answered two questions indicating 1) the extent to which features of the individual, such as his/her character, attitude, or temperament, influenced their actions (dispositional attribution), and 2) the extent to which features of the environment that surround the individual, such as atmosphere, social norms, or other contextual factors, influenced their actions (situational attribution; 1 = *Strongly disagree*, 6 = *Strongly agree*). Vignette and question presentation order were counterbalanced. For each vignette, a “biased attribution” score was assigned (coded = 1) if participants failed to report both dispositional and situational factors as influential to the individuals’ behavior. Otherwise I assigned a score of 0. I calculated a composite index of biased attribution by averaging the scores from the four vignettes;  $\alpha = .60$ .

## Results

### Convergent Validity

Chapter 2 results are presented in Table 2. I first examined the relationships between wise reasoning (interpersonal conflicts) measure and the three self-report measures of wisdom. As expected, I observed small-to-medium positive associations with these measures,  $.19 < r_s \leq .40$ , suggesting good convergent validity. Next, I found that wise reasoning about interpersonal conflicts related to wise reasoning about the intergroup conflict,  $r = .45, p < .001$ . In turn, wise reasoning about the intergroup conflict significantly predicted observer-rated wise reasoning performance about the intergroup conflict,  $B = .19, t(200) = 2.66, p = .008$ . This association is comparable in magnitude to the degree of convergence of self- and observer-ratings on other established diagnostic instruments (Meyer et al., 2001). The convergence across methods of

assessments and across situations is noteworthy. It suggests that people's wise reasoning in one situation may generalize to another.

### **Discriminant Validity**

**Biased responding.** Next, I tested whether interpersonal (vs. intergroup) wise reasoning and trait level measures of wisdom would predict biased responding. Each of the trait-level wisdom measures was associated with biased responding,  $.22 \leq r_{\text{Impression management}} \leq .40$  and  $.17 \leq r_{\text{Self-deception}} \leq .36$  ( $p < .001$ ), replicating past findings (Glück et al., 2013; Taylor et al., 2011). In contrast, wise reasoning scores were negligibly related to biased responding,  $r_{\text{impression management}} = .08, p = .014, r_{\text{self-deception}} = -.05, p = .186$ , establishing evidence of the new measure's independence from biased responding, and further distinguishing wise reasoning from self-report trait-style wisdom measures.

**Social biases.** Next, I compared the relations between wise reasoning and the three trait-style measures of wisdom to measures of social-psychological bias. Here, I found that the trait-style measures related to greater bias blind spot,  $.18 \leq r_s \leq .25$ , but wise reasoning scores did not ( $r < .01$ ). Furthermore, participants with higher wise reasoning scores were less likely to make biased (vs. balanced) attributions,  $r(696) = -.11, p = .002$ , as were participants scoring higher on one trait-style wisdom scale, the SAWS:  $r(227) = -.13, p = .040$ .<sup>4</sup> The size of the association between wise reasoning and biased attribution was comparable when controlling for SAWS,  $r = -.11, p = .07$  (note that the magnitude of the relation between wise reasoning and biased attributions controlling [vs. not controlling] for SAWS remains the same but the  $p$ -value increases due to smaller sub-sample containing both SAWS and wise reasoning data). In

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<sup>4</sup> Other global wisdom scales showed no significant relations to attributional judgments,  $r_s < |.05|$ .

contrast, the reverse was not true—the magnitude of the relationship between SAWS and biased attributions was reduced when controlling for wise reasoning,  $r = -.07, p = .25$ .

### **Chapter 2 Summary**

Altogether, Chapter 2 presented findings showing that wise reasoning scores exhibited good convergent validity, with consistent relations with extant trait-style wisdom scores and observer-rated wisdom scores, as well as expected relations to wise reasoning about intergroup conflict. Further, Chapter 2 findings showed that, in contrast to trait-style wisdom measures, wise reasoning exhibited excellent discriminant validity, and was independent of biased responding and social-cognitive biases.

### CHAPTER 3: INDIVIDUAL-LEVEL OUTCOMES

According to psychological theorizing on wisdom (Baltes & Smith, 2008; Erikson, 1984; Ryff & Heincke, 1983; Ryff & Keyes, 1995; Staudinger & Glück, 2011; Sternberg, 1998), the wise individual ought to be balanced in thinking, judgment, and action, skilled at emotion regulation and intelligence, and oriented to collective well-being (vs. being predominantly self-serving). Does wise reasoning relate to such tendencies? Chapter 3 presents the results of tests addressing this question. I hypothesized that wise reasoning would be positively associated with such tendencies (Baltes & Staudinger, 2000; Kunzmann & Baltes, 2003; Tiberius, 2008), without fully overlapping with them (Staudinger & Glück, 2011; Staudinger et al., 1997).

I selected such measures as mindfulness, openness, emotional intelligence, and attributional complexity to compare with wise reasoning, because they have been shown to lead to positive social-cognitive outcomes (Fletcher, Danilovics, Fernandez, Peterson, & Reeder, 1986; Goldstein & Gigerenzer, 2002; Kabat-Zinn, 2000; Law, Wong, & Song, 2004; Wong & Law, 2002) that are associated with wisdom (Baltes & Smith, 2008; Dambrun & Ricard, 2011; Garland, Farb, Goldin, & Fredrickson, 2015; Grossmann et al., 2013; Staudinger & Glück, 2011; Sternberg, 1998). Most psychological perspectives suggest that wisdom involves recognition of change and uncertainties in life (Baltes & Smith, 2008b; Basseches, 1984; Grossmann et al., 2010; Staudinger & Glück, 2011). Hence I expected wise reasoning would be associated with changeable (i.e., incremental) beliefs about conflicts and social life in general. Measures such as emotion suppression and rumination were selected because of research indicating that they lead to negative outcomes (Gross & John, 2003; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). I expected negative or null relationships between these constructs and wise reasoning. Finally, I included measures of social orientation, such as communal relationship orientation,

agreeableness, and attending to others' emotions, to examine whether wise reasoning relates to motivation toward others' well-being.

### **Study 3**

#### **Method**

##### **Participants**

Participants in Samples A, B, D, and G completed individual differences measures. Participants from Samples A, B, and D were recruited from MTurk to take part in an online survey, and were compensated US\$.50 for their time. Participants from Sample G were recruited as part of mass testing at the University of Waterloo and were compensated with course credit. Participants responded to the wise reasoning measure and a subset of the included measures, as detailed in Table 3. Participants in Sample G also completed several other measures as part of mass testing; these were not analyzed and are not included in the current study.

##### **Measures**

**Attributional complexity.** Fletcher and colleagues' (1986) measure of attributional complexity was used. The measure assesses the degree to which individuals are motivated to uncover more or less in-depth information about social events. Participants were asked to rate the extent to which they agreed with 28 statements (e.g., "I think very little about the different ways that people influence one another") on 7-point scales (1 = *Disagree strongly*, 7 = *Agree strongly*);  $\alpha = .92$ .

**Big five personality traits.** John, Naumann, and Soto's (2008) Big Five Inventory was used to assess personality. Participants indicated the extent to which they agreed with 44 statements about themselves, assessing openness to experience (e.g., "Is curious about many different things"), Conscientiousness (e.g., "Does a thorough job"), Extraversion (e.g., "Has an



assertive personality”), Agreeableness (e.g., “Is helpful and unselfish with others”), and Neuroticism (e.g., “Can be moody”) on 5-point scales (1 = *Disagree strongly*, 5 = *Agree strongly*);  $\alpha > .82$ .

**Communal relationship orientation.** Clark, Ouellette, Powell, and Milberg’s (1987) scale was used. Participants responded as to how characteristic of them each of 10 statements is (e.g., “I’m not especially sensitive to other people’s feelings”), on a 5-point Likert-type scale (1 = *Extremely characteristic of me*, 5 = *Extremely uncharacteristic of me*);  $\alpha = .88$ .

**Emotion regulation.** Gross and John’s (2003) 10-item Emotion Regulation Questionnaire was used. The measure assesses two dimensions of emotional regulation. The first dimension, *reappraisal*, includes six statements assessing the extent to which individuals control their emotions by changing the way they think about situations (e.g., “When I want to feel more positive emotion, I change the way I’m thinking about the situation”). The second dimension, *suppression*, includes four statements assessing how individuals withhold expressing their emotions (e.g., “I control my emotions by not expressing them”). All statements were assessed on 7-point scales (1 = *Strongly agree*, 7 = *Strongly disagree*);  $\alpha > .85$ .

**Emotional intelligence.** Wong and Law’s (2002) 16-item Emotional Intelligence Scale was used. The measure assesses 4 dimensions of emotional intelligence: *self-emotions appraisal* (e.g., “I really understand what I feel”), *others-emotions appraisal* (e.g., “I have good understanding of the emotions of people around me”), *use of emotion* (e.g., “I would always encourage myself to try my best”), and *regulation of emotion* (e.g., “I can always calm down quickly when I am very angry”). All statements were assessed on 7-point scales (1 = *Totally disagree* to 7 = *Totally agree*);  $\alpha > .88$ .

**Growth mindset about social relations.** I adapted items from the growth (i.e., incremental) versus fixed (i.e., entity) mindset of people (Chiu, Hong, & Dweck, 1997) to create items that measured growth mindset of social relations. I asked participants the extent to which they agreed with three statements regarding *interpersonal relations* (e.g., “People can always change their own interpersonal ability”). I also asked participants to report the extent to which they agreed with three statement regarding *social conflicts* (e.g., “The degree of conflict between people can change over time”). Participants replied to statements on 7-point scales (1 = *Strongly disagree*, 7 = *Strongly agree*). Scores were calculated by averaging the items;  $as > .79$ .

**Intellect.** Mussel’s (2013) 24-item scale was used. The measure assesses two motivational components of intellect: *seek* and *conquer*. The seek dimension includes 12 items referring to openness and positivity toward situations that are intellectually challenging (e.g., “I would like to learn new ways of doing things”). The conquer dimension includes 12 items assessing how one is motivated to resolve situational incongruities and master intellectual challenges, once they arise (e.g., “I am able to think about things in a lengthy, focused way”). All statements were assessed on 7-point scales (1 = *Strongly agree*, 7 = *Strongly disagree*):  $as > .95$ .

**Mindfulness.** Baer and colleagues’ (2006) 39-item Five Factor Mindfulness Questionnaire was used. The measure assesses *non-reactivity to inner experience* (e.g., “In difficult situations, I can pause without immediately reacting”), *observing/attending* (e.g., “I pay attention to how my emotions affect my thoughts and behavior”), *acting with awareness* (e.g., “I find myself doing things without paying attention”), *describing/labeling with words* (e.g., “I’m good at finding the words to describe my feelings”), and *non-judging of experience* (e.g., “I criticize myself for having irrational or inappropriate emotions”). Participants responded to

statements on 5-point scales (1 = *Never or very rarely true*, 5 = *Very often or always true*):  $\alpha > .85$ .

**Perspective taking.** The perspective taking dimension of Davis' (1980) Empathy Questionnaire was used. Participants rated the degree to which nine statements describe them (e.g., "I try to look at everybody's side of an agreement before I make a decision") on a 5-point scale (1 = *Does not describe me well*, 5 = *Describes me very well*):  $\alpha = .80$ .

**Rumination.** Nolen-Hoeksema and Morrow's (1991) 10-item Ruminative Responses Scale was used. The measure assesses two dimensions of rumination: adaptive *reflection* (e.g., "Go someplace alone to think about your feelings") and maladaptive *brooding* (e.g., "Think: What am I doing to deserve this?"). Each dimension was assessed with 5 items on 4-point scales (1 = *Almost never* to 4 = *Almost always*);  $\alpha > .77$ .

## Results

Sample inclusion, number of observations and items per measure, central tendency for each measure, and correlations between wise reasoning and individual differences measures are presented in Tables 3-4. Wise reasoning was significantly associated with open-minded beliefs and thinking styles, including growth mindset about social relations, intellect, attributional complexity, and openness. Wise reasoning was further associated with greater social orientation, as measured by perspective-taking, extraversion, communal relationship orientation, and others-emotions appraisal sub-scale of emotional intelligence. Finally, wise reasoning was related to emotion regulation, three sub-dimensions of mindfulness (non-reactivity, observing and attending, describing with words), emotional intelligence (self-emotions appraisal, use of emotions, regulation of emotions), emotional reappraisal, and adaptive reflection. Although maladaptive brooding was positively correlated to wise reasoning, brooding normally shares

variance with adaptive reflection (Treyner et al., 2003). When controlling for reflection, brooding was unrelated to wise reasoning,  $r = .06$ . In contrast, reflection remained positively associated with wise reasoning when controlling for brooding,  $r = .23$ . Associations with other individual differences did not reach statistical significance.<sup>5</sup>

### Chapter 3 Summary

Taken together, Chapter 3 findings showed that wise reasoning relates to positive individual-level outcomes. Wise reasoning scores were positively related to mindfulness and other beneficial cognitive traits, adaptive emotional functioning, and orientation to collective well-being. The findings indicate that wise reasoning has excellent construct validity (Cronbach & Meehl, 1955), and that people's use of wise reasoning in their own interpersonal and workplace conflicts relates to, but is not fully explained by, individual differences in these other constructs (i.e., no observed relation was greater than .50).

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<sup>5</sup> Much research has investigated perspective taking alone, and its positive relations to important psychological and social outcomes (e.g., prosociality; Underwood & Moore, 1982). I explored whether wise reasoning would relate to individual differences in emotion regulation, and prosocial tendencies once the variance explained by the perspective-taking aspect of wise reasoning was removed. To this end, I first computed a perspective-taking index, using the first four items of the wise reasoning scale. I also recalculated an overall index of wise reasoning by averaging the remaining 17 items. Next, I conducted five separate regression analyses with perspective-taking index as the predictor of wise reasoning (average index and four sub-components), saving the unstandardized residual scores for further analyses. This process removed the variance explained by the perspective-taking index from the remaining wise reasoning scores. Finally, I tested the zero-order correlations between the residual scores and each of the individual differences in the current study. Results are presented in Table 4, alongside the correlations between the non-residualized scores and individual differences, for comparison. As results indicate, the pattern of results was similar, albeit with different magnitude of correlations in several cases.

