

ABSTRACT

Title of thesis: A UNIFIED MODEL OF MOTIVATED REASONING:
THE INTERACTIVE ROLE OF MOTIVATIONAL
FACTORS, SITUATIONAL AFFORDANCES, AND
COGNITIVE RESOURCES IN HUMAN JUDGMENT.

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Motivated biases are considered under an integrative theoretical framework which specifies the interplay between motivation, situational affordances, and cognitive resources. According to this framework, motivation influences the cognitive strategies taken in a given situation. Then, cognitive resources are channeled to the appropriate set of cognitive processes suggested by the dominant motivation. The presence of cognitive resources allows information processing to be directed at either reaching an accurate decision, or overcoming reality constraints impeding one from reaching a desirable judgment. In the absence of cognitive resources the dominant motivation, whether it be accuracy or directional motivation, has a lesser impact when reaching the desired judgment is made difficult. In such case, salient situational cues and ambiguous information may determine judgments to a greater degree irrespective of the motivational relevance of those cues. Two studies supported the present model in two unrelated contexts using different operationalizations of the major constructs.

A UNIFIED MODEL OF MOTIVATED REASONING: THE INTERACTIVE ROLE OF
MOTIVATIONAL FACTORS, SITUATIONAL AFFORDANCES, AND COGNITIVE
RESOURCES IN HUMAN JUDGMENT.

by

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Introduction

The human understanding, when it has once adopted an opinion ... draws all things else to support and agree with it. Though there may be (more) instances to be found on the other side, yet these it either neglects or despises, or else by some distinction sets aside and rejects.

-Francis Bacon

Making accurate judgments is one key component of thinking in humans.

Although decision makers often demonstrate the ability of making accurate judgments, studies on reasoning show that judgment accuracy is often altered by situational and idiosyncratic factors (Kunda & Sanitioso, 1989; Tversky & Koehler, 1994). After a period of controversy, the role of motivation on judgment has been established as a potential source of bias, a phenomenon also referred to as *motivated reasoning*. Despite the considerable body of research devoted to this topic, the case for motivated reasoning has generally focused on whether these motivational biases really exist. Therefore, relatively little systematic investigation has been undertaken of the factors that might influence the occurrence and magnitude of motivationally produced judgmental bias. The present research addresses this gap in knowledge by proposing a model of motivated reasoning that encompasses three factors, namely motivation, situational affordances, and cognitive resources. Two studies aiming at empirically investigating this model are proposed.

The Role of Motivation

The influence of motivation on human judgment has been a topic of continuous interest in the field of psychology. Early on in the 20th century, in Sigmund Freud's

Psychodynamic Theory (1920), motivational biases were thought of as playing a crucial role in individuals' psyche. Specifically, motivational biases were conceived as processes directed at protecting the self by fending off anxiety-provoking thoughts from consciousness. According to Freud, the *ego*, which is governed by the *reality principle*, defends itself from unacceptable sexual and violent impulses through a series of psychological strategies, which he referred to as *defense mechanisms*. Freud proposed that *defense mechanisms* are aimed at satisfying these sexual and violent impulses in socially acceptable ways. For example, through the mechanism of *projection*, one perceives a threatening trait in others in order to avoid recognizing it as part of oneself. Other forms of defense involve the *repression* or *denial* of unacceptable information which unable one to recall or simply deal with the implications of certain events. Thus, Freud's Psychodynamic Theory was innovative in that it suggested a series of possible ways in which motivated reasoning may occur (for a full review see Baumeister, Dale, & Sommer, 1998).

