

FROM MINDLESS TO MINDFUL DECISION MAKING:
REFLECTING ON PRESCRIPTIVE PROCESSES

by

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Abstract

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From mindless to mindful decision making: Reflecting on prescriptive processes

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People frequently make judgments and decisions in ways that, in hindsight, they might prefer to have made differently. Their judgments and decisions may be strongly influenced by some attributes that people would prefer receive less weight (e.g. transient emotions, peripheral cues, and social influence), and people may neglect other attributes that they would prefer receive more weight (e.g. factual information, subjective experiences, and personal preference). The central claim in this dissertation is that asking people to reflect on prescriptive decision processes—how decisions *should* be made—elicits a psychological state of mindfulness where people are increasingly aware of and better able to correct decisional influences. Such mindfulness thus improves the subjective quality of decisions. Six experiments examine how introspection-induced mindfulness changes the weighting of decision attributes and the outcome of decisions in various domains including charitable giving (Studies 1 & 5), dating (Studies 2 & 6), policy evaluations (Study 3), and movie preferences (Study 4). In each experiment, people's decisions are strongly influenced by some attributes while neglecting other attributes, in contrast with people's beliefs about how decisions

should be made. By inducing mindfulness of prescriptive decision processes, people weight the decision attributes in closer accordance with how they think decisions should be made in that particular context. Furthermore, mindfulness also promotes increased awareness of decisional influences, which leads to judging the quality of decisions differently: a decision that people perceive to be consistent with their beliefs about how decisions should be made, is evaluated more favorably than a decision that is perceived to be inconsistent with such beliefs (Study 6).

Keywords: judgment and decision making, mindfulness, introspection, emotion, negativity bias, persuasion

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Chapter 1: Introduction

One fundamental lesson from studying judgment and decision making is that the weighting of decision attributes is a critical component for describing and evaluating people's decision processes (Kahneman & Frederick, 2002). Some attributes are heavily weighted in the decision process such as emotional reactions (Hsee & Rottenstreich, 2004; Rottenstreich & Hsee, 2001), negative information (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001), losses (Tversky & Kahneman, 1981), etc. and other attributes may not receive much weight at all such as numeric information (Hsee & Rottenstreich, 2004), analytic and logical arguments (Kahneman & Frederick, 2002), etc.. Attribute weighting is an important factor in judgment and decision making in part because many decisions could easily be improved by changing the attribute weighting instead of changing the kind of processing (e.g. from intuition to reasoning, Kahneman, 2003) that people engage in when making decisions. In this dissertation, we propose a state of mindfulness where people are aware of decision attributes and where they observe how much weight these decision attributes receive in their decision making process. We hypothesize that this state leads people then to think about the respective weight that decision attributes *should* get, based on people's subjective beliefs about how much influence attributes should have. We think that—upon reflection—people have beliefs about how much weight decision attributes should get that may differ from how much weight people would normally give these attributes. Using the example of a voting decision, we introduce the general idea before we then delve

deeper into the theoretical background and lead into studies that examine the present hypotheses.

Imagine that someone is deciding which political candidate to vote for in an upcoming election. People's voting decisions can be strongly influenced by their impression of a candidate, such as a candidate's attractiveness (Olivola & Todorov, 2010). But would people agree that it *should* influence voting decisions? The positions that the candidate takes on specific issues such as protecting the environment, education, health care, foreign policy may also affect people's voting decisions, but it is an interesting question to ask how much candidates' attractiveness matters relative to their positions on issues matters for voting decisions—and most importantly for the present dissertation, how much it *should* matter from the voters' point of view.

While a candidate's attractiveness may affect people's voting decisions, they may not be aware of this effect. Similarly, while a candidate's stance on specific issues may provide a somewhat weaker influence on a person's voting decision, people may generally also not be aware of this influence. The important point is that people's voting decisions (and many other judgments and decisions) are influenced by various decision attributes, but that people may not be aware that these attributes influence their decisions and how much their relative influence is. It seems plausible that people can gain some awareness of these attributes and their relative influence. For example, if people have to justify why they voted for one candidate and not another, they may realize that some attributes provided undue influence on their judgments and decisions. If

people were mindful of how much these attributes might influence their decision, they might change the relative weighting of these attributes. For the voting example, mindful decision makers might become aware that they were basing their decisions strongly on their impression of a candidate and less on a candidate's position on specific issues. This insight may lead them to think about whether this weighting is their most preferred weighting and if it is not, they may engage in correcting how much their decision is based on their impression versus a candidate's positions on issues. In this example, we would certainly expect that a majority would prefer to make decisions based on a candidate's positions rather than on subjective impressions of the candidate such as attractiveness.

This dissertation seeks to examine a psychological process of mindful judgment and decision making. The assumption is that people generally process information without being aware of the attributes that affect their judgments and decisions—and how much they do. We refer to this psychological state as mindlessness because people rely on decision attributes to different degrees without being aware of these attributes' influence on their decisions. This state can be considered the default state of processing for most people and is not to be confused with claims about how deep or how much people process, which is an important distinction that we come back to throughout this dissertation. Not being aware of decision attributes may certainly often be an adaptive strategy that works well for most judgments and decisions in everyday life. However, we hypothesize that people sometimes have a different opinion about how much

influence some attributes should have had on their judgments and decisions. As in the voting example, people could come to the conclusion that they were strongly affected by the attractiveness of political candidates—and they wish they were not, but that they did not put a lot of weight on the candidates' position on important issues—and they wish they did.

One of the central claims in this dissertation is that some problematic aspects in judgment and decision making that arise from a mindless default attribute weighting, which is inconsistent with normative weighting can be mitigated by changing the weighting of attributes. We purposefully created decision situations where the weight that attributes receive is inconsistent with the weight the attributes *should* have received—according to people's beliefs about the weighting. We predict that once people are in a mindful as opposed to a mindless state, they are aware of the decision attributes, they think about how much these attributes should influence the decision (based on their own subjective standards), and they change the weighting of these attributes to match it with how much weight they think the attributes should get. It is certainly possible to imagine situations where people are not mindful and aware of the decision attributes, but where their decisions are perfectly consistent with their beliefs about how decisions should be made. We predict that in these situations, mindfulness would not lead to a change in the decision, but mindfulness could have additional benefits such as reducing regret about negative outcomes of decisions because people made a decision where they were aware of how they wanted to make it. These additional benefits of mindfulness are open for future

research. In the present research however, we were primarily interested in examining the effects of mindfulness on changes in the decision process. Our theoretical reasoning only predicts changes in the attribute weighting if the mindless default weighting differs from people's preferred weighting. Thus, we focused in our empirical investigation on designing paradigms where the default weighting is at odds with people's preferred weighting.

Attention and weighting processes in judgment and decision making

In a rich, real world environment, there is a lot of information available that people could process when they are making decisions. It is necessary to have one's attention focus on only a smaller subset of the total information available. This is based on the assumption that it would be impossible for decision makers to consciously process all the information available, which would not be very adaptive (Kahneman, 2003; Simon, 1978).¹ Attention is selecting which subset of this information receives significance in the decision making process (Kahneman, 1973). Attention may be automatically drawn to some information and stimuli (depending on goals or on affective states), but decision makers can also intentionally direct it to some information (Weber & Johnson, 2009). We adopt the perspective to view attention as a spotlight that serves as a selection tool such that information that people attend to receive more weight in the decision making process. How much attention people place on

¹ This does not imply that people cannot process much of this information unconsciously or implicitly and that this information can influence judgments and decisions through unconscious or implicit processing.

attributes is generally predictive of how much weight these attributes receive in the decision. There could certainly be important other information that would be relevant for a decision, but if it is outside this “attention spotlight,” people will attend to this information less and thus, weigh this information less in the decision process.²

Attention influences judgment and decision making. Attention is an important precursor for decision making—presumably because the information that people attend to will get some weight in the decision process (Weber & Johnson, 2009). The following section will present three areas where some attributes attract more attention and receive a lot of weight in the decision process (emotions, negative information, and group influence and expert opinion in persuasion paradigms) compared with other attributes that attract less attention and receive less weight.

Emotions attracts attention. Emotions draw attention to stimuli or features of stimuli. For example, threat-related and fear-relevant stimuli such as snakes capture people’s attention more than positive or neutral stimuli (Fox, Russo, Bowles, & Dutton, 2001; Öhman, Flykt, & Esteves, 2001; Yiend, 2010). Immediately arousing emotional experiences also capture attention more than previously experienced emotions and presumably impairing attention to subsequent experiences (Derryberry, 1993; Van Boven, White, & Huber, 2009). Using eye tracking methods, it has also been found that people orient their attention more to emotional pictures compared with neutral pictures

² This does not imply that there are no other mechanisms for the influence of attributes on judgment and decision making (e.g. priming).

(Nummenmaa, Hyönä, & Calvo, 2006). Another finding shows that directing attention to non-arousing aspects of a picture decreases the late positive potential, an event related potential related to increased attention to emotional stimuli (Dunning & Hajcak, 2009).

Additionally, emotions not only attract attention, but they also direct people's attention to features of the situation that are relevant for behavior (Loewenstein, Weber, Hsee, & Welch, 2001; Weber & Johnson, 2009). For example, experiencing fear helps focusing on the person or object that arouses the fear and facilitates behavioral responses to address the threat.

In sum, emotions related to the decision outcome, emotional information about the decision, or emotions that people experience during the decision making process attract more attention than emotionally neutral aspects. Therefore, they might receive more weight in the decision process compared with other attributes that characterize the decision. Arguably because emotions often serve important signaling functions in social situations and because they facilitate behavioral responses, the fact that they attract attention has high adaptive value.

One important area where emotions have a strong effect on judgment and decision making is charitable giving. People give more to those whose suffering is more upsetting compared with people whose suffering is relatively less upsetting (Batson, 1990). But such a strong influence of sympathetic emotion on donation decisions can be problematic because factors that arouse emotions may be independent of the objective severity of suffering. If factors that are unrelated

to the objective suffering contribute to strong emotional reactions in response to a crisis, donation decisions might be insensitive to the objective scope of human suffering. Such “scope insensitivity” has been examined in various phenomena such as the identifiable victim effect (Kogut & Ritov, 2005a, 2005b; Small & Loewenstein, 2003) and the immediacy bias in emotion perception (Huber, Van Boven, & McGraw, in press; Van Boven et al., 2009). The identifiable victim effect describes decisions where people are more inclined to make donations that alleviate the suffering of a specific, identified individual rather than a group of individuals, which is largely attributable to the stronger sympathetic emotions evoked by an identifiable victim (Kogut & Ritov, 2005a). We have recently tested whether an immediacy bias in perceived emotions where immediately experienced emotions are perceived as more intense than previously experienced emotions might produce an immediacy bias in donation decisions (Huber et al., in press; Van Boven et al., 2009). That is, people might be more likely to donate resources to alleviate human suffering that happens to arouse immediate emotional reactions than to human suffering that happened to have aroused previous emotional reactions. In one test of this prediction, participants watched (in random order) two short films portraying humanitarian crises in Africa. Directly after viewing the second clip, participants were asked to make ratings of how deserving each crisis was for receiving humanitarian aid. Consistent with the immediacy bias, participants perceived as more deserving whichever crisis they happened to have learned about second and aroused immediate emotions.

Most participants also chose to donate more money to the humanitarian crisis they learned about second.

Although emotion's influence on donation decisions is undoubtedly desirable in many situations, there are many other situations in which people might prefer to donate based on objective information such as the number of victims. Again, it is important to keep in mind that an increased weighting of objective information is what people would prefer to do once they reflect on the way they made the decision. We examine whether making people mindful of emotional reactions and objective information changes their influence when making monetary allocations to humanitarian crises.

Negative information attracts attention. People exhibit a negativity bias in a number of different areas (Baumeister et al., 2001; Rozin & Royzman, 2001). In essence, these effects demonstrate that negative information gets more weight compared with positive information. For example, people form negative impressions easier than positive impressions (Baumeister et al., 2001 summarizes these). When people process information about another person, they give a lot of weight to extreme information and to negative information (Fiske, 1980). For example, the more unfavorable a trait is, the smaller the number of instances required to confirm the negative stereotype and the larger the number of instances required to disconfirm it (Rothbart & Park, 1986).

Again, there is value in processing information with a focus on negative information. Some information about other people is more diagnostic than other information (Skowronski & Carlston, 1989). For example, if someone wants to

know how friendly another person is, it may not be very informative to know which major this person chose in college. However, it may be very useful and informative to know what someone's friends think about this person. In addition to the usefulness of some categories of information, valence conveys important diagnostic information. Negative information is more diagnostic according to Skowronski and Carlston's (1989) category diagnosticity approach, because even just a few negative behaviors are enough to categorize someone as a "bad" person while a few positive behaviors are not enough to be categorized as a "good" person.

Thus, negative information and is weighted more, it attracts people's attention through an automatic vigilance mechanism (Pratto & John, 1991), and it has a greater impact on evaluations compared with positive information (Ito, Larsen, Smith, & Cacioppo, 1998).

Even though the negativity bias occurs in part because of negative information's diagnostic value, there can be situations where the negativity bias leads to problematic judgments and decisions.³ A classic illustration is the Asian disease framing effect (Tversky & Kahneman, 1981). In this paradigm, the number of people affected by the outbreak of a disease is either framed in terms of how many people will be saved or how many people will die. There are two courses of action and both are presented to participants either in a "people saved"

³ It is interesting that this attention to negative information is often referred to as a "negativity bias," which suggests that the literature on this topic views this effect as a systematic error in judgment. In judgment and decision making, biases are defined as deviations from rational choice and they are thought to be the outcome of using heuristics (Gilovich & Griffin, 2002).

or in a “people die” framing. A majority chooses the course of action that saves 200 people (out of a total of 600 people, which kills 400 people), but participants avoid the very same course of action when 400 will be killed (again, out of a total of 600 people, which saves 200 people). Clearly the information about the courses of action is exactly the same—the only difference is that the framing or presentation of this information differs.

Furthermore, there are different categories of information such as valence and relevance. Imagine there are two pieces of information that people can use to make a decision. In one scenario, the relevant piece of information is negative and a less relevant piece of information is positive. In this situation, the relevant information will receive a lot of weight because of the negativity bias, which in this situation is beneficial because people probably want to give relevant information a lot of weight. In a different scenario, the relevant piece of information is positive and a less relevant piece of information is negative. In this scenario, the relevant information may receive less weight because the negativity bias leads people to attend more to the moderately relevant information. Again, we argue that the weighting in line with the negativity bias would not be people’s preference for the ideal weighting, given the relevance of the information.

Group influence and expert opinion in persuasion. Among the many sources of persuasive influence, group influence and expert opinions are influential in changing people’s attitudes (Asch, 1955; Petty & Wegener, 1999). Specifically, political group influence has been shown to be more influential than

people's ideologies or the attitude object itself (Cohen, 2003). In a typical paradigm, participants read about a welfare policy and they either received information that Republicans in the House of Representatives supported the policy or that Democrats supported it. A third group of participants did not receive any information on which political party supported the policy. In the control condition, participants evaluated the policy based on the policy's content and how well it matched their political ideology: Democratic participants supported a generous welfare policy (e.g. full medical assistance, 2 years of paid tuition at a community college, etc.) more than Republican participants. In contrast, when participants received information on which political party in the House of Representatives supports the policy, their evaluation of the policy matched the position of their political ingroup (e.g. if Democrats in the House of Representatives supported the policy, Democratic participants were more likely to evaluate the policy more positively). This finding shows that social groups shape the meaning of the attitude object (Cohen, 2003). Attitudes certainly do not simply develop from objective information about the attitude object alone and information about how social groups evaluate the attitude object is an important factor in the development of an attitude (Asch, 1955).

This impact of group influence may often be a sensible strategy because the position of social groups can be relevant information, complementing information on the content of the attitude object itself. On the other hand, one can also easily imagine situations where people would like to evaluate a policy without being strongly influenced by group influence—especially when attitudes

can be so dramatically different for the very same policy simply as a function of group influence as demonstrated by Cohen (2003).

There are several peripheral cues known to affect persuasion such as the credibility and the attractiveness of the source (Chaiken, 1987; Petty & Wegener, 1999). Based on commonly used models, there are two routes to persuasion: a central route where people consider a message based on its logic and a peripheral route where people rely on peripheral cues (Petty & Wegener, 1999). This view is also consistent with other dual process models such as the heuristic-systematic model where people either process more heuristically, relying on cues and using short-cuts or where people process more systematically (Chaiken, 1987; Chaiken, Liberman, & Eagly, 1989). One of the peripheral cues that we will examine in this dissertation is the power of expert opinions. A peripheral cue such as expertise can change people's attitudes when they are not carefully examining the argument and the information presented (DeBono & Harnish, 1988; Petty, Cacioppo, & Goldman, 1981).

Persuasion has had a very long history in social psychology and we think that it may be more obvious why group influence and expert opinion should not strongly influence and change attitudes, at least not as a general rule. It seems problematic that people who are processing somewhat carefully and effortful, have dramatically different views about the exact same welfare policy when they know whether their own political party supports or opposes it. Do people really believe that it is in their best interest to evaluate a policy less based on its content and more on which political party supports it? We argue that people would

disagree that it is, for example because they might know that political parties may have different motives and agendas that leads them to support or oppose a policy and they might know that such political agendas can have little to do with the actual content of a policy.

Similarly, for expert opinion as a powerful peripheral cue for persuasion (Chaiken, 1987; Petty et al., 1981), it may seem sensible for people to not always rely on experts. This may be especially true in situations where people have already experience with the attitude object and they really feel like they are in a position to evaluate the attitude object themselves instead of relying too much on expert opinions.

In sum, the judgments and decisions in the areas of emotion, negative information, and persuasion that we have just described, have in common that people strongly rely on some attribute and less on other attributes:⁴ people can be strongly influenced by emotional information and not very much by objective information, they can be strongly influenced by negative information and less by other relevant information, their attitudes can be strongly influenced by group influence and expert opinion and less by their own attitudes and experiences. Notice that one claim in this dissertation is that these weightings can be very different from people's beliefs about how much weight these attributes should

⁴ By describing these weightings in terms of pairs of attributes where one strongly influences judgments and decisions and another attribute does not, we don't mean to imply that these two attributes might be in some kind of competition or contrast where more influence of one would necessarily imply less influence of the other.

get and if people were to think about these beliefs, they would change the weightings.

Mindless judgment and decision making

We have argued above that these effects in the three domains of emotions, negative information, and persuasion, are all decision weightings that can be very functional and adaptive (e.g. allowing a quick response in a threatening situation). These weightings appear to be “scripted” in the sense that people are processing emotional and negative information, group influence and expert opinion without being aware and mindful of how much weight this information actually has on their judgments and decisions (Langer, 2000). Importantly, these weightings are not necessarily the same as automatic or heuristic processing, which are often used to characterize the processing style that people engage in when they are not especially motivated to process very carefully, deeply, or systematically—an idea which is consistent with a number of different dual process models (Bless & Schwarz, 1999; Epstein, Lipson, Holstein, & Huh, 1992; Epstein & Pacini, 1999; Kahneman, 2003; Petty & Wegener, 1999; Pham, 2007; Sloman, 1996, 2002). This dissertation does not hypothesize that mindful decision making can change processing style from heuristic to systematic. Instead, we propose and examine mindful decision making as a processing style that makes people aware of how much various pieces of information influence their judgments and decisions, and this awareness allows people to either increase or decrease the weighting of this

information. Because we argue that mindlessness is not the same as automatic or heuristic processing, one prediction that follows and is examined in this dissertation is that the effects of systematic thinking would lead to different weightings compared with mindful judgment and decision making.

Even though these three effects are examining different psychological mechanisms in different areas, we argue that one feature that all these effects have in common is a strong reliance on some types of information or decision attributes (emotions, negative information, group influence, and expert opinion). This mindless reliance on information can be compared to following and expecting behavioral scripts mindlessly (Langer, 1992, 2000; Langer & Abelson, 1972; Langer, Blank, & Chanowitz, 1978; Langer & Piper, 1987). For behavioral scripts, people presumably have abstracted features from encountering a number of similar situations and they are processing behavioral sequences relying on those features without awareness instead of the specific information of the actual situation. In one of the early studies, participants were approached while they were waiting to make copies at a copy machine and a confederate of the experimenter wanted to cut in line (Langer et al., 1978). Participants were given not a good reason for why the confederate wanted to cut in line, no information, or a good reason. When the confederate wanted to cut in line to make just a few copies, more participants allowed the confederate to do this when the confederate gave them a good or not a good reason compared with no reason at all. Interestingly, it did not matter whether the confederate said “May I use the xerox machine, because I have to make copies” (not a good

reason) or “May I use the xerox machine, because I’m in a rush” (good reason). A behavioral pattern such as this has been interpreted as “mindless” because one would expect people to differentiate between providing a good or not a good reason. When participants were sufficiently motivated because the confederate wanted to make a lot of copies, they attended to the information and they differentiated between a good and not a good reason (more participants let the confederate cut in line when they provided a good reason compared with not a good reason).

A similar perspective can be adopted for judgment and decision making. People rely on emotions and negative information, they allow groups to define the meaning of attitude objects, and they rely on peripheral cues in persuasion. Throughout this dissertation, we refer to these weightings as mindless judgment and decision making. In sum, when people are making judgments and decisions mindlessly, they may be unduly influenced—according to their own beliefs about how decisions should be made—by information that attracts attention by default.

Mindful decision making

From mindless to mindful judgment and decision making. Up until now, we argued that scripted judgment and decision processing that people engage in by default can be characterized as relatively mindless. In a mindless state of judgment and decision making, people can either under- or overweight attributes compared with people’s prescriptive beliefs about how much weight

attributes should get. As we briefly mentioned above, theoretically, people can also weight attributes in line with their prescriptive beliefs, which is not the focus of the present investigation, but could be of interest to examine other aspects of mindfulness in future research. Such aspects of mindfulness may include for example benefits in reducing regret after learning about the negative outcome of a decision because it serves as a justification for the decision (Connolly & Zeelenberg, 2002) or it may increase choice satisfaction as a consequence of thinking about the weighting of the decision attributes.

Many of the judgments and decisions people make by default show a different weighting than what people's prescriptive beliefs would imply. We refer to beliefs about how much attributes should be weighted as prescriptive beliefs to differentiate these subjective beliefs and standards from normative standards, which are mostly based on external rational choice models. The studies in this dissertation examine various kinds of prescriptive beliefs, their effects on decision attribute weightings, and whether people think they make better decisions when they are mindful of decision attributes. We examined two different ways for inducing mindful processing, but the common idea is that we ask people to rate the importance of decision attributes before they make their judgment or decision. We hypothesized that this would make people mindful and aware of the decision attributes. Consequently, people would engage in changing their weighting to match their prescriptive beliefs.

There is an interesting analogy in cognitive psychology, which are effects of inattention blindness where information is presented directly in front of

people, but they fail to see it, because their attention is focused on other information (Mack, 2003). Perhaps one of the most famous illustrations of this effect is where participants are watching a video clip where two groups of people are each playing a ball game and a majority of participants are not aware that a person wearing a gorilla costume is walking among two groups (Simons & Chabris, 1999). People were instructed to count the number of times one of the groups passes the ball, which requires all their attentional resources. While people are focusing their attention on the number of times one of the groups passes the ball, they do not see a person in a gorilla costume walking right through the two groups even though this person is clearly in their visual field. When people are asked afterwards if they noticed anything unusual, most of them are not aware that anything unusual happened in the video, indicating that people simply did not see this person. However, if people are made aware of this and they see the person in a gorilla costume, they are very surprised and even shocked that they failed to notice this, suggesting that they believe that they should clearly notice events that are so unusual and unexpected (Simons, 2000).

In the present research, people read and see information, but they are not attending to some attributes and they are not weighting those. It may be the case that since decision attributes such as emotions attract people's attention, people may fail to notice other information such as objective, numerical information and it is only when people are aware of these attributes that they start to weight them according to their prescriptive beliefs. These two phenomena are certainly very different and we do not mean to imply that the very same psychological

processes are at play in both. For example, in attentional blindness paradigms, the information that people do not see is not relevant to complete the task successfully whereas in the present research, we examine situations where people believe that the decision attributes are in fact relevant. Additionally, while inattention blindness is a phenomenon where people fail to notice a stimulus, the studies in the present research are focused more on the degree to which some attributes influence judgments and decisions. The analogy is still interesting however in the sense that by default, people attend to one attribute and they may fail to notice other attributes, and while people are not necessarily shocked that they did not notice other attributes, they believe that they should have taken these attributes more into account.

Defining mindful decision making. We define mindful decision making as a psychological state in which people are aware and observant of their decision processes. By decision processes, we refer to attribute weighting processes such as the weighting of emotional reactions or negative information when making judgments and decisions. When people are mindful, they become aware of the decision attributes and how much weight these attributes receive. Importantly, we hypothesize that this awareness of how much weight attributes receive by default brings people's prescriptive beliefs about the attribute weightings to mind. We believe that being aware of decision attributes and their relative weighting leads to a critical evaluation of whether this seems to be the subjectively best weighting because presumably people are motivated to make "good decisions" (Shafir, Simonson, & Tversky, 1993). If it is not, then people

subsequently change the attribute weighting to match their preferred weighting. (If it seems to be the subjectively best weighting, then mindfulness would not lead to a change in the attribute weighting.)

The kinds of decision attributes that people can become aware of depend on the decision context. For example, we examine decision attributes such as emotional reactions, objective information, expert opinion, personal liking, etc. In almost all the studies that we present, we measure the weighting of attributes within the context of multiple regression data analyses where we operationalize attributes' weight in terms of whether they predict judgments and decisions when people are mindful compared to mindless.