## CHAPTER 4: INTERPERSONAL-LEVEL OUTCOMES

Chapter 3 showed initial evidence of the relation between wise reasoning and balancing self-interest with others' well-being—prosociality in terms of trait-level communalism and agreeableness—an important assumption of the concept of wisdom (Staudinger & Glück, 2011; Sternberg, 1998). However, I wanted to establish stronger and more nuanced evidence for this relation and how it manifests in behavior in different domains. Thus, in Chapter 4, I present two studies testing the relationship between wise reasoning and prosociality, in two domains: 1) in behaviors within participants' own interpersonal conflicts (Study 4) and 2) in a public goods game (PGG; Study 5). As described more below, Study 5 presents a more nuanced examination of the effect of wise reasoning on prosociality by testing whether wise reasoning moderates the previously-demonstrated (Rand, Greene, & Nowak, 2012) negative effect of decision time on cooperation.

### **Study 4**

In Study 4, I test the relations between wise reasoning and the behaviors that people report engaging within the same conflict they recalled for the wise reasoning assessment. In this test, I expected that wise reasoning would relate to more prosocial and less antisocial conflict-related behaviors, within participants' own interpersonal conflicts.

### **Method**

#### **Participants and Procedure**

Participants were drawn from Samples B-D, and F. In all cases, participants were recruited from MTurk to take part in an online survey, and were compensated US\$.50 for their time. Participants from Samples B-D were assessed for their wise reasoning about an intergroup conflict they had recently experienced. Following completion of the wise reasoning measure,

participants reported the conflict-related behaviors that they engaged within that same conflict (e.g., forgave the other person). Participants from Sample F completed the same measures as above, but reported their conflict-related behaviors first (to ensure that the wise reasoning measure itself did not influence responses to conflict-related behaviors).

## Measures

**Conflict-related behaviors.** Based on research on conflict resolution (De Dreu, Evers, Beersma, KluIr, & Nauta, 2001; Deutsch et al., 2011; Rahim & Magner, 1995) I created items assessing the behaviors that participants engaged, specifically within the conflict they recalled as part of the wise reasoning measure. Participants responded to statements concerning their behavior during the conflict: 1) *I tried to find another person to hear both sides of the story*; 2) *I tried to find somebody to give me impartial advice*; 3) *I tried to communicate with the other person to try to solve the problem together*; 4) *I forgave the other person*; 5) *Tried to just disengage from the other person and/or the situation*; 6) *Retaliated against the other person*; 7) *Tried to find an ally against the other person*. Participants indicated whether they engaged in each behavior (*No/Yes*). Items 1-4 were categorized as prosocial, and items 5-7 as anti-social.

## Results

Concerning the relationship between wise reasoning and prosocial conflict-related behavior, I found that greater wise reasoning related to people's prosocial behaviors within their own conflicts,  $.08 < \rho s < .22$  ( $ps < .001$ ), and less likelihood of engaging in anti-social behaviors,  $-.14 < \rho s < -.11$  ( $ps < .001$ ). This tendency held controlling for age, gender, and presentation order of the materials. These findings suggested that wise reasoning promotes prosociality.

## **Study 5**

Going beyond zero-order relations, Study 5 presents the results of a more nuanced examination of the effect of wise reasoning on prosociality. Specifically, I wanted to examine whether wise reasoning relates to more robust prosociality. Would wise reasoners maintain cooperation in situations that typically evoke self-interested concerns? For this test, I examined recent research on the cognitive underpinnings of cooperation, which has shown that decision time can reduce cooperation (Rand et al., 2012). Rand et al. (2012) suggested that deliberation (time) reduces cooperation because it brings forth egocentric concerns in response to the threat of the self being exploited in economic games. However, this research neglected to test whether differences in thinking style can moderate the effect of deliberation. I suggested that people who utilize wise reasoning in their own threatening situations (i.e., conflicts) may be less susceptible to the negative effect of deliberation in social dilemma tasks. That is, wise reasoners may focus less on the potential self-losses that can be accrued via defection and be more likely to consider maximizing potential group gains accrued via cooperation. Accordingly, I tested whether wise reasoning would moderate the established negative effect of decision time on cooperation in the PGG.

## **Method**

### **Participants and Procedure**

Participants were drawn from Sample G. Participants were recruited from MTurk to take part in an online survey, and were compensated US\$.75 for their time. Further, they were provided a bonus of US\$.40 to use to take part in the PGG. Participants completed the wise reasoning measure and the PGG, counterbalanced in presentation order with a standard filler task between measures. I adopted the same procedure used by Rand et al. (2011). Namely, I measured

naturalistic decision time on the PGG and also conducted an experimental manipulation of decision time. I randomly assigned participants to one of three conditions wherein they were forced to deliberate ('Time-delay' condition;  $n = 200$ ) or forced to not deliberate ('Time-pressure' condition;  $n = 169$ ) on their cooperation decision, or a control condition in which there was no time restriction (control condition;  $n = 265$ <sup>6</sup>). I measured decision time in all cases.

## Measures

**Public goods game.** Participants took part in a public goods game (PGG). As in prior work (Rand et al., 2012), participants were told that they received a \$0.40 bonus that they could use in a 4-player group task. They then read the PGG instructions (full materials are presented in Appendix F), indicating that they were randomly paired with three other anonymous participants for a group project and that each member of the group could contribute as much of their bonus as they wish to the project. Each member could keep the amount of money that they did not contribute. The collective contribution would be doubled and split evenly between all four members of the group. After reading the PGG instructions, participants proceeded to a contribution page where they were asked to decide how much of their bonus to contribute. Following Rand et al., (2012), participants were randomly assigned to one of three conditions. Participants in the 'time delay' condition were instructed to consider their decision for at least 10 seconds; participants in the 'time pressure' condition were instructed to take less than 10 seconds to make their decision; participants in the 'control' condition did not receive time instructions (see Appendix F for complete instructions and filtering criteria for participants who failed to read

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<sup>6</sup> Valid  $n$ s after screening for reading comprehension and following PGG instructions; screening criteria are presented in Appendix F.



or adhere to task instructions). I tracked the amount of time participants took deliberating on their decision in all conditions.

## Results

To reiterate, I hypothesized that wise reasoning would moderate the established negative effect of decision time (naturalistic and experimentally induced) on cooperation in the PGG. First, I tested whether wise reasoning moderated the effect of naturalistic decision time (i.e., in the control condition) on cooperation. I found no correlation between wise reasoning and deliberation time,  $r = .05$ ,  $p = .228$ . Consistent with prior work (Rand et al., 2012), I found that decision time on the PGG decision was negatively related to cooperation,  $B = -1.47$ ,  $SE = 0.32$ ,  $t = 4.57$ ,  $p < .001$ . However, as predicted, I also found that wise reasoning moderated the effect,  $B = 0.83$ ,  $SE = 0.32$ ,  $t = 2.57$ ,  $p = .011$ . Unpacking the interaction, I found that the negative effect of decision time was attenuated for participants with stronger wise reasoning (+1 *SD*),  $B = -0.86$ ,  $SE = 0.25$ ,  $t = -3.39$ ,  $p = .001$ , compared to those with weaker wise reasoning (-1 *SD*),  $B = -2.06$ ,  $SE = 0.50$ ,  $t = -4.16$ ,  $p < .001$ . Unpacking the interaction a different way, with decision time as the moderator, I found that wise reasoning predicted greater cooperation when participants deliberated a lot (+1 *SD* on decision time),  $B = 11.73$ ,  $SE = 5.10$ ,  $t = 2.30$ ,  $p = .022$ , but not when they deliberated little (-1 *SD* on decision time),  $B = -8.22$ ,  $SE = 4.77$ ,  $t = -1.73$ ,  $p = .086$ . The moderating effect of wise reasoning held irrespective of the order in which participants completed the wise reasoning measure and PGG materials (interaction controlling for presentation order,  $B = 0.85$ ,  $SE = 0.32$ ,  $t = 2.62$ ,  $p = .009$ ).

Next I examined whether wise reasoning moderated experimentally manipulated decision time. Analysis with condition, wise reasoning, and their interaction as predictors of cooperation showed a main effect of wise reasoning,  $F(1,628) = 5.05$ ,  $p = .025$ , and a marginal condition  $\times$

wise reasoning interaction,  $F(2,628) = 2.79, p = .060$ . As shown in Figure 2, in the deliberation ('time delay') condition wise reasoning was significantly associated with more cooperation,  $B = 10.87, SE = 3.55, t = 3.06, p = .003$ . There was no significant wise reasoning  $\rightarrow$  cooperation association among participants in the other groups, 'time pressure':  $B = 3.69, SE = 4.31, t < 1, p > .250$ ; 'control':  $B = -0.33, SE = 3.09, t < 1, p = > .250$ .

Decomposing the condition factor into two dummy-coded variables (0 = control, 1 = time delay or time pressure), wise reasoning significantly qualified the difference between 'time delay' and control conditions, dummy-code  $\times$  wise reasoning interaction:  $B = 11.20, SE = 4.76, t = 2.36, p = .019$ . However, wise reasoning did not qualify the difference between 'time pressure' and control conditions, 'time pressure'-code  $\times$  wise reasoning interaction,  $t = 0.77, p > .250$ . Notably, participants in 'time pressure' and 'control' conditions spent similar amount of time on the cooperation task,  $M_{\text{difference}} = 2.24, SE = 1.11, p = .130$ , whereas participants in the 'time delay' condition spent significantly more time than participants in both other conditions, control:  $M_{\text{difference}} = 17.25, SE = 1.01, p < .001$ , and 'time pressure':  $M_{\text{difference}} = 19.48, SE = 1.18, p < .001$ .

With no significant difference in time spent on the PGG decision in the 'time pressure' and control conditions, I pooled the slopes for both conditions, examining whether wise reasoning moderated the effect of deliberation on cooperation, finding a group  $\times$  wise reasoning interaction (time pressure + control vs. time delay),  $B = 9.75, SE = 4.36, t = 2.34, p = .019$ . Instructions to deliberate led to less cooperation among participants with weaker wise reasoning (at -1 SD),  $B = -8.56, SE = 4.46, t = 1.96, p = .051$ . However, this effect was attenuated and reversed in direction among participants with stronger wise reasoning (at +1 SD),  $B = 6.02, SE = 4.46, t = 1.35, p = .177$ .

## Chapter 4 Summary

Taken together, Chapter 4 findings provided incremental support for my hypothesis that wise reasoning would have a positive effect on prosociality. First, stronger use of wise reasoning within people's own conflicts related positively to prosocial and negatively to antisocial conflict-related behaviors within those same conflicts. Further, I found support for the hypothesis that people who are more likely to express wisdom in reflections on personal conflicts tend to sustain cooperation in situations that may evoke self-interested concerns. Specifically, I found that wise reasoning moderated the effect of naturalistic and experimentally manipulated decision time on cooperation in the PGG. The findings indicate that wise reasoning relates to prosociality—balancing self-interest with interest in others' well-being—as wisdom theory would suggest. They also suggest that the positive effect of wise reasoning is most potent when people are explicitly asked to deliberate.

Notably, although wise reasoning attenuated the negative effect of naturalistic decision time in Study 5, the effect was still significant even for those with stronger wise reasoning. One explanation for this effect is that I underspecified the focus of the wise reasoning assessment in Study 5. Specifically, I assessed participants' wise reasoning about one of their own conflicts, and then tested whether these wise reasoning scores moderated a relationship in a different domain: their deliberation and cooperation in the PGG. Although I found some evidence that people's wise reasoning in one domain (e.g., one's own conflicts) relates positively to their wise reasoning in another domain (e.g., intergroup conflicts) in Study 2, I also argue that wise reasoning is to some extent situation-specific. As such, wise reasoning could have been a stronger moderator of the deliberation-cooperation effect if I had assessed people's wise reasoning in relation to the PGG experience directly. Therefore, in subsequent studies, presented

in Chapter 5, I refined the specificity of my measurement. Specifically, I focused the wise reasoning assessment directly on people's reasoning about a specific conflict, and tested its moderating effect on outcomes within the same context.

Notwithstanding the above caveat, the main purpose of Chapter 5 is to present evidence of the benefits of wise reasoning at the group (e.g., societal) level, and to provide more conclusive evidence of its bias-reducing effect. Specifically, I tested whether wise reasoning about ongoing intergroup conflicts would reduce intergroup bias and improve tolerance and motivation toward outgroups.