Despite Freud's major influence on psychology and Francis Bacon's insights quoted in the introduction, the idea of motivation influencing judgment took a very long time before being formally accepted and empirically demonstrated. In the realm of perceptual judgment for example, individuals have been traditionally thought of as passive observers, encoding an exact copy of the outside world, without interfering with the actual content. The notion that top-down processes, including motivational factors, could interfere with perception was a foreign concept until the end of the Second World War by research on functional perception. Sometimes dubbed as the "New Look", this tradition of research conceived perception as a tool in the service of one's motivation

(Bruner, 1957). Specifically, it was proposed that needs and values could have their influence on the perceptual system by accentuating and facilitating visual localization of goal-relevant objects. A classic demonstration of this phenomenon is Bruner and Goodman's (1947) early work in which children from different socio-economical status estimated the size of monetary coins. In comparison to children from affluent families, poor children, for whom the value of money was greater, overestimated the size of the coins. Although these early studies were later criticized for their methodology (Eiser & Stroebe, 1972; Tajfel, 1957), it is these early perceptual studies that first empirically supported the conception of motivation influencing judgments.

Endeavors directed at investigating motivated reasoning have provided evidence that motivation could impact domains far beyond those concerned with perception. According to Festinger's (1957) Cognitive Dissonance Theory, aversive tensions are assumed to arise when willful behavior is at odds with an actor's attitudes or core values (Steele, 1988). In line with this theoretical framework, individuals become motivated to assuage these tensions by changing their attitudes to either reduce or remove the discrepancy between their attitude and behavior. Consequently, Cognitive Dissonance Theory proposes specific instances in which motivation influences and biases individuals' attitudes (i.e. judgments toward an entity).

Attribution processes have also been claimed to be influenced by motivational biases (Cialdini, Braver, & Lewis, 1974; Kelley, 1971). It has been hypothesized and empirically corroborated that individuals tend to attribute causality to themselves when their efforts have produced favorable outcomes, but attribute causality to external factors when the outcomes are unfavorable (e.g., Johnson, Feigenbaum, & Weiby, 1964; Jones,

Gergen, & Davis, 1962; Streufert, & Streufert, 1969). Kelley's Attribution Theory (1967, 1971) suggests that individuals are inclined to display such bias in an attempt to preserve a perception of internal control over their environment.

More recent accounts suggest that a vast number of situations exist in which judgment can be altered in motivationally congruent ways. In Ross, McFarland, and Fletcher's study (1981) participants led to believe that toothbrushing was bad for their health reported having performed these behaviors in the recent past less frequently than participants led to believe that toothbrushing was actually regarded as a healthy behavior. In a similar vein, Kunda and Sanitioso (1989) found that people led to believe that certain personality traits are conducive to academic success came to think that they possessed those traits to a greater extent, compared to the control participants for whom no such belief was established. Other research showed that individuals are generally inclined to make judgments that are arguably too favorable to be objectively justified. Weinstein (1980) for example, provided evidence that individuals predicting the likelihood of occurrence of future events in their lives generally demonstrated greater optimism toward future desirable events. Individuals also reported that positive events were more likely to occur to them than to others, whereas negative events were less likely to occur to them than to others.

Despite all the supportive evidence, the existence of motivational biases has been a matter of controversy and intense debate over the years. In fact, substantial efforts have been put forward to authenticate motivational biases against the critique of cognitive-based rival interpretations. A case in point is Cognitive Dissonance Theory (Festinger, 1957; Festinger & Carlsmith, 1959) and Self-Perception Theory (Bem, 1967; 1972) that

have been pitted against each other in order to establish whether individuals' attitude change in dissonance studies reflected a motivational process or a cognitive process in which individuals were inferring their attitude from their own behavior. Similarly, motivational biases in causal attributions (Kelley, 1967) have been challenged by cognitive interpretations. In their discussion of this topic, Miller and Ross (1975) argued that the attribution biases claimed by several authors (e.g. Johnson et al., 1964; Kelley, 1971) could be reinterpreted without invoking motivational constructs. In this vein, Miller and Ross suggested that individuals may have performance expectancies based on the amount of effort and level of ability they invest in a given task. Consequently, in instances where individuals have high performance expectancies, the occurrence of success would be consistent with their expectations and lead to greater internal attribution, whereas failure would be perceived as inconsistent with their expectations and therefore be attributed to external factors.