The similarity to Ellen Langer's and to clinical conceptualization of mindfulness is that people become aware of their decision processes, that is, their attribute weighting (Baer, 2003; Dimidjian & Linehan, 2003; Langer, 1992), but we hypothesize that this kind of mindfulness also leads people to bring to mind prescriptive beliefs about the ideal decision processes. Furthermore, we hypothesize that people compare their decision processes with their prescriptive beliefs and that they engage in correcting their decision processes to match their prescriptive beliefs. Neither Ellen Langer's nor clinical conceptualizations of mindfulness propose that mindfulness is related to such as strong evaluative component. Initially however, when people become aware of their own thought and decision processes, mindfulness is conceptualized similarly across Ellen Langer's work, clinical applications, and the present research. In Ellen Langer's work, people become aware of behavioral sequences and scripts (Langer &

Abelson, 1972; Langer et al., 1978) and in clinical applications, people become aware of their thoughts, emotions, and bodily sensations (Baer, 2003). In the present research, people become aware of decision attributes and their relative weighting.

Conscious and unconscious thinking in judgment and decision making

Traditionally, judgment and decision making research has assumed that a more careful, systematic, and analytic processing is the best way to reduce some of the problematic aspects that judgments and decisions can have, precisely for the reason that one of the main purposes of this kind of processing is to correct for problems that arise of heuristic and shallow processing (Kahneman, 2003).⁵ This perspective is based in part on the notion that people are cognitive misers with limited resources who are processing only a small portion of the available information, which can lead to erroneous judgments (Fiske, 1992; Fiske & Taylor, 1991; Simon, 1978).

This view of conscious thinking is related to dual process models where the initial type of processing is fast, automatic, effortless, and emotional (often referred to as system 1, tacit, intuitive, or heuristic processing) and another type of processing is slow, controlled, effortful, and neutral (often referred to as system 2, analytic, or systematic processing) (Bless & Schwarz, 1999; Epstein et al., 1992; Epstein & Pacini, 1999; Kahneman, 2003; Pham, 2007; Sloman, 1996, 2002). Dual process models are widely used theoretical perspectives that have

⁵ There are many more strategies for debiasing people's judgments that help decision makers in specific situations (Fischhoff, 2002).

been developed in various areas such as attribution theory (Trope & Gaunt, 1999), impression formation (Fiske, Lin, & Neuberg, 1999), attitudes and persuasion (Petty & Wegener, 1999), and moral reasoning (Haidt, 2001). While their general purpose has been shown to be useful and influential, the main assumption of two distinct processes has also been criticized (Kruglanski & Thompson, 1999; Osman, 2004).

However, attempts to debias people by making them process more can also backfire. In response to learning about the identifiable victim effect, participants who were forewarned about it and encouraged to avoid it decreased, rather than increased, the amount they donated (Small, Loewenstein, & Slovic, 2007). They chose to donate less money to the identifiable victim compared with participants who were not made aware of this effect, but they did not increase their donation to the group of victims. They donated equal amounts to the identifiable victim and the group of victims. This pattern suggests that encouraging people to think in a more calculating way—or at least to be on guard against biased behavior—undermined their emotionally induced desire to donate and did not increase their predicted rational behavior of giving more money to more people. We are speculating here, but it could be possible that people only recognize the problematic influence of emotional reactions in this situation and therefore, only corrected for that and they fail to recognize the problem that the number of victims has not enough influence on their decision.

Research on heuristics, unconscious thought, and snap decisions has also stressed the fact that this kind of processing can be very adaptive, efficient, and

lead to surprisingly accurate judgments and decisions (Ambady & Rosenthal, 1992; Dijksterhuis, 2004; Dijksterhuis, Bos, Nordgren, & van Baaren, 2006; Gigerenzer, Todd, & Group, 1999; Hogarth, 2005; Olivola & Todorov, 2010). One of the reasons why heuristics and unconscious thought can be superior than conscious, analytic, and systematic thought is related to the fact that too much thinking can be problematic for the following reason. In situations where people are thinking too much without knowledge of what they should be thinking about, thinking and introspection can be detrimental in part because it draws people's attention to information that is not relevant and in contradiction of their preference (Nisbett & Wilson, 1977; Payne, Samper, Bettman, & Luce, 2008; Wilson, Kraft, & Dunn, 1989; Wilson & Schooler, 1991). In a classic study, people chose among a number of posters and were instructed to indicate their reasons for choosing a particular poster (Wilson, Lisle, Schooler, Hodges, & et al., 1993). They were less satisfied with their decision compared with people who did not think about reasons. Presumably, this effect occurs because it is difficult for people to verbalize reasons for their preferences and feelings, which leads them to generate reasons that may or may not be accurate, but lead to change people's attitude to the poster that they chose and thus, decrease their satisfaction with their choice.

In sum, people are making many decisions that are not optimal based on normative criteria (e.g. rational choice theory). The question which processing style—effortful, analytic, and conscious or heuristic and unconscious thought—leads to better decisions has shaped the field of judgment and decision making

substantially. The present research in this dissertation contributes to this debate by approaching this question from a very different angle: instead of focusing on normative criteria, we focus on people's own evaluations and beliefs about how they think they should make decisions to evaluate the quality of people's decisions. Second, instead of focusing on the differentiation between analytic, systematic, and reason-based thinking compared with intuitive and heuristic thinking, we examine mindful compared with mindless decision making as a processing state. We discuss in the following section how the mindfulness/mindlessness distinction is different from the reasoning/intuitive processing distinction.

What makes mindfulness different from analytic and systematic thinking?

It is important to differentiate on a theoretical level between heuristic/intuitive and analytic/systematic processing on one hand and mindless and mindful processing on the other hand.

One critical feature is that these two ways of describing processing are not the same, but we do not argue that they are orthogonal. For example, it is certainly possible that mindless processing can be characterized as effortful, slow, controlled, and rule-governed, which are essential characteristics of the reasoning system (Kahneman, 2003). Alternatively, mindless process can be fast, automatic, effortless, and emotional, which are essential characteristics of the intuitive system (Kahneman, 2003). As noted above, we define mindless processing as the default processing that people engage in as a function of

context and situation and where they follow judgmental scripts. In terms of mindful processing, one can certainly characterize it similarly as the reasoning system, but with the additional, critical component that mindfulness involves awareness of the processing and prescriptive beliefs that people use to change their processing if necessary. The latter feature is actually quite important for the concept of mindfulness as opposed to the reasoning system because it addresses one of the problems why the reasoning system sometimes fails to lead to better decisions. The reasoning system can make it difficult for people to correct for problematic judgments and decisions if people do not know how to correct for problematic judgments, that is, they have to recognize the problem first and then they have to have and apply a theory to correct for this problem (Hogarth, 2005; Kahneman & Frederick, 2002). If people do not have this kind of knowledge, then analytic or systematic thinking about cannot improve the process. Additionally, people's knowledge may not be very well calibrated and attuned to when erroneous and biased judgments occur (Wilson & Brekke, 1994; Wilson, Centerbar, & Brekke, 2002; Wilson, Gilbert, & Wheatley, 1998; Wilson, Houston, & Meyers, 1998).

The central idea behind mindful judgment and decision making is the claim that making people aware of the attributes that influence their decision leads people to change the weighting of these attributes consistent with their beliefs about how the weighting should be done. Thus, we hypothesize that people have beliefs about how they should weight attributes and that awareness

of these attributes leads people to be more mindful of the weighting of these attributes.

People have beliefs and lay theories about how judgments and decisions ought to be made (Hsee, Hastie, & Chen, 2008; Hsee, Zhang, Yu, & Xi, 2003; Inbar & Gilovich, 2007; Weber & Lindemann, 2007). Generally speaking, people prefer to make decisions based on rational considerations, which also encompasses making decisions based on objective and quantified attributes (lay rationalism, lay scientism, Hsee). People's lay beliefs can also be much more specific than that. Inbar and Gilovich (2007) suggest that people match the characteristics of the decision situation to the decision process. For example, for important choices with major consequences, people prefer to make these choices using a rational and reason-based decision strategy (as opposed to an intuitive process).

The research presented in this dissertation proposes a different set of lay beliefs. Instead of proposing that people have beliefs about when they should be processing more rationally and when they should be relying more on their intuition (Inbar & Gilovich, 2007), we propose that people have prescriptive beliefs about the importance that specific attributes should have in the decision making process. Prescriptive beliefs are specific beliefs about how important attributes should be for a given judgment or decision and therefore, how much influence and weight it should have on the decision process. We believe this is an original approach based on the idea that the weighting of attributes is a function of how much people attend to information by default and that people

have beliefs about whether they think that this is consistent with how much they think they should be weighting the attributes.⁶ The final section in this introduction present hypotheses about how it can change the attention to and the weighting of attributes for the three phenomena discussed above: emotional and negative information, and group influence and expert opinion in persuasion.

Predictions

Emotions attracts attention. We predict that mindful decision making would increase the weighting of—perhaps otherwise neglected—objective and non-emotional information. For humanitarian aid allocations, this leads us to predict that information about how many people are affected by a crisis receives more weight when making this decision mindfully.

Negative information attracts attention. We predict that mindful decision making would increase the weighting of relevant, non-negative information and decrease the influence of negative information. In this dissertation, we examine this in the context of dating decisions where people have two pieces of information: their feelings about someone and information about what their friends think of someone. The hypothesis is that people believe that their feelings should be much more influential than what their friends think of someone. We hypothesize that mindless decision makers rely more on what

⁶ It is certainly possible that the default weighting is consistent with the beliefs about how the weighting should be done. If this is the case, the weighting that people would be doing when they are mindful would be the same that they are doing by default.

friends think when this information is negative, but that mindful decision makers rely more on their own feelings, despite the negativity bias.

Group influence and expert opinion in persuasion. We predict that mindful decision making would limit the impact of group influence and the power of expert opinion on attitudes, but at the same time, we predict that it would increase the influence of other information on attitudes. In the context of policy evaluations, we predict that mindfulness limits group influence on people's evaluation of a policy proposal, but that people's broad attitudes towards the policy's content influence their evaluation of the policy more strongly. We hypothesize that mindfulness limits the influence of expert opinion by increasing the weighting of personal experience with the attitude object.

Study Overview

In this dissertation, we propose and examine a psychological state of mindful judgment and decision making. In Chapter 2, we report two studies, in which participants were made mindful of decision attributes by asking them to rate the importance of the attributes before making a decision. Both studies show that mindful decision makers weigh information differently (compared with a control condition) and that these weightings are more consistent with people's prescriptive beliefs. The first study focuses more the change of the weightings and the second study focuses more on a change in outcome. In Chapter 3, we report three studies that investigate several questions regarding the induction and the mechanism of mindfulness: Does mindfulness change the

weighting of attributes that are not specifically mentioned to participants during the induction of mindfulness (Study 3)? Can mindfulness change the weighting of actual affective experiences (Study 4 b)? Do the prescriptive beliefs have causal influence on the direction in which the judgment is corrected (Study 4 c)? Most importantly, two studies in Chapter 3 will address how mindfulness is different from effortful and systematic processing (Study 3 and Study 5). In Chapter 4, we examine whether mindfulness changes the perception of decisions that other people have made. Specifically, is a decision evaluated more favorably when it indicates a weighting consistent with people's prescriptive beliefs compared with a decision where the weighting is not consistent with prescriptive beliefs. This chapter will address the question whether people perceive decisions differently as a function of mindfulness. Throughout the introduction, we emphasized that mindfulness makes people aware of the attributes and we measure this awareness by measuring people's perception of how much attributes were weighted in decisions.

Chapter 2: Initial Evidence

Humanitarian Aid Allocation I (Study 1)

The first study examined whether making participants mindful of different attributes changes the weighting of these attributes in the decision making process according with participants' prescriptive beliefs. Two categories of attributes are of particular interest: feeling-based information and objective information. These two attribute categories are of interest because they relate to various dual-process models (e.g., the heuristic system is assumed to respond more to feeling-based information, Epstein and Pacini, 1999) and because people often place more weight on feeling-based information by default, which can have problematic behavioral implications especially when feeling-based information is not a valid cue for a decision (Epstein & Pacini, 1999; Hsee & Rottenstreich, 2004; Kahneman, 2003). More specifically, in charitable giving decisions, people often neglect information about the scope of crises (typically operationalized as the number of people that are dying) and instead, their decisions are more strongly influenced by emotional factors (Batson, 1990). For example, the identifiable victim effect shows people's insensitivity to the scope of humanitarian suffering because people donate more money to a single identified victim compared with a group of identified (or unidentified) victims (Kogut & Ritov, 2005a, 2005b; Small & Loewenstein, 2003). There is even some evidence that very large numbers of victims undermine emotional responses such that people become increasingly insensitive to increases in the

number of victims (Fetherstonhaugh, Slovic, Johnson, & Friedrich, 1997; Slovic, 2007).

We predicted that mindful decision making makes people aware of attributes that influence humanitarian aid decisions: feelings that people experience as a reaction of learning about humanitarian crises and the objective scope (e.g. the number of people who are dying) of crises. Thus, a decision situation was created where people were presented with two crises: one crisis had a higher mortality rate, but was intended to evoke less emotional reactions (compared with a second crisis) and a second crisis had a lower mortality rate, but was intended to evoke more emotional reactions (compared with the first crisis). Thus, unlike in many previous studies, the scope of the humanitarian crises was experimentally manipulated using a within-subjects design, which made the information easily available and comparable for all participants (Hsee & Rottenstreich, 2004; Kahneman, Ritov, & Schkade, 1999; Kogut & Ritov, 2005a, 2005b).⁷ This procedure allowed a measurement of which information has a greater influence on people's charitable giving: objective information about the crises' scope (e.g. information about the mortality rates in different humanitarian crises) or feeling-based information (e.g. emotional reactions). For this study and all others presented here, it is important to mention that we measure the influence of emotional reactions and objective information in the

⁷ Only Experiment 2 in Kogut & Ritov, 2005b used a within-subjects design to manipulate the number of victims. Participants simultaneously learned about an identified single victim and an identified group of seven victims, which resulted in equal donations to both, thus, effectively eliminating the identifiable victim effect. However, participants still were not sensitive to the number of victims—if they were, they would have donated more to the group of seven victims.

context of a multiple regression where we examine whether these attributes predict the outcome of the judgment or decision, that is, do they have any weight on the outcome. The hypothesis is that mindful decision making leads participants to weight objective information more (the crises' scope, operationalized as mortality information) compared with a control condition.

Method.

Participants and stimulus materials. Undergraduate students at the University of Colorado at Boulder ($N = 68$; 47 female, 21 male) participated in exchange for course credit. Participants were told that they would receive two flyers, each describing the work of an organization that helps people in need. Participants were told that these organizations are equally effective in their efforts to mitigate suffering in these crises. This was done to make sure that participants did not base their aid allocation decisions on interpretations of the organizations' differential effectiveness. Then, participants received two flyers and were told to carefully read the flyers. One flyer presented the organization "Project Aid" and the work they are doing to fight Tuberculosis in Malawi where Tuberculosis kills 128,000 people every year. The information about Tuberculosis was presented in more emotionally evocative ways, using colored photographs (e.g. displaying children with sad facial expressions, looking into the camera). A second flyer presented the organization "Help Now" and the work they are doing to provide better treatment for Malaria in Ghana where Malaria kills 192,000 people every year. The information about Malaria was presented in less emotionally evocative ways, using fewer photographs and

colder colors in the photographs (e.g. showing a map of malaria risk or a people's houses in a village). Thus, these two flyers intended to display Tuberculosis as the less deadly crisis compared with Malaria, but at the same time, Tuberculosis was intended to evoke stronger emotional reactions compared with Malaria.

Measures of emotional reaction and mortality perception. After participants read the flyers, they were asked to indicate their emotional reaction and perceived mortality of Malaria and Tuberculosis: “To what extent do you have a stronger emotional reaction toward one disease over the other?” (1 = *Stronger emotional reaction to Malaria*, 8 = *Stronger emotional reaction to Tuberculosis*) and “To what extent are more people dying of one disease compared with the other?” (1 = *Many more people are dying of Malaria*, 8 = *Many more people are dying of Tuberculosis*).

Aid allocation. Finally, participants were asked to imagine that they “decided to donate money (\$125 in total) to charitable organizations [...] to relieve suffering resulting from Malaria and Tuberculosis.” To avoid that participants make an even split among the two crises, they read information about what each organization can do with their donation: “\$100: Provide seven community health workers to teach mothers to recognize danger signs of major childhood illnesses and seek care from a trained health provider. \$50: Provide an orphan or vulnerable child with essential services like health, nutrition and psychosocial support for two years. \$25: Provide training materials for ten health professionals to prevent or recognize, diagnose and treat illnesses.”

Participants indicated how much money they would allocate to relieve suffering from Malaria and how much to relieve suffering from Tuberculosis. Participants were reminded that the total amount had to sum up to \$125.

Mindfulness. How mindful participants were about their allocation was experimentally manipulated by either asking them about their prescriptive beliefs before or after they decided on how to allocate the money. Participants indicated their prescriptive beliefs about the importance of their emotional reaction and of information regarding the crises' severity ("How much do you think should information about your emotional reaction toward the diseases influence your allocation decision?", "How much do you think should information about how many people are dying of each disease influence your allocation decision?", 1 = *not at all*; 8 = *a lot*). In the control condition, participants indicated their prescriptive beliefs after they stated their allocations. In the mindful condition (where these beliefs needed to be made salient) however, participants indicated their prescriptive beliefs before they stated their allocations.

Results.

Manipulation check. The flyers that described the two aid organizations intended to display Tuberculosis as the less deadly crisis, but evoking stronger emotional reactions compared with Malaria. As expected, participants reported that more people were dying of Malaria compared with Tuberculosis ($M = 2.28$, $SD = 1.02$), which is significantly lower than the midpoint (4.5) of the scale and consistent with the intention to present Malaria as the more deadly crisis, $t(67) =$

-17.95, $p < .001$. Perception of mortality did not differ as a function of whether participants were in the control or in the mindful conditions, $F < 1.3$.

However, participants reported having equally strong emotional reactions towards Tuberculosis compared with Malaria ($M = 4.57$, $SD = 1.86$), which is not significantly different from the midpoint (4.5) of the scale, $t < 1$, *ns*. Thus, the manipulation of how emotionally evocative the crises were presented did not change participants' emotional reactions. Even though participants were randomly assigned to conditions and emotional reactions were measured before the mindfulness manipulation, there was a marginally significant difference in participants' emotional reactions such that participants in the control condition tended to have stronger emotional reactions to Malaria ($M = 4.80$, $SD = 2.10$) compared with the mindful condition ($M = 4.03$, $SD = 1.49$), $F(1,66) = 3.01$, $p = .087$, $\eta_{\text{partial}}^2 = .044$.

Prescriptive beliefs. A majority of participants (67.65%) believe that information about how many people are dying should influence their decision more than emotional reactions. A minority (10.29%) indicated that emotional reactions should influence their decision more than how many people are dying. The remaining portion (22.06%) indicated that these two are equally important. Thus, in line with the predictions, participants believed that emotional reactions toward the diseases should influence their allocation decision less ($M = 5.12$, $SD = 1.71$) compared with information about how many people are dying ($M = 6.43$, $SD = 1.24$). A 2 (type of information: emotion, mortality) \times 2 (mindful, control) ANOVA with repeated measures on the first factor revealed only a main effect

of type of information, $F(1,66) = 29.90, p < .001, \eta_{\text{partial}}^2 = .312$. Importantly, these beliefs did not vary as a function of whether people thought about these beliefs before or after they decided on how to allocate monetary aid, $F < 1.5, ns$. Participants both in the control and in the mindful condition believed that emotional reactions should influence the allocation decision less ($M_{\text{control}} = 5.31, SD = 1.86$ and $M_{\text{mindful}} = 4.91, SD = 1.53$) compared with information about how many people are dying ($M_{\text{control}} = 6.37, SD = 1.44$ and $M_{\text{mindful}} = 6.48, SD = 1.00$, control condition, $F(1,66) = 9.93, p = .002, \eta_{\text{partial}}^2 = .131$; mindful condition, $F(1,66) = 20.80, p < .001, \eta_{\text{partial}}^2 = .240$). It is important to keep this finding in the control condition in mind because it turns out to be in contrast to the weighting that participants actually place on these two pieces of information.⁸

Allocation decision. We analyzed participants' allocation decision computing a difference score, subtracting the allocation to Tuberculosis from the allocation to Malaria such that higher numbers indicate higher allocations to Malaria, which was the crisis with the higher mortality rate, and zero indicates exactly equal allocations to both crises. We regressed this difference score on mindful (+1 if mindful, -1 if control), emotional reactions (reverse scored, mean centered), perceived mortality (reverse scored, mean centered), and the two interactions mindful \times emotional reactions and mindful \times perceived mortality (see Table 1).

⁸ Beliefs about emotional reactions and about information about how many people are dying were not correlated, $r(68) = .11, ns$.

Table 1. Predictors and findings for the multiple regression examining the impact of mindfulness, emotional reactions, perceived mortality, and its interactions (Mind = 1 if mindful & -1 if control; Mort = mortality perception, mean centered; Emot = emotional reactions, mean centered).

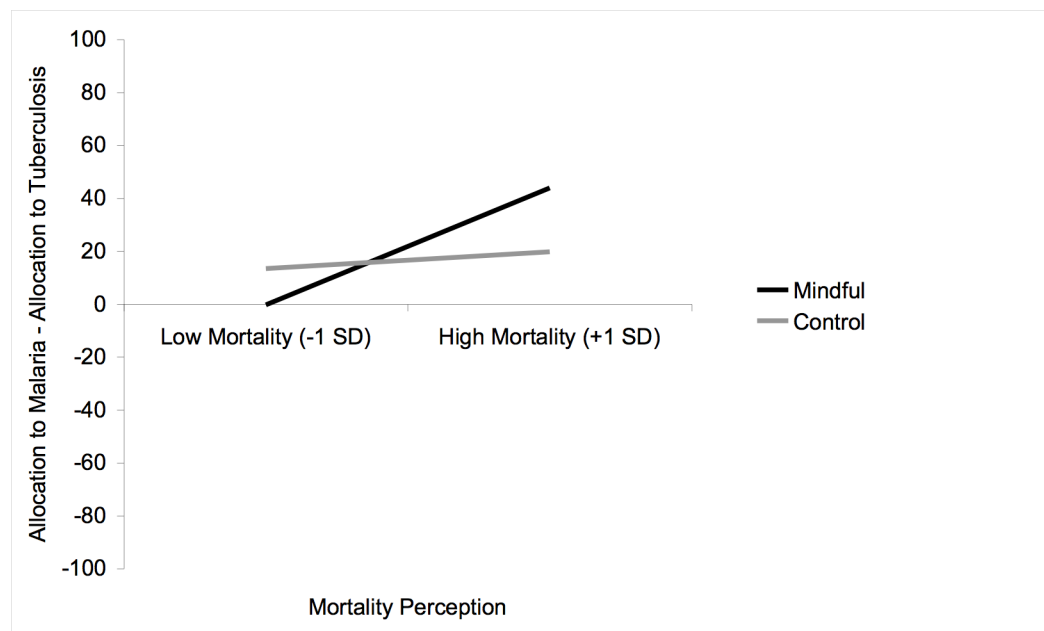
| | b | se | t(62) | p-value | $\eta_{partial}^2$ |
|--------------------|-------|------|-------|---------|--------------------|
| Intercept | 19.18 | 4.36 | 4.40 | < .001 | 0.238 |
| Mind | 2.63 | 4.36 | 0.60 | .549 | 0.006 |
| Emot | 11.17 | 2.53 | 4.41 | < .001 | 0.239 |
| Mort | 12.37 | 4.27 | 2.89 | .005 | 0.119 |
| Mind * Mort | 9.26 | 4.27 | 2.17 | .034 | 0.070 |
| Mind * Emot | -1.13 | 2.53 | -0.45 | .657 | 0.003 |

This analysis revealed that, on average, participants donate more to Malaria than to Tuberculosis, $b = 19.18$, $t(62) = 4.40$, $p < .001$, $\eta_{partial}^2 = .238$. Furthermore, on average, stronger emotional reactions to Malaria (relative to Tuberculosis) lead to higher allocations to Malaria (relative to Tuberculosis), $b = 11.17$, $t(62) = 4.41$, $p < .001$, $\eta_{partial}^2 = .239$. Similarly, on average, higher perceived mortality leads to higher allocations, $b = 12.37$, $t(62) = 2.89$, $p = .005$, $\eta_{partial}^2 = .119$. Most interestingly for the present research, there was a significant interaction between mindful and perceived mortality information such that higher perceived mortality leads to higher allocations and this slope was steeper in the mindful condition compared with the control condition, $b = 9.26$,

$t(62) = 2.17, p = .034, \eta_{\text{partial}}^2 = .070$. There was no significant interaction between mindful and emotional reactions, $t < |1|, ns$.