## CHAPTER 5: GROUP-LEVEL OUTCOMES

In Chapter 5, I focus on group level benefits of wise reasoning and provide more conclusive evidence for the link between wise reasoning and reduced bias. I also test whether wise reasoning and reduced bias lead to improved tolerance and motivation. Here, I focus specifically on whether wise reasoning reduces *intergroup bias*: indiscriminate favoritism toward ingroups versus outgroups (Fiske, 2002). Intergroup bias has been called “the problem of the century” (Fiske, 2002) because of its exacerbating relationship with societal conflict and because it is notoriously difficult to reduce, particularly in heightened societal conflicts. Past research and practice in reducing intergroup bias focused mainly on intergroup contact interventions. These interventions tend to increase favorability of an outgroup because they expose individuals to positive experiences with an outgroup member. They provide broader and more balanced information that is inconsistent with individuals’ biased representations (e.g., stereotypes, prejudices) about outgroups, allowing people to transcend their default, egocentric views (e.g., Tadmor, Hong, Chao, Wiruchnipawan, & Wang, 2012). Wise reasoning similarly allows individuals to transcend egocentrism and reveals a broader purview of situations and perspectives. Further, wisdom is said to relate to balanced (i.e., unbiased) emotions and motivation, value-relativism, and tolerance for outside views (e.g., Staudinger & Glück, 2011). As such, I suggested that wise reasoning would curb intergroup bias, in terms of more balanced impressions and emotional reactions toward outgroups, even without engaging individuals in positive intergroup contact. I also explored whether wise reasoning would result in improved motivation for contact with outgroup members, an important factor predicting positive intergroup contact. Support for this hypothesis would improve understanding about the roots of intergroup bias, as rooted in egocentrism and myopic thinking, and reveal a more efficient method to reduce

intergroup bias and maximize the efficiency of extant contact programs. Further, the positive effects of contact programs are specific to one outgroup. However, because wise reasoning is a general reasoning process, it can be applied to any group and should be applicable across different intergroup situations, even during times of heightened conflicts, when providing actual positive intergroup contact situations is most difficult.

As noted in the Chapter 4 summary, I also provide evidence regarding measurement specificity for assessing wise reasoning. In the studies presented in Chapter 5, I assessed participants' wise reasoning about a specific intergroup conflict (vs. about any interpersonal or work conflict they had experienced). First, I provided an impression formation stimulus to facilitate participants' reflection on the ongoing conflict. I then assessed their favorability to different groups in the conflict, as my operationalization of intergroup bias (described further, below). Finally, I assessed their wise reasoning about the conflict.

I hypothesized that stronger use of wise reasoning would relate to reduced intergroup bias, which would be observed as more favorable attitudes toward outgroups, and less between-group polarization in intergroup favorability. I present three studies testing the hypothesis, in the context of ongoing, heightened intergroup conflicts (e.g., socio-political and ideological conflicts).

### **Study 6**

Study 6 established the relationship between wise reasoning and intergroup bias. It was conducted in Hong Kong during the Umbrella Movement in 2014, which involved large-scale (over 10,000 protesters in a single day) and sustained (2-3 months, depending on territory) defiant protests and barricade of major roads in the city. Public opinion about the legitimacy of the movement was polarized.

## Method

### Participants and Procedure

During the peak of Occupy Central's Umbrella Movement (UM) protests in late November 2014, I recruited 76 local undergraduate students from a Hong Kong University subject pool (Sample I). I compared positivity toward UM protestors among protestors ( $n = 42$ ; code = 0) and non-protestors ( $n = 33$ ; code = 1). Hereby, participants were first asked to form an impression of the protestors, based on a picture slideshow (Appendix G). Next, participants reported their favorability toward protestors. Finally, I assessed participants' wise reasoning about the conflict (Appendix D).

### Measures

**Impression formation stimulus.** Participants viewed a slideshow of 20 headshots of Umbrella Movement protestors. Among the 20 headshots, gender of protestors was equal and presentation order was randomized.

**Intergroup bias.** In Chapter 6, participants reported their favorability toward different groups in two ways. Participants from Sample I (i.e., Umbrella Movement conflict) reported the extent to which they perceived the protestors as warm (i.e. "warm", "friendly", "good-natured"; Cronbach's  $\alpha = 0.96$ ) and trustworthy (i.e. "trustworthy", "honest", and "sincere") from 1 = *not at all* to 7 = *extremely* ( $\alpha = 0.90$ ), two automatic and basic social impressions that influence interpersonal and intergroup behaviors (Fiske, Cuddy, & Glick, 2007). In Study 6, reduced intergroup bias would be indicated by higher warmth and trust impressions toward protestors by non-protestors, and less between-group polarization in warmth and trust impressions toward protestors.

**Wise reasoning.** Participants completed the measure of wise reasoning adapted to focus on the specific intergroup conflict (Appendix D);  $\alpha = .91$ .

## Results

I conducted two multiple regressions to test the hypothesis, with group membership (protestors vs. non-protestors), wise reasoning, and their interaction as the predictors, and warmth and trust impressions as the outcome variables. As expected, there were significant Group  $\times$  wise reasoning interactions,  $B_{warmth} = 1.25$ ,  $SE = 0.53$ ,  $t = 2.36$ ,  $p = .021$ ,  $B_{trust} = 1.16$ ,  $SE = 0.40$ ,  $t = 2.88$ ,  $p = .005$ . I unpacked the interactions to investigate if wise reasoning related to more favorable impression of outgroup members (Figure 3). Consistent with my hypothesis, wise reasoning among non-protesters was associated with more favorability toward protestors,  $B_{warmth} = -1.25$ ,  $SE = 0.33$ ,  $t = 3.83$ ,  $p = .001$ ,  $B_{trust} = 1.12$ ,  $SE = 0.25$ ,  $t = 4.52$ ,  $p < .001$ . This finding was first evidence that wise reasoning relates to reduced intergroup bias. Unsurprisingly, wise reasoning did not relate to more favorability toward protestors for their own group,  $p > .250$ .

Next, I examined how wise reasoning influenced the extent to which group membership determined attitude polarization, or favoritism toward the ingroup versus outgroup. For participants with weaker wise reasoning (-1 SD), group membership significantly determined group-based polarization in favorability toward the protestors. Specifically, non-protestors (vs. protestors) with weaker wise reasoning (-1 SD) reported significantly less favorability toward protestors,  $B_{warmth} = -1.00$ ,  $SE = 0.41$ ,  $t = -2.43$ ,  $p = .018$ ,  $B_{trust} = -0.91$ ,  $SE = 0.31$ ,  $t = -2.91$ ,  $p = .005$ . However, among participants with stronger wise reasoning (+1 SD), group membership did not significantly determine favorability towards protestors,  $B_{warmth} = 0.39$ ,  $SE = 0.41$ ,  $t = 0.94$ ,  $p > .250$ ,  $B_{trust} = 0.38$ ,  $SE = 0.31$ ,  $t = 1.21$ ,  $p = .231$ . These findings provided initial evidence that



wise reasoning is associated with attenuated intergroup bias, with stronger wise reasoning improving favorability toward an outgroup and relating to more balanced between-group favorability impressions.

### **Study 7**

Study 6 was a between-subjects test focused on the effects of wise reasoning on individuals' favorability toward a specific focal group (i.e., Protestors in the Umbrella Movement) who played a prominent role in an acute conflict. To extend the findings, Study 7 was a between- and within-subjects test that examined the balancing effects of wise reasoning on intergroup bias for two focal groups with chronic ideological conflict. Importantly, Study 7 also investigated whether the reduced intergroup bias associated with wise reasoning predicted positive downstream effects in terms of tolerance or support toward social policy that promotes equality. I conducted the study in the context of the same-sex marriage conflict in North America. At a contentious time prior to the Supreme Court of the United States (SCOTUS) ruling in favor of same-sex marriage equality, I preselected LGB and Christian heterosexual (i.e., Catholic, Protestant, Christian-other) participants to test the hypothesis.

### **Method**

#### **Participants and Procedure**

I preselected 333 undergraduate students, 191 of whom were Christian heterosexuals (i.e., Catholic, Protestant, Christian-other), and 142 of whom were LGB (lesbian/gay/bisexual) from the University of Waterloo subject pool (Sample J). Group membership variable was coded 0 = LGB and 1 = Christian heterosexuals. Approximately 33% of homosexual participants reported belonging to a religion (25% Christian, 3.5% Muslim, 3.5% Hindu, 2.1% Buddhist, 1.4% Jewish). To minimize number of participants belonging to both groups, these participants were

not included in main analyses (results were not changed when they were included). Twenty-five Christian participants reported belonging to more than one religion. To ensure adequate consistency within the Christian group, I report analyses excluding these participants (final  $n = 166$ ; results were not changed when they were included). Participants first read a news clipping summarizing the debate about same-sex marriage legislation and religious freedom to form an impression about the events (Appendix G). Next, they reported their favorability toward the two groups as the measure of intergroup bias. Christian heterosexuals then reported the extent of their support for same-sex marriage, a policy that would benefit the minority outgroup.<sup>7</sup> Then I assessed participants' wise reasoning.

## Measures

**Impression formation stimulus.** Participants read a news article detailing the same-sex marriage debate that I compiled from the Associated Press. The news article was compiled to present neutral information, laying out perspectives from both sides of the debate (Appendix G).

**Intergroup bias.** Participants reported their favorability toward Christians and homosexuals, rating their general emotions on a feeling thermometer (e.g., Gervais & Norenzayan, 2012) from 0 (*Extremely Cold/Unfavorable*) to 100 (*Extremely Warm/Favorable*). The presentation order of target groups was randomized. In Study 7, reduced intergroup bias would be indicated by higher feeling thermometer ratings toward outgroup members, and less between-group polarization in thermometer ratings favoring the ingroup.

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<sup>7</sup> I did not assess support for same-sex marriage in LGB participants because my focus was on attitudes toward policy that benefits the outgroup, and was aware of no analogous scale of support for Christians, the majority group; further I expected a ceiling effect on support for same-sex marriage among LGB participants.

**Support for same-sex marriage.** To examine attitudes toward policy that promotes equality as a downstream consequence, I measured Christian heterosexuals' support for same-sex marriage (Pearl & Galupo, 2007). These participants rated the extent to which they agreed with 16 statements (e.g., "I oppose the legalization of same-sex marriage"; reverse-coded) on a 6-point scale (1 = *Strongly disagree*, to 6 = *Strongly agree*;  $\alpha = .91$ ).

**Wise reasoning.** Participants completed the measure of wise reasoning adapted to focus on the specific intergroup conflict (Appendix D);  $\alpha = .94$ .

## Results

### Intergroup Bias

Because of the between- and within-subject design, I conducted repeated measures ANOVA on participants' intergroup bias. I entered feeling thermometer ratings toward Christian and homosexual targets as the within-subject level factors and group membership as the between-subject level predictor, with wise reasoning as the moderator. As expected, I found a significant mixed-level 3-way interaction,  $F(1, 298) = 8.50, p = .004$ , meaning that participants' favorability toward the different groups depended on both group membership and their use of wise reasoning.

First, I tested whether wise reasoning was associated with more favorability toward the outgroup. Findings are presented in Figure 4. Among Christian participants, wise reasoning predicted more favorability toward homosexuals (the outgroup),  $B = 7.54, SE = 3.03, t = 2.49, p = .014$ , but did not significantly predict favorability toward Christians (the ingroup),  $t < 1, p > .250$ . Among LGB participants, wise reasoning predicted more favorability toward Christians (the outgroup),  $B = 9.29, SE = 3.40, t = 2.73, p = .007$ , but did not significantly predict favorability toward homosexuals (the ingroup),  $t < 1, p > .250$ .

I then examined how wise reasoning influenced the extent to which group membership determined between-group intergroup polarization in favorability. Among participants with weak wise reasoning (-1 SD), favorability toward ingroup and outgroup differed substantially,  $t_{\text{Christian participants}} = 2.75, p = .007, t_{\text{LGB participants}} = 7.84, p < .001$ . However, among participants with stronger wise reasoning (+ 1 SD), such polarization disappeared among Christians,  $t < 1, p > .250$ , and was much attenuated among LGBs,  $t = 3.86, p < .001$ . Providing incremental support for my hypothesis, these findings suggest that wise reasoning relates to more favorability toward outgroups, for both groups in a conflict. Wise reasoning also has a balancing effect in that it attenuated between-group polarization in favorability, for both groups.

### **Christian Heterosexuals' Support for Same-Sex Marriage**

To examine support for same-sex marriage as a downstream consequence, I conducted a mediation analysis with 10,000 bootstrap samples (Rucker, Preacher, Tormala, & Petty, 2011). The analysis included only Christian participants, with wise reasoning as the predictor and favorability toward homosexuals as the mediator. Because favorability toward Christians and homosexuals were interrelated, favorability toward Christians was controlled for in the mediation analyses. Nevertheless, the same pattern of mediation emerged with or without the control. As seen in Figure 5, wise reasoning was associated with increased favorability toward homosexuals, which in turn was associated with stronger support for same-sex marriage. The bootstrapping analysis for mediation revealed that the indirect path from wise reasoning to support for same-sex marriage was significant, and the direct effect was no longer significant. Thus, the results showed that greater favorability toward homosexuals statistically accounted for the variance in the relation between wise reasoning and support for same-sex marriage among Christian heterosexuals.

## Study 8

To this point, all of the findings presented in this dissertation pertaining to the wise reasoning construct are correlational. Although the results have been very consistent across studies, the correlational design limits claims that wise reasoning causes beneficial outcomes. Thus, to extend the findings, in Study 8, I conducted an experimental wise reasoning intervention and tested its effect on intergroup bias reduction. The study was conducted in the U.S., the day following the SCOTUS ruling in favor of same-sex marriage equality, an event celebrated by some Americans, but protested by others. I tested whether the wise reasoning intervention reduced U.S. Christians' and social conservatives' intergroup bias toward homosexuals. As in Study 7, I also tested whether reduced intergroup bias would lead to positive downstream consequences, namely tolerance or support for policy that promotes equality, and motivation for intergroup contact.

## Method

### Participants and Procedure

The day after the SCOTUS same-sex marriage equality ruling, I recruited 378 U.S. residents via MTurk to complete an online survey about social issues. Participants were directed to one of two surveys. The first survey (intervention condition) contained a wise reasoning intervention (detailed below); only Christians and social conservatives were directed to this survey. The second survey (control condition) was identical to the first, but without the intervention, and did not restrict participation by religion or political orientation (non-Christian and social liberals were to be used for a separate study). In total, I collected responses from 201 American Christians and social conservatives ( $n_{\text{intervention condition}} = 72$ ;  $n_{\text{control condition}} = 129$ ). Participants in the intervention condition, and not the control condition, first completed a wise

reasoning facilitation task (Appendix H) and were then asked to apply the same kind of reasoning to guide their thinking when reading a news article that followed. All participants were asked to read and reflect on a news clipping about the same-sex marriage equality ruling (Appendix G). Next, they reported their favorability toward Christians and toward homosexuals, as well as their support for same-sex marriage equality and their motivation for intergroup contact. Finally, I assessed participants' wise reasoning.

## Measures

**Wise reasoning intervention.** Before completing the survey, Intervention (but not Control) participants completed a training exercise of recalling a past conflict in their own lives (i.e., event-reconstruction, as in the original wise reasoning measure). I then asked participants to think about their conflict by using several dimensions of wise reasoning. Questions [aspect of wise reasoning] included: *How might the other party think or feel about the situation differently?* [Others' perspectives] *Could the situation change or become clearer in time, or could your initial reaction change, when more information becomes available?* [Intellectual humility and change] *Could there be a way to compromise in the situation?* [Search for compromise and resolution] *When you put aside your own feelings, how might the situation appear to uninvolved people?* [Outsider's vantage point]. Then, I told participants that they would read a news article, and asked them to recall and try to use the same wise reasoning questions while reflecting on the article.<sup>8</sup> Full intervention materials are presented in Appendix H. These participants then completed the same measures as control participants.

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<sup>8</sup> As expected, participants in the intervention condition took significantly longer to complete the survey; controlling for time spent on the survey did not change the pattern of results.

**Impression formation stimulus.** Participants read a news clipping from the New York Times that included text about the SCOTUS ruling and depicted photographs of people celebrating the event (Appendix G).

**Intergroup bias.** Participants reported their favorability toward Christians and homosexuals, rating their general emotions on a feeling thermometer (e.g., Gervais & Norenzayan, 2012) from 0 (*Extremely Cold/Unfavorable*) to 100 (*Extremely Warm/Favorable*). The presentation order of target groups was randomized. As in Study 7, reduced intergroup bias would be indicated by higher feeling thermometer ratings toward outgroup members, and less between-group polarization in thermometer ratings favoring the ingroup.

**Support for same-sex marriage.** To examine attitudes toward policy that promotes equality as a downstream consequence, I measured participants' support for same-sex marriage (Pearl & Galupo, 2007). They rated the extent to which they agreed with 16 statements (e.g., "I oppose the legalization of same-sex marriage"; reverse-coded) on a 6-point scale (1 = *Strongly disagree*, to 6 = *Strongly agree*;  $\alpha = .90$ ).

**Motivation for intergroup contact.** In the post-SCOTUS study, I included an additional item to probe participants' motivation to engage in intergroup contact as a potential downstream consequence (Halperin, Russell, Trzesniewski, Gross, & Dweck, 2011): "If you had the opportunity, to what extent would you be willing to meet with people who hold opinions very different from yours about same-sex marriage and hear their point of view? (1 = *Not at all*, to 6 = *Very Much*).

**Wise reasoning.** Participants completed the measure of wise reasoning adapted to focus on the specific intergroup conflict (Appendix D);  $\alpha = .90$ .

## Results

### Intergroup Bias

First, I tested whether the intervention increased wise reasoning. Results of an independent sample *t*-test revealed that the intervention was successful, with participants in the intervention condition reporting stronger use of wise reasoning ( $M = 3.80$ ,  $SD = 0.66$ ) than participants in the control condition ( $M = 3.48$ ,  $SD = 0.99$ ),  $t(199) = 2.49$ ,  $p = .014$ . I then investigated the effect of the intervention on intergroup bias in favorability toward Christians and homosexuals. I conducted repeated measures ANOVA, entering favorability toward Christians and homosexuals as the within-subjects level outcomes and condition as the between-subjects predictor. Findings are presented in Figure 6. Overall, participants reported more favorability toward Christians than homosexuals,  $F(1, 196) = 53.09$ ,  $p < .001$ . However, as predicted, this main effect was qualified by a significant mixed-level 2-way interaction,  $F(1, 196) = 13.53$ ,  $p < .001$ , meaning that participants' favorability toward the target groups depended on the condition to which they had been assigned.

I first tested if the wise reasoning intervention increased favorability toward the outgroup. Participants in the wise reasoning intervention (vs. control) condition reported more favorability toward the outgroup, homosexuals,  $B = 15.34$ ,  $SE = 4.76$ ,  $t = 15.34$ ,  $p = .001$ , while participants in the control (vs. intervention) condition reported more favorability to the ingroup, Christians,  $B = 16.48$ ,  $SE = 4.05$ ,  $t = 4.05$ ,  $p < .001$ . I then unpacked the interaction to examine the effect of condition on polarization in favorability, that is, the extent to which the two conditions exhibited ingroup favoritism. Among participants in the control condition, positivity toward ingroup Christians and outgroup homosexuals differed substantially, with participants strongly favoring Christians (i.e. intergroup bias),  $t = 4.28$ ,  $p < .001$ ,  $\eta^2_p = 0.13$ . Among participants in the



intervention condition, such intergroup bias was attenuated, and in fact, reversed,  $t = -2.24, p = .028, \eta^2_p = 0.07$ .

### **Motivation for Intergroup Contact**

I conducted a serial mediation with 10,000 bootstrap samples (Model 6; Hayes, 2012) to examine motivation for intergroup contact as a downstream consequence of the wise reasoning intervention, via improved favorability toward the homosexuals. There was no direct effect of the intervention on motivation for group contact ( $p > .250$ ). As seen in Figure 7, the wise reasoning intervention (vs. control) increased participants' use of wise reasoning, resulting in more favorability toward homosexuals and stronger motivation for intergroup contact. The bootstrapping analysis for mediation revealed that the indirect path from intervention to motivation for intergroup contact was significant and the direct effect was not significant. These results showed that stronger wise reasoning and more favorability toward homosexuals statistically explained the effect of the wise reasoning intervention on stronger motivation for intergroup contact. Switching the order of the mediators and outcome variables yielded insignificant indirect effects, providing some support for this particular serial order of the indirect effect.

### **Support for Same-Sex Marriage**

Using the same method for mediation analysis as the above, I also tested support for same-sex marriage as a downstream consequence. There was a direct effect of the intervention on support for same-sex marriage ( $t = 2.660, p = .008$ ). As seen in Figure 7, the wise reasoning intervention (vs. control) increased participants' use of wise reasoning, resulting in more favorability toward homosexuals, and stronger support for same-sex marriage. The bootstrapping analysis for mediation revealed that the indirect path from intervention to support for same-sex

marriage was significant and the direct effect was no longer significant. These results showed that stronger wise reasoning and subsequently more favorability toward homosexuals statistically explained the effect of the wise reasoning intervention on stronger support for same-sex marriage. Again, switching the order of the variables yielded insignificant indirect effects, providing support for this specific serial order of mechanism.

### **Chapter 5 Summary**

Altogether, Chapter 5 provides strong evidence for the benefits of wise reasoning. Specifically, I found that wise reasoning about societal conflicts was reliably associated with reduced intergroup bias: more favorability toward outgroups and decreased between-group polarization in favorability (e.g., ingroup favoritism). Thus, in Studies 6-8, wise reasoning related to more balanced emotional reactions to outgroups. Study 7 also showed that individual differences in wise reasoning relates to greater favorability toward policy that promotes equality and greater tolerance for others. Chapter 8 provided initial evidence for the causal role that wise reasoning plays in reducing bias. The new experimental wise reasoning intervention increased favorability toward the outgroup via increased wise reasoning. The intervention also led to positive downstream consequences. Participants' motivation toward intergroup contact and their favorability toward policy that promotes equality were increased. Additionally, I found that the positive effect of the wise reasoning on these downstream consequences was mediated by increased favorability toward outgroups. Thus, the wise reasoning intervention achieved major goals of intergroup contact paradigms without requiring actual contact.

## GENERAL DISCUSSION

Wisdom is universally valued, yet there are gaps in the empirical research on the topic, specifically on its practice and development. I suggest that one of the reasons for the lack of large-scale study on wisdom is the absence of a valid and efficient measure that can be adapted to assess wisdom in different life challenges. For example, extant self-report wisdom measures are confounded by socially desirable responding and focus on global character traits, glossing over how people think through life challenges. Performance measures require daunting administrative protocol, which can discourage researchers to embark on wisdom research.

Although there is a paucity of quantitative information about wisdom, there is millennia-worth of discussion about how it can be practiced and developed. This large body of philosophical and theoretical psychological work points to several forms of reasoning that can improve wisdom. This dissertation provided first quantitative evidence for the reliability and validity of an efficient new questionnaire-based measure of wise reasoning, and that wise reasoning leads to outcomes classically attributed to wisdom. Specifically, through confirmatory factor analyses over a large sample, Chapter 1 showed that different theoretical aspects of wise reasoning indeed covary reliably and represent an empirically testable, unitary construct. Chapter 2 showed that wise reasoning relates to, but is distinct from, self-reported global-level wisdom and other-rated wise reasoning performance. It also showed that wise reasoning is distinct from biased responding and social-cognitive biases, outperforming extant wisdom measures. Chapter 3 showed, as argued by many notable wisdom theorists, that wise reasoning relates consistently to individual differences in constructs that relate to positive psychological outcome, such as mindfulness, openness, communal orientation, and emotion regulation. Chapter 4 provided incremental and nuanced evidence that wise reasoning relates positively to prosociality, even in

anonymous contexts and in situations that have previously been shown to evoke egocentric imbalance (i.e., social dilemma tasks; when deliberating about social dilemma decisions). Chapter 5 provided both correlational and experimental evidence that wise reasoning can balance emotional reactions in situations involving highly-polarized societal issues, improving motivation for intergroup contact and increasing tolerance for policy that benefits an outgroup. Altogether, the findings provide much support for the claim that wise reasoning provides a psychological foundation for wisdom. The findings showed i) that it can be reliably and validly assessed, ii) that it can be—and is—practiced by people within their own life challenges, iii) that it relates positively to a range of individual, interpersonal, and intergroup outcomes, and iv) that it can be facilitated, suggesting that it can be practiced and developed.

The new wise reasoning measure focuses on specific thinking processes within or about concrete life challenges. By focusing on concrete challenges, the new measure exploits the context-specificity necessary to understand the application of wise reasoning to the varied and complex challenges facing contemporary society. In this dissertation, I was able to conduct assessments on three similar areas—workplace, interpersonal, and intergroup conflicts—but the measure’s flexibility invites inquiry to a very broad range of situations. The new measure moves beyond extant wisdom measures by assessing practicable psychological processes, as compared to the indirect evidence of those processes gained via assessments of wise character (as in global, trait-level measures) and the contents of individuals’ reasoning (as in performance measures). As such, this dissertation provides first large-scale assessment of wise reasoning, shows evidence of its psychological benefits, and provides methods for research focused on the practice and development of wisdom.

In addition to assessing naturalistic wise reasoning, this dissertation also introduced a new experimental wise reasoning intervention. The results from the intervention (Study 8) showed convergent evidence for the utility of wise reasoning by showing nearly identical results as naturalistic, individual differences in wise reasoning (Studies 6 and 7). Study 8 findings provided causal evidence, namely that wise reasoning reduced intergroup bias. The intervention materials provide a simple method for reducing bias in intergroup conflicts—the main purpose of intergroup contact interventions—that does not require actual contact experience with an outgroup member, a daunting process for intergroup researchers to administer. The intervention increased participants' motivation to interact with and tolerance in the form of support for policy meant to benefit outgroup members. Last, and perhaps most important for the downstream goals of my research, the success of the intervention suggests that people can practice wise reasoning, that such practice results in immediate benefits. Potentially, wise reasoning can be developed through such practice.

### **Implications and Future Directions**

The studies presented in this dissertation have important implications for theory and research on wisdom. Theorists over millennia have claimed that wisdom would relate to many personal and social benefits. Here, I focused on reasoning components of wisdom. I expected that wise reasoning should relate to an improved ability to manage emotional reactions, for example to moderate the level to which emotions dictate judgment and decision making, and thereby also improve motivation, for example to be less self-centered and more tolerant of different views or values. The current studies showed that wise reasoning relates to reduced cognitive bias, balancing self-interest with group goals, more moderate emotional reactions and more prosocial motivation. As such, these studies support some of the oldest claims about

wisdom. Studies 7 and 8 showed at both the correlational and experimental levels that using wise reasoning can afford moderation in emotion (i.e., reducing intergroup bias), and that doing so also balances individuals' motivation (i.e., increasing tolerance for different views and values, and increasing motivation for intergroup contact).

This dissertation also provides new confirming evidence regarding the importance of ego-detachment/self-transcendence, intellectual humility, taking multiple and broader perspectives and attempting to integrate them, for beneficial psycho-social outcomes. These elements of cognition have been argued to help individuals lead better, wiser lives by many theorists over the ages (e.g., Baltes & Smith, 2008; Frankl, 1966; Rahula, 1974; Staudinger & Glück, 2011; Vervaeke & Ferraro, 2013; Weststrate et al., 2016). However, no research has provided a comprehensive and large-scale test on these ideas, assessing these forms of reasoning as a unitary construct. This dissertation is the first set of studies showing evidence that different aspects of wise reasoning work together to relate to a host of adaptive individual difference variables, interpersonal cooperation, motivation, emotional balance, and even existential tolerance in the form of support for social policy meant to benefit outgroup members and motivation for contact with outgroup members. By exploring and confirming these relations empirically, this dissertation represents an important advance in the theory and philosophy of wisdom.