When analyzing the control group's allocation decisions, the only significant predictor of allocations are emotional reactions, $b = 12.30, t(62) = 4.20, p < .001, \eta_{\text{partial}}^2 = .221$ (notice that, on average, the intercept in this analysis is significantly higher than zero, $b = 21.57, t(62) = 3.68, p < .001, \eta_{\text{partial}}^2 = .179$; based on mean deviating perceived mortality information and emotional reactions based on the control condition's means). However, when analyzing the mindful participants' allocation decisions, both emotional reactions, $b = 10.04, t(62) = 2.43, p = .018, \eta_{\text{partial}}^2 = .087$ and mortality information were significant predictors of allocations, $b = 21.63, t(62) = 3.63, p = .001, \eta_{\text{partial}}^2 = .175$ (notice that, on average, the intercept in this analysis is significantly higher than zero, $b = 14.70, t(62) = 2.43, p = .018, \eta_{\text{partial}}^2 = .087$; based on mean deviating perceived mortality information and emotional reactions based on the mindful condition's means). (See Appendix 1 for additional analyses examining whether the strength and direction of participants' prescriptive beliefs have any direct or moderating effects on allocation decisions. Readers of Appendix 1 will see that prescriptive beliefs about mortality information predict, on average, participants allocation such that the more people agree that mortality information is important, the more money they allocate to the more deadly crisis.)

Figure 1. Allocation decisions in U.S. Dollars (0 indicate equal allocations to each crisis; positive numbers indicate higher allocations to Malaria) as a function of mindful and control condition and as a function of how high people perceive the mortality for Malaria (note that $X_{Low\ Mortality} = 5.70$ and $X_{High\ Mortality} = 7.74$ on an 8-point scale, $M = 6.72$, $SD = 1.02$, $Median = 7.00$). Note that all participants except one participant correctly perceived Malaria higher on mortality compared with Tuberculosis).



Discussion. In sum, these findings show that participants have strong beliefs about which information should influence their allocation decisions: emotional reactions or objective information. Most participants believe that emotional reactions toward the diseases should influence their allocation decision less compared with information about how many people are dying (but notice that—in absolute terms—both of these attributes seem important to

participants). Importantly, these beliefs did not change as a function of whether participants indicated the beliefs before or after they stated their allocation. This is interesting because it highlights the inconsistency between participants' decisions and their prescriptive beliefs. Participants in the control condition who just made an allocation decision where they are not weighting mortality information, indicate that they think they should have weighed mortality information more. It also shows that prescriptive beliefs are quite stable, that is, participants are not trying to appear more consistent in their beliefs (by changing the prescriptive beliefs to match the decision) than they actually are.

This initial study shows that making people mindful about prescriptive beliefs changes their decisions such that their decisions reflect these beliefs better. Consequently, participants who were mindful weigh information about how many people are dying more strongly when making allocations—presumably because they think their allocation should reflect this information more strongly.

One could argue that the reason why participants weigh information more in line with their prescriptive beliefs lies in the fact that participants strive to reduce cognitive dissonance and they do this by matching their actual weighting to their prescriptive beliefs (Festinger, 1957). However, this can only be part of the underlying explanation because participants in the control condition are exhibiting inconsistent judgments (they don't change their prescriptive beliefs to match their actual weightings). We believe that mindfulness makes people more

aware of this inconsistency, which leads to reducing the inconsistency by changing the weighting of the decision attributes.

As intended, the flyers about the two crises made one crisis (Malaria) seem more severe in terms of how many people are dying compared with the other crisis (Tuberculosis). However, the manipulation check for emotional reactions did not show that the operationalization of emotionality was effective, that is, participants did not report having stronger emotional reactions for Tuberculosis. One explanation for this is that emotional reactions are evoked by a variety of variables such as pictures, description of the crises, but also by the severity of the crises. Tuberculosis might have triggered emotional reactions mostly because of the vivid pictures in the flyer, but Malaria might have triggered a similar emotional reaction, but mostly because it was the more severe crisis where clearly more people died. This also helps explain the lack of a significant interaction of emotional reactions by mindful condition. Believing that emotional reactions should (or should not) influence one's allocation decision might not translate as easily into weighting this information more strongly because there are many other factors (like a crisis' severity) that influence emotional reactions and those factors might make it justified to continue to weigh emotional reactions in the allocation decision—even when mindful. The present study design could not differentiate among the different aspects that influence people's emotional reactions and thus, subsequent changes in weighting of these different aspects of emotional reactions were not observed.

Finally, one could have expected that the direction and strength of prescriptive beliefs influenced how much (and in which direction) participants change the weighting of the mortality perception. As Appendix 1 shows, we only find support for the fact that the more people agree that mortality information is important for this decision, the more money people allocate to the more deadly crisis. We do not find any support for the hypothesis that the crucial interaction between mindfulness and mortality information depends on the direction or the strength of the beliefs. We believe that there are two reasons that explain this lack of a (not predicted) three-way interaction. First, it is important to keep in mind that we designed all the paradigms and experimental materials with the goal that the majority of participants held the same beliefs. Thus, we primarily intended to examine any main effects of mindfulness or interactions between mindfulness and decision attributes. Measuring prescriptive beliefs was mostly meant to serve as a manipulation check to make sure people's beliefs matched our hypothesis. Second, there is a statistical power problem where the variance on measures of prescriptive beliefs was (intentionally) limited, which contributes to low statistical power for detecting a moderating effect of prescriptive belief's content. As a reader, one might have also had the impression that it seemed fairly obvious to find such clear majorities in terms of people's prescriptive beliefs, which was exactly what we intended. Just as the reader might have felt that it is obvious which information should influence one's judgment and decision, it might have been just as obvious for the participants in these studies. Yet, participants in the control condition still failed

to judge and decide according to these “obvious” beliefs. Part of this phenomenon is that despite the obviousness of how information should get weighted, people often fail to do so because they are typically not aware of the decision attributes and their influence on decision making. However, when mindful, people are in a state where they are aware of and attend to this information and they are able to make an informed decision about the weighting of this information. In the General Discussion, we will return to this issue of whether beliefs have a direct influence on judgments and decisions or whether they moderate any effects of mindfulness on judgments and decisions.

Dating Decision (Study 2)

One important goal for Study 2 is to show that mindful decision making can also translate into judgments and decisions where people rely more on feeling-based information as opposed to objective information. In line with the theoretical framework presented in the introduction, the content of prescriptive beliefs is different depending on the decision context. In the context of humanitarian aid allocation, a majority of the participants believes that they should rely more on objective information, in the context of choosing a person for a date, a majority might believe that one’s feelings should strongly influence the decision process. This aspect of the theoretical framework is important to highlight because it differentiates mindful decision making from interventions that increase more effortful and systematic (and thus, relying less on affect) information processing in comparison to heuristic processing. Mindful decision

making however is characterized by awareness of prescriptive beliefs about the decision process, which can lead to increasing the weighting of objective information (as in Study 1), but which can also lead to increasing the weighting of feeling-based information. The content of people's prescriptive beliefs differs depending on the decision context and thus, when people are mindful of these beliefs, the weighting of information changes to match these prescriptive beliefs.

The second goal was to show that mindfulness can change the decision outcomes. Study 1 showed that the weighting of objective information changes, but it is also important to show that as a consequence of weighting information differently, participants' preferences change.

This study presented participants with two short descriptions of people who they consider taking out on a date. Participants were asked to imagine that they had stronger feelings for one person (compared with the other person), but that their friends approve less of this person (compared with the other person). The prediction is that mindful participants (compared with the control condition) will prefer to go out with the person that they have stronger feelings about—presumably to bring their preference in line with their prescriptive beliefs about what should influence a dating decision more: personal liking (feeling-based information) or friends' approval (external, objective information). Participants in the control condition on the other hand might be overly influenced by the negative evaluation of one's friends.

Method.

Participants and stimulus materials. Undergraduate students at the University of Colorado at Boulder ($N = 56$; 41 female, 12 male, 3 participants failed to indicate their gender) participated in exchange for course credit. Participants were asked to imagine that “there are two students here at the University of Colorado who are both interested in going out on a date with you.” They are further asked to imagine that they “decided to go out on a date this Friday night” and that they have to choose with whom they would go out on a date. Participants were told about one person (Person A) that “All of your friends really like this person and they immediately became extremely fond of this person” (high friends’ approval) and “You also like hanging out with him/her and you look forward to seeing him/her again” (moderate liking). About another person (Person B), participants were told that “When your friends met this person, a lot of them did not really warm up to him/her” (low friends’ approval) and “You enjoy hanging out with this person a lot and every time you are not spending time with him/her, you catch yourself thinking about him/her” (high liking). The rest of the description was intended to be similar in valence and attractiveness of the person (see Appendix 2 for a full description).

The reasoning behind these two descriptions was that Person A would be preferred in the control condition (in part because there is no negative information about this person unlike for Person B’s description where one’s friends clearly don’t like this person), but when participants were mindful, they would prefer Person B because their own (hypothetical) feelings for this person

are stronger compared with Person A and this information about one's own liking is believed to be more important than friends' approval.

To be sure that there was nothing in the description of these two people that would be confounded with the independent variable (high friends' approval paired with moderate liking, low friends' approval paired with high liking), there was a second version where the same descriptions were used and only the critical information about friends' approval and liking was exchanged (see Appendix 2).

Dating decision. After reading this information, participants indicate with whom they want to go out on a date this Friday night (1 = *strongly prefer to go out with Person A*; 6 = *strongly prefer to go out with Person B*). This constitutes our main dependent variable of interest.

Mindfulness. Just as in Study 1, the mindfulness manipulation is operationalized by asking participants to indicate their prescriptive beliefs either before or after they made a decision. Participants were made mindful of their dating decision by indicating their prescriptive beliefs about the importance of their emotional reactions and their friends' approval before they decided whom they choose for a date ("My own liking of each person should strongly influence my decision with whom to go out on a date.", "How much my friends like each person should strongly influence my decision with whom to go out on a date. 1 = *strongly disagree*; 6 = *strongly agree*). In the control condition, participants indicated their prescriptive beliefs after they made their dating decision.

Results.

Prescriptive beliefs. A majority of participants (96.23%) believe that own liking should influence their dating decision more than how much one's friends like someone. The remaining portion (3.77%) indicated that these two are equally important. Also in line with the predictions, participants believed that their own liking of someone should influence their dating decision more ($M = 5.79, SD = 0.45$) compared with information about how much one's friends like someone ($M = 3.57, SD = 0.99$). A 2 (type of information: own liking, friends liking) $\times 2$ (mindful, control) ANOVA with repeated measures on the first factor revealed only a main effect of type of information, $F(1,51) = 218.58, p < .001, \eta_{partial}^2 = .811$. These beliefs did not vary as a function of whether people thought about these beliefs before or after they made their dating decision, $F < 1, ns$. Participants both in the control and in the mindful condition believed that own liking should influence dating decisions more ($M_{control} = 5.73, SD = 0.53$ and $M_{mindful} = 5.85, SD = 0.36$) compared with information about how much one's friends like someone ($M_{control} = 3.50, SD = 0.99$ and $M_{mindful} = 3.63, SD = 1.01$, control condition $F(1,51) = 107.68, p < .001, \eta_{partial}^2 = .679$, and mindful condition $F(1,51) = 110.96, p < .001, \eta_{partial}^2 = .685$).⁹

Dating decision. We analyzed participants' dating decision computing a variable where higher numbers reflect choosing whichever person one feels more strongly about. Participants in the mindful condition chose someone they felt more strongly ($M = 3.93, SD = 1.54$) about compared with participants in the

⁹ Beliefs about own liking and information about friends' approval were not correlated, $r(53) = .01, ns$.

control condition ($M = 3.00$, $SD = 1.67$; $t(54) = -2.15$, $p = .036$). (See Appendix 3 for additional analyses examining whether the strength and direction of participants' prescriptive beliefs have any direct or moderating effects on dating decisions. Just as we found in Study 1, these additional analyses reveal a direct influence of prescriptive beliefs about how much information about one's friends and how much they like someone. The more participants believed that their friends' approval is important, the more they chose to date whomever their friends liked more. Again, we return to this issue in the General Discussion.)

Discussion. This study is conceptually consistent with the findings from Study 1, but it extends the findings from Study 1 in two ways. First, unlike humanitarian aid allocations, romantic partner choice is a domain where people believe their own feelings should have a strong influence (compared with what one's friends think about one's romantic partners). Thus, while this study conceptually replicates the findings from Study 1 in a different domain, it also addresses the possibility that mindful decision is similar to processing information in valuation by calculation mode where they would rely more on fact based information such as objective information about the mortality rates of humanitarian crises (Hsee & Rottenstreich, 2004).

Second, both studies show that people have in fact strong beliefs about which information should influence their decision more and both studies show two ways of how these beliefs can influence decision making. In Study 1, making people mindful of these beliefs leads to an increased weighting of mortality information. In Study 2 however, making people mindful of their

beliefs leads to different preferences (that is, which person participants choose for a date), which reflect these beliefs as they choose whichever person they have stronger feelings about.

Chapter 3: Boundary and Mechanism Evidence

Global Warming Policy Agreement (Study 3)

The purpose of Study 3 is to examine whether mindfulness can limit the impact of group influence on attitude change. If mindfulness about one's judgment and decision processes allows participants to become aware of what factors influence their judgments and decisions and to make a conscious decision about how much weight they want to place on these factors (based on their prescriptive beliefs), then one would also expect that mindfulness can limit group influence in a persuasion paradigm.

This is an extension of the previous two studies in two ways. First, one goal for Study 3 is to show that mindfulness can decrease the influence of one type of information, but that—at the same time—it can also increase the influence of another type of information (Study 1 only showed an increase in using mortality information, but it did not show a decrease in using emotional information). Second, based on past research, it seems quite clear that participants underestimate the impact of group influence on attitude change (Cohen, 2003). That is, participants in past studies indicated that they think their attitudes are based on facts (and not on group influence), despite the fact that their attitude change in the study suggested the opposite. Thus, it is interesting to test the effects of mindfulness in a paradigm where people are clearly very biased in their self perception and very unaware of this biased perception. This is interesting because this bias suggests that people would like to see their attitudes not being affected by group influence and instead they would like to see

their attitudes being based on facts. Study 3 examines whether being mindful of these influences changes the relative weight that these influences—groups vs. facts—have on people’s attitudes and it examines whether being mindful of these influences can help people to overcome group influence.

In this study, participants read a summary of a “cap and trade” policy to address global warming (see Appendix 4). The policy was strongly supported, depending on random assignment, by either a majority of Democrats or Republicans. Consistent with previous research, it was expected that participants in the control condition would evaluate the policy primarily along partisan lines with relatively little influence of their personal attitudes toward the global warming crisis (the “party over policy” effect, Cohen, 2003). In the mindful condition, participants were first asked to reflect on how they thought policies should be evaluated, and specifically, to rate how much they thought policies should be evaluated based on partisan considerations (such as which political group supports the policy) versus people’s personal attitudes toward policy-relevant issues. It was expected that once participants were mindful of these two sources of influence, they would decrease the impact of group influence and increase the impact of their attitudes towards the policy.

Method.

Participants and stimulus materials. Undergraduate students at the University of Colorado at Boulder ($N = 190$) participated in exchange for course credit. They were told that this was a study about Global Warming Opinions. First, they were asked to indicate their political affiliation on two questions: “Use

the following political labels to describe yourself.” (1 = *Liberal*, 7 = *Conservative*; 1 = *Democrat*, 7 = *Republican*, both were highly correlated, $r = .70$ and thus, averaged into a Republican/Conservative score, $M = 3.41$, $SD = 1.41$). After that, participants read a global warming proposal, which was a cap and trade program (see Appendix 4). A cap and trade policy involves a limit on how much pollutants can be emitted and requires firms to buy permits allowing the emission of pollutants. This posits a regulation approach that goes against a conservative ideology and in the U.S., cap and trade programs are typically proposed and supported by Democrats. Participants were either told that “65% of the Democrats and 30% of the Republicans” or that “65% of the Republicans and 30% of the Democrats” in the House of Representatives agreed with this proposal and a third group of participants did not receive any information at all about which majority supports this proposal. After that, participants were asked to indicate their agreement with the proposal (How much do you agree with the policy proposal? 1 = *not at all*, 7 = *very much*).

Finally, participants’ global warming attitudes were measured with 16 questions addressed to measure the importance of global warming as a problem for today’s world (see Appendix 5). This is a scale that was developed recently to measure people’s concern about global warming, capturing people’s thoughts, behaviors, intentions, and emotional reactions. The internal reliability of the scale was good (Cronbach’s alpha = .74; a factor analysis suggests a single-factor solution where this factor explains 43.69% of the variance with 16 items, eigenvalue = 6.99, a scree plot also supported a single-factor solution).

Participants' global warming attitudes are correlated with political affiliation ($r(187) = -.51, p < .001$).

Mindfulness. Importantly, how mindful people were of their policy agreement was experimentally manipulated by either asking them questions about their prescriptive beliefs before they indicated their policy agreement. One question asked them about the importance of the content of a policy for their own policy agreement ("How much do you think the content of a policy should influence your position on a policy proposal, regardless of the position of your political party? 1 = *very little*; 7 = *very much*). The second question asked them about the importance of their political party's position for their own policy agreement ("How much do you think the position of your political party should influence your position on a policy proposal, regardless of the content of the proposal? 1 = *very little*; 7 = *very much*). Again, in the mindful condition where participants needed to be made aware of these beliefs, participants answered these questions just before they indicated their policy agreement. In the control condition, participants answered these questions at the end of the study.

Results.

Prescriptive beliefs. A majority of participants (81.05%) believed that content should influence their own policy agreement more than political party support. A minority (7.37%) believed that political party support should influence their policy agreement more than content of the policy and the remaining proportion (11.58%) believed that these two pieces of information are equally important. Also in line with the predictions, participants believed that

content of the policy should influence their policy agreement more ($M = 5.73$, $SD = 1.29$) compared with political party information ($M = 2.73$, $SD = 1.49$). A 2 (type of information: content, political party) \times 2 (mindful, control) ANOVA with repeated measures on the first factor revealed only a main effect of type of information, $F(1,188) = 326.59$, $p < .001$, $\eta_{\text{partial}}^2 = .635$. Importantly, these beliefs did not vary as a function of whether people thought about these beliefs before or after they indicated their policy agreement, $F < 1$, *ns*. Participants both in the control and in the mindful condition believed that content of a policy should influence their policy agreement more ($M_{\text{control}} = 5.91$, $SD = 1.13$ and $M_{\text{mindful}} = 5.54$, $SD = 1.43$) compared with political party information ($M_{\text{control}} = 2.80$, $SD = 1.56$ and $M_{\text{mindful}} = 2.66$, $SD = 1.41$; control condition, $F_{\text{control}}(1,188) = 178.02$, $p < .001$, $\eta_{\text{partial}}^2 = .486$; mindful condition, $F_{\text{mindful}}(1,188) = 149.35$, $p < .001$, $\eta_{\text{partial}}^2 = .443$.¹⁰

Policy agreement. Two sets of analyses were performed to examine whether group influence or content of the policy affects people's agreement with the policy. The first set of analyses examined whether group influence (i.e. the party over policy effect, Cohen, 2003) affects people's agreement with the policy depending on whether participants were mindful or not. A second set of analyses examined whether the content of the policy affects people's agreement with the policy depending on whether participants were mindful or not.

Impact of group influence on policy agreement. Remember that the prediction is that when participants are mindful, there should be no effect of

¹⁰ Beliefs about the content of a policy and about political party information were negatively correlated, $r(190) = -.35$, $p < .001$.

party over policy because people's prescriptive beliefs are such that information about political party support should matter less for their own agreement compared with the content of the policy. In fact, in a multiple regression where policy agreement was regressed on predictors listed in Table 4 (contrast codes) and Table 5 (the results of the multiple regression), there was an effect of political affiliation such that more Republican/Conservative participants were, the less they agreed with the policy, $b = -.19$, $t(180) = -2.96$, $p = .003$, $\eta_{\text{partial}}^2 = .046$. This is in line with the intention behind the policy since Democrats/Liberals should be more likely to agree with a cap and trade policy. In addition, there was a significant effect of Republican vs. Democratic majority such that participants agreed less with the policy when the majority party was Republican, $b = -.22$, $t(180) = -2.06$, $p = .041$, $\eta_{\text{partial}}^2 = .023$. This finding could be due to the fact that participants typically expect Democrats to support a cap and trade policy and Republicans to oppose it and the fact that the support by political party was reversed in this condition could have made participants question the validity of the policy, which resulted in lower agreement with the policy. Most importantly, this analysis revealed the predicted 3-way interaction, which was marginally significant, $b = -.15$, $t(180) = -1.96$, $p = .051$, $\eta_{\text{partial}}^2 = .021$.

Table 4. Contrast codes for reference group.

| | Democratic majority | Republican majority | No majority information |
|------------|------------------------|------------------------|----------------------------|
| DemRep | - 1 | + 1 | 0 |
| PolControl | - 1 | - 1 | + 2 |

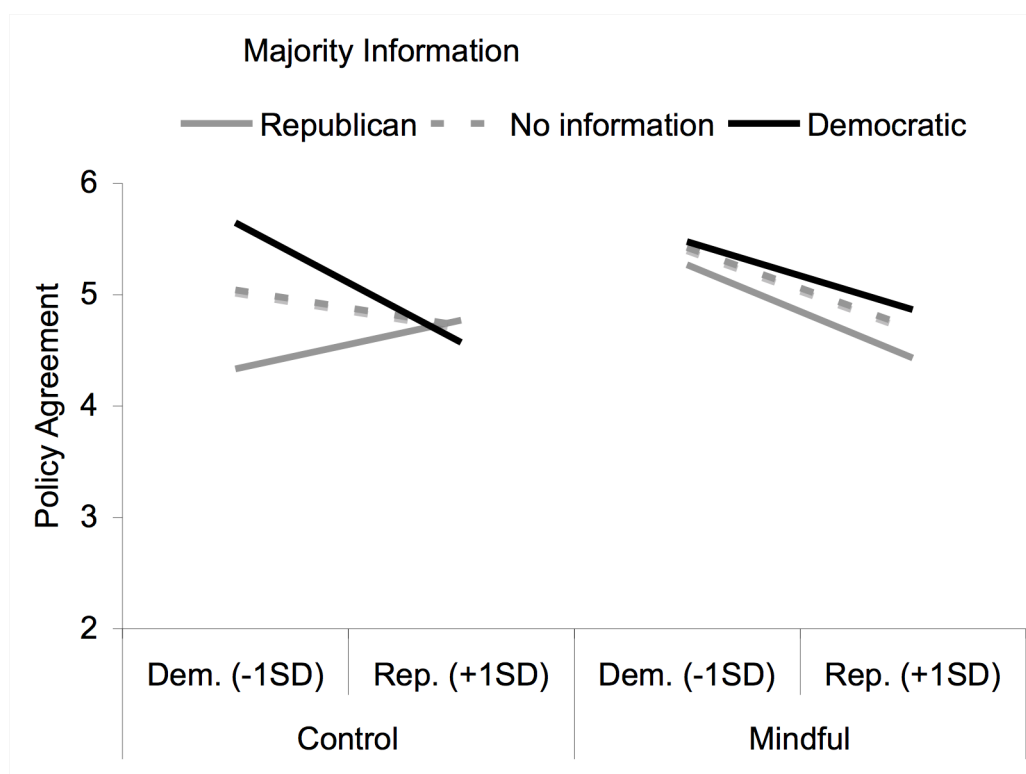
Table 5. Predictors and findings for the multiple regression examining the impact of group influence on policy agreement (PA = political affiliation, Mind = 1 if mindful & -1 if control).

| | b | se | t(180) | p-value | $\eta_{partial}^2$ |
|---------------------------|-------|------|--------|---------|--------------------|
| Intercept | 4.94 | 0.09 | 56.68 | < .001 | 0.947 |
| PA | -0.19 | 0.06 | -2.96 | .003 | 0.046 |
| DemRep | -0.22 | 0.11 | -2.06 | .041 | 0.023 |
| PolControl | 0.02 | 0.06 | 0.27 | .788 | 0.000 |
| Mind | 0.09 | 0.09 | 1.03 | .306 | 0.006 |
| PA * Mind | -0.07 | 0.06 | -1.14 | .254 | 0.007 |
| DemRep * Mind | 0.06 | 0.11 | 0.55 | .583 | 0.002 |
| PA * DemRep | 0.11 | 0.08 | 1.44 | .151 | 0.011 |
| PA * DemRep * Mind | -0.15 | 0.08 | -1.96 | .051 | 0.021 |

To interpret this marginal 3-way interaction, the effects of participants' political affiliation and majority information were examined separately for the mindful and the control condition (see Figure 2). As predicted, in the control

condition, there is a party over policy effect such that participants agree more with the policy when the supporting party matches their own political affiliation, $b = .27$, $t(91) = 2.48$, $p = .015$, $\eta_{\text{partial}}^2 = .063$ and on average, there was no effect of participants own political affiliation, $b = -.11$, $t(91) = -1.32$, $p = .192$, $\eta_{\text{partial}}^2 = .019$. In contrast, there was no party over policy effect in the mindful condition, $b = -.04$, $t(88) = -0.36$, *ns*, and instead only participants' own political affiliation predicted their agreement with the policy such that the more Republican/Conservative participants were, the less they agreed with the policy, $b = -.26$, $t(88) = -2.81$, $p = .006$, $\eta_{\text{partial}}^2 = .082$. (See Appendix 6 for additional analyses examining whether the strength and direction of participants' prescriptive beliefs have any direct or moderating effects on policy agreement and group influence. These additional analyses revealed a direct influence of prescriptive beliefs on policy evaluation such that participants who believed that the content is more important also agreed more with the policy. This could be due to the fact that there was no other, alternative policy and participants who thought that content should play a big role for their own position may have come to the conclusion that the policy is a feasible attempt to address this problem. In addition, this relationship between beliefs and policy agreement was stronger when participants were mindful, which probably reflects the fact that prescriptive beliefs were simply more salient in the mindful condition. In the General Discussion, we will address the issue that the previous studies revealed a direct effect of prescriptive beliefs on the decision, but that, in the present study, we find this effect to be strengthened when participants were mindful.)