The new measure, training paradigm, and results presented in this dissertation open up numerous avenues for future research. The current dissertation provides first examples that wise reasoning can be core to the benefits of wisdom at individual, interpersonal, and intergroup levels, and provides a measure that can allow researchers to conduct research on the practice and development of wisdom. Thus, my first suggestion for future research is to utilize the findings

and the new psychometric and experimental materials presented here to guide studies on the practice and development of wisdom. This could include, for example, diary studies testing the relations between situation-specific wise reasoning and decision making and behavior, and longitudinal studies conducting similar tests over major life challenges and through time.

Regarding the new measure, and specifically its adaptability to different situations and contexts, future research should investigate its utility for assessing wise reasoning in other challenging situations within educational, organizational, and business, leadership, and negotiation contexts. It also allows researchers to conduct efficient tests on the intra-individual variability of wise reasoning, across different situations and points in time, which would provide crucial information about the trait-like properties of wise reasoning (see Grossmann, 2017). Further, in this dissertation, each version of the new measure used very similar items across all studies, only adjusting them slightly per type of conflict. Future research should use the new situation-specific assessment method to explicitly assess other theoretical components of wisdom, including emotional and motivational components (i.e., with novel items), to examine their benefits and whether and how they converge with aspects of wise reasoning examined here.

Regarding the wise reasoning construct, this dissertation opens the path for researchers and practitioners in many fields to investigate when and how wise reasoning can result in positive outcomes. That is, many of the problems under investigation in different streams of psychology, from clinical to organizational, from strategic management and negotiation to behavioral economics, all involve some focus of imbalance: egocentrism, bias, misperception, misattribution, lack of trust/cooperation, and motivated cognition. This dissertation showed that wise reasoning can be beneficial across a range of situations and levels of analysis. As such, I suggest that researchers exploring routes for overcoming psychological imbalance in different

streams of social science should consider the utility of wise reasoning. With the availability of the new measure, such investigations are now viable and can be easily administrated with little investment and potential for great profit, and with simple methods for improvement. For example, wise reasoning can provide a parsimonious explanation for resolving problems that tend to involve imbalance, egocentrism, or bias, and the new wise reasoning intervention paradigm can be used and adapted to train individuals to use wise reasoning within or about a broad array of challenges.

One of my goals in conducting this research was to understand how wisdom can be of use in applied contexts, such as in organizational behavior and leadership. This research opens up new directions for research in these areas. For example, many studies have shown that employees who experience challenges in the workplace, such as low levels of fairness, tend to perform worse and engage more in deviance (e.g., Colquitt et al., 2013). However, little research has examined the reasoning processes that determine these relations, and no research has investigated the role of wisdom in determining the effects of workplace challenges. I suggest that wise reasoning provides employees with a psychological buffer that can enable them to reinterpret and deal more effectively with a broad range of negative workplace challenges, thereby reducing the relations between such experiences and negative outcomes such as employee deviance. Future research should investigate the role that wise reasoning plays in determining employees' reactions to challenging workplace situations, and whether this leads to positive downstream outcomes, such as improved interpersonal relations, work performance, and commitment to the organization.

The present studies have demonstrated that wise reasoning relates to more cooperation and reduced intergroup bias. These are two variables that have been shown to affect group and



team effectiveness in the workplace, and could be even more important and tenuous as diversity in the workplace increases. As such, future research should examine how wise reasoning affects workplace processes that involve groups or teams with high or increasing levels of diversity (e.g., multinational teams, interdisciplinary teams). For example, the categorization-elaboration model of group diversity and performance (Van Knippenberg, De Dreu, & Homan, 2004) suggests that, although all types of diversity can (or ought to) have positive effects on workplace performance (e.g., teamwork), imbalanced impressions and emotions toward different groups can reduce or even reverse such effects. Specifically, the model suggests that bias distracts people from deliberating appropriately about job tasks. My findings showed that wise reasoning reduced intergroup bias and improved individuals' downstream cooperative attitudes toward outgroup members. Thus, I suggest that wise reasoning would be an important mechanism determining the effects of workplace diversity on individual and team performance. Future research should assess whether wise reasoning reduces the negative effects and amplifies the positive effects of diversity in the workplace, and whether it plays an adaptive role in team performance in general.

The findings presented in this dissertation open new directions for the leadership research. Leadership scholars and practitioners have begun to assert that, because one role of leadership is to effectively navigate, prevent and resolve complex social challenges, the field must begin to introduce wisdom concepts into leader decision-making, specifically to understand how to develop wise, balanced leaders. For example, McKenna, Rooney, & Boal (2009), arguing for such a necessity, put forth a series of "wisdom principles" for leadership. They cited such factors as using reason and careful observation, pragmatic decision making that acknowledges different values orientations and workers' needs for pleasant and rewarding workplace experience. They then provided a theoretical analysis comparing established leadership "styles"

with the wisdom principles. The current dissertation provides a measure capable of testing McKenna et al.'s (2013) propositions, and allows for in-depth analyses of how leaders' wise reasoning relates to the outcomes associated with each style of leadership, an important direction for future research.

The new measure also allows researchers to determine whether and when leaders use particular aspects of wise reasoning more than others, and whether the type or context of leadership decisions demand particular aspects of wise reasoning more than others. Perhaps most importantly, the new measure allows researchers to examine the dynamic nature of leadership—simultaneously managing individuals, relationships, groups and work processes. Specifically, it can be used to determine how and when leaders switch or adapt their wise reasoning to fit different situations, and how these processes lead to adaptive outcomes in their decision making. The leadership research has recently come under criticism for several validity issues, one of which is a focus on outcomes rather than psychological processes to explain leadership (e.g., Knippenberg & Sitkin, 2013). This dissertation, and specifically the new wise reasoning measure, may find one of its most important roles in providing a new method for investigating the psychological processes that lead to effective leadership. They have the potential to improve the validity of the leadership research and they provide new concepts by which leadership can be defined, assessed, and trained.

Finally, although discussed earlier, I would like to end this discussion on the notion of the practice and development of wisdom. The aim of the current work was to establish a new method of assessing and inducing the reasoning processes theorized to promote wisdom, in order to facilitate research on the practice and development of wisdom. This is only a starting point—future research, hopefully encouraged by the current work, is required to explore how wise

reasoning creates wiser individuals and, furthermore, wiser societies. On this point, future research should examine how wise reasoning is practiced and developed over the lifespan, how life experiences can have an impact on wise reasoning, and how wise reasoning leads broadly to adaptive life outcomes. The current work begins to pave a way for such research. Much remains to be done to further understand the psychology of wise reasoning, and the practice and development of wisdom and balance at the individual, interpersonal, and societal levels.

### **Conclusion**

Wisdom is a quality that is revered by people from every culture. Many recent calls, from both academia and industry, have been made to invigorate discourse on the age-old concept and to study its practice and development, to help people better navigate contemporary challenges (e.g., education, leadership, conflict management). However, wisdom has not yet enjoyed large-scale empirical investigation. I suggested that one reason for this gap in the research is that there is no efficient measure of wisdom. My doctoral research provides a valid and efficient method to assess wise reasoning, and establishes a comprehensive network of relations between wise reasoning and concepts that are crucial to individual, social, organizational, and societal well-being. Going beyond individual differences in wise reasoning, the present work also provides experimental evidence for the utility of a wise reasoning intervention for ameliorating bias and improving tolerance and motivation toward others. The evidence and materials provided in this dissertation have a potential to spark greater interest in research and applied work on wisdom across contemporary individual, interpersonal, and societal life challenges.

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## APPENDICES

### Appendix A: Initial Wise Reasoning Scale Items

Item #	Label
1*	Put myself in the other person's shoes
2	Tried to not waste time thinking about the other person's beliefs - they did something wrong, and that's that
3	Told myself that the other person was wrong for what they were doing
4	Wondered whether the other person might be right
5*	Tried to communicate with the other person what we might have in common
6	Wondered about the possibility that we could both be right and/or wrong
7*	Made an effort to take the other person's perspective
8	Spent time thinking about why the other person felt the way they did
9*	Took time to get the other person's opinions on the matter before coming to a conclusion
10	Considered how the situation might change through time
11	Believed that how the situation would work out was set in stone right from the beginning
12	Thought about how the other person's intentions and opinions might change as the situation evolves
13	Wondered whether my own intentions and opinions might change as the situation evolves
14	Approached the situation assuming there were two sides to the situation
15*	Looked for different solutions as the situation evolved
16*	Considered alternative solutions as the situation evolved
17	Assumed that there could be multiple ways the situation might unfold
18	Knew whose side to take as soon as the conflict began
19	Knew exactly how the situation would end
20	Did not form judgment until I saw the outcome of the situation
21*	Believed the situation could lead to a number of different outcomes
22*	Thought the situation could unfold in many different ways
23	Wondered whether the situation seemed to be about one issue, but really was about something else
24	Search for underlying reasons for the situation
25*	Double-checked whether my opinion on the situation might be incorrect
26*	Double-checked whether the other person's opinions might be correct
27	Tried to establish whether both parties had common ideas about the situation
28*	Looked for any extraordinary circumstances before forming my opinion
29*	Behaved as if there may be some information to which I did not have access
30	Tried to understand the context of the situation
31	Told myself that I was in the right, and not to worry about extra details
32	"Stuck to my guns" on the matter - I knew who was wrong and who was right
33*	Tried my best to find a way to accommodate both of us
34	Realized that it was not possible for a single involved party to come out as a sole winner from the situation
35*	Though it may not have been possible, I searched for a solution that could result in both of us being satisfied
36*	Considered first whether a compromise was possible in resolving the situation
37	Considered a compromise to be a weak solution in this situation
38	Avoided compromise, since it would make it impossible for me to come out satisfied
39*	Viewed it as very important that we resolve the situation
40*	Tried to anticipate how the conflict might be resolved
41	Tried to "step outside myself" to gain perspective on the situation
42	Attempted to view the situation from a 3rd person perspective
43*	Wondered what I would think if I was somebody else watching the situation
44*	Tried to see the conflict from the point of view of an uninvolved person
45*	Asked myself what other people might think or feel if they were watching the conflict
46*	Thought about whether an outside person might have a different opinion from mine about the situation

\*Item included in the final measure

## Appendix B: Event Reconstruction and Final Wise Reasoning Scale

### Event Reconstruction of Wise Reasoning

In this section we would like you to think about a difficult situation that has happened to you with another person, **specifically in your workplace** / **specifically with a close friend** (e.g., a disagreement, conflict). This should be a situation that you yourself were involved in, whether or not you were the person who initiated the situation. We would like you to take a moment to recall the situation and visualize the events in your mind's eye; consider who was involved and what happened, what you thought and how you felt. After doing so, please respond to the following questions:

1. When did this situation first begin?
  - i. This week
  - ii. Within the last month
  - iii. Within the last 6 months
  - iv. Within the last year
  - v. Over a year ago
2. What day of the week was it?
  - i. M
  - ii. T
  - iii. W
  - iv. T
  - v. F
  - vi. S
  - vii. S
  - viii. Don't remember
3. What time of day was it?
  - i. Morning
  - ii. Afternoon
  - iii. Evening
  - iv. Don't remember
4. What were you doing when it happened? This only needs to be a sentence or two.
  - i. {text box}
5. Where were you?
  - i. {text box}
6. Who was involved in this situation? Check any/all that apply – you may select more than one for any person: a coworker may also be a friend. (This question is omitted when assessing conflicts with a close friend)
  - i. Boss, supervisor, or manager
  - ii. Mentor
  - iii. Trainer
  - iv. Colleague or Coworker
  - v. Subordinate
  - vi. Mentee
  - vii. Trainee or Apprentice
  - viii. Customer or Client
  - ix. Supplier

- x. Friend
  - xi. Family
7. Was the person the same gender as you?
- i. Yes
  - ii. No
8. As you were thinking about this situation, what thoughts came to your mind? Please write your thoughts in the space provided.
- i. {text box}

## Final Scale of Wise Reasoning

Please continue to think about the situation you called to mind in the previous section and recall the extent to which you engaged in the following thoughts and behaviors – what you actually did as the situation unfolded. None of the statements listed below are supposed to be "good" or "bad". We are simply interested in how people approach difficult situations. Therefore, it is very important to us that you answer as accurately as possible - your honesty is appreciated, and your replies are, of course, anonymous.

"While this situation was unfolding, I did the following..." (from 1 – *not at all*, to 5 – *very much*)

1. Put myself in the other person's shoes
2. Tried to communicate with the other person what we might have in common
3. Made an effort to take the other person's perspective
4. Took time to get the other person's opinions on the matter before coming to a conclusion
5. Looked for different solutions as the situation evolved
6. Considered alternative solutions as the situation evolved
7. Believed the situation could lead to a number of different outcomes
8. Thought the situation could unfold in many different ways
9. Double-checked whether my opinion on the situation might be incorrect
10. Double-checked whether the other person's opinions might be correct
11. Looked for any extraordinary circumstances before forming my opinion
12. Behaved as if there may be some information to which I did not have access
13. Tried my best to find a way to accommodate both of us
14. Though it may not have been possible, I searched for a solution that could result in both of us being satisfied
15. Considered first whether a compromise was possible in resolving the situation
16. Viewed it as very important that we resolve the situation
17. Tried to anticipate how the conflict might be resolved
18. Wondered what I would think if I was somebody else watching the situation
19. Tried to see the conflict from the point of view of an uninvolved person
20. Asked myself what other people might think or feel if they were watching the conflict
21. Thought about whether an outside person might have a different opinion from mine about the situation

### Legend

Items 1-4: others' perspectives; items 5-9: consideration of change and multiple ways situation may unfold; items 10-13: intellectual humility/recognition of limits of knowledge; items 14-18: search for a compromise / resolution; items 19-21: view of the event through the vantage point of an outsider

## **Appendix C: Crimea Case Scenario (Chapter 2)**

Please read the following article carefully. You will later be asked about your opinion on this issue.