Figure 2. Agreement with the global warming policy as a function of mindful and control condition, whether participants were led to believe that a majority of Republicans or Democrats supported the policy (or no information), and as a function of participants' political affiliation (Democrat = 1 SD below the mean on political affiliation; Republican = 1 SD above the mean on political affiliation).



Impact of global warming attitudes policy agreement. In a second set of analyses, policy agreement is regressed on participants' political affiliation, whether participants were made mindful (+1) or not (-1), one contrast code contrasting the Republican majority (+1) from the Democratic majority (-1,

control = 0), a second orthogonal contrast contrasting any political party information (each coded as -1) from the control condition (+1), participants' global warming attitudes, and most importantly, the interaction between global warming attitudes and the mindful condition (see Table 7). This analysis revealed three significant effects. First, as reported above, when the supporting political party was the Republican party, participants agreed less with the policy, $b = -.25$, $t(180) = -2.35$, $p = .020$, $\eta_{\text{partial}}^2 = .030$. Second, the more participants see global warming as a problem (indicated as scoring higher on the global warming scale), the more they agree with the policy, $b = .63$, $t(180) = 3.97$, $p < .001$, $\eta_{\text{partial}}^2 = .081$. Third, there is marginally significant support that the latter effect is accentuated when participants were mindful, $b = .23$, $t(180) = 1.66$, $p = .099$, $\eta_{\text{partial}}^2 = .015$. Specifically, when only looking at the control condition and policy agreement is regressed on political affiliation, the two contrast codes indicating which party supports the policy, and global warming attitudes, global warming attitudes are marginally predicting participants' policy agreement, $b = .39$, $t(90) = 1.67$, $p = .099$, $\eta_{\text{partial}}^2 = .030$. The same analysis in the mindful condition reveals that global warming attitudes significantly predict policy agreement, $b = .97$, $t(87) = 4.04$, $p < .001$, $\eta_{\text{partial}}^2 = .158$.

Table 7. Predictors and findings for the multiple regression examining the impact of policy's content on policy agreement (PA = political affiliation, Mind = 1 if mindful & -1 if control, GW = mean centered global warming attitudes).

| | b | se | t(180) | p-value | $\eta_{partial}^2$ |
|------------------|-------|------|--------|---------|--------------------|
| Intercept | 4.95 | 0.08 | 58.60 | < .001 | 0.950 |
| DemRep | -0.25 | 0.11 | -2.35 | .020 | 0.030 |
| PolControl | -0.01 | 0.06 | -0.09 | .928 | 0.000 |
| PA | -0.04 | 0.07 | -0.56 | .576 | 0.002 |
| Mind | 0.10 | 0.09 | 1.14 | .256 | 0.007 |
| GW | 0.63 | 0.16 | 3.97 | < .001 | 0.081 |
| Mind * GW | 0.23 | 0.14 | 1.66 | .099 | 0.015 |

This is consistent with the analysis in the mindful condition reported earlier (see Figure 2, mindful condition) where there was no party over policy effect and only participants' own political affiliation predicted their agreement with the policy, $b = -.26$, $t(88) = -2.81$, $p = .006$, $\eta_{partial}^2 = .082$. Here, in the mindful condition, participants' global warming attitudes predict policy agreement (and global warming attitudes and political affiliation are correlated as reported above, $r(187) = -.51$, $p < .001$). (See Appendix 7 for additional analyses examining whether the strength and direction of participants' prescriptive beliefs have any direct or moderating effects on policy agreement and global warming attitudes. As reported above, analyses reported in Appendix 7 show that prescriptive beliefs directly predict policy evaluations, and they also interact with

the mindful condition such that the relationship between prescriptive beliefs and policy evaluation is stronger when participants are made mindful. In addition, there is a marginal significant three-way interaction indicating that attitudes toward global warming predict policy evaluations when mindful, but that this is only the case for people who believe that the content of a policy is more important compared with the position of one's political party. Again, we will return to discuss these findings in a more comprehensive way in the General Discussion.)

Discussion. In the control condition, participants' policy evaluations were biased by group influence (i.e. information about which political party supports the policy). In contrast, attitudes about global warming and how much of a problem it is for today's world had marginally significant influence on participants' policy evaluation. However, a majority of participants held the belief that policies should be evaluated based on personal attitudes toward policy-relevant issues more than on partisan considerations—an opinion that did not vary as a function of whether people evaluated the policy before or after they reported how they thought policies should be evaluated. This belief is also consistent with the biased self perception reported in Cohen (2003) where participants indicated that they thought they were not affected by group influence, but more by the content of a policy. In sum, participants in the control condition evaluated the policy in a way that is inconsistent with their beliefs about how they should evaluate policies: their evaluations were affected more by

group influence and less by their attitudes towards the content of the policy, but a majority clearly believes that it should be the opposite.

When participants were made mindful, their policy evaluations were not affected by group influence (i.e., whether Democrats or Republicans supported the policy) and instead, they were strongly influenced by their personal attitudes about global warming. Making people mindful of how much they personally believe partisan politics and personal attitudes should influence policy evaluation thus led them to evaluate policies in a way that more closely matched their personal normative beliefs. The marginally significant finding that people's attitudes about global warming predicted policy evaluations more strongly when they were mindful (compared with the control condition) is interesting because it suggests evidence for the mechanism that the mindfulness induction makes people aware of decision attributes, which subsequently changes its weighting without specifically mentioning this particular attribute in the mindfulness induction. While in previous studies, the mindfulness induction called specific attention to two decision attributes, the advantage of the present study lies in the fact that the mindfulness induction only mentions the importance of the "content of the policy" and the "position of your political party." An attitude about global warming is without a doubt an important decision attribute for evaluating a global warming policy and people tend to become aware of this when they are mindful even though the manipulation does not call explicit attention to this particular attribute.

Finally, this study also showed evidence that prescriptive beliefs directly influence policy evaluations and that this is even more the case when participants were made mindful of their prescriptive beliefs (Appendix 6 and 7). The general notion in all the studies presented here is that people weigh information differently by default compared with when they are mindful of this information and how they want to use this information. However, as we have seen in all three studies reported so far, prescriptive beliefs can also have a direct influence on decisions. It is certainly not surprising to find that people who believe that mortality information is very important for donation decisions also on average, allocate more money to the more deadly humanitarian crisis (Study 1) or that people who believe that their friends' opinion is very important prefer to date someone whom their friends are very fond of (Study 2). Or, as we have found in this study, people who believe that the content of a policy is very important also agree more with a feasible policy. Only in this last study on policy evaluations however do we find significant evidence that prescriptive beliefs predict policy evaluations even more when people are mindful, that is, when they explicitly thought about their prescriptive beliefs. One possible explanation is that in Study 1 and Study 2, people's beliefs might have been easily available so that making them very explicit and salient did not change anything in terms of how much these beliefs affected their decision. However, in Study 3, these beliefs might have been less available and they might have been not something that people would easily have thought of. Thus, making them salient increased the effect of these beliefs on policy evaluations. .

Movie Preference (Study 4)

The previous studies showed that mindful decision making can change the weighting of different kinds of information when participants are led to think about how much they should weigh these different kinds of information in the decision they are about to make. The study on global warming policy evaluations showed a marginally significant finding that it is not necessary to make people aware of attributes by explicitly mentioning them in the mindfulness induction. A central goal for Study 4 was to test whether the mindfulness induction has to mention attributes in the same decision domain or whether it is enough to mention similar attributes in a different decision domain. If awareness of attributes in a different decision domain leads to awareness and a subsequent change in the weighting just like inducing awareness of attributes in the same decision domain, then this would provide support for an “incidental” induction of mindfulness.

Furthermore, this study is designed to create extended periods of liking (or disliking) experiences in a lab setting. This is worth mentioning as an important feature of the experimental design because it is much more difficult to change the influence (i.e., the weighting) of real feelings compared with hypothetical experiences (as in Study 2).

Study 4 a reports findings from a pretest on the stimulus materials. In Study 4 b, participants first watched movie previews, after which they were presented with information about these movies from a film critic website. At the

end, participants indicated how much they would like to watch the entire movie. The information from the film critic website contradicted participants' experience during the preview. For example, participants may have experienced high levels of liking during watching a movie preview, but the film critic information judged the movie very negatively. The idea behind this design was that participants' experience during the preview should predict the degree to which they were interested in watching the entire movie and that this relationship was weakened by providing contradicting information from film critics. Most importantly, it was expected that the relationship between participants' experience during the preview and how much they were interested in watching the entire movie would be stronger when participants were made mindful (regardless of whether mindfulness was induced incidentally or not) compared to a control condition.

Movie Preview Pretest (Study 4 a). Undergraduate students at the University of Colorado at Boulder ($N = 25$; 16 female, 9 male) participated in exchange for course credit. They watched 8 movie previews in one of ten randomly ordered sequences. After they watched the first preview, they indicated their liking and enjoyment of the preview ("How much did you like this preview?", "How much did you enjoy watching this preview?" 1 = *not very much*, 9 = *a lot*). Participants also indicated how much they would like to watch the movie ("How much does this preview make you want to watch the entire movie?", "How much would you like to watch the entire movie?"; 1 = *not very*

much, 9 = *a lot*). After that, participants were given information about the movies from a movie review website.

“The movie review website rottentomatoes.com provides reviews and summarizes critiques of movies. Most of these critiques are based on movie experts and movie critics working at news magazines or newspapers such as the New York Times. Rottentomatoes.com summarizes all available movie reviews in a tomatometer. The tomatometer measures the percentage of positive reviews from approved critics. The higher the percentage, the more positive reviews (out of all the reviews) a movie received. In addition, you are able to read a few short quotes or the entire review from critics about the movie. Notice that all of the critics’ reviews are based on the entire movie while you have only seen a very short preview here.”

Then, participants received information about the movie (see Figure 3 for an example). While this information was still displayed on the screen, participants were asked “How much would you like to watch the entire movie?” (1 = *not very much*, 10 = *a lot*). The purpose of the pretest was to select movie previews that were relatively similar in terms of content, length, and presentational style. In addition, the purpose of the pretest was to select movie previews where providing film critic information significantly changed people’s watching preferences. Therefore, the following analyses compare participants’ reactions and watching preferences before they received film critic information with watching preferences after they received film critic information.

Figure 3. Example for operationalization of the film critic information. The tomatometer has previously been explained to participants (in this example, there were 86% positive reviews from approved film critics for the movie *Rachel Getting Married*).

Rachel Getting Married (2008)

T-Meter Critics | Top Critics | RT Community | My Critics | My Friends | DVD

86% TOMATOMETER

How does the Tomatometer work?

CERTIFIED FRESH Reviews Counted: 182
Fresh: 157 Rotten: 25
Average Rating: 7.5/10

Consensus: Engrossing tale of family angst, highlighted by Hathaway's powerful performance.

Rated: R [See Full Rating] **Theatrical Release:** Oct 3, 2008 Limited
Runtime: 1 hr 53 mins **Box Office:** \$12,748,504
Genre: Dramas

Synopsis: Young fans of Anne Hathaway's previous roles in family films such as THE PRINCESS DIARIES and ELLA ENCHANTED probably wouldn't know what to make of her character in RACHEL GETTING MARRIED.... [More]

Starring: Anne Hathaway, Debra Winger, Bill Irwin, Rosemarie DeWitt
Director: Jonathan Demme
[See More Credits]

Rate this Movie

0%

- Write a Review
- Read Reviews
- Add to List
- Get this Movie
- Buy Poster

To analyze these data, the ratings were transformed into z-scores (within each participant). This was done because the response scale (10-point scale) for watching preferences after receiving film critic information differed from the response scales (9-point scale) that was used for the ratings before receiving film critic information. Within each person, a z-score was computed for *Reactions* (averaging the liking and enjoyment questions, $r = .97$), for *Watch Pre* (averaging “How much does this preview make you want to watch the entire movie?” and “How much would you like to watch the entire movie?”, $r = .97$), and *Watch Post* for each of the eight movies. Importantly, *Watch Pre* is a measure of participants’ watching preferences before they received film critic information and *Watch Post* is a measure of participants’ watching preferences

after they received film critic information. For example, to compute a participant's z-score for *Reactions* to the preview *Steam*, this z-score was based on this participant's average (and standard deviation) *Reactions* to all eight movie previews; to compute a participant's z-score for watching preferences before film critic information, *Watch Pre*, this z-score was based on this participant's average (and standard deviation) of the *Watch Pre* measures to all eight movie previews before film critic information.

The pretest revealed that overall, the (accurate) information provided by film critics is effective in changing people's intentions and preferences to watch the movie (see Table 9). Based on this pretest, *Running with Scissors*, *Silk*, and *Rachel Getting Married* were included in the main experiment. *Running with Scissors* and *Silk* showed a significant decrease in watching preferences after receiving film critic information. *Rachel Getting Married* showed a significant increase in watching preferences after receiving film critic information. In addition, *Steam* was selected, but the film critic information was changed from 14% to 66% film critic approval with the goal to increase participants' *Watch Post* ratings.¹¹

Even though the pretest showed that film critic approval information significantly changed how much participants wanted to see the entire movie

¹¹ One of the goals in selecting the previews was to have an equal number of previews in the main study where film critic information decreases watching preferences and where this information increases watching preferences. This served the purpose to have a sample of previews in the main study that is diverse in terms of initial liking and in terms of how film critic information changes watching preferences. This diversity in the stimuli was an important aspect for the main study with regard to the external validity of the stimuli (to address stimulus sampling concerns).

based on the preview, many of these previews did not appear to be a good fit for other reasons. For example, some of the previews had many interruptions showing its nominations at film festivals, which—in addition to participants’ experienced liking—presumably influenced their ratings of their reactions and their watching preferences.

Table 9. Average z-scores for each preview on *Reactions*, *Watch Pre*, and *Watch Post*. For example, a z-score of -0.82 for *Steam* means that *Steam*’s z-score (computed based on the set of eight previews for each participant) is -0.82 standard deviations below the mean across all participants. For each preview, t-statistics are reported comparing *Reactions* with *Watch Post* and comparing *Watch Pre* with *Watch Post*.

| Movie | Reactions | Watch Pre | Film Critic | Watch Post | React vs Watch Post | Watch Pre vs. Watch Post |
|----------|-----------------|-----------------|-------------|-----------------|-----------------------|--------------------------|
| Steam | -0.82 (0.69) | -0.86 (0.76) | 14% | -1.09 (0.55) | t(24)=1.87 p=.074 | t(24)=1.62 p=.118 |
| Scissors | 1.11 (0.67) | 1.16 (0.59) | 30% | 0.67 (0.74) | t(24)=3.20 p=.004 | t(24)=3.59 p=.001 |
| Rachel | -0.34 (0.79) | -0.24 (0.73) | 86% | 0.41 (0.70) | t(24)=-3.97 p=.001 | t(24)=-3.78 p=.001 |
| Silk | 0.33 (0.73) | 0.29 (0.80) | 8% | -0.42 (0.98) | t(24)=4.82 p<.001 | t(24)=5.28 p<.001 |

| | | | | | | |
|---------|-----------------|-----------------|-----|-----------------|-----------------------|-----------------------|
| Italian | -0.14 (0.84) | -0.06 (0.80) | 10% | -0.50 (0.68) | t(24)=2.65 p=.014 | t(24)=3.98 p=.001 |
| Fargo | -0.50 (0.79) | -0.52 (0.83) | 94% | 0.28 (0.97) | t(24)=-4.59 p<.001 | t(24)=-4.31 p<.001 |
| Count | -0.20 (0.68) | -0.19 (0.63) | 95% | 0.51 (0.76) | t(24)=-3.57 p=.002 | t(24)=-3.81 p=.001 |
| Margot | 0.56 (0.73) | 0.41 (0.82) | 51% | 0.14 (0.56) | t(24)=3.25 p=.003 | t(24)=1.95 p=.063 |

Preview Liking and Movie Preferences (Study 4 b).

Method.

Participants and stimulus materials. Undergraduate students at the University of Colorado at Boulder ($N = 57$; 40 female, 17 male) participated in exchange for course credit. Participants were told that their task in this study is to watch a few movie previews and answer a few questions about each movie. The order of the movie previews was the same across conditions (*Steam*, *Running with Scissors*, *Rachel Getting Married*, *Silk*). Based on the pretest, *Steam* had a low enjoyment rating ($M = -0.82$, $SD = 0.69$) and was paired with a high film critic approval rating (66%, not truthfully), *Running with Scissors* had a high enjoyment rating ($M = 1.11$, $SD = 0.67$) and was paired with a low film critic approval rating (20%, not truthfully), *Rachel Getting Married* had a moderate enjoyment rating ($M = -0.34$, $SD = 0.79$) and was paired with a high film critic approval rating (86%, truthfully), and *Silk* had a moderate enjoyment

rating ($M = 0.33$, $SD = 0.73$) and was paired with a low film critic approval rating (8%, truthfully).

Similar to the pretest, after participants watched the first preview, they indicated their reactions during the preview and their watching preferences before receiving film critic information (“How much did you like this preview?”, “How much did you enjoy watching this preview?”, “How much would you like to watch the entire movie?”; 1 = *not very much*, 9 = *a lot*). After that, participants were given information about the movies from a movie review website, just as was done in the pretest (see Figure 3). Finally, participants were asked “How much would you like to watch the entire movie?” (1 = *not very much*, 9 = *a lot*).

Mindfulness. How mindful participants were of their watching preference after the film critic information was experimentally manipulated by either asking them to indicate their prescriptive beliefs about the importance of preview liking and film critic approval information before or after they indicated how much they would like to watch the entire movie. Participants answered three questions that reminded them of their prescriptive beliefs: “My own liking of a movie preview should strongly influence my decision to watch the entire movie.”, “Information about the movies provided by film critics should strongly influence my decision to watch the entire movie.” (1 = *strongly disagree*; 5 = *strongly agree*), and “You might recall from your own experience that you liked a preview, but that the critics did not recommend watching this movie. Or you might recall that you did not really like a preview that much, but the critics

highly recommended the movie. In situations where your own liking of the preview contradicts what critics say about the movie, which is more important in your opinion?" (1 = *How much I liked the preview is much more important*, 6 = *Recommendations provided by film critics is much more important*).¹²

In the control condition, participants answer these three questions after they indicated their movie preference ratings. In the mindful condition (where these beliefs needed to be made salient) however, participants answer these questions just before they indicated their movie preference ratings.

One important goal for this study was to test whether these beliefs have to be activated in the same domain as the judgment or the decision itself or whether it is sufficient to make people mindful in a different domain (unrelated to their movie preference). To do this, we asked participants to indicate prescriptive beliefs in a different domain. The questions were introduced as being about choosing classes for next semester "What do you think is more important when choosing your classes for next semester, information about the classes provided by other students who took these classes or how much you like the topic of the classes?" Participants indicated agreement with three statements: "My own liking of the topic of the classes should strongly influence my decision which classes to take next semester.", "Information about the classes provided by other students who took these classes should strongly influence my decision

¹² Unlike in the previous studies, there was one question that involved a direct comparison of the importance of the two attributes (liking and film critic information). In the previously reported studies, prescriptive beliefs about two attributes were often not correlated, but there may be situations that require a direct tradeoff of the two attributes' importance.

which classes to take next semester.” (1 = *strongly disagree*, 5 = *strongly agree*), and “You might recall from your own experience that you liked the topic of a class, but that other students who took the class did not recommend taking this class. Or you might recall that you did not really like the topic of a class, but other students who took the class highly recommended the class. In situations where your liking of the topic of a class contradicts what other students who took the class are saying about the class, which is more important in your opinion?” (1 = *How much I like the topic of a class is much more important*; 6 = *Recommendations provided by other students who took the class is much more important*). After participants indicated their agreement with all three statements, they were asked how much they would like to watch each of the movies presented in the previews.

In sum, participants in this study had actual experiences of liking and enjoyment of these previews and after that, they received information that was somewhat inconsistent with this experience. The prediction is that participants in both mindful conditions place more weight on their own experiences of liking when they indicate how much they would like to see the entire movie compared with the control condition. It may be sufficient to think about these beliefs and that it doesn't matter in which domain these beliefs are activated. Thus, thinking about prescriptive beliefs in other decision domains might lead to the same finding as thinking about prescriptive beliefs in the current domain.

Results.

Prescriptive beliefs. Analyzing the absolute ratings, a majority of participants (75.68%) believe that own liking should influence their movie preference more than film critics. A minority (10.81%) believe that film critics should influence movie preferences more than own liking of the preview and the remaining proportion (13.51%) believe that these two pieces of information are equally important. Similarly, looking at the comparative ratings, a majority (81.08%) indicates that own liking is more important compared with film critics and only a minority believed it should be the opposite way (18.92%). Also in line with the predictions, participants believed that their own liking of the previews should influence their movie preference more ($M = 4.13$, $SD = 0.78$) compared with film critic information ($M = 2.76$, $SD = 0.97$). A 2 (type of information: own liking, film critics) \times 2 (mindful, control) ANOVA with repeated measures on the first factor revealed only a main effect of type of information, $F(1,36) = 35.70$, $p < .001$, $\eta_{\text{partial}}^2 = .498$. Importantly, these beliefs did not vary as a function of whether people thought about these beliefs before or after they decided on how to allocate, $F < 1$, *ns*. Participants both in the control and in the mindful condition believed that own liking should influence their movie preference more ($M_{\text{control}} = 4.22$, $SD = 0.55$ and $M_{\text{mindful}} = 4.05$, $SD = 0.95$) compared with film critic information ($M_{\text{control}} = 2.61$, $SD = 0.98$ and $M_{\text{mindful}} =$

2.90, $SD = 0.97$, control condition $F(1,36) = 23.10, p < .001, \eta_{\text{partial}}^2 = .391$, and mindful condition $F(1,36) = 13.08, p < .001, \eta_{\text{partial}}^2 = .266$.¹³

Also in line with the predictions, when asked a comparative question participants believed that own liking is more important than film critic information ($M = 2.26, SD = 1.22$ with 3.5 indicating equal importance and numbers less than 3.5 indicating own liking as more important). In a regression, regressing this rating (mean centered) on the control vs. mindful condition revealed only that the intercept was different from zero, $b = -1.25, t(36) = -6.42, p < .001$, but this did not vary as a function of condition (control = -1, mindful, same domain = +1), $b = 0.30, t(36) = 1.55, ns$.

For the other mindful condition, analyzing the absolute ratings, a majority of participants (89.47%) believe that own liking should influence their class choices more than friends' feedback. The remaining proportion (10.53%) believe that these two pieces of information are equally important. Similarly, looking at the comparative ratings, a majority (68.42%) indicates that own liking is more important compared with friends' feedback and only a minority believed it should be the other way around (31.58%). Also in line with the predictions, participants believed that their own liking should influence their class choices more ($M = 4.89, SD = 0.32$) compared with friends' feedback ($M = 3.26, SD = 0.81, t(18) = 8.56, p < .001$).¹⁴ Also in line with the predictions, when asked a comparative question participants believed that own liking is more important

¹³ Beliefs about the importance of own liking and about film critic information were negatively correlated, $r(38) = -.32, p = .053$.

¹⁴ Beliefs about the importance of own liking and about friends' feedback were not correlated, $r(19) = .12, p = .639$.

than film critic information ($M = 2.53$, $SD = 1.47$), which is significantly different from the scale midpoint of 3.5, $t(18) = -2.89$, $p = .010$.

Movie preferences. There are two different ways for analyzing these data. One strategy is to use a multilevel data analysis approach and to estimate separate slopes and intercepts for each individual participant. A second strategy is to examine the relationship between participants' reactions to the preview and their preferences for watching the movies—averaging across all four films—as a function of mindfulness (compared with the control condition). The prediction for both data analysis strategies is that the slope for reactions to the preview should be steeper in the mindful conditions compared with the control condition, presumably because participants in the mindful conditions are less influenced by film critic information, but more by their own liking of the preview.

First, we used a multilevel data analysis approach to examine these data. On the level of the individual participant, we regressed their *Watch Post* ratings on their average *Reactions* to the preview (“How much did you like this preview?”, “How much did you enjoy watching this preview?”) and we were subsequently and across participants interested in whether these slopes differ as a function of mindfulness condition. Thus, level 1 analyses (for each participant i) and for each film j) and level 2 analyses were as follows:

$$\text{Level 1:} \quad \text{Watch Post}_{ij} = \alpha_{0i} + \alpha_{1i} \text{Reactions}_{ij} + \varepsilon_{ij}$$

$$\text{Level 2:} \quad \alpha_{0i} = \beta_{00} + \beta_{01} \text{Control Vs. Mindful}_i + \beta_{02} \text{Mindful: same} \\ \text{Vs. diff. domain}_i + \varepsilon_{0i}$$

$$\alpha_{1i} = \beta_{10} + \beta_{11} \text{ Control Vs. Mindful}_i + \beta_{12} \text{ Mindful: same}$$

$$\text{Vs. diff. domain}_i + \epsilon_{1i}$$

This analysis was performed with all three sets of orthogonal contrast codes (see Table 14), but the slope for *Reactions* did not differ as a function of condition (control, mindful in same or different domain), $t < |1.6|$, *ns*. The same analyses were performed using the film critic information as the predictor on level 2, but the slope for film critic information did not differ by condition, $t < |1.5|$, *ns*. Interestingly however, additional analyses reported in Appendix 8 indicate that there is evidence for a three-way interaction such that the relationship between preview liking and movie preference depends on mindfulness (*Control Vs. Mindful*) and prescriptive beliefs. Specifically, for participants who endorse the belief that personal liking is more important than film critic information, both mindfulness conditions show a stronger relationship between preview liking and movie preference compared with the control condition. For participants who endorse the opposite belief such that film critic information is more important than personal liking of the previews, both mindfulness conditions lead to a weaker relationship between preview liking and movie preference.