Ukraine shares history and cultural heritage with many of its different neighbors. People in Eastern Ukraine identify with Russia, and many Russians see Ukraine as part of their motherland. In contrast, people in Western Ukraine identify with Western Europe. In the last few years Ukraine became a battleground for political and economic influence from Russia and the West. The country is in an economic recession and suffers a huge deficit: it requires more goods from abroad than it produces and sells. Many Ukrainians wish to join with Russia to avoid significant economic hardship. Many others wish to cut ties with Russia and seek deals with the European Union, where they see opportunities for more jobs.

Last year, pro-Western Ukrainians hoped that a trade agreement with European Union would help the economy. However, at the last moment, Ukraine's President Yanukovich turned away a European deal in favor of a \$15 billion bailout from Russia. Some say it was a corrupt decision made under pressure from the Kremlin. Following this, hundreds of thousands of people took the protest to the streets. In the weeks and months that followed, the protests turned into a general outcry against governmental corruption and police violence. Eventually, after much destruction and violence protesters took control of Kiev's city center, and parliament voted to remove Mr. Yanukovich from office, who in turn fled the country. Some say the protesters have been financially backed up by the Western powers, interested in the natural resources of the country.

Recently in Crimea, a southern peninsula of Ukraine with a predominantly Russian ethnic majority (58%) and a large Russian military presence, an internationally-disputed election took place in which the majority voted in favor of independence from Ukraine and to join Russia. Some fear that that the events in Crimea are a sign of things to come and that Ukraine will be split as a result of the current crisis.

## Appendix D: Intergroup Wise Reasoning Measure (Chapter 2 and Chapter 5)

As you reflected on the conflict, to what extent did you engage in the following thoughts and behaviors? Note, none of the statements listed below are supposed to be "good" or "bad". We are simply interested in how people approach difficult situations. Please select the extent to which you engaged in the following thoughts and behaviors:

"While I was contemplating and writing about the previous scenario, I did the following..." (from 1 – not at all, to 5 – very much)

1. Put myself in both parties' shoes
2. Thought about the things both parties might have in common
3. Made an effort to take both parties' perspective
4. Took time to consider both parties' opinions on the matter before coming to a conclusion
5. Looked for different solutions to the evolving conflict
6. Considered alternative solutions as I learned about the conflict
7. Believed the situation could lead to a number of different outcomes
8. Thought the situation could unfold in many different ways
9. Double-checked whether my opinion on the situation might be incorrect
10. Double-checked whether either party's opinions might be correct
11. Looked for any extraordinary circumstances before forming my opinion
12. Behaved as if there may be some information to which I do not have access
13. Tried my best to find a way to accommodate both parties' perspectives
14. Though it may not have been possible, I searched for solutions that could result in both parties being satisfied
15. Considered first whether a compromise was possible in resolving the situation
16. Viewed it as very important that the parties resolve the situation
17. Tried to anticipate how the conflict might be resolved
18. Wondered what I would think if I were somebody else considering the situation
19. Tried to see the conflict from the point of view of an uninvolved person
20. Asked myself what other people might think or feel if they were considering the conflict
21. Thought about whether an outside person might have a different opinion from mine about the situation



## Appendix E: Attribution Vignettes (Chapter 2)

---

### **Vignette 1**

Steve Jensen is the president of a large construction company in New York. Last year, local government fined the company, as unstable scaffolding caused problems resulting in injuries to several people.

Recently, Steve Jensen started a special discount house building program for large families. Also, he decided to donate a large sum of money to a local orphanage.

---

### **Vignette 2**

Sara Martin is a top executive of a company “XinK Int.” “XinK Int.” is one of the leading pharmaceutical companies in the US. However, the company has experienced a decline in their public image which has led to a decline in sales in the last half a year. Recently, the company started several activities, which were focused on the stabilization of their leading position in the pharmaceutical market.

Not too long ago, “XinK Int.” developed a new drug for treating malaria. Shortly after that several African countries experienced an outbreak of malaria. As soon as Sara Martin found out about this event, she decided to donate a lot of medicine to the regions in Africa that needed assistance. Local mass media showed different reactions to this news.

---

### **Vignette 3**

Since his childhood, David Conner wanted to become a doctor. Now, he is a young surgeon at a local hospital in the Baltimore area. During his first year he has had a wonderful track record. However, due to a recent argument with the head physician, any little mistake would mean that he would be fired.

Last week, a patient died during a surgery performed by David Conner because another doctor had given her an incorrect diagnosis. However, David decided to hide this fact and told the woman’s the other doctor's incorrect diagnosis—that the weak heart of the patient was the reason for her death, and therefore the doctors could not save her.

---

### **Vignette 4**

Emma Peterson is a banker at a large bank in Cincinnati, OH. Several major pension funds are heavily invested in the bank. In the last couple of months, the bank lost a large amount of money on the stock market. The current financial difficulties of the bank may devalue the bank’s shares.

However, Emma Peterson did not reveal the loss to the company’s shareholders in order to avoid causing panic. Instead, Emma Peterson reported a sizeable profit at the annual meeting of the shareholders, hoping that the annual balance of the company would still be positive in comparison to the last year.

---

## Appendix F: Experimental Instructions for Public Goods Game (Chapter 4)

### Experimental conditions

---

*Screen 1.*

**You will now complete a short decision making task. Below is a description and instructions:**

You have been randomly assigned to interact with 3 other people. All of you receive this same set of instructions. You cannot participate in this study more than once.

*Screen 2.*

In addition to the 75 cents you already receive for this HIT, each person in your group is given 40 cents for this interaction.

**You each decide how much of your 40 cents to keep for yourself, and how much (if any) to contribute to the group's common project (in increments of 2 units: 0, 2, 4, 6, etc.). Money contributed to the common project will be doubled, and then split evenly among the 4 group members.**

For every 2 cents contributed to the common project, the group receives 4 cents to split. If everyone contributes all of their 40 cents, everyone's money will double: each of you will earn 80 cents. But if everyone else contributes their 40 cents, while you keep your 40 cents, you will earn 100 cents, while the others will earn only 60 cents. Thus, if everybody contributes to the project, you all may gain; if nobody else contributes, you may personally lose money on contributing.

*Screen 3.*

The other people are REAL and will really make a decision – there is no deception in this study.

Once you and the other people have chosen how much to contribute, the interaction is over. Neither you nor the other people receive any bonus other than what comes out of this interaction.

*Screen 4 (time pressure condition).*

Please make your decision as quickly as possible. **You must make your decision in less than 10 seconds!**

Please use the slider to choose the amount of money you wish to contribute:

Your contribution: 0 -----slider-----40

*Screen 4 (time delay condition).*

Please carefully consider your decision. **You must wait and think for at least 10 seconds before making your decision.**

Please use the slider to choose the amount of money you wish to contribute:

Your contribution: 0 -----slider-----40

*Screen 5.*

You MUST answer these two questions correctly to receive your bonus!

1. What level of contribution earns the highest payoff for the group as a whole?
  2. What level of contribution earns the highest payoff for you personally?
-

## Control condition

---

### *Screen 1.*

**You will now complete a short decision making task. Below is a description and instructions:**

You have been randomly assigned to interact with 3 other people. All of you receive this same set of instructions. You cannot participate in this study more than once.

### *Screen 2.*

In addition to the 75 cents you already receive for this HIT, each person in your group is given 40 cents for this interaction.

You each decide how much of your 40 cents to keep for yourself, and how much (if any) to contribute to the group's common project (in increments of 2 units: 0, 2, 4, 6, etc.). Money contributed to the common project will be doubled, and then split evenly among the 4 group members.

**For every 2 cents contributed to the common project, the group receives 4 cents to split. If everyone contributes all of their 40 cents, everyone's money will double: each of you will earn 80 cents. But if everyone else contributes their 40 cents, while you keep your 40 cents, you will earn 100 cents, while the others will earn only 60 cents. Thus, if everybody contributes to the project, you all may gain; if nobody else contributes, you may personally lose money on contributing.**

### *Screen 3.*

The other people are REAL and will really make a decision – there is no deception in this study.

Once you and the other people have chosen how much to contribute, the interaction is over. Neither you nor the other people receive any bonus other than what comes out of this interaction.

### *Screen 4.*

Please use the slider to choose the amount of money you wish to contribute.

Your contribution: 0 -----slider-----40

### *Screen 5.*

You MUST answer these two questions correctly to receive your bonus!

1. What level of contribution earns the highest payoff for the group as a whole?
2. What level of contribution earns the highest payoff for you personally?

---

**Filtering criteria:** Consistent with past studies (Rand et al., 2012) and research on reading speed and comprehension (Burns et al., 2002; Mayes, Sims, & Koonce, 2001), I filtered cases for failure to read or adhere to PGG task instructions. Specifically, I filtered <2s, <14.24s, and <2s on screens 1, 2 and 3, respectively in the control condition, and <2s, <15.77s, and <2s, on screens 1, 2, and 3, respectively in the time pressure and time delay conditions), screening out 8.5%<sub>time pressure</sub>/8.4%<sub>time delay</sub>/6.3%<sub>control</sub> recruits for failing to read task instructions, and 7.4%<sub>time pressure</sub>/4.3%<sub>time delay</sub> recruits for failing to adhere to experimental instructions.

**Appendix G: Impression Formation Stimuli (Chapter 5)**

**Umbrella Movement Conflict – Sample Photos of Protesters**



## Pre-SCOTUS Same-Sex Marriage Conflict – News Summary

### SOCIETY

#### Should gay marriage be (i)legal?



This summer, New York became the latest US state to legalize same-sex marriage. As of July 24, six states and the District of Columbia issue marriage licenses to gay and lesbian couples. Across the states, the battle over same-sex couples marrying continues, as many states have passed laws restricting marriage to heterosexual couples. Gay and lesbian activists across the globe insist the federal government should do more to make same sex marriage legal nationwide. Meanwhile House lawmakers, led by Speaker John Boehner looked into how Congress could use the Bipartisan Legal Advisory Group to defend The Defense of Marriage Act, which allows states to refuse to recognize same-sex marriages under the laws of other states).

The same-sex marriage debate is not solely an American phenomenon. In Canada, although the Canadian Parliament passed legislation making same-sex marriage legal nationwide in 2005, the Conservative Party of Canada has been urging the Parliament to reconsider the issue. The debate over gay marriage remains very controversial nowadays in Canadian society. Due to the differences in values and beliefs, it is also not uncommon to see conflicts between the two sides emerging on a day-to-day basis. Among many, there was a publicized case of a lesbian couple in Vancouver, who were refused to rent a hall for their wedding reception from the Knights of Columbus, a Catholic men's service group. The couple complained to the Human Rights Tribunal, citing discrimination: "We just wanted to have a beautiful day, a celebration of our love...this does not feel very right." But on the other side, the Knights argue against discrimination; they say that the Catholic Church owns the hall, and membership is limited to practicing Catholics. He explained, "if it's lawful to say no to performing a same-sex marriage, it's lawful to say no to

celebrating the event. To celebrate an event against your religious belief is the same as conducting the event yourself."

Overall, there are several arguments for both sides of the debate. The side for legalizing gay marriage is largely represented by homosexuals and human rights organizations. They claim that denying same-sex couples the right to marry also denies them the rights and responsibilities that come with marriage. For instance, it allows employers and states to refuse spousal medical care and other normal benefits, exposing homosexuals and their relationships to greater health and well-being risks, while simultaneously devaluing the importance of loyalty and obligation within same-sex relationships. Same-sex marriage proponents argue that such an arrangement makes same-sex couples "second-class citizens", and is therefore discriminatory and unconstitutional. They claim that Americans do not want to see their neighbors, workmates, family members, and friends treated differently from themselves.



The religious community is deeply divided over the issue of same-sex marriage. Among many, the Catholic Church and evangelical Christian groups have played a leading role in public opposition to gay marriage, while mainline Protestant churches and other religious groups wrestle with whether to ordain gay clergy and perform same-sex marriage ceremonies. Many Christian leaders consider the legalization of same-sex marriage an instance of government forcing secular values on churches and religious people's lives. Aside from the ethical argument that national legalization of same-sex marriage symbolizes the abandonment of moral principles, conscience, and the Church in general, most Christian leaders are worried that they will get sued if they do not provide same-sex wedding ceremonies at church; moreover, they claim that religious groups will be forced to provide LGBT education in their affiliated schools and to hire employees that engage in homosexual conduct, and provide benefits to their partners.

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# Post-SCOTUS Same-Sex Marriage Conflict – New York Times Article

## Supreme Court Ruling Makes Same-Sex Marriage a Right Nationwide

By ADAM LIPTAK JUNE 26, 2015

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WASHINGTON — In a long-sought victory for the gay rights movement, the [Supreme Court ruled by a 5-to-4 vote on Friday](#) that the Constitution guarantees a right to [same-sex marriage](#).

“No longer may this liberty be denied,” Justice Anthony M. Kennedy wrote for the majority in the historic decision. “No union is more profound than marriage, for it embodies the highest ideals of love, fidelity, devotion, sacrifice and family. In forming a marital union, two people become something greater than once they were.”

Marriage is a “keystone of our social order,” Justice Kennedy said, adding that the plaintiffs in the case were seeking “equal dignity in the eyes of the law.”

The decision, which was the culmination of decades of litigation and activism, [set off jubilation and tearful embraces across the country](#), the first [same-sex marriages](#) in several states, and resistance — or at least stalling — in others. It came against the backdrop of fast-moving changes in public opinion, with polls indicating that most Americans now approve of the unions.



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## Appendix H. Experimental Wise Reasoning Training Materials (Chapter 5)

### Instructions (part one)

In this section, we would like you to think about a difficult situation that has happened between you and another person (for instance, a disagreement, conflict, etc.) in the past year or two.

This should be a situation that you yourself were involved in, whether or not you were the person who initiated the situation. We would like you to take a moment to recall the situation and visualize the events in your mind.