The second data analysis strategy examines how much weight people's reactions to the preview have in predicting their preference for watching the entire movie after they have received film critic information. (See Appendix 9 for additional analyses and additional information on the effect of film critic information on watching preferences as a function of mindfulness.) For an

overview of the contrast codes used for the control condition and the mindful conditions, please refer to Table 14. The most important hypotheses concerned the difference between the control condition and both mindfulness conditions (*Control Vs. Mindful*). To examine these hypotheses more specifically, two additional sets of contrast codes were created where one contrast code tests the difference between the control and the same domain mindfulness condition (*Control Vs. Mindful (same domain)*) and another contrast code tests the difference between the control and the different domain mindfulness condition (*Control Vs. Mindful (different domain)*). Thus, three sets of orthogonal contrast codes were created (see Table 14).

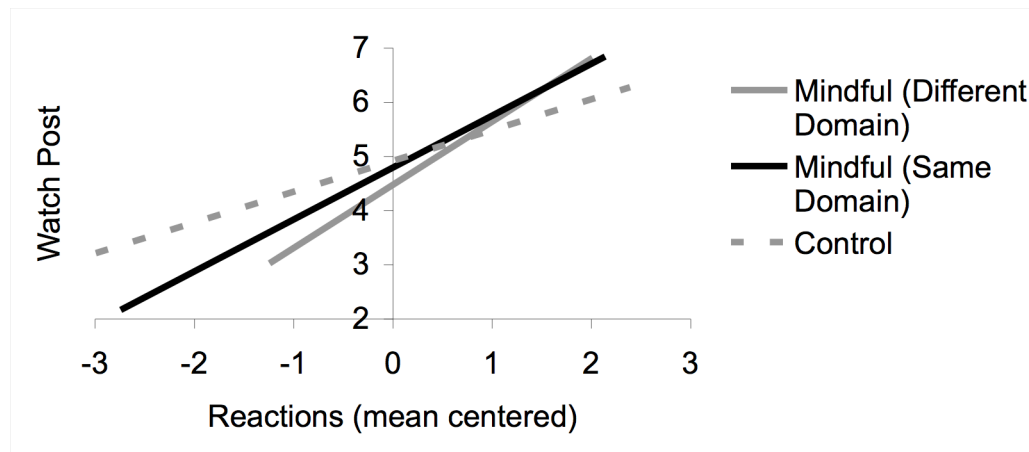
Table 14. Three sets of orthogonal contrast codes to examine differences in slopes between reactions and watching preferences after receiving film critic information.

| | Control | Mindful (same domain) | Mindful (different domain) |
|---|---------|-----------------------------|----------------------------------|
| Control Vs. Mindful | +2 | -1 | -1 |
| Mindful: same Vs. diff. domain | 0 | +1 | -1 |
| Control Vs. Mindful (same) | -1 | +1 | 0 |
| Control Mindful (same domain) Vs. Mindful (diff. domain) | -1 | -1 | +2 |
| Control Vs. Mindful (diff. domain) | -1 | 0 | +1 |
| Control Mindful (diff. domain) Vs. Mindful (same domain) | -1 | +2 | -1 |

To examine whether the slopes differ significantly as a function of condition, *Watch Post* (“How much would you like to watch the entire movie?”) was regressed on *Reactions* (“How much did you like this preview?”, “How much did you enjoy watching this preview?”, across all conditions $r = .97$), *Control Vs. Mindful*, *Mindful: same Vs. diff. domain*, both interactions of the contrast codes by *Reactions*, controlling for *Watch Pre*. Not surprisingly, *Watch Pre* predicted *Watch Post*, $b = .60$, $t(50) = 3.43$, $p < .001$, $\eta_{\text{partial}}^2 = .190$. Most

importantly for the present hypothesis, there was a significant interaction between *Reactions* and the contrast code *Control Vs. Mindful*, $b = -.13$, $t(50) = -2.05$, $p = .045$, $\eta_{\text{partial}}^2 = .078$, indicating a steeper slope between reactions and watching preferences when participants were made mindful (regardless of the domain) compared with the control condition (see Figure 4). Interestingly, there is no significant interaction between *Reactions* and the contrast code *Mindful: same Vs. diff. domain*, $b = -.03$, $t < 1$, *ns*. None of the other predictors was significant, $ts < |1.3|$, *ns*.

Figure 4. Relationship between *Reactions* and *Watch Post* as a function of mindful (different or same domain) and control condition. The regression lines are plotted given the range of data.



To examine whether the slope for reactions in the control condition differs from the mindful (same domain) condition, the same multiple regression was performed, but with a different set of orthogonal contrast codes (see Table 14, second set of contrast codes). One code contrasted the control condition

from the mindful (same domain) condition, *Control Vs. Mindful (same domain)*, and a second code contrasted the control condition and mindful (same domain) condition from the mindful (different domain) condition, *Control Mindful (same domain) Vs. Mindful (diff. domain)*. The interaction between *Reactions* and the contrast code *Control Vs. Mindful (same)* was marginally significant, $b = .19$, $t(50) = 1.81$, $p = .077$, $\eta_{\text{partial}}^2 = .061$, indicating a trend for a steeper slope between reactions and watching preferences when participants were made mindful compared with the control condition (see Figure 4). The interaction between *Reactions* and the contrast code *Control Mindful (same domain) Vs. Mindful (diff. domain)* was not significant, $t < |1.1|$, *ns*.

To examine whether the slope for reactions in the control condition differs from the mindful (different domain) condition, the same multiple regression was performed again, but using a different set of orthogonal contrast codes (see Table 14, third set of contrast codes). One code contrasted the control condition from the mindful (different domain) condition, *Control Vs. Mindful (diff. domain)*, and a second code contrasted the control condition and mindful (different domain) condition from the mindful (same domain) condition, *Control Mindful (diff. domain) Vs. Mindful (same domain)*. The interaction between *Reactions* and the contrast code *Control Vs. Mindful (diff. domain)* was not significant, $b = .22$, $t(50) = 1.67$, $p = .101$, $\eta_{\text{partial}}^2 = .078$ (see Figure 4). The interaction between *Reactions* and the contrast code *Control Mindful (diff. domain) Vs. Mindful (same domain)* was also not significant, $t < |1|$, *ns*.

Finally, examining each slope separately revealed that *Reactions* significantly predict watching preferences after receiving film critic information. In the control condition, *Reactions* were a significant predictor, $b = .57$, $t(16) = 3.13$, $p = .006$, $\eta_{\text{partial}}^2 = .380$ (see Figure 4). In the mindful (same domain) condition, *Reactions* predicted *Watch Post*, $b = .96$, $t(18) = 7.44$, $p < .001$, $\eta_{\text{partial}}^2 = .754$. In the mindful (different domain) condition, *Reactions* predicted *Watch Post*, $b = 1.17$, $t(17) = 4.60$, $p < .001$, $\eta_{\text{partial}}^2 = .554$.¹⁵

Discussion. Both, the multilevel modeling approach and the second data analysis approach are valid ways for analyzing these data. The biggest difference between these two is that the second data analysis approach averages across the four different film clips without taking into account the variation among the four clips. While both analytic strategies have validity and allow us to draw slightly different conclusions, we want to be sure to point out that there is a good reason for the second data analysis approach where we averaged across all four trials (=films). All four films have in common that people experience a reaction when they were watching the preview and these reactions toward the previews as a set predict people's preference toward the movie set. Receiving somewhat contradicting information from film critics diminishes this relationship. Regardless of whether the film critic information increased or decreased people's preferences, in all cases, it would have diminished how well

¹⁵ A multiple regression was performed to examine the effects of prescriptive beliefs on watching preferences. Prescriptive beliefs neither predicted watching preferences, controlling for *Reactions*, contrast codes, *Watch Pre*, and the interactions between *Reactions* and contrast codes, nor did they interact with any of the findings reported previously, all $ts < |1.5|$, *ns*.

preview reactions predict preferences (which is exactly what we find when comparing control with mindful conditions).

We conclude from this study that positive reactions to a movie preview significantly predict how much participants would like to watch the entire movie—even in the presence of information from film critics that contradicts participants experience while previewing the movie. However, a majority of participants believe that their own reactions to a movie preview are more important than film critics' information when making decisions about whether to see the actual movie. Compared with a control condition, participants in both mindful conditions put more weight on their reactions to the movie preview when deciding whether to watch it or not.

Interestingly, there was no difference whether these beliefs were activated in the same domain, relevant to the movie decisions or in a different domain where participants thought about how to choose which classes to take next semester (based on what their friends tell them about the class or how much they like the topic of the class). This suggests that a state of mindful decision making can be induced in a different decision situation and that this mindfulness carries over to the judgment and decision that people are about to make.

Experimental Manipulation of Prescriptive Beliefs (Study 4 c). The goal in this study is to experimentally manipulate the content of people's prescriptive beliefs. So far, in all the decision domains, there was a majority of participants holding the same prescriptive belief. Even though there was some variation in terms of how strong people held the belief and even though a few

people even had beliefs that were opposite from the predictions, the content of people's beliefs was, as predicted, very similar across all participants. Thus, making people mindful of these beliefs leads people to change the weighting of these beliefs to match their beliefs better. This theoretical reasoning assumes that when making decisions mindfully, the content of these beliefs plays a causal role such that people's weighting changes because people hold prescriptive beliefs that suggest a different weighting than what participants would be doing by default (in the control condition). This is one of the reasons why in all the previously reported studies, it was examined whether the direction and strength of people's beliefs moderates the way participants change their weighting when made mindful. In fact, there was no evidence in the previously reported studies suggesting that the direction (or strength) of prescriptive beliefs has any effect on the weighting of the information (with the exception of Study 3 where there was a marginal interaction of mindful \times global warming attitudes \times prescriptive beliefs, see Appendix 7). However, all paradigms have been selected and designed with the goal in mind to have a clear majority of participants holding similar beliefs. It is therefore not surprising that there was a lack of evidence for the moderating role of prescriptive beliefs.

In this study, the content of participants' prescriptive beliefs was experimentally manipulated. Participants saw previews of two movies, they received information from film critics and how much they recommend each movie, and finally, participants indicated how much they would like to watch each movie. One half of participants was lead to believe that information

provided from film critics is more important for their movie preference compared with their liking of the preview. The other half was lead to believe the reverse (liking of the preview is more important for movie preference compared with information provided from film critics). The hypothesis is that for the latter group of participants who presumably believe that preview liking is more important than film critic information, their movie preferences will be less influenced by film critic information and that film critic information will affect movie preferences more for the former group of participants who presumably believe that film critic information is more important than preview liking.

One of the challenges in manipulating participants' prescriptive beliefs is to develop a manipulation that still seems to participants as if they self-generated the beliefs as opposed to externally provided decision rules. Thus, participants were asked to think and write about why they should rely more on their own liking or why they should rely more on information provided by film critics when choosing which movie to see.

Method.

Participants and stimulus materials. Undergraduate students at the University of Colorado at Boulder ($N = 47$; 20 female, 27 male, data collection ongoing) participated in exchange for course credit. Participants were given two movie options to indicate their preference. One movie (*Rachel Getting Married*) had very positive film critic information, which highly recommended the movie. A second movie (*Silk*) had very negative film critic information where only a very small minority of film critics recommended the movie. Thus, the two

important attributes on which these movie previews vary were the degree of enjoyment participants experienced during the preview and the information provided from film critics. The main outcome measure was participants' preferences for watching the entire movie based on the preview and the film critic information.

First, participants were told that they were about to watch a couple of movie previews and that their task is simply to watch these movie previews and to answer questions later on. After participants watched the preview for *Rachel Getting Married* and *Silk*, they received film critic information (see Figure 3). For *Rachel Getting Married*, the film critics highly recommended this movie (86% positive reviews from film critics) and for *Silk*, the film critics strongly advised against this movie (8% positive reviews from film critics).

Mindfulness. Then, participants either wrote about why it might be better to rely on the information provided by film critics or why it might be better to rely on own liking of a preview when making decisions about how much they want to see a movie. Specifically, participants who were instructed to think about the fact that relying on film critic information might often be better than relying on own liking of a preview (Film Critics > Liking) read the following instructions:

You might recall from your own experience that you sometimes liked a preview, but that the critics did not recommend watching this movie. Or you might recall that you did not really like a preview that much, but the critics highly recommended the movie. In situations where your own liking of the preview contradicts what critics say about the movie, it is often better to trust what film critics say about the movie. Most of the time, how film critics rated the movie is a very good and reliable indicator for how much people will enjoy the movie.

After all, they have seen the entire movie (and not just a preview) and they know how good it is.

Please describe briefly why you think that you should trust more what film critics say as opposed to how much you liked a preview when you decide whether to see a movie.

Participants who were instructed to think about the fact that relying on own liking of a preview might often be better than relying on film critic information (Liking > Film Critics) read the following instructions:

You might recall from your own experience that you sometimes liked a preview, but that the critics did not recommend watching this movie. Or you might recall that you did not really like a preview that much, but the critics highly recommended the movie. In situations where your own liking of the preview contradicts what critics say about the movie, it is often better to trust your own liking of the preview. Most of the time, how much people liked a preview is a very good and reliable indicator for how much people will enjoy the actual movie. After all, people have different tastes and you know best how much you just enjoyed the preview!

Please describe briefly why you think that you should trust more how much you liked a preview as opposed to what film critics say when you decide whether to see a movie.

Finally, participants were asked “How much would you like to watch the entire movie?” (1 = *not very much*, 9 = *a lot*).

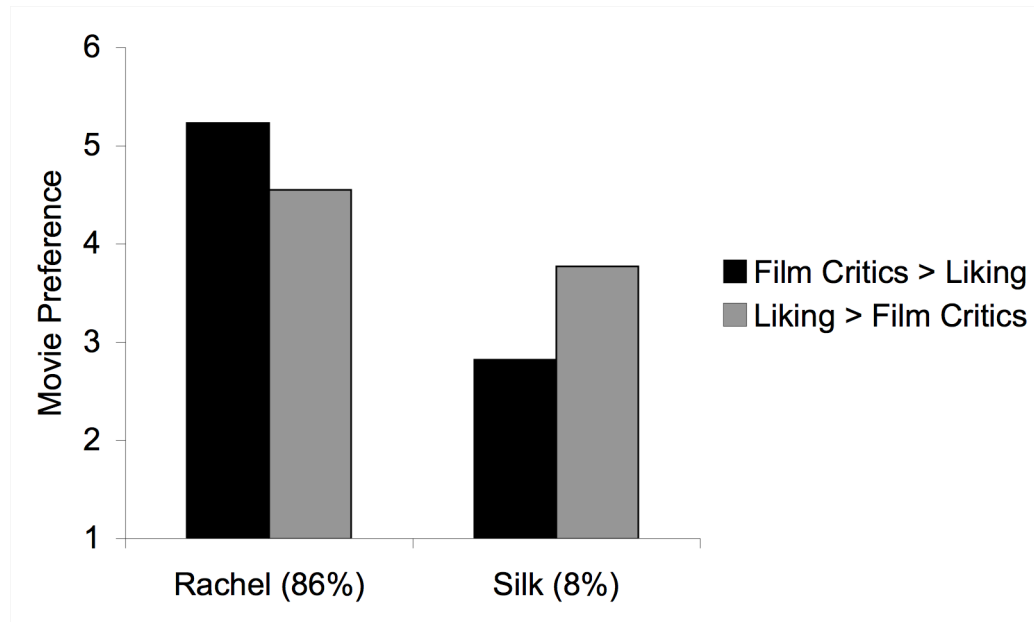
Results. Data from three participants were excluded from data analyses because they did not follow the instructions: all three participants were in the Film Critics > Liking condition, but their responses to the open ended question indicated that they think it is better to rely on own liking as opposed to film critic information.

These ratings on watching preferences were analyzed using a 2 (Rachel, Silk) × 2 (Film Critics > Liking, Liking > Film Critics) ANOVA with the first factor as a repeated measures factor (see Figure 5). This analysis indicated a

main effect of movie such that *Rachel* ($M = 4.89$, $SD = 2.71$) received higher ratings than *Silk* ($M = 3.30$, $SD = 2.31$, $F(1,42) = 14.38$, $p < .001$, $\eta_{\text{partial}}^2 = .255$). More importantly, there was also a marginally significant interaction, $F(1,42) = 3.80$, $p = .058$, $\eta_{\text{partial}}^2 = .083$, suggesting that relying on experts increases the preference for *Rachel* (this simple effect is $F < 1$, *ns.*), but decreases it for *Silk* (this simple effects is $F(1,42) = 1.92$, $p = .173$, $\eta_{\text{partial}}^2 = .044$).¹⁶

¹⁶ Another way to look at this interaction is to examine how strongly *Rachel* is preferred over *Silk*: while *Rachel* is preferred over *Silk* in the Film Critics > Liking condition, $F(1,42) = 16.49$, $p < .001$, $\eta_{\text{partial}}^2 = .282$, this is no longer the case when participants were in the Liking > Film Critics condition, $F(1,42) = 1.70$, $p = .200$, $\eta_{\text{partial}}^2 = .039$.

Figure 5. Movie preference as a function of preview (*Rachel*, which was recommended by 86% of all film critics, and *Silk*, which was recommended by 8% of all film critics) and whether participants were led to believe that film critic information is more important for this preference rating compared with liking of the preview (Film Critics > Liking) or vice versa (Liking > Film Critics).



Discussion. While *Rachel* received a stronger endorsement from film critics (86% of all critics recommended the movie) compared with *Silk* (only 8% of all critics recommended the movie) and while this difference in recommendation leads to an overall preference for watching *Rachel* over *Silk*, this preference tends to be stronger when participants were led to believe that film critic information is more important than liking of the preview, but this effect is only marginally significant. In fact, this preference is not significant when participants were led to believe that liking of the preview is more

important than film critic information. That is, whichever prescriptive beliefs participants were lead to endorse, affected their preferences for watching these movies—presumably because participants weighed film critic information and liking of the preview differently as a function of the type of prescriptive belief they endorsed.

The main goal of this study was to show that the content of prescriptive beliefs plays a causal role for how much and in which direction people engage in changing their preferences. All participants in this study were mindful of the use of personal liking of a preview and information provided by film critics while they were thinking about their preferences for watching each of these movies. However, unlike in previous studies where a majority of participants had similar (and relatively homogeneous) prescriptive beliefs, this study manipulated the type of prescriptive beliefs that participants held. The findings show that the content of these prescriptive beliefs causes people to change their preferences in the direction that is more in line with whichever prescriptive beliefs people were lead to hold.

The timing of the mindfulness instruction is also noteworthy: as in previous studies, participants first see all the materials relevant for the decision and then mindfulness is induced. This suggests that the encoded information is the same for all participants (in the control and in the mindful conditions), but that the mindfulness changes the weighting of this information in line with people's prescriptive beliefs.

Humanitarian Aid Allocation II (Study 5)

The goal of this study is to examine and address the possibility that mindful decision making is a process similar to effortful thinking or that it is a process that leads to similar outcomes as effortful thinking does. This study used the context of humanitarian aid allocation, but in addition to manipulating how mindful participants were made about the weighting of information, their need for cognition was measured (Cacioppo, Petty, Feinstein, & Jarvis, 1996). The need for cognition (NCS, see Appendix 10) can be considered as a measurement of analytical-rational thinking based on the cognitive-experiential self-theory (Epstein, Pacini, Denes-Raj, & Heier, 1996). Since the purpose of this study was mostly to address questions whether mindfulness makes people process more effortful and analytically, we were primarily interested in measuring analytical-rational thinking using the need for cognition scale and not people's engagement in heuristic and automatic processing. If mindful decision making and analytical-rational thinking are working in similar ways, then one would predict that participants in the control condition who are high on the need for cognition would show similar effects compared with participants in mindful condition who are lower on the need for cognition. However, if mindful decision making changes decision making (in comparison with a control condition) because of other ways—other than because of increasing the amount of deep thinking—then this dissociation might result in an interaction pattern.

Method.

Participants and stimulus materials. Undergraduate students at the University of Colorado at Boulder ($N = 57$; 30 female, 27 male) participated in exchange for course credit. A similar procedure was used as in the first study. Participants received two flyers and were told to carefully look at the flyers and read all the information on them. One flyer presented the organization “Project Aid” and the work they are doing to fight Tuberculosis in Malawi where Tuberculosis kills 128,000 people every year. This flyer about Tuberculosis contains six colored pictures (e.g. showing children with sad facial expressions). Another flyer presented the organization “Help Now” and the work they are doing to provide better treatment for Malaria in Ghana where Malaria kills 192,000 people every year. This flyer about Malaria contains four colored pictures (e.g. showing maps of malaria risk and houses). Thus, these flyers intended to display Tuberculosis as the less deadly crisis compared with Malaria, but at the same time, Tuberculosis presumably evoked stronger emotional reactions compared with Malaria.

Measures of emotional reaction and mortality perception. After participants read the flyers, they answered two questions about their reactions and the mortality information of Malaria and Tuberculosis: “To what extent do you have a stronger emotional reaction toward one disease over the other?” (1 = *Stronger emotional reaction to Malaria*, 8 = *Stronger emotional reaction to Tuberculosis*) and “To what extent are more people dying of one disease

compared with the other?” (1 = *Many more people are dying of Malaria*, 8 = *Many more people are dying of Tuberculosis*).

Aid allocation. Finally, participants were asked to imagine that they “decided to donate money (\$125 in total) to charitable organizations [...] to relieve suffering resulting from Malaria and Tuberculosis.” The main outcome measure finally was the allocation decision. Participants indicated how much money they allocate to relieve suffering from Malaria and how much they allocate to relieve suffering from Tuberculosis. The total amount of the allocation had to sum up to \$125.

Mindfulness. As before, how mindful participants were about their allocation was experimentally manipulated by either asking them about their prescriptive beliefs before or after they decided on how they wanted to allocate the money. Participants indicated their prescriptive beliefs about the importance of their emotional reaction and of information regarding the crises’ severity (“How much do you think should information about your emotional reaction toward the diseases influence your allocation decision?”, “How much do you think should information about how many people are dying of each disease influence your allocation decision?”, 1 = *not at all*; 8 = *a lot*). In the control condition, participants indicated their prescriptive beliefs after they stated their allocations. In the mindful condition (where these beliefs needed to be made salient) however, participants indicated their prescriptive beliefs right before they stated their allocations. At the end of the study, participants completed the need for cognition scale (NCS).

Results.

Need for Cognition (NCS). The items on the need for cognition (NCS) scale were highly correlated with each other (Cronbach's alpha = .92, a factor analysis suggests a single-factor solution where this factor explains 43.63% of the variance, 18 items, eigenvalue = 7.85, a scree plot also supported a single-factor solution) and were thus averaged into one composite score after properly reverse scoring some items ($M = 3.43$, $SD = 0.67$). There were no differences on NCS as a function of mindful decision making ($M_{control} = 3.56$, $SD = 0.58$, $M_{mindful} = 3.30$, $SD = 0.74$, $F(1,55)=2.13$, ns).

Manipulation Check. Participants reported having equally strong emotional reactions towards Tuberculosis compared with Malaria ($M = 4.79$, $SD = 1.45$), which is not significantly different from the midpoint of the scale, $t(56) = 1.51$, ns . However, participants reported that more people were dying of Malaria compared with Tuberculosis ($M = 2.39$, $SD = 1.01$), which is significantly lower than the midpoint of the scale, $t(56) = -15.75$, $p < .001$.

These perceptions do not differ as a function of mindful decision making (both F s < 1 , ns) and they were not correlated with NCS (both r s $< |.16|$, ns)

Prescriptive beliefs. As in Study 1, participants (47.37%) believe that information about how many people are dying should influence their decision more than emotional reactions. A minority (17.54%) indicated that emotional reactions should influence their decision more than how many people are dying. The remaining portion (35.09%) indicated that these two are equally important. Also in line with the predictions, participants believed that emotional reactions

toward the diseases should influence their allocation decision less ($M = 5.19$, $SD = 1.62$) compared with information about how many people are dying ($M = 6.12$, $SD = 1.18$). A 2 (type of information: emotion, mortality) \times 2 (mindful, control) ANOVA with repeated measures on the first factor revealed only a main effect of type of information, $F(1,55) = 11.12$, $p = .002$, $\eta_{partial}^2 = .168$. Importantly, these beliefs did not vary as a function of whether people thought about these beliefs before or after they decided on how to allocate, $F < 1$, *ns*. Participants both in the control and in the mindful (only marginal significant) condition believed that emotional reactions should influence the allocation decision less ($M_{control} = 5.07$, $SD = 1.82$ and $M_{mindful} = 5.33$, $SD = 1.39$) compared with information about how many people are dying ($M_{control} = 6.23$, $SD = 1.25$ and $M_{mindful} = 6.00$, $SD = 1.10$; $F_{control}(1,55) = 9.51$, $p = .003$, $\eta_{partial}^2 = .147$; $F_{mindful}(1,55) = 2.80$, $p = .100$, $\eta_{partial}^2 = .048$. Beliefs about mortality information were not correlated with participants' beliefs about emotional reactions, $r(57) = -.07$, *ns*. Importantly, these beliefs were also not correlated with NCS (both $r_s < |.22|$, *ns*).

Allocation decision. We analyzed participants' allocation decision computing a difference score, subtracting allocation to Tuberculosis from the allocation to Malaria such that higher numbers indicate higher allocations to Malaria. We regressed this difference score on perceived mortality information (reverse scored, mean centered), mindful (+1 if mindful, -1 if control), NCS (mean centered), all two-way, and the three-way interaction (Table 15). On average, higher scores on NCS lead to higher allocations, $b = 30.86$, $t(49) = 2.94$,

$p = .005$, $\eta_{\text{partial}}^2 = .150$. In addition, there was marginally significant evidence for a 3-way interaction, $b = -27.82$, $t(49) = -2.00$, $p = .051$, $\eta_{\text{partial}}^2 = .076$.

Table 15. Multiple regression on allocations (allocation to Malaria – allocation to Tuberculosis) with the following predictors (Mort = mortality perception, mean centered; Mind = 1 if mindful & -1 if control; NCS = Need for Cognition, mean centered).

| | b | se | t(49) | p-value | η_{partial}^2 |
|--------------------------|--------|-------|-------|---------|---------------------------|
| Intercept | 7.58 | 6.41 | 1.18 | .242 | 0.028 |
| Mort | 6.55 | 6.98 | 0.94 | .353 | 0.018 |
| Mind | -0.49 | 6.41 | -0.08 | .939 | 0.000 |
| NCS | 30.86 | 10.51 | 2.94 | .005 | 0.150 |
| Mort * Mind | 9.72 | 6.98 | 1.39 | .170 | 0.038 |
| Mort * NCS | -3.62 | 13.90 | -0.26 | .796 | 0.001 |
| Mind * NCS | 6.58 | 10.51 | 0.63 | .534 | 0.008 |
| Mort * Mind * NCS | -27.82 | 13.90 | -2.00 | .051 | 0.076 |

To examine this marginally significant 3-way interaction further, regression slopes are estimated for participants who scored low or high on NCS (-/+1 standard deviation, $M = 3.43$, $SD = 0.67$ on 5-point scale). For participants who score higher than the average on NCS (+1 SD), on average, mortality information did not predict allocations, $t < |1|$, *ns*, which also did not depend on mindful decision making (compared with control), $t < |1|$, *ns*. However, the

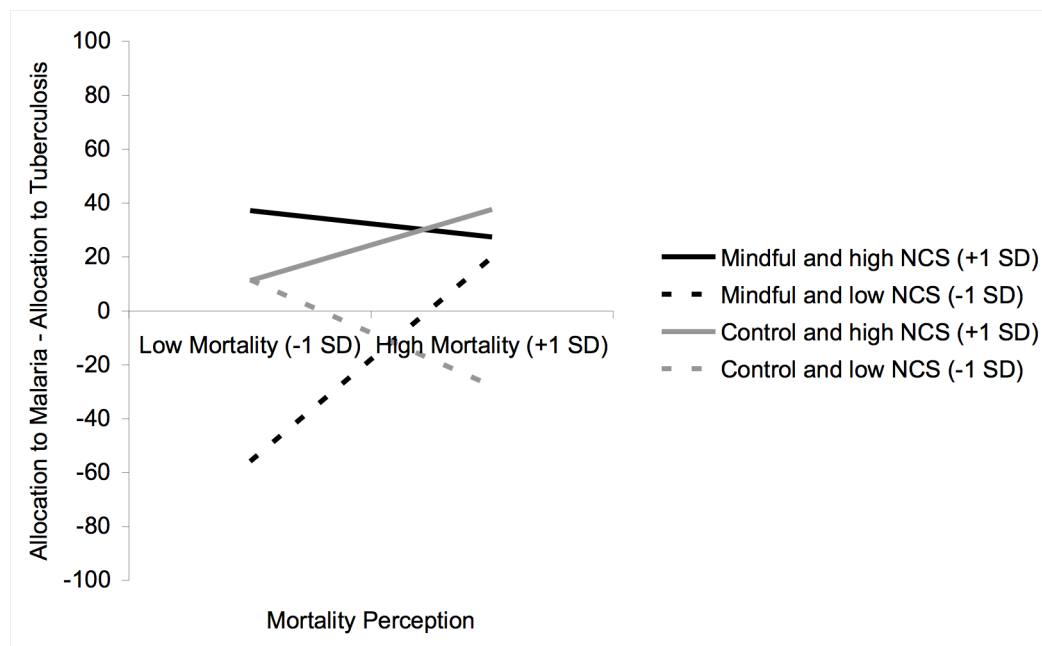
intercept was significantly higher than zero, $b = 28.29$, $t(49) = 3.14$, $p = .003$, $\eta_{\text{partial}}^2 = .168$, indicating higher allocations to Malaria compared with Tuberculosis (see the two solid lines in Figure 6).

For participants who score lower than the average on NCS (-1 SD), on average, mortality information did not get any weight when allocating money to the two crises, $t < |1|$, *ns*, but mortality information interacted with mindfulness such that mindfulness increased the weighting of mortality information compared with the control condition, $b = 28.39$, $t(49) = 2.07$, $p = .044$, $\eta_{\text{partial}}^2 = .081$. Interestingly, the intercept in this analysis was not significantly different from zero, $b = -13.12$, $t < |1.3|$, *ns*. Specifically, for participants who score lower than the average NCS (-1 SD), the slope for mortality information was significantly positive in the mindfulness condition, $b = 37.37$, $t(49) = 2.40$, $p = .020$, $\eta_{\text{partial}}^2 = .105$ (95% CI [6.078, 68.653]), but it was not different from zero in the control condition, $b = -19.42$, $t(49) = -0.86$, $p = .393$, $\eta_{\text{partial}}^2 = .015$ (see the two dashed lines in Figure 6).^{17 18}

¹⁷ The only slope in Figure 6 that is significantly different from zero is black, dashed line for participants in the mindful condition who are lower than average on NCS. The two intercepts that are higher than zero have participants who are higher than the average NCS (control condition: $b = 24.37$, $t(49) = 2.06$, $p = .045$, $\eta_{\text{partial}}^2 = .080$, mindful condition: $b = 32.21$, $t(49) = 2.37$, $p = .022$, $\eta_{\text{partial}}^2 = .103$) while all other intercepts are lower than zero, but not significantly so, $t_s < |1.3|$, *ns*.

¹⁸ An additional analysis examined whether the strength of participants' prescriptive belief about mortality information has a direct effect on allocations or moderates any of the other reported findings. There was no evidence for any of these effects, $F_s < 2.5$.

Figure 6. Allocation decisions (0 indicate equal allocations to each disease; positive numbers indicate higher allocations to Malaria) as a function of mindful and control condition, high and low NCS ($NCS_{Low} = 2.76$ and $NCS_{High} = 4.11$ on 5 point scale, $M = 3.43$, $SD = 0.67$, $Median = 3.61$), and as a function of how high people perceive the mortality for Malaria (note that $X_{Low Mortality} = 5.60$ and $X_{High Mortality} = 7.63$ on 8-point scale, $M = 6.61$, $SD = 1.01$, $Median = 7.00$, also indicating that all participants except one perceived Malaria higher on mortality compared with Tuberculosis).



Discussion. These findings show that mindful decision making has a different effect on participants' allocation decisions compared with chronically elevated levels of cognition. For participants who were high on NCS, mindful decision making had no effect on how much weight they place on perceived mortality information. For participants who were low on NCS however, mindful

decision making increased participants' weighting of mortality information. Before we interpret these findings any further, we want to be sure to address the fact that we did not find evidence for a two-way interaction of mortality information and mindfulness as we obtained in Study 1. The samples of the two studies are different and it is possible that the participants in Study 1 are lower in their need for cognition, which would explain why we found this interaction to be significant in Study 1. Another possibility is that the prescriptive beliefs about the weighting of emotional reaction and mortality information of participants in Study 1 seemed slightly stronger compared with participants' beliefs in Study 5. This may have created a situation in Study 1 that made it easier for the mindfulness condition to have an effect on the weighting of mortality.

This dissociation of the effects of NCS and mindfulness is of theoretical interest for two reasons. First, it shows that mindful decision making does not exhibit the same outcomes in terms of weighting of mortality information and absolute levels of allocations as engaging in more thinking (i.e. higher need for cognition). If mindful decision making and engaging in more thinking were the same psychological process, then one would expect participants high in NCS in the control condition to exhibit a similar pattern as participants low in NCS in the mindful condition. This is clearly not the case and supports the argument that making decisions mindfully is a different psychological state compared with the motivation to "think more" about the decision.

Furthermore, this dissociation also sheds some light on how these two psychological constructs differ. To examine the effects of low vs. high NCS, compare the two slopes in the control condition (the solid and dashed grey slopes in Figure 5). These two slopes do not differ from each other, $b = 24.20$, $t(49) = 1.03$, $p = .308$, $\eta_{\text{partial}}^2 = .021$. And even though there is no significant effect of NCS, $b = 24.28$, $t(49) = 1.64$, $p = .108$, $\eta_{\text{partial}}^2 = .052$, descriptively, there is a trend such that higher NFC leads to higher allocations for Malaria, the more deadly crisis. To examine the effects of making people mindful (compared with the control condition) for participants who are low in NCS, mindfulness increases the weighting of mortality information, $b = 28.39$, $t(49) = 2.07$, $p = .044$, $\eta_{\text{partial}}^2 = .081$, but there is no effect suggesting that mindfulness increases allocations for Malaria, the more deadly crisis, $b = -4.91$, $t < |1|$, *ns*.

People who score low on the need for cognition allocate about equal amounts to each crisis, thus, neglecting the crises' difference in mortality and their perception of the crises' mortality. However, by making this group of people mindful, they base their allocations on their perceptions of the crises' mortality. On the other hand, people who score high on the need for cognition allocate more money to the crisis with the higher mortality rate. In fact, their allocation indicates that they donate about 72.63% of the \$125 to the crisis with the higher mortality rate. It is interesting to note that 60% of the total number of deaths happens in the crisis with the higher mortality rate. Thus, it seems as if people who are high in the need for cognition might follow in their allocations proportionally the mortality rates—indicating a decision strategy that seems

quite sophisticated and probably superior from a normative perspective compared with basing decisions on subjective perceptions of mortality. People who score high on the need for cognition may perceive such a strategy as better, which could explain that mindfulness does not lead them to adopt a different strategy where they would weight mortality perception.

In sum, a psychological state of mindfulness increases the weighting of an attribute (especially for people who are not high in motivation for cognitive activity). In contrast, a higher level of motivation for cognitive activity has no effect on the weighting of an attribute, but it has a direct effect on the decisions people make. This is important for the present research because it suggests that making people mindful about their decisions leads them to engage in a different process other than simply thinking more about this decision—presumably mindful decision making facilitates using available information in people’s minds in a way that they think is more appropriate.

Chapter 4: Decision Evaluation – Dating Decision (Study 6)

All the studies reported up until now show that a state of mindfulness leads people to “see” their own decisions in a different light, for instance so that they consider putting more weight on one attribute and less weight on another attribute. As a result of mindful decision making, people change the weighting of information, because they bring to mind prescriptive beliefs of how decisions should be made. Study 6 examines whether mindfulness helps people to perceive initial attribute weightings. According to our theorizing about mindful decision making, we predict that it makes it easier for people to become aware and to perceive the initial attribute weightings, determine whether those weightings meet people’s subjective standards set in their prescriptive beliefs, and change the weightings so that they meet the prescriptive beliefs. Thus, this study sought to examine whether mindfulness increases people’s awareness and perception of decision processes and specifically, attribute weightings. Theoretically, this is important because this perception is the precursor to changing the attribute weightings, which we showed in all previous studies. In the previous studies, we assumed that people changed the attribute weightings because the default attribute weighting is inconsistent with their prescriptive beliefs about the attribute weighting and people correct the weighting to match the weighting that they believe the attributes should receive. However, this theoretical reasoning presumes that people perceive their initial default weighting (either as meeting or not meeting their own subjective standards).

It is problematic to directly measure people's perceptions of their initial attribute weightings for their own decisions because bringing attention and awareness to these weightings most likely changes and biases their perception so that people would think that weighting is consistent with prescriptive beliefs.¹⁹ Therefore, in this study, we ask people for their perception of other people's weightings and to subsequently evaluate the quality of these decisions.

Participants were presented with decisions that others have made and they were asked to evaluate these decisions. For a dating decision scenario, participants were expected to perceive more clearly whether a decision was influenced more by a decision maker's own liking or by friends' approval when participants were made mindful and consequently, to evaluate a decision more favorably when the decision reflects the decision maker's own liking more compared with friends' approval.²⁰

Method

Participants and stimulus materials. Undergraduate students at the University of Colorado at Boulder ($N = 108$; 41 female, 64 male, 3 participants failed to indicate their gender) participated in exchange for course credit. Participants were told that students from the Introduction to Psychology class participated in a study and that they will see how these participants responded in this study. Participants had full access to the instructions and materials that these

¹⁹ This assumption is consistent with findings such as the "bias blind spot" which shows that people are generally motivated to see themselves as free of erroneous judgment (Pronin, Lin, & Ross, 2002).

²⁰ This hypothesis is also based on the findings of Study 2 where there was clear evidence that participants' prescriptive lay beliefs indicate that dating decisions should be based on own liking as opposed to friends' approval.

other participants had, which were identical to the Dating Decision Study described earlier. Participants saw two different patterns of responses (the order was counterbalanced). One pattern indicated a participant's preference for dating the person who the decision maker's friends liked more ("Friends" pattern) and the other pattern indicated a participant's preference for dating the person who the decision maker likes more ("Liking" pattern). The two different decision patterns were operationalized by showing participants two completed questionnaires. Participants were told that two different students who participated in this study earlier in the semester completed these questionnaires.

After participants read the information and saw each participant's dating preference, they were asked a few questions about their perceptions of this other person's dating decision. As a manipulation check, they answered "How much do you think this participant's dating decision was influenced by her/his own liking of each person?" and "How much do you think this participant's dating decision was influenced by how much her/his friends like each person?" (1 = *not at all*, 6 = *very much*).

The overall perception of the quality of the decision was measured (How much do you agree with this participant's dating decision? 1 = *don't agree at all*, 6 = *strongly agree*, How would you rate the quality of this participant's dating decision? 1 = *very bad decision*, 6 = *very good decision*, How carefully do you think thought this participant about this dating decision? 1 = *not carefully at all*, 6 = *very carefully*).

In addition, they indicated an overall impression of this person (How likable do you think this participant is? 1 = *not at all likable*, 6 = *very likable*, How intelligent do you think this participant is? 1 = *Not very intelligent*, 6 = *very intelligent*, How competent do you think this participant is? 1 = *not very competent*, 6 = *very competent*, How friendly do you think this participant is? 1 = *not very friendly*, 6 = *very friendly*).

Participants answered the same set of questions for two decision patterns: one participant's preference for dating the person who the decision maker's friends liked more ("Friends" pattern) and a second participant's preference for dating the person who the decision maker likes more ("Liking" pattern)

Mindfulness. How mindful people were about their perceptions of this other participant's decision was manipulated by asking them to indicate their prescriptive beliefs before they indicated their perceptions about each decision pattern. Specifically, participants rated the importance of own liking and the importance of their friends' approval ("People's own liking of each person should strongly influence their decision with whom to go out on a date.", "How much people's friends like each person should strongly influence their decision with whom to go out on a date." 1 = *strongly disagree*; 7 = *strongly agree*). In the mindful condition (where these beliefs needed to be made salient) however, participants indicated their prescriptive beliefs right before they rated their perceptions of this person's decision. In the control condition, participants were not asked to indicate their prescriptive beliefs.

Results

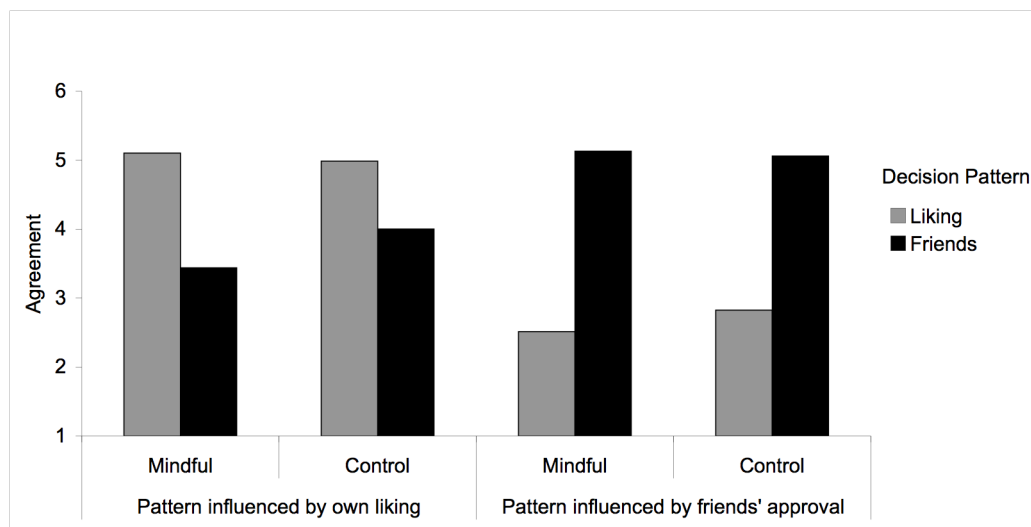
Prescriptive Beliefs. Participants beliefs were only measured in the mindful condition and the previous finding was replicated that participants think that own liking is more much more important for these decisions compared with friends' approval. A majority (92.30%) of people in the mindful condition believed that own liking is more important compared with friends' approval while the remaining portion thought that both information is equally important. A paired t-test confirmed that liking is more important ($M = 5.51, SD = 0.79$) compared with friends' approval ($M = 3.28, SD = 1.10, t(38) = 11.38, p < .001$). Prescriptive beliefs were only measured in the mindful condition and therefore, it is not possible to test whether prescriptive beliefs change as a function of mindfulness. Given all previous evidence however where in none of the studies a change in prescriptive beliefs was found (especially in Study 2 which used the same decision context and measured participants prescriptive beliefs in the same way), there is no reason to suspect that prescriptive beliefs in the mindful condition would be any different than prescriptive beliefs in the control condition.

Decision perception. A 2 (pattern: Liking, Friends) \times 2 (mindful, control) ANOVA with repeated measures on the first factor showed that people thought that the Liking pattern was more strongly influenced by own liking ($M = 5.03, SD = 0.93$) compared with the Friends pattern ($M = 3.80, SD = 1.34$), $F(1,106) = 65.04, p < .001, \eta_{partial}^2 = .380$ (Figure 7). This perception was even stronger when participants were mindful, $F(1,106) = 4.29, p = .041, \eta_{partial}^2$

=.039. In the mindful condition, participants rated the Liking pattern as more strongly influenced by own liking compared with the Friends pattern, $F(1,106) = 40.20, p < .001, \eta_{\text{partial}}^2 = .275$. The same simple effect is also significant in the control condition, $F(1,106) = 24.87, p < .001, \eta_{\text{partial}}^2 = .190$. This confirmed that participants accurately perceived these two patterns as representing one decision (“Liking” pattern) that is based more on own liking than the other decision (“Friends” pattern). However, the perception of how much the decision is based on liking is accentuated when participants are mindful, which is due to a change in the perception of the Friends pattern when people are mindful compared with the control condition, $F(1,106) = 4.58, p = .035, \eta_{\text{partial}}^2 = .041$. There are no differences in the perception of the Liking pattern when people are mindful compared with the control condition, $F < 1, ns$.

Similarly, a 2 (pattern: Liking, Friends) \times 2 (mindful, control) ANOVA with repeated measures on the first factor showed that people thought that the Friends pattern was more strongly influenced by friends’ approval ($M = 5.08, SD = 0.84$) compared with the Liking pattern ($M = 2.71, SD = 1.11$), $F(1,106) = 314.18, p < .001, \eta_{\text{partial}}^2 = .748$. The interaction between pattern and mindfulness was not significant, $F < 2, ns$.

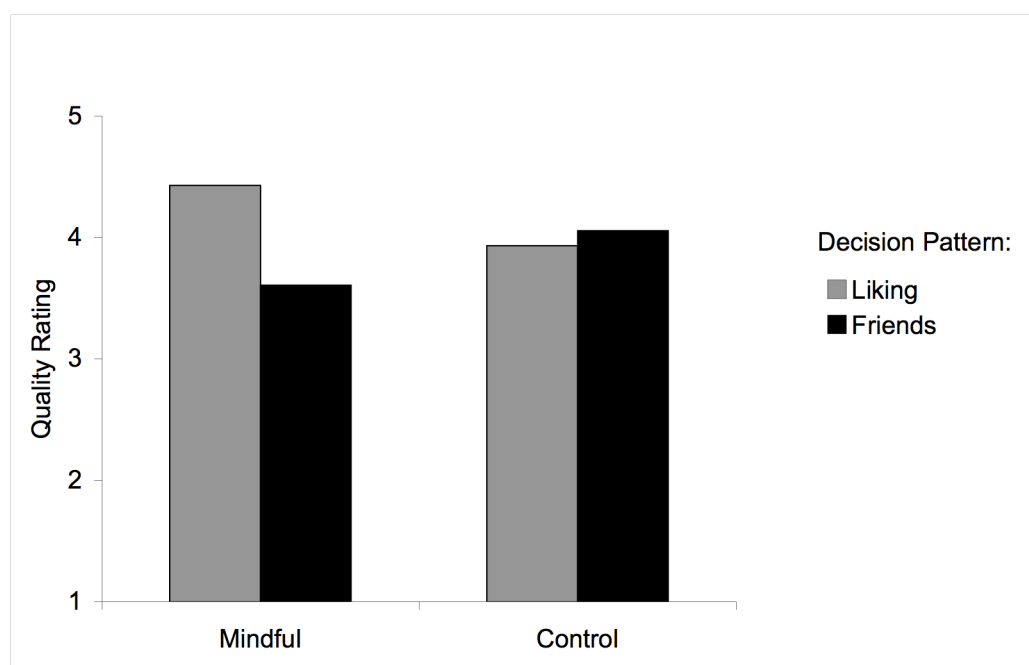
Figure 7. Participants' agreement for each decision pattern with how much they were influenced by own liking and by friends' approval as a function of whether they were evaluating the patterns mindfully. The two decision patterns were one dating decision that was influenced by own liking (Liking pattern) and another dating decision that was influenced by friends' approval (Friends pattern).



In terms of ratings of quality, we averaged *agree*, *quality*, and *careful* for each decision pattern (Liking pattern Cronbach's $\alpha = .71$, Friends pattern Cronbach's $\alpha = .76$) into an overall quality index for each decision pattern. A 2 (pattern: Liking, Friends) \times 2 (mindful, control) ANOVA with repeated measures on the first factor showed that on average people tended to rate the Liking pattern of higher quality ($M = 4.11$, $SD = 1.01$) compared with the Friends pattern ($M = 3.89$, $SD = 0.99$), $F(1,106) = 3.88$, $p = .051$, $\eta_{partial}^2 = .035$, which is a marginal significant main effect (see Figure 8). This pattern was even stronger when participants were mindful, $F(1,106) = 7.20$, $p = .008$, $\eta_{partial}^2 = .064$. Participants in the control condition did not evaluate the quality of these two patterns

differently: the quality of the Liking pattern ($M = 3.93$, $SD = 1.03$) was rated not significantly different compared with the decision maker who exhibited the Friends pattern ($M = 4.06$, $SD = 0.95$), $F < 1$, *ns*. Participants in the mindful condition rated the Liking pattern ($M = 4.43$, $SD = 0.92$) as significantly better compared with the Friends pattern ($M = 3.61$, $SD = 1.01$), $F(1,106) = 8.47$, $p = .004$, $\eta_{\text{partial}}^2 = .074$. Both patterns are evaluated differently when people were mindful compared with the control condition. The Liking pattern was evaluated more positively, $F(1,106) = 6.29$, $p = .014$, $\eta_{\text{partial}}^2 = .056$ and the Friends pattern was evaluated more negatively, $F(1,106) = 5.29$, $p = .023$, $\eta_{\text{partial}}^2 = .048$.

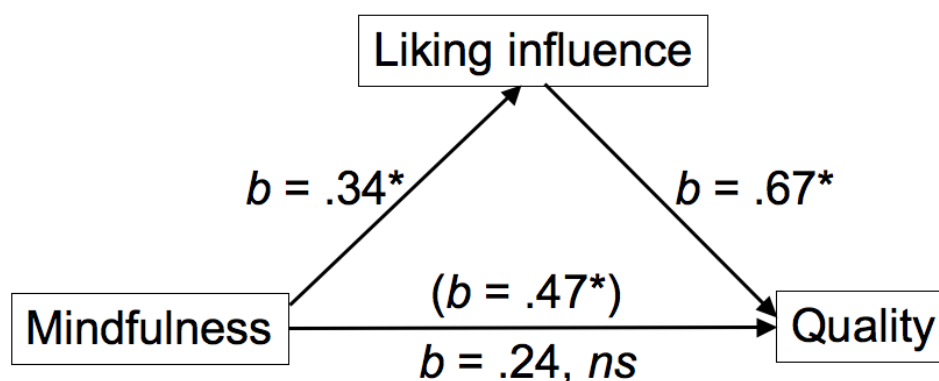
Figure 8. Quality rating of the decision as a function of whether participants rated the dating decision that was influenced by own liking (Liking pattern) or by friends' approval (Friends pattern) and as function of mindful and control condition.