First describe the situation, and then elaborate and explain in one or two paragraphs based on the guided questions below.

When you are writing, focus on your thoughts and feelings. Don't worry about spelling, grammar, or how well-written it is.

1. Describe the situation:

[Text box]

2. Elaborate and answer the below questions (in one or two paragraphs):

- How might the other party think or feel about the situation differently?
- Could the situation change or become clearer in time, or could your initial reaction change, when more information becomes available?
- Could there be a way to compromise in the situation?
- When you put aside your own feelings, how might the situation appear to uninvolved people?

[Text box]

## **Instructions (part two)**

In the following you will be randomly presented with a news article on a current social issue.

When you read the news article, please recall the questions you have answered when you were describing your difficult situation (see again below). **Try**  
**to use the same thinking strategies when you are reflecting on the summary:**

- How might the other party think or feel about the situation differently?
- Could the situation change or become clearer in time, or could your initial reaction change, when more information becomes available?
- Could there be a way to compromise in the situation?
- When you put aside your own feelings, how might the situation appear to uninvolved people?



**Appendix I. Tables**

Table 1. *Sample Characteristics*

	Sample A	Sample B	Sample C	Sample D	Sample E	Sample F	Sample G	Sample H	Sample I	Sample J	Sample K
Context	Workplace	Workplace	Interpersonal	Interpersonal	Interpersonal & Intergroup	Interpersonal	Interpersonal	Interpersonal	Intergroup	Intergroup	Intergroup & Training Intervention
Recruited <i>N</i>	653	629	398	773	278	340	532	1154	74	308	201
Valid <i>N</i>	404	469	398	730	240	340	467	634	74	308	201
Age <i>M(SD)</i>	32.49 (10.33)	32.49 (10.33)	31.73 (10.33)	32.49 (10.33)	29.76 (7.53)	34.24 (12.51)	20.00(3.59)	34.44 (11.06)	19.14 (0.80)	20.73 (4.96)	37.93 (13.46)
Gender (%♀)	48.30	49.89	57.45	65.88	62.69	55.60	54.81	62.5/37.5	39/35	231/77	113/87/1
Ethnicity (%)											
Asian-American	5.69	6.67	5.1	4.15	8.89			3.9	Hong Kong Chinese	33.1	8.0
African-American	9.65	9.46	8.2	7.31	6.68			9.9	-	7.5	8.0
Caucasian	73.76	72.69	78.7	79.23	74.72			79.7	-	55.8	79.6
Hispanic	4.46	7.10	4.8	4.58	6.03			3.6	-	1.3	4.5
Other	6.20	4.10	3.6	4.79	3.83			2.8	-	5.2	7.0
Median Income (\$)		35,000-50,000	35,001-50,000	25,000- 35,000	41,000-60,000		-	35,001-50,000	-	-	40,000-49,000
Edu (%)											
High school		12.09	14.9	12.03	7.13		-	10.6	-	-	10.4
College		55.63	36.2	52.74	76.04		Undergrads	73.1	Undergrads	Undergrads	70.1
Post-grad		10.70	37.5.0	14.18	17.54		-	16.4	-	-	19.4

*Note:* Due to administrative error, income and education questions were not included in Sample A and only age and gender were assessed in Samples F and G. Valid *N* = participants who passed screening criteria and completed the study.

Table 2. *Pearson's Correlation Between Wise Reasoning, Global Measures of Wisdom, and Bias-Related Indicators*

Constructs	<i>M (SD)</i>	WR	SAWS	3D-WS	ASTI
<b>Global Self-rated Wisdom</b>					
SAWS	4.58 (0.61)	.40***			
3D-WS	3.28 (0.47)	.21***			
ASTI	3.67 (0.69)	.19**			
<b>Observer-rated Wisdom<sup>a</sup></b>	0.07 (1.08)	.19**			
<b>Bias-Related Indicators</b>					
Social Desirability					
Self-Deception	0.12 (0.11)	-.05	.17**	.36***	.23***
Impression-Management	0.12 (0.11)	.08*	.22***	.40***	.24***
Bias Blindspot	1.42 (1.81)	<.01	.25***	.18**	.19**
Biased (vs. Balanced) Attributions	-0.57 (0.33)	-.11**	-.13*	-.04	-.02

*Note.* WR = wise reasoning. SAWS = Self-assessed wisdom scale. 3D-WS = Three-dimensional wisdom scale. ASTI = Adult self-transcendence inventory.

<sup>a</sup> Unstandardized estimate from a linear regression with wise reasoning predicting observer-rated wisdom are reported.

\* $p \leq .05$ , \*\* $p \leq .01$ , \*\*\* $p \leq .001$ .

Table 3. *Chapter 3 Measures, Sample Inclusion, Number of Items per Measure, Central Tendency, and Correlations with Wise Reasoning*

Construct	Sample ( <i>n</i> )	Reliability ( $\alpha$ )	<i>M</i>	<i>SD</i>	<i>r</i>
<b>Big-Five Personality</b>					
Openness	B1 (220)	.82	3.72	0.64	.19**
Conscientiousness	B1 (220)	.85	3.88	0.69	.02
Extraversion	B1 (220)	.83	3.14	0.91	.23***
Agreeableness	B1 (220)	.83	3.8	0.70	.12†
Neuroticism	B1 (220)	.85	2.63	0.83	-.10
<b>Intellect</b>					
Seek	B2 (220)	.95	5.39	1.06	.23***
Conquer	B2 (217)	.96	5.00	1.15	.24***
<b>Attributional Complexity</b>					
Perspective taking	A (404)	.80	3.41	0.73	.48***
<b>Emotional Intelligence</b>					
Self-emotions appraisal	D (702)	.90	5.21	1.20	.10**
Others-emotions appraisal	D (701)	.89	5.2	1.10	.21***
Use of emotion	D (701)	.88	5.22	1.26	.11**
Regulation of emotion	D (701)	.90	4.83	1.38	.12***
<b>Mindfulness</b>					
Nonreactivity	B2 (223)	.87	3.27	0.75	.19**
Observing and attending	B2 (223)	.87	3.54	0.75	.42***
Acting with awareness	B2 (223)	.92	3.30	0.88	-.12†
Describing with words	B2 (221)	.85	3.39	0.75	.17**
Non-judging of experience	B2 (220)	.93	3.04	0.96	-.11
<b>Communal orientation</b>					
Emotion Regulation	A (404)	.88	2.52	0.79	.24***
<b>Emotion Regulation</b>					
Reappraisal	B2 (216)	.93	4.88	1.22	.23***
Suppression	B2 (216)	.85	4.29	1.38	.06
<b>Ruminative Response</b>					
Reflection	D (701)	.77	2.59	0.68	.26***
Brooding	D (701)	.82	2.54	0.77	.14***
<b>Social Relations Growth Mindset</b>					
Interpersonal relations are changeable	G (466)	.79	4.75	1.07	.16***
Social conflicts are changeable	G (466)	.85	5.28	0.92	.15***

*Note.* Sample B participants responded to one half of the individual differences measures (i.e., B1 or B2).

† $p \leq .08$ , \* $p \leq .05$ , \*\* $p \leq .01$ , \*\*\* $p \leq .001$ .

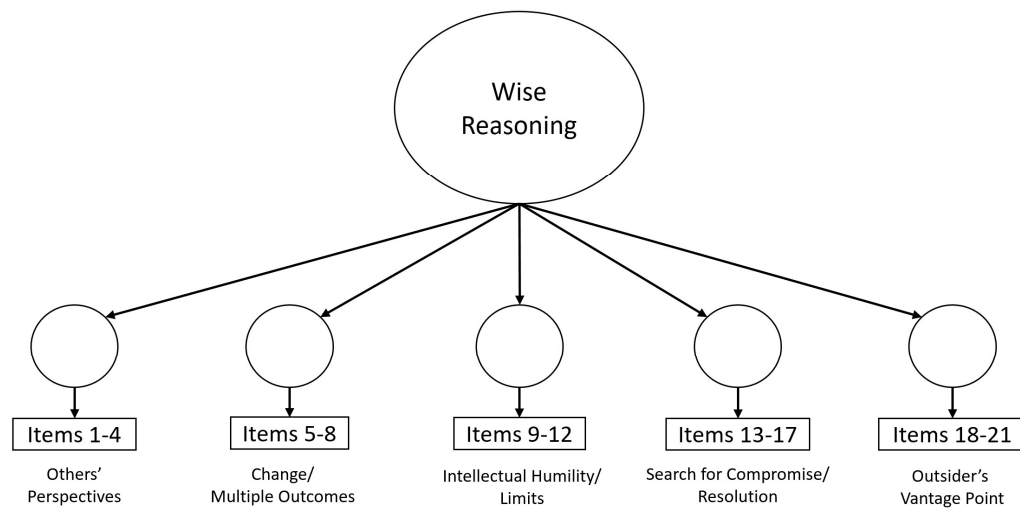
Table 4. *Pearson's Correlations Between Wise Reasoning (Residual Score), Individual Aspects of Wise Reasoning (Raw Score / Residual Score), and Individual Differences*

Constructs	WR Res.	Aspect of Wise Reasoning				
		Perspective	Change/Res.	Humility/Res.	Compromise/Res.	Outsider/Res.
<b>Big-Five Personality</b>						
Openness	.20**	.08	.20**/.17**	.15*/.12†	.16*/.13†	.13†/.10
Conscientiousness	.11	-.07	.08/.12†	.05/.10	.12†/.20**	-.13†/-.10
Extraversion	.21**	.14*	.21***/.17*	.19***/.14*	.14*/.07	.22***/.18**
Agreeableness	.14*	.04	.21***/.20**	<.01/<.01	.19**/.20**	<.01/<.01
Neuroticism	-.04	-.09	-.10/-.06	-.12†/-.09†	-.11/-.07	.05/.10
<b>Intellect</b>						
Seek	.16*	.17**	.23***/.17**	.13*/.04	.20**/.12†	.16*/.10*
Conquer	.13†	.22***	.22***/.14*	.16*/.05	.16*/.03	.20**/.12**
Attributional Complexity	.23***	.10	.16*/.12†	.21***/.19**	.18**/.15*	.18**/.15*
Perspective taking	.30***	.39***	.38***/.20***	.31***/.09†	.48***/.30***	.37***/.22***
<b>Emotional Intelligence</b>						
Self-emotions appraisal	.06	.07†	.12**/.10**	.05/<.01	.11**/.09*	<.01/<.01
Others-emotions appraisal	.11**	.19***	.13***/.06	.09*/-.01	.23***/.15***	.13***/.07†
Use of emotion	.12***	.04	.11**/.10**	.05/.04	.13***/.13***	.07†/.06
Regulation of emotion	.06	.11**	.09*/.05	.08*/.03	.11**/.06	.07†/.03
<b>Mindfulness</b>						
Non-reactivity	.09	.17**	.16*/.09	.16*/.08	.18**/.09	.07/<.01
Observing and attending	.21***	.38***	.36***/.21***	.32***/.13*	.34***/.12†	.27***/.21†
Acting with awareness	-.04†	-.13†	-.03/-.04	-.09/-.02	-.04/.06	-.20**/-.16*
Describing with words	.10	.14*	.21***/.18**	.11/.04	.11/.04	.08/.02
Non-judging of experience	-.06	-.10	-.11/-.07	-.07/-.02	.01/.10	-.18**/-.15*
Communal relationship	.14**	.20***	.22***/.13*	.18***/-.07	.23***/.14**	.14**-.06
<b>Emotion Regulation</b>						
Reappraisal	.12†	.20**	.24***/.16*	.17*/.07	.21***/.10	.10/.01
Suppression	-.06	.11	.02/-.04	.11/.06	.02/-.06	-.06/-.13†
<b>Ruminative Response</b>						
Reflection	.16***	.21***	.15***/.11	.21***/.11**	.19***/.08*	.22***/.16***
Brooding	.13***	.08*	.07*/.18***	.12**/.09*	.07†/.03	.19***/.17***
<b>Social Relations Growth Mindset</b>						
Interpersonal relations	.11*	.11*	.15***	.19***/.16***	.11*/.06	.03/<.01
Social conflicts	.12**	.08†	.20***	.16***/.14**	.11*/.08†	<.01/-.03

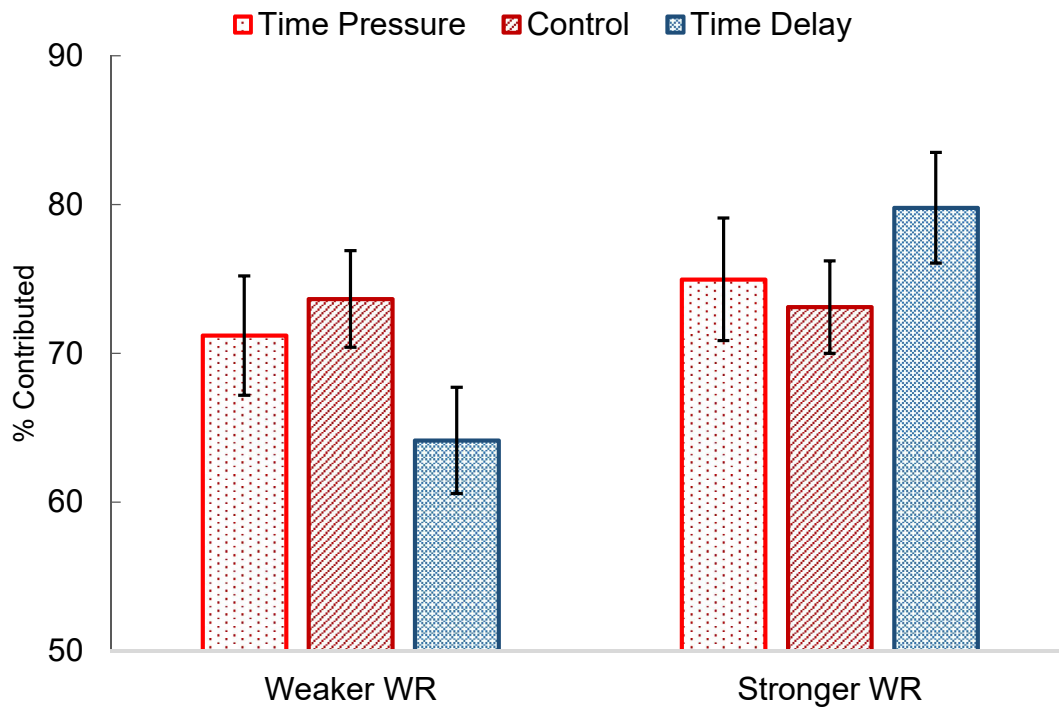
Note. WR Res. = wise reasoning (items 5-17) residual score; Res. = residual score for each aspect of wise reasoning.

† $p \leq .08$ , \* $p \leq .05$ , \*\* $p \leq .01$ , \*\*\* $p \leq .001$ .

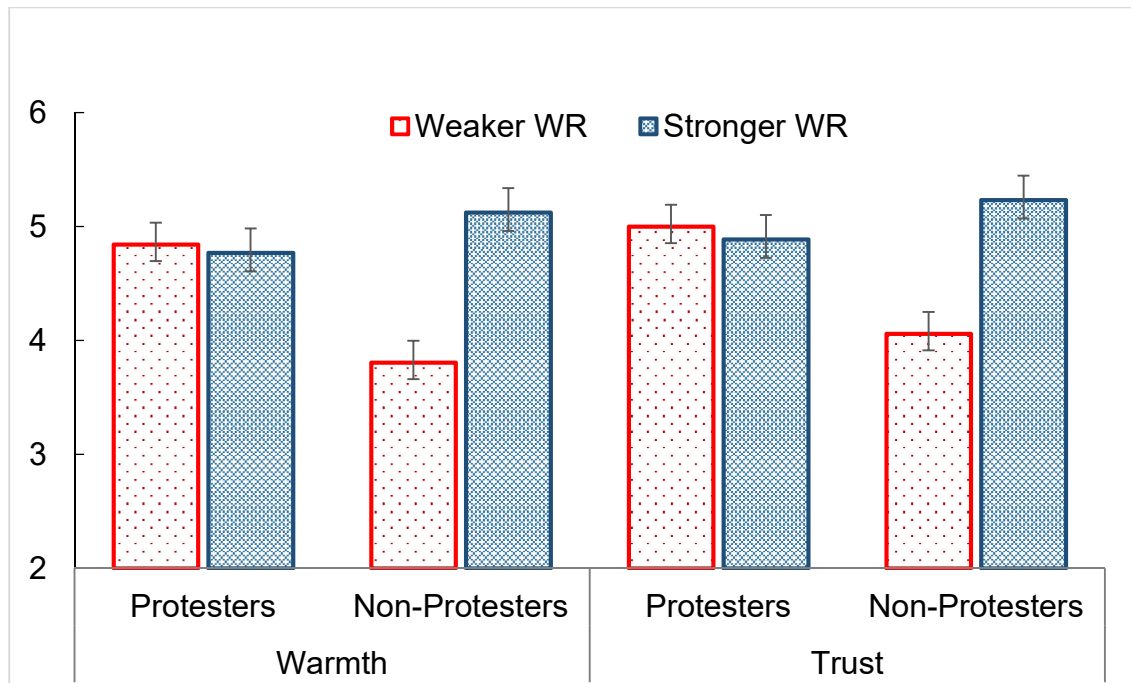
## Appendix J. Figures



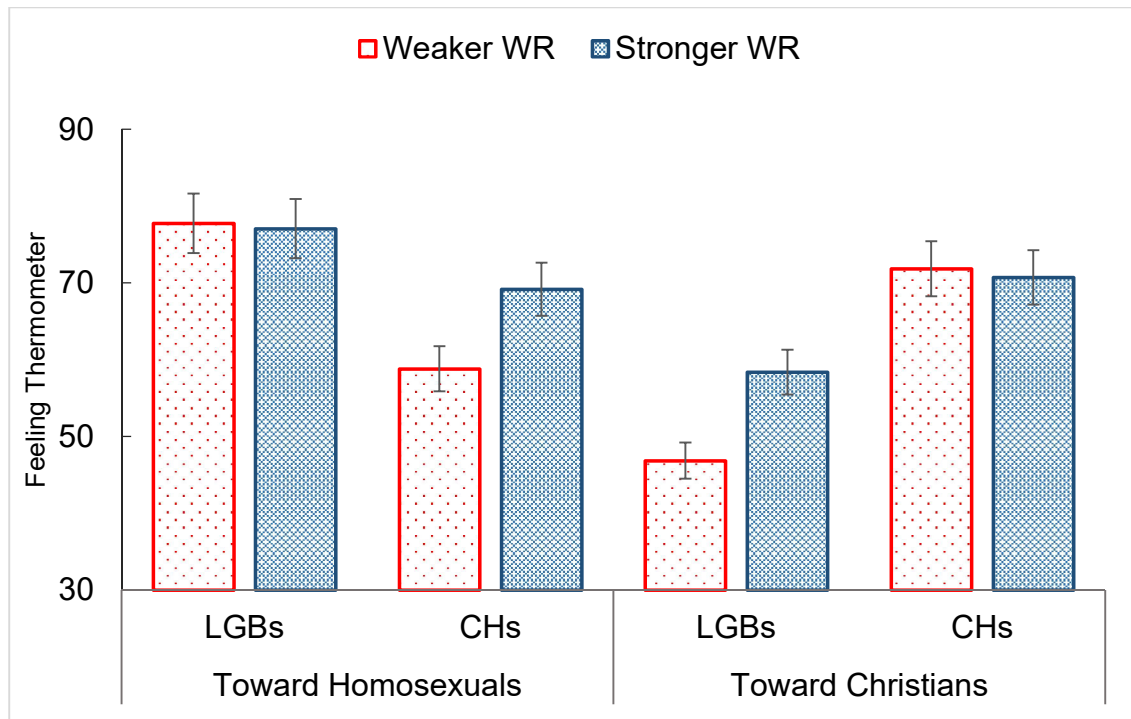
*Figure 1.* Five-factor model of wise reasoning. Item numbers are taken from the final 21-item measure (Appendix B).



*Figure 2:* Effect of wise reasoning (WR) on the relationship between experimentally manipulated deliberation and cooperation in the public goods game. Tests of simple slopes on cooperation were conducted at +/- 1 standard deviation from the mean on wise reasoning. Stronger wise reasoning related to greater cooperation when participants were instructed to deliberate over their contribution in the public goods game.

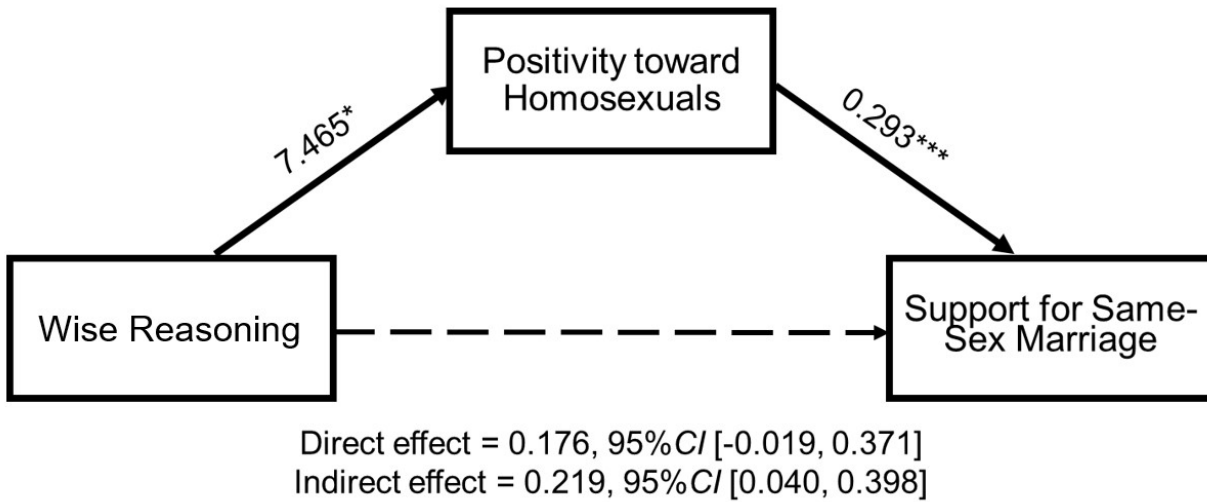


*Figure 3.* Ratings of favorability (warmth and trust impressions) toward Umbrella Movement (UM) protesters (Y axis), by both protesters and non-protesters (X axis). Tests of simple slopes on ratings of Warmth and Trust were conducted at +/- 1 standard deviation from the mean on wise reasoning. Wise reasoning predicted more favorability toward UM protesters in non-protesters and reduced group-related polarization in favorability toward protesters.



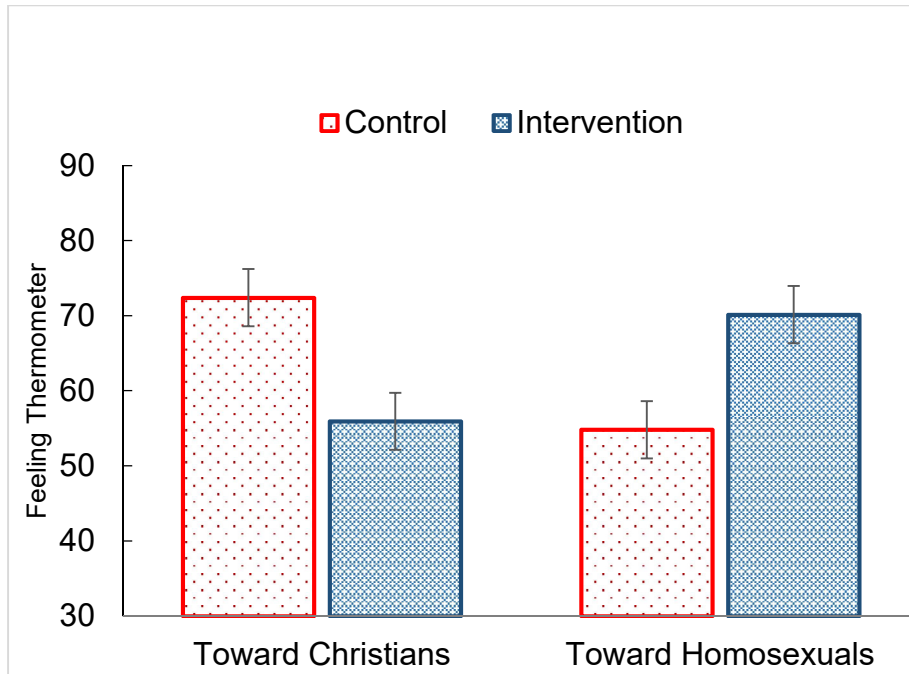
*Figure 4.* Feeling thermometer ratings of favorability toward homosexuals (left) and Christians (right; Y axis), by both lesbian/gay/bisexual (LGB) and Christian heterosexual (CH) participants. Tests of simple slopes on favorability ratings were conducted at +/- 1 standard deviation from the mean on wise reasoning. Wise reasoning related to more favorability toward outgroups and reduced between-group polarization in favorability.





*Figure 5.* Mediation analysis of the effect of wise reasoning on support for same-sex marriage via favorability toward homosexuals among Christian heterosexual participants. Coefficients are standardized.

\* $p < 0.050$ , \*\* $p < 0.010$ , \*\*\* $p < 0.001$ .



*Figure 6.* Feeling thermometer ratings of favorability toward Christians (left) and homosexuals (right) by U.S. Christian and social conservative participants. Wise reasoning intervention led to more favorability toward homosexuals and attenuated favorability toward Christians.

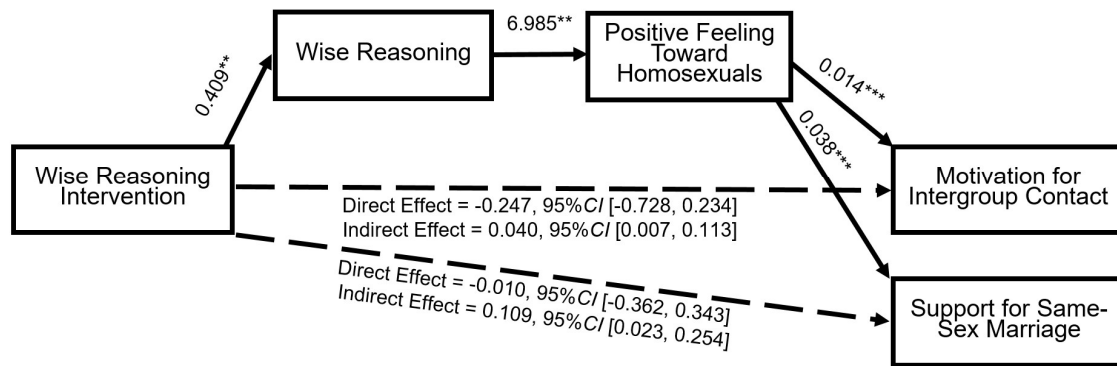


Figure 7. Serial mediation analyses (combined for visualization) of the effect of wise reasoning intervention on 1) motivation for intergroup contact, and 2) support for same-sex marriage via the use of wise reasoning and favorability toward homosexuals among American Christian and social conservative participants. Coefficients are standardized.

\* $p < 0.050$ , \*\* $p < 0.010$ , \*\*\* $p < 0.001$ .