To examine whether participants' agreement with how much the decision pattern is influenced by own liking is a mediator for the difference in quality rating when participants were mindful, we examined a mediational analysis (Baron & Kenny, 1986; Judd & Kenny, 1981). First, we examined whether mindfulness predicts a difference in quality ratings (subtracting quality ratings for the friends pattern from quality ratings from the liking pattern). Essentially, this replicates the repeated measures ANOVA reported in the previous paragraph. The intercept in this analysis corresponds to the main effect of pattern, $b = 0.35$, $t(106) = 1.97$, $p = .051$, $\eta_{\text{partial}}^2 = .035$, and mindful (1 = mindful, -1 = control) as a predictor corresponds to the interaction of mindfulness \times decision pattern, $b = 0.47$, $t(106) = 2.86$, $p = .008$, $\eta_{\text{partial}}^2 = .064$.

Second, we examined whether mindfulness predicts the mediator, agreement with how much the decision pattern is influenced by own liking, $b = 0.34$, $t(106) = 2.07$, $p = .041$, $\eta_{\text{partial}}^2 = .039$. Third, we examined whether the mediator affects quality ratings in a multiple regression where quality ratings are regressed on mindful and agreement with how much the decision pattern is influenced by own liking. The mediator predicts quality ratings, controlling for mindfulness, $b = 0.67$, $t(106) = 8.24$, $p < .001$, $\eta_{\text{partial}}^2 = .392$. In the very same multiple regression, the effect of mindfulness on quality ratings, controlling for the mediator, is no longer significantly different from zero, $b = 0.24$, $t(106) = 1.73$, $p = .086$, $\eta_{\text{partial}}^2 = .028$. A Sobel confirmed this to be a full mediation, $t(106) = 2.02$, $se = 0.11$, $p = .044$.

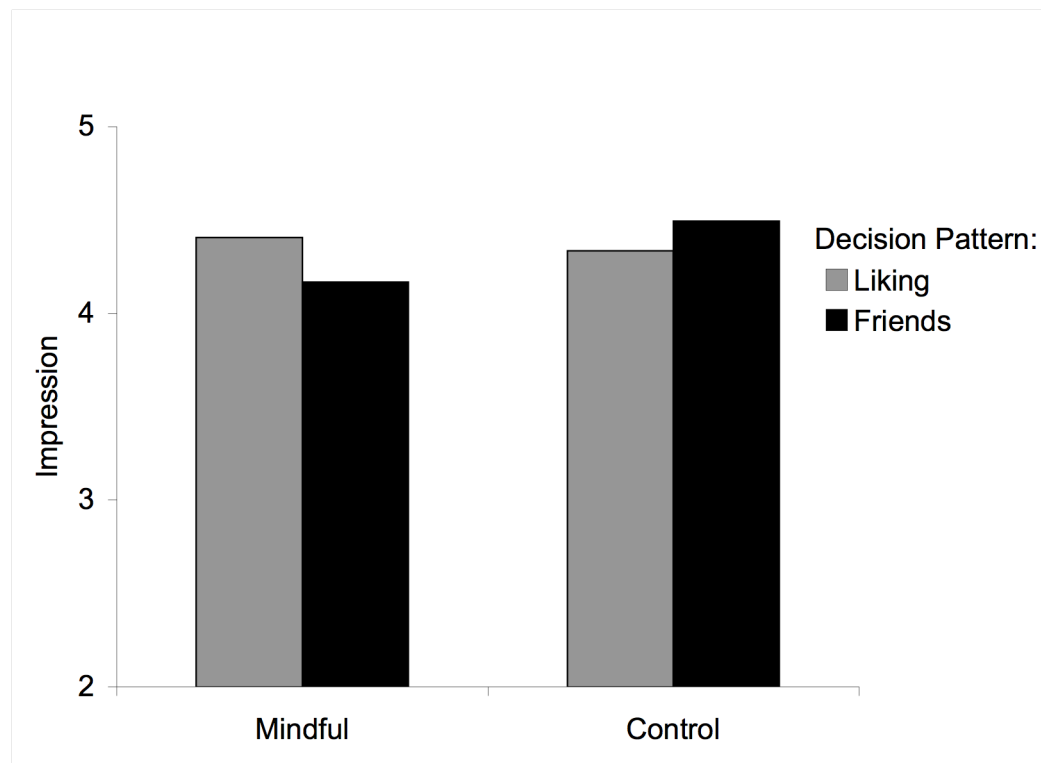
Figure 9. Mediation analysis where Mindful = 1 and Control = -1, agreement with how much the decision pattern is influenced by own liking for the Liking pattern – agreement with how much the decision pattern is influenced by own liking for the Friends pattern, and quality of the Liking pattern – quality of the Friends pattern (note that * refers to significant coefficients).



Finally, for impression ratings, we averaged *likable*, *intelligent*, *competent*, and *friendly* for each pattern (Liking pattern Cronbach's $\alpha = .77$, Friends pattern Cronbach's $\alpha = .84$) into an overall impression index for each pattern. A 2 (pattern: liking, friends) \times 2 (mindful, control) ANOVA with repeated measures on the first factor showed that participants impressions of the patterns depended on whether they were mindful, $F(1,106) = 5.65, p = .019, \eta_{\text{partial}}^2 = .051$ (Figure 10, none of the main effects was significant, $F < 1.6, ns$). This suggests that only when participants were mindful, their impressions of the decision maker who exhibited the Liking pattern were marginally more favorable ($M = 4.41, SD = 0.70$) compared with the decision maker who exhibited the Friends pattern ($M = 4.17, SD = 0.72, F(1,106) = 3.19, p = .077, \eta_{\text{partial}}^2 = .029$).

Participants in the control condition showed a non-significant trend in the opposite direction, $F(1,106) = 2.50, p = .117, \eta_{\text{partial}}^2 = .023$. While the impression of the person exhibiting the Liking pattern did not change comparing the mindful with the control condition, $F < 1, ns$, the impression of the person exhibiting the Friends pattern was significantly less favorably when participants were mindful compared with the control condition, $F(1,106) = 6.00, p = .016, \eta_{\text{partial}}^2 = .054$.

Figure 10. Impression rating of the decision maker as a function of whether participants rated the dating decision that was influenced by own liking (Liking pattern) or by friends' approval (Friends pattern) and as function of mindful and control condition.



Discussion

This study showed that while participants have a clear idea about how other people should make decisions in the context of dating decision, by default, they are not evaluating decisions according to these prescriptive beliefs. Participants in the mindful condition (compared with the control condition) perceive more clearly that one dating decision reflects a stronger influence of own liking (as opposed to what one's friends think) and that another dating decision reflects a stronger influence of what one's friends think (as opposed to own liking). The mediation analysis suggests that this difference in how people perceive the decision patterns leads to evaluating the two patterns differently: a dating decision that reflects a stronger influence of what one's friends think is evaluated less favorably compared with a dating decision that reflects a stronger influence of own liking. This finding strongly suggests that mindful decision making makes people aware of the weighting of the decision attributes and that people's perception of these weightings is related to evaluations of the quality of a decision. This study shows that people can perceive the attribute weightings and that this influences their quality judgments of decisions made by others, and we believe that this difference in quality ratings is one of the reasons why people change the attribute weightings for their own decision.

This finding is consistent with the theoretical reasoning that people have prescriptive beliefs about attribute weightings, but that they are initially not aware of these attributes and how much weight they receive by default. Inducing

mindful processing makes people aware of these attributes and their respective weighting.

Chapter 5: General Discussion

Overall Summary

Judgments and decisions could often easily be changed and improved if people would change the weighting of attributes. The research presented in this dissertation proposed and examined mindfulness as a psychological state, where people become aware of decision attributes and how much they weight these decision attributes. Awareness of these attribute weightings brings to mind how these attributes should be weighted (prescriptive beliefs), which leads people to change the attribute weightings to match their prescriptive beliefs. Across four different decision contexts, we presented evidence that mindfulness changes the weighting of decision attributes and the outcome of decisions.

In Chapter 2, we described two studies that provide initial evidence that mindfulness changes decision making by changing the weighting of decision attributes. In Study 1, mindfulness increased the weighting of objective information about the deadliness of a humanitarian crisis when people decided how much money to allocate to mitigate suffering in this crisis. Study 2 showed that mindfulness changed the outcome of a dating decision such that the decision—and the weightings that it indicated—was more consistent with people’s prescriptive beliefs (that is, people relied more on their own liking of someone as opposed to what friends think of someone).

In Chapter 3, we presented findings from three studies that addressed alternative explanations and provided some evidence for the underlying process. Study 3 presented evidence that mindfulness limited the impact of group

influence on attitudes when people were asked to evaluate a policy proposal. This study also presents tentative evidence (although statistically this is not significant) that mindfulness changes the weighting of attributes that are not even explicitly mentioned and pointed out to participants. In Study 4, we showed that mindfulness can be induced by leading people to think about prescriptive beliefs in a different context. This suggests that once a state of mindfulness is induced—even if this is done in a different decision context—people process mindfully in the current decision context. It remains an open question to see whether this is still true if beliefs are activated in a context where the decision attributes are different or where the content of the beliefs is different from the prescriptive beliefs in the current decision context. Study 4 presented also evidence for the causality of the content of people's prescriptive beliefs on the direction in which they change the weighting of the decision attributes (Study 4).

Study 5 addressed the issue of differentiating between mindfulness and analytic processing by examining the effects of individual differences regarding people's motivation and chronic engagement in reasoning and cognition. We addressed this issue by measuring individual differences on Need for Cognition (NCS), which is a scale that measures how much people are motivated to engage in effortful processing (Cacioppo et al., 1996). We found a dissociation between NCS and mindfulness such that mindfulness increased the weighting of mortality (compared with a control condition) for people who scored low on NCS, but that people who scored higher on NCS allocated more money to the crisis with the higher mortality rate (which did not depend on their perception of the crises'

mortality). In other words, while mindfulness changed the weighting of mortality perceptions for allocation decisions, higher NCS led to higher allocations to the crisis with the higher mortality rate. We argue that if mindfulness and high NCS were in fact the same psychological construct, we would have observed similar effects on the allocations and the weighting of mortality.

Chapter 4 reported the findings of a study on people's perceptions and evaluations of other people's decisions and attribute weightings (Study 6). Here, we found that mindfulness led to a clearer perception of the attribute weightings, which led to differences in evaluations of these decisions. Thus, this study provided evidence for the fact that mindfulness facilitates awareness of the attribute weightings and that people judge the quality of a decision based on the attribute weightings.

Complementing the findings from the previous chapters, this study added another piece of evidence for the process by which mindfulness operates. Two important aspects are worth to be highlighted. One speaks to our hypothesis that mindfulness makes people more aware of the influence of decision attributes. In this study, we showed that people perceived more clearly how much influence decision attributes have when people were mindful. The other, related aspect is that mindfulness can improve decision making based on subjective standards. People evaluated decisions more favorably when they were consistent with their own prescriptive beliefs. From the previous chapters and especially from Study 2, we know that mindfulness changed the weighting to be more consistent with

prescriptive beliefs. Taken together, this leads us to conclude that mindfulness improves the subjective quality of decisions.

Implications

In this section, we briefly highlight implications that this research has for other areas. Specifically, we discuss how introspection on prescriptive beliefs relates to previous notions of introspection. We also present a short section on practical implications of this work.

Introspection. Introspection has a bad reputation in social psychology. This is mostly based on research done by Wilson and colleagues, whose work showed that introspecting and analyzing reasons can lead to negative consequences, such as decrease satisfaction with their choices (Wilson et al., 1989; Wilson et al., 1993; Wilson & Schooler, 1991). The research presented in this dissertation however shows that introspecting on prescriptive beliefs can improve decision making based on subjective standards. The critical difference is that introspecting on why people prefer some consumer goods over others leads people to generate reasons, which can contradict their initial evaluative response to these goods. In other words, if people are asked to introspect on thoughts that they cannot know, they bring reasons to mind which may have little to do with their own preference, but which may even contradict their preference. This is in contrast with the work presented here. The beliefs that people are led to introspect are very easy to generate—in fact, these beliefs are so “obvious” to people that it seems trivial to even ask people to indicate them. Mindful decision

making might not be helpful for people and it might not improve decision making if people would not have these obvious prescriptive beliefs. Thus, we conclude that introspection as a psychological construct deserves to be examined from different perspectives without the preconceived notion that it can only be detrimental for people's judgments and decisions.

Normative decision making. An important question in judgment and decision making research and its applications is how we can guide or “nudge” people to make better decisions (Thaler & Sunstein, 2008). These kinds of questions presume that we can make informed judgments about the objective quality of decisions. Can we conclude anything regarding the objective quality of people's decisions based on the empirical and theoretical contribution of the present research? For the studies presented here, it seems not obvious how to evaluate the objective quality of the decision and the weighting process. This is not surprising given the fact that we were primarily interested in subjective notions of decision quality. Perhaps the only paradigm in this set of studies that speaks to this question is the humanitarian aid allocation paradigm. The lack of sensitivity for mortality rates and scope neglect more generally is considered to be problematic as implied by the assumption that if people were processing more carefully, they might not exhibit this problematic aspect of judgment and decision making (e.g. Hsee & Rottenstreich, 2004; Small et al., 2007). Our finding that mindfulness increases the sensitivity for mortality information (subjectively perceived) can be interpreted as a tentative finding where mindfulness might increase objective decision quality.

Based on our theoretical reasoning however, it is entirely possible that mindfulness has the potential both to increase and to decrease objective decision quality. For instance, if people's prescriptive beliefs are contrary to objective and normative rules for making good decisions, it seems possible that making people aware of attributes, that—from a normative perspective—people should not be aware of and that they should not take into account, might decrease decision quality. It is important to stress that fact that our theoretical reasoning does not imply better decisions from a normative perspective, but it might still be a fruitful endeavor to investigate when mindful decision making could improve objective decision quality. Such knowledge would certainly contribute a great deal to the practical implications of mindfulness as an intervention.

Practical implication. Inducing mindfulness for judgment and decision making could be useful and relatively easy to implement for practical applications. For example, if an organization has an interest in limiting group influence on policy evaluations or if charitable giving organizations have an interest in “nudging” people (Thaler & Sunstein, 2008) into making allocations that are strongly influenced by objective information about the mortality of humanitarian crises, these organizations could provide a simple reminder that encourages mindful decision making.

Such an intervention certainly requires that people have relatively homogeneous prescriptive beliefs, but that organizations also have knowledge about those beliefs. The studies in the present research were designed such that a majority of the participants held the type of prescriptive belief that resonates with

our idea for good decision making, but also with normative claims in the literature about problematic aspects of decision making. Mindful decision making might not be suitable for decision contexts where people do not have stable and relatively strong beliefs about how they should weight decision attributes. It might also not be suitable for decision contexts where organizations would not view people's prescriptive beliefs as being in people's or in society's best interest.

Remaining questions for future research

In several sections of this dissertation, we reported analyses examining the effects of prescriptive beliefs either directly on the decision or by moderating any effects of mindfulness (e.g. on attribute weighting). We find a direct effect of beliefs in the Humanitarian Aid Allocation Study (Study 1), in the Dating Decision Study (Study 2), and in the Global Warming Policy Agreement Study (Study 3). People who believe that mortality information is very important for aid allocations allocate more money to the more deadly crisis (Study 1). People who believe that friends' opinions are very important for their dating decisions prefer to date someone that their friends are very fond of (Study 2). Finally, people who believe that a policy's content is very important for their own position agree more with a feasible policy to address global warming (Study 3). For the Movie Preference Study (Study 4), we do not find evidence for a direct effect of beliefs. There is no reason to expect that beliefs about the importance of own liking and film critic information should be *directly* related to people's

preference for watching any of the previews or the preview as a set. As we pointed out when we discussed the Global Warming Policy Agreement Study (Study 3), this is the only paradigm where we find evidence for an interaction between mindfulness and prescriptive beliefs. One possible explanation might be that in this paradigm, prescriptive beliefs might not as available as they might be in other paradigms and therefore, making them salient through a mindfulness intervention may increase their direct effect on decisions.

In two studies, we find tentative evidence that the effect of mindfulness on changing the attribute weighting depends on the direction and strength of people's prescriptive beliefs. We find marginal statistical support for this in the Global Warming Policy Agreement Study where prescriptive beliefs moderate the effect of mindfulness on the relationship between global warming and policy support. In the Movie Preference Study, we also find support for such a pattern where prescriptive beliefs moderate the effect of mindfulness on the relationship between preview reactions and movie preference. At the same time, these patterns are absent in the Humanitarian Aid Allocation and in the Dating Decision Study. We mentioned that the lack of such patterns in the Humanitarian Aid Allocation and in the Dating Decision Study could be due to a lack of variation in people's prescriptive beliefs, which is a result of the how we intended to design these paradigms, namely that people should mostly endorse one specific type of prescriptive belief. Based on our theoretical reasoning, the strength and especially the direction of people's beliefs should play a role in how and how much people change the attribute weightings. Thus, we believe that the

lack of these patterns in the first two studies is a consequence of low statistical power (due to the variance and the methodology, which was not primarily intended to test for these effects). There are certainly better ways to test for these patterns in future research. One would be to develop a paradigm where people's prescriptive beliefs are polarized, which would maximize statistical power to find effects where prescriptive beliefs influence the changes in attribute weightings due to mindfulness differently—depending on the content of these beliefs.

Another important question that we mentioned throughout this dissertation is how awareness of attributes and thinking of prescriptive beliefs would result in changing the weighting of the attributes. We think that people are able to perceive their default weightings more accurately and that this allows them to assess more accurately whether they are meeting their own standards, set by their prescriptive beliefs. We believe that people have a strong interest in reaching consistency between their actual weightings of the attributes and their prescriptive beliefs about how they should weight the attributes because consistency is an important self concept (Bem, 1967; Tedeschi, Schlenker, & Bonoma, 1971). But what is the important psychological mechanism behind “mindfulness” that increases people's awareness of the decision attributes and their weighting in the decision process and what leads to changing the decision attributes?

One possibility is that this kind of introspective thinking acts as a signal that indicates to people that they are not meeting their own standards (Monteith,

Voils, & Ashburn-Nardo, 2001) and thus, suggests to people that their actual weightings are dissimilar from their prescriptive weightings (Mussweiler, 2003). Thus, it could be the case that people, as soon as they notice that they engage in introspective thinking about prescriptive beliefs, interpret this as a signal that their judgment might be problematic.

This also brings up a critical next step in the theoretical and empirical development of this work by raising the following question. What are the circumstances, decision contexts, or perhaps individual differences that lead people to become mindful of their decision attribute weightings by introspecting on their prescriptive beliefs? In the studies presented here, we experimentally induce mindfulness by asking people directly about their prescriptive beliefs. The next question however needs to examine under which circumstances people engage in more or less mindful processing because these circumstances can potentially tell us more about the nature of this processing state.

A related question concerns examining other ways or situations that lead to a state of mindfulness. The mindfulness inductions in the present studies required people to indicate their prescriptive beliefs (because we were interested in measuring these beliefs). It seems certainly plausible however that pointing out the attributes might be sufficient for engaging in thinking about the prescriptive weighting of these attributes. Again, drawing the parallel to inattentional blindness, once someone pointed the Gorilla out to participants, it is impossible to ignore it in the future. Similarly, once the decision attributes are

pointed out to people, it might be impossible to not think about the weighting of these.

Other situational factors that lead to mindful decision making may include circumstances where people introspect on their thought and decision processes. Notice again that this is not identical with effortful, analytical, or systematic processing where people tend to think more about the decision objects and information about the decision. In contrast, this kind of introspection that may lead people into a state of mindfulness requires people to become aware of their own mental processes and to perceive how much they attend to certain types of information. Thus, one could imagine that when people reflect and introspect more on their thought processes, they become mindful of how much they attend to certain types of information. This kind of reasoning suggests to include individual difference scales on self-reflection in decision making paradigms such as the ones we examined here. Further, it might be interesting to experimentally direct people's focus of attention either to the decision objects and decision information or to people's thought processes. For example, we would predict that directing people's attention to the decision objects and information about them will not change people's weighting of the decision attributes to match their prescriptive beliefs as when they were made mindful. In contrast, if people's attention or mental focus is directed "inwards," that is, to their thought decision processes, we predict that they will be mindful of the decision attributes and change their weighting to match their prescriptive beliefs about the weighting.

Closing Remarks

Giving people a tool that allows them to make better judgments and decisions according to their own standards is an important benefit that this research offers. To be sure, we do not claim that mindful decision making will lead to better decisions based on normative standards, nor do we claim that it will generally lead to better decisions than heuristic or analytic decision making. Our claim and the evidence that we presented is that mindfulness improves the subjective quality of judgments and decisions by bringing people's decisions in line with how people think they should to make decisions.

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Appendix 1

To examine whether the strength of participants' prescriptive beliefs about how much mortality perception and how much emotional reactions should influence allocation decisions, the following regressions were conducted. The analyses are theoretically organized in two separate multiple regressions to examine whether beliefs about mortality perception moderate the weighting of mortality perception as a function of mindfulness (Table 2). A second analysis examined whether beliefs about emotional reaction moderate the weighting of emotional reaction as a function of mindfulness (Table 3). As before, the dependent measure was a difference score, subtracting allocations to Tuberculosis (the less deadly crisis) from allocations to Malaria (the more deadly crisis). Just as reported above, this analysis revealed a significant effect of perceived mortality, emotional reactions, and the interaction of mindful x perceived mortality (Table 2 & 3). In addition, this analysis revealed that beliefs about mortality information predicted allocations, such that stronger beliefs about using mortality perception lead to higher allocations to the more deadly crisis (Table 2 & 3). Beliefs about emotional reactions did not significantly predict allocations, $t < |1.5|$, *ns*. Neither beliefs about mortality perception nor about emotional reactions interacted with any of the other predictors, all $t_s < |1|$, *ns*.

Table 2. Predictors and findings for the multiple regression examining the impact of prescriptive beliefs about how much mortality perception should influence allocation decisions (Mind = 1 if mindful & -1 if control; Mort = mortality perception, mean centered; Emot = emotional reactions, mean centered; BeliefMort = prescriptive beliefs about mortality perception, mean centered; BeliefEmot = prescriptive beliefs about emotional reaction, mean centered).

| | b | se | t(58) | p-value | $\eta_{partial}^2$ |
|--------------------------|-------|------|-------|---------|--------------------|
| Intercept | 19.62 | 4.21 | 4.67 | < .001 | 0.273 |
| Mind | 2.15 | 4.29 | 0.50 | .618 | 0.004 |
| Mort | 12.88 | 4.30 | 3.00 | .004 | 0.134 |
| Emot | 12.16 | 2.37 | 5.14 | < .001 | 0.313 |
| BeliefMort | 8.65 | 3.89 | 2.22 | .030 | 0.078 |
| BeliefEmot | -3.29 | 2.57 | -1.28 | .206 | 0.027 |
| Mind * Mort | 8.09 | 4.33 | 1.87 | .067 | 0.057 |
| Mort * BeliefMort | -1.01 | 4.17 | -0.24 | .810 | 0.001 |
| Mind * BeliefMort | 0.93 | 3.90 | 0.24 | .813 | 0.001 |
| Mind * Mort * BeliefMort | -2.37 | 4.17 | -0.57 | .572 | 0.006 |

Table 3. Predictors and findings for the multiple regression examining the impact of prescriptive beliefs about how much emotional reactions should influence allocation decisions (Mind = 1 if mindful & -1 if control; Mort = mortality perception, mean centered; Emot = emotional reactions, mean centered; BeliefMort = prescriptive beliefs about mortality perception, mean centered; BeliefEmot = prescriptive beliefs about emotional reaction, mean centered).

| | b | se | t(58) | p-value | $\eta_{partial}^2$ |
|--------------------------|-------|------|-------|---------|--------------------|
| Intercept | 17.56 | 4.35 | 4.04 | < .001 | 0.219 |
| Mind | 1.39 | 4.36 | 0.32 | .751 | 0.002 |
| Mort | 12.12 | 4.27 | 2.84 | .006 | 0.122 |
| Emot | 11.02 | 2.49 | 4.43 | < .001 | 0.253 |
| BeliefMort | 10.01 | 3.55 | 2.82 | .007 | 0.121 |
| BeliefEmot | -3.93 | 2.69 | -1.46 | .150 | 0.035 |
| Mind * Emot | -2.65 | 2.54 | -1.04 | .301 | 0.018 |
| Emot * BeliefEmot | -1.31 | 1.73 | -0.76 | .452 | 0.010 |
| Mind * BeliefEmot | 2.48 | 2.65 | 0.93 | .354 | 0.015 |
| Mind * Emot * BeliefEmot | -1.74 | 1.77 | -0.98 | .330 | 0.016 |

Appendix 2

Two versions of the dating descriptions, administered between-subjects. The bolded sentences contain the manipulation of personal liking and friends' approval. The font was not printed in bold for participants.

Version 1:

[Person A: friends' approval: high; personal liking: moderate

Person B: friends' approval: low; personal liking: high]

Person A is a junior pre-law student and you have been friends with him/her for a few months. He/she is friendly and very outgoing and your family thinks highly of this person. He/she is in the process of applying to law schools and hopes to continue his/her education at a well-renowned law school to be able to pursue his/her goal of making partner at a prestigious law firm. **All of your friends really like this person and they immediately became extremely fond of this person. You also like hanging out with him/her and you look forward to seeing him/her again.**

Person B has been a friend of yours for a few months. He/she is a junior majoring in business with a minor in computer science and after graduation he/she will probably work at a big corporation few years. His/her plans are to eventually start a business that is based on his/her interest in developing web-based applications. **When your friends met this person, a lot of them did not really warm up to him/her. You enjoy hanging out with this person a lot and every time you are not spending time with him/her, you catch yourself thinking about him/her.**

Version 2:

[Person A: friends' approval: low; personal liking: high

Person B: friends' approval: high; personal liking: moderate]

Person A is a junior pre-law student and you have been friends with him/her for a few months. He/she is friendly and very outgoing and your family thinks highly of this person. He/she is in the process of applying to law schools and hopes to continue his/her education at a well-renowned law school to be able to pursue his/her goal of making partner at a prestigious law firm. **When your friends met this person, a lot of them did not really warm up to him/her. You enjoy hanging out with this person a lot and every time you are not spending time with him/her, you catch yourself thinking about him/her.**

Person B has been a friend of yours for a few months. He/she is a junior majoring in business with a minor in computer science and after graduation he/she will probably work at a big corporation few years. His/her plans are to eventually start a business that is based on his/her interest in developing web-based applications. **All of your friends really like this person and they immediately became extremely fond of this person. You also like hanging out with him/her and you look forward to seeing him/her again.**

Appendix 3

Dating decisions were regressed on mindful (+1 if mindful, -1 if control), beliefs that own liking should influence dating decisions, beliefs about how much one's friends approve of someone, the interaction of mindful by beliefs about own liking, and the interaction of mindful by beliefs about friends' approval. This analysis revealed, on average, a significant effect of mindful, $b = 0.49$, $t(47) = 2.30$, $p = .026$, $\eta_{\text{partial}}^2 = .101$. In addition, beliefs about friends' approval predicted participants' dating preferences, $b = -0.51$, $t(47) = -2.36$, $p = .023$, $\eta_{\text{partial}}^2 = .106$. Neither of the two interactions was significant: mindful \times friends' approval, $b = -0.28$, $t(47) = -1.31$, $p = .197$, $\eta_{\text{partial}}^2 = .035$, and mindful \times own liking, $b = -0.21$, $t < |1|$.

Appendix 4

The following shows the global warming policy used in Study 3. Note that there were three conditions. In one condition, 65% of the Republicans and 30% of the Democrats supported the proposal (Majority information: Republican). In a second condition, 65% of the Democrats and 30% of the Republicans supported the proposal (Majority information: Democrats). In a third condition, the two sentences at the beginning and at the end containing the majority information were omitted.

Various policies have been proposed to address global warming, here is one that is currently discussed. We would like to get your opinion on it to see how much the general public would support such a policy. Currently, 65% of the Republicans [Democrats] and 30% of the Democrats [Republicans] in the House of Representatives agreed with this proposal and were willing to pass it.

A private group has proposed a cap-and-trade program to combat global warming. The proposal draws on the power of the marketplace to reduce emissions in a cost-effective and flexible manner. Under the program, an overall cap on carbon emissions is established. The emissions allowed under the cap are divided up into individual allowances that represent the permission to emit that amount. Because the emissions cap restricts the amount of pollution allowed, allowances that give a company the ability to pollute take on financial value. Companies are free to buy and sell allowances in order to continue operating in the most profitable manner available to them. Those that are able to reduce pollution at a low cost can sell their extra allowances to companies facing high costs. Each year the number of allowances will decline to match the required annual reduction targets. In addition to this, companies will be pushed to gradually shift their source of energy, in all areas possible, to renewable energy. By shifting to renewable energy the use of fossil fuels will drastically decrease and therefore reduce the toxic fumes flowing into the atmosphere.

When polled, 65% of the Republicans [Democrats] and 30% of the Democrats [Republicans] in the House of Representatives agreed with this proposal and were willing to pass it.

Appendix 5

Global Warming Scale:

For each of the following statements, participants were asked to check whether they *strongly disagree*, *disagree*, *neither agree nor disagree*, *agree*, or *strongly agree*. These five response options were shown using five different columns to the right of the questions. Participants then made a check mark in one of the five cells.

1. Global warming is already a serious problem
2. There is a mix of opinion among scientists about whether global warming is a real problem
3. Global warming is not very important to me personally
4. Global warming is currently impacting my quality of life
5. Until we are sure that global warming is really a problem we should not take any steps that would have economic costs
6. Global warming is a serious and pressing problem. We should take steps to combat global warming, even if they involve significant costs
7. I would donate money to an organization if I believe it had an effective program for combating global warming
8. Concern about global warming has influenced my use of energy (for example, turning off lights when I leave a room)
9. Global warming will be a serious problem for future generations
10. Global will cause problems for my children or grandchildren down the line
11. Global warming is a more serious problem than global poverty
12. Global warming is a more serious problem than HIV/AIDS
13. Hearing about global warming makes me feel frustrated
14. Hearing about global warming makes me feel angry
15. Hearing about global warming makes me worry
16. Hearing about global warming makes me feel fear

Appendix 6

Finally, a regression with the following predictors was performed (see Table 6). As in the analysis reported above, there were effects of political affiliation, majority information, and the 3-way interaction between mindful, majority information, and political affiliation. In addition, this analysis also revealed an effect of prescriptive beliefs such that the more participants believed that content is more important than political party information, the more they agreed with the policy, $b = 0.09$, $t(178) = 2.44$, $p = .016$, $\eta_{\text{partial}}^2 = .032$. This finding is probably due to the fact that the policy (i) was quite reasonable and (ii) that not agreeing with the policy meant not addressing the problem of global warming. Thus, if participants believe that the content of the policy is more important, they came to realize that this is a good policy based on its content (and the lack of alternatives), which resulted in more agreement with it. In addition, this effect of beliefs was stronger in the mindful condition, $b = 0.08$, $t(178) = 2.20$, $p = .029$, $\eta_{\text{partial}}^2 = .027$. Further analyses examining whether beliefs moderate the 3-way interaction revealed no significant findings, $t < 1$, *ns*.

Table 6. Predictors and findings for the multiple regression examining the impact of group influence on policy agreement (PA = political affiliation, Mind = 1 if mindful & -1 if control, Beliefs = Prescriptive beliefs about the importance of a policy's content – prescriptive beliefs about the importance of political party supporting the policy).

| | b | se | t(178) | p-value | η_{partial}^2 |
|---------------------------|-------|------|--------|---------|---------------------------|
| Intercept | 4.67 | 0.14 | 33.07 | < .001 | 0.860 |
| DemRep | -0.22 | 0.10 | -2.15 | .033 | 0.025 |
| PolControl | 0.02 | 0.06 | 0.38 | .708 | 0.001 |
| PA | -0.18 | 0.06 | -2.85 | .005 | 0.044 |
| Mind | -0.15 | 0.14 | -1.03 | .305 | 0.006 |
| Beliefs | 0.09 | 0.04 | 2.44 | .016 | 0.032 |
| Mind * PA | -0.06 | 0.06 | -1.03 | .305 | 0.006 |
| Mind * DemRep | 0.05 | 0.10 | 0.49 | .624 | 0.001 |
| DemRep * PA | 0.09 | 0.08 | 1.15 | .254 | 0.007 |
| Mind * Beliefs | 0.08 | 0.04 | 2.20 | .029 | 0.027 |
| Mind * DemRep * PA | -0.18 | 0.08 | -2.28 | .024 | 0.028 |

Appendix 7

Finally, a regression was performed to examine the effects of prescriptive beliefs on policy evaluations (see Table 8). The stronger participants believe that a policy's content is more important than political party information, the more they agree with the policy, $b = .09$, $t(178) = 2.50$, $p = .013$, $\eta_{\text{partial}}^2 = .034$, and this was even more the case when participants were reminded of their prescriptive beliefs, $b = .07$, $t(178) = 2.02$, $p = .045$, $\eta_{\text{partial}}^2 = .022$. There was even evidence for a statically marginal 3-way interaction such that the stronger relationship between global warming attitudes and policy attitudes when participants were mindful tends to be even more true the stronger participants' beliefs are that a policy's content is more important than political party information, $b = .11$, $t(178) = 1.82$, $p = .071$, $\eta_{\text{partial}}^2 = .018$.

Table 8. Predictors and findings for two multiple regressions examining the impact of policy's content on policy agreement (PA = political affiliation, Mind = 1 if mindful & -1 if control, Beliefs = Prescriptive beliefs about the importance of a policy's content – prescriptive beliefs about the importance of political party supporting the policy).

| | b | se | t(178) | p-value | η_{partial}^2 |
|-----------------------|-------|------|--------|---------|---------------------------|
| Intercept | 4.68 | 0.14 | 34.30 | <.001 | 0.869 |
| Mind | -0.11 | 0.14 | -0.80 | .425 | 0.004 |
| DemRep | -0.25 | 0.10 | -2.45 | .015 | 0.032 |
| PolControl | 0.002 | 0.06 | 0.03 | .979 | 0.000 |
| PA | -0.03 | 0.07 | -0.42 | .672 | 0.001 |
| Beliefs | 0.09 | 0.04 | 2.50 | .013 | 0.034 |
| GW | 0.62 | 0.16 | 3.97 | <.001 | 0.081 |
| Mind * GW | 0.22 | 0.14 | 1.61 | .110 | 0.014 |
| Mind * Beliefs | 0.07 | 0.04 | 2.02 | .045 | 0.022 |

| | b | se | t(176) | p-value | η_{partial}^2 |
|----------------------------|--------|------|--------|---------|---------------------------|
| Intercept | 4.66 | 0.14 | 34.35 | <.001 | 0.870 |
| Mind | -0.09 | 0.14 | -0.69 | .493 | 0.003 |
| DemRep | -0.26 | 0.10 | -2.57 | .011 | 0.036 |
| PolControl | -0.003 | 0.06 | -0.05 | .958 | 0.000 |
| PA | 0.002 | 0.07 | 0.03 | .973 | 0.000 |
| Beliefs | 0.11 | 0.04 | 2.96 | .004 | 0.047 |
| GW | 1.02 | 0.22 | 4.59 | .001 | 0.107 |
| Beliefs * GW | -0.14 | 0.06 | -2.28 | .024 | 0.029 |
| Mind * GW | -0.06 | 0.20 | -0.32 | .749 | 0.001 |
| Mind * Beliefs | 0.06 | 0.04 | 1.64 | .103 | 0.015 |
| Mind * Beliefs * GW | 0.11 | 0.06 | 1.82 | .071 | 0.018 |

Appendix 8

Below are additional multilevel analyses regressing Post Watch ratings on various predictors (see Table 14 for contrast codes, BeliefsDiff = Prescriptive belief that liking is more important — Prescriptive belief that film critic information is more important, Reactions to the previews were not mean deviated). These results need to be treated with caution since convergence was not achieved. The first set of analyses examines participants' reactions to the preview. The second set of analyses examines Film Critic information (Silk = 8%, Scissors = 20%, Steam = 66%, Rachel = 86%).

| | Estimate | se | t | p-value |
|--|----------|------|-------|---------|
| Intercept | 2.77 | 0.68 | 4.07 | < .001 |
| Control Vs. Mind | -0.37 | 0.53 | -0.69 | 0.492 |
| Mind: same Vs. diff. | 0.13 | 0.17 | 0.76 | 0.457 |
| React | 0.36 | 0.11 | 3.28 | 0.001 |
| BeliefsDiff | -1.07 | 0.37 | -2.90 | 0.004 |
| Control Vs. Mind * React | 0.10 | 0.09 | 1.13 | 0.258 |
| Control Vs. Mind * BeliefsDiff | 0.51 | 0.29 | 1.79 | 0.075 |
| React * BeliefsDiff | 0.19 | 0.06 | 3.38 | 0.001 |
| Control Vs. Mind * React * BeliefsDiff | -0.10 | 0.05 | -2.29 | 0.023 |

| | Estimate | se | t | p-value |
|--|----------|------|-------|---------|
| Intercept | 2.71 | 0.73 | 3.71 | < .001 |
| Control Vs. Mind: same | 0.33 | 0.81 | 0.41 | 0.681 |
| Control Mind: same Vs. Mind: diff. | -0.08 | 0.09 | -0.83 | 0.414 |
| React | 0.38 | 0.12 | 3.13 | 0.002 |
| BeliefsDiff | -1.06 | 0.40 | -2.68 | 0.008 |
| Control Vs. Mind: same * React | -0.09 | 0.13 | -0.70 | 0.486 |
| Control Vs. Mind: same * BeliefsDiff | -0.52 | 0.43 | -1.20 | 0.229 |
| React * BeliefsDiff | 0.19 | 0.06 | 2.97 | 0.003 |
| Control Vs. Mind: same * React * BeliefsDiff | 0.11 | 0.07 | 1.60 | 0.111 |

| | Estimate | se | t | p-value |
|--|----------|------|-------|---------|
| Intercept | 3.12 | 0.65 | 4.80 | < .001 |
| Control Vs. Mind: diff | 0.92 | 1.04 | 0.88 | 0.380 |
| Control Mind: diff. Vs. Mind: same | 0.05 | 0.10 | 0.54 | 0.598 |
| React | 0.28 | 0.10 | 2.71 | 0.007 |
| BeliefsDiff | -1.28 | 0.35 | -3.61 | < .001 |
| Control Vs. Mind: diff * React | -0.23 | 0.17 | -1.36 | 0.176 |
| Control Vs. Mind: diff * BeliefsDiff | -1.13 | 0.57 | -1.97 | 0.052 |
| React * BeliefsDiff | 0.24 | 0.05 | 4.42 | < .001 |
| Control Vs. Mind: diff * React * BeliefsDiff | 0.22 | 0.09 | 2.42 | 0.016 |

| | Estimate | se | t | p-value |
|--|----------|------|-------|---------|
| Intercept | 3.69 | 0.49 | 7.48 | < .001 |
| Control Vs. Mind | -0.05 | 0.39 | -0.12 | 0.907 |
| Mind: same Vs. diff. | 0.17 | 0.24 | 0.70 | 0.484 |
| FilmCritic | 0.02 | 0.01 | 2.13 | 0.037 |
| BeliefsDiff | 0.74 | 0.26 | 2.86 | 0.006 |
| Control Vs. Mind * FilmCritic | 0.00 | 0.01 | 0.63 | 0.532 |
| Control Vs. Mind * BeliefsDiff | -0.16 | 0.21 | -0.76 | 0.453 |
| FilmCritic * BeliefsDiff | -0.01 | 0.00 | -2.77 | 0.008 |
| Control Vs. Mind * FilmCritic * BeliefsDiff | 0.00 | 0.00 | 0.42 | 0.677 |

| | Estimate | se | t | p-value |
|--|----------|------|-------|---------|
| Intercept | 3.76 | 0.53 | 7.07 | < .001 |
| Control Vs. Mind: same | 0.12 | 0.59 | 0.21 | 0.835 |
| Control Mind: same Vs. Mind: diff. | -0.08 | 0.14 | -0.58 | 0.563 |
| FilmCritic | 0.02 | 0.01 | 1.89 | 0.065 |
| BeliefsDiff | 0.70 | 0.28 | 2.49 | 0.016 |
| Control Vs. Mind: same * FilmCritic | -0.01 | 0.01 | -0.54 | 0.594 |
| Control Vs. Mind: same * BeliefsDiff | 0.26 | 0.31 | 0.85 | 0.401 |
| FilmCritic * BeliefsDiff | -0.01 | 0.01 | -2.45 | 0.018 |
| Control Vs. Mind: same * FilmCritic * BeliefsDiff | 0.00 | 0.01 | -0.55 | 0.586 |

| | Estimate | se | t | p-value |
|--|----------|------|-------|---------|
| Intercept | 3.61 | 0.47 | 7.60 | < .001 |
| Control Vs. Mind: diff | 0.07 | 0.77 | 0.09 | 0.931 |
| Control Mind: diff. Vs. Mind: same | 0.08 | 0.14 | 0.59 | 0.560 |
| FilmCritic | 0.02 | 0.01 | 2.24 | 0.029 |
| BeliefsDiff | 0.79 | 0.25 | 3.17 | 0.002 |
| Control Vs. Mind: diff * FilmCritic | -0.01 | 0.01 | -0.58 | 0.562 |
| Control Vs. Mind: diff * BeliefsDiff | 0.17 | 0.42 | 0.41 | 0.681 |
| FilmCritic * BeliefsDiff | -0.01 | 0.00 | -2.92 | 0.005 |
| Control Vs. Mind: diff * FilmCritic * BeliefsDiff | 0.00 | 0.01 | -0.15 | 0.881 |

Appendix 9

Table 10. Relationship between *Reactions* (mean centered) and watching preferences before receiving film critic information (*Watch Pre*).

| | | b | se | t(55) | p-value | r |
|----------|-----------|------|------|-------|---------|------|
| Steam | Intercept | 4.16 | 0.16 | 25.36 | < .001 | |
| | Reactions | 0.82 | 0.08 | 10.00 | < .001 | 0.80 |
| Scissors | Intercept | 6.97 | 0.13 | 51.88 | < .001 | |
| | Reactions | 1.00 | 0.08 | 11.98 | < .001 | 0.85 |
| Rachel | Intercept | 4.44 | 0.13 | 33.29 | < .001 | |
| | Reactions | 1.09 | 0.06 | 18.44 | < .001 | 0.93 |
| Silk | Intercept | 5.93 | 0.18 | 32.38 | < .001 | |
| | Reactions | 1.05 | 0.10 | 10.83 | < .001 | 0.83 |

Table 11. Relationship between *Reactions* (mean centered) and watching preferences after receiving film critic information (*Watch Post*) for the control condition. The point here is that the relationship between reactions and watching preferences doesn't change much as a function of receiving film critic information (the intercepts change because of the film critic information). Looking at the findings in the next table, it becomes clear that mindfulness changes the slope, but not the intercept.

| | | b | se | t(16) | p-value | r |
|----------|-----------|------|------|-------|---------|------|
| Steam | Intercept | 4.11 | 0.52 | 7.85 | < .001 | |
| | Reactions | 0.57 | 0.28 | 2.05 | .057 | 0.46 |
| Scissors | Intercept | 5.19 | 0.34 | 15.34 | < .001 | |
| | Reactions | 0.81 | 0.21 | 3.95 | .001 | 0.70 |
| Rachel | Intercept | 6.03 | 0.51 | 11.81 | < .001 | |
| | Reactions | 0.89 | 0.25 | 3.58 | .003 | 0.67 |
| Silk | Intercept | 4.59 | 0.38 | 12.14 | < .001 | |
| | Reactions | 0.83 | 0.20 | 4.04 | .001 | 0.71 |

Table 12. Relationship between *Reactions* (mean centered) and watching preferences after receiving film critic information (*Watch Post*) as a function of mindfulness. Performing these analyses separately for each movie, none of the interactions are significant. Note also that reactions, on average, predict watching preference after receiving film critic information similarly as reactions predict watching preference before receiving film critic information (see Table 10).

| | b | se | t(51) | p-value | $\eta_{partial}^2$ |
|----------------------|------|------|-------|---------|--------------------|
| Steam | | | | | |
| Intercept | 3.80 | 0.25 | 15.01 | < .001 | 0.815 |
| Mind: same Vs. diff. | 0.12 | 0.31 | 0.41 | .686 | 0.003 |
| Control Vs. Mind | 0.16 | 0.18 | 0.86 | .395 | 0.014 |

| | | | | | |
|-----------------------------|-------|------|-------|--------|---------|
| React | 0.65 | 0.13 | 5.04 | < .001 | 0.332 |
| Control Vs. Mind * React | -0.04 | 0.10 | -0.45 | .655 | 0.004 |
| Mind: same Vs. diff.* React | -0.06 | 0.15 | -0.40 | .692 | 0.003 |
| Scissors | | | | | |
| Intercept | 5.28 | 0.25 | 21.47 | < .001 | 0.900 |
| Mind: same Vs. diff. | 0.05 | 0.30 | 0.16 | .874 | < 0.001 |
| Control Vs. Mind | -0.05 | 0.18 | -0.26 | .797 | 0.001 |
| React | 1.02 | 0.16 | 6.38 | < .001 | 0.444 |
| Control Vs. Mind * React | -0.11 | 0.11 | -0.94 | .352 | 0.017 |
| Mind: same Vs. diff.* React | -0.05 | 0.20 | -0.25 | .808 | 0.001 |
| Rachel | | | | | |
| Intercept | 5.41 | 0.27 | 20.02 | < .001 | 0.887 |
| Mind: same Vs. diff. | 0.31 | 0.33 | 0.94 | .351 | 0.017 |
| Control Vs. Mind | 0.31 | 0.19 | 1.62 | .111 | 0.049 |
| React | 0.72 | 0.12 | 5.98 | < .001 | 0.412 |
| Control Vs. Mind * React | 0.08 | 0.09 | 0.89 | .378 | 0.015 |
| Mind: same Vs. diff.* React | -0.17 | 0.14 | -1.19 | .240 | 0.027 |
| Silk | | | | | |
| Intercept | 4.56 | 0.23 | 20.20 | < .001 | 0.891 |
| Mind: same Vs. diff. | 0.12 | 0.27 | 0.43 | .671 | 0.004 |
| Control Vs. Mind | 0.02 | 0.16 | 0.09 | .928 | < 0.001 |
| React | 1.01 | 0.12 | 8.27 | < .001 | 0.577 |
| Control Vs. Mind * React | -0.09 | 0.09 | -1.05 | .297 | 0.022 |
| Mind: same Vs. diff.* React | -0.14 | 0.15 | -0.97 | .337 | 0.018 |

Table 13. Overview of descriptive and inferential statistics for reactions, watching preference before and after receiving film critic information for the control condition, mindful (same domain), and mindful (different domain).

| | | Reactions | Watch Pre | Watch Post |
|----------|------------------------|-------------|-------------|-------------|
| Steam | Control | 4.47 (1.94) | 4.17 (1.92) | 4.11 (2.42) |
| | Mindful (same domain) | 4.60 (2.33) | 4.30 (2.23) | 3.85 (2.25) |
| | Mindful (diff. domain) | 4.34 (1.84) | 4.00 (2.11) | 3.42 (2.19) |
| Scissors | Control | 6.78 (1.66) | 6.83 (1.82) | 4.94 (1.92) |
| | Mindful (same domain) | 7.15 (1.86) | 7.15 (2.03) | 5.45 (2.67) |
| | Mindful (diff. domain) | 7.29 (1.32) | 6.89 (1.94) | 5.53 (2.63) |
| Rachel | Control | 4.28 (2.12) | 4.72 (2.63) | 5.94 (2.82) |
| | Mindful (same domain) | 4.28 (2.31) | 4.25 (2.86) | 5.35 (2.48) |
| | Mindful (diff. domain) | 4.58 (2.48) | 4.37 (2.63) | 4.95 (2.53) |
| Silk | Control | 5.75 (1.86) | 5.94 (2.60) | 4.28 (2.16) |
| | Mindful (same domain) | 6.32 (2.21) | 5.84 (2.50) | 4.84 (2.61) |
| | Mindful (diff. domain) | 6.29 (1.68) | 6.00 (2.29) | 4.63 (2.75) |

| | M.E. of mindfulness (vs. control) | M.E. of Reactions, Watch Pre, Watch Post | Int. | Post hoc comparison |
|----------|---|---|-------|---|
| Steam | F(2,108)=4.53 p=.013 $\eta_{partial}^2 = .077$ | F<1 | F<1 | React diff. Watch Post |
| Scissors | F(2,108)=50.08 p<.001 $\eta_{partial}^2 = .481$ | F<1 | F<1 | React diff. Watch Post Watch Pre diff. Watch Post |
| Rachel | F(2,108)=11.40 p<.001 $\eta_{partial}^2 = .174$ | F<1.3 | F<1.3 | React diff. Watch Post Watch Pre diff. Watch Post |
| Silk | F(2,108)=28.55 p<.001 $\eta_{partial}^2 = .350$ | F<1 | F<1 | React diff. Watch Post Watch Pre diff. Watch Post |

Appendix 10

Need for Cognition Scale (NFC):

For each of the statements below, please indicate to what extent the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a "1" to the left of the question; if the statement is extremely characteristic of you (very much like you) please write a "5" next to the question. Of course, a statement may be neither extremely uncharacteristic nor extremely characteristic of you; if so, please use the number in the middle of the scale that describes the best fit.

Please keep the following scale in mind as you rate each of the statements below:

- 1 = extremely uncharacteristic;
- 2 = somewhat uncharacteristic;
- 3 = uncertain;
- 4 = somewhat characteristic;
- 5 = extremely characteristic.

1. I would prefer complex to simple problems. _____
2. I like to have the responsibility of handling a situation that requires a lot of thinking. _____
3. Thinking is not my idea of fun. _____
4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. _____
5. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something. _____
6. I find satisfaction in deliberating hard and for long hours. _____
7. I only think as hard as I have to. _____
8. I prefer to think about small, daily projects to long-term ones. _____
9. I like tasks that require little thought once I've learned them. _____
10. The idea of relying on thought to make my way to the top appeals to me. _____
11. I really enjoy a task that involves coming up with new solutions to problems. _____
12. Learning new ways to think doesn't excite me very much. _____
13. I prefer my life to be filled with puzzles that I must solve. _____
14. The notion of thinking abstractly is appealing to me. _____
15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought. _____
16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort. _____
17. It's enough for me that something gets the job done; I don't care how or why it works. _____
18. I usually end up deliberating about issues even when they do not affect me personally. _____