Yet in the end, the concept of motivational biases appears to have survived the onslaught of cognitive reinterpretations. As Kunda (1990) noted “the case for motivated reasoning appears quite strong... The position that all biases are due to purely cognitive processes is no longer tenable” (p. 493). A large part of this success is due to experimental designs that manipulated participant's motivation while keeping constant the information presented. Using this paradigm, Klein and Kunda (1992), for example, made participants believe they would engage in a history trivia game with another individual. Participants were led to believe that this individual would either be their future partner or opponent. Despite being provided with similar information regarding that individual's prior performance, participants who thought of that person as their future

partner rated that person as better at history than participants who thought of that person as their future opponent. Klein and Kunda's (1992) research has been one among many that has led researchers to accept the role of motivation in human judgment and conclude that cognitive rival interpretation could not account for the available experimental results (Dunning, 1999; Kruglanski, 1996).

The Role of Situational Affordances

The research described thus far attests that motivated reasoning has constituted a topic of continuous interest to social psychologists. Yet, because much of the relevant research centered on establishing the authenticity of the phenomenon, little is known about the boundary conditions under which motivated reasoning may occur. About the only factor that has been identified as facilitating motivational biases is *stimulus ambiguity*. Several authors have observed that individuals are more likely to reach desirable conclusions when judgments are given on elements that are ambiguous, hence loosely defined and subject to multiple interpretations. Dunning, Meyerowitz, and Holzberg (1989) for instance, observed that individuals tended more to ascribe positive traits to themselves and less likely to ascribe negative traits to themselves when these traits were ambiguous (e.g., sophisticated) rather than well-defined (e.g., punctual).

Similarly, Hsee (1996) discussed how “unjustifiable” (motivational) factors may influence judgments by referring to the concept of *elasticity*. Hsee proposed that judgments are more likely to become biased when the relative weight that should be attributed to the justifiable factors is ambiguous. In such circumstances, unjustifiable factors may come into play and influence judgment making. To illustrate Hsee's proposition, one could think of a wine expert tasting two different bottles of wine for a

competition in which one of the bottle has been produced by a good friend. If both wines have interesting qualities but their comparison is ambiguous, one showing “nice legs” in the glass (a sign of viscousness associated with high-quality wine) and the other offering good tannins (polyphenols generated by the grapes as well as wooden casks and considered the hallmark of “big” red wines) for example, it becomes difficult for the judge to determine the relative weight that should be given to these justifiable factors. In this situation, despite knowing that the winner of the competition should not be based on liking and sympathy, the situation allows the wine expert to unconsciously favor the old friend by rendering a judgment that appears to be impartial and based on justifiable factors. Hsee's notion of *elasticity* is akin to Kunda's (1990) notion of *reality constraints* (see also Pyszczynski & Greenberg, 1987; cf. Kruglanski, 1999). Kunda suggested that in spite of being motivated to reach certain desired conclusions, decision makers still acknowledge the existence of “objective reality” which when it is clear and obvious, reduces one’s ability to distort judgments toward motivationally pleasing conclusions.

Thus, stimulus ambiguity is one factor that makes distortion easy to accomplish, and stimulus clarity is what makes distortion difficult to accomplish in a motivationally desirable direction. It is possible, however, that there are other factors, apart from stimulus ambiguity that affect the difficulty of distortion. For instance, the amount of information and its complexity may make distortion more difficult because of the demands of information processing that may deplete one’s cognitive resources and reduce one’s cognitive capacity to engage in the “cognitive work” that distortion may require. The same may happen when the information to be distorted appears late versus early in the information processing sequence, that is, after considerable resources may have been

expended.

The Role of Cognitive Resources

Processing capacity, also referred to as working memory, is often conceptualized as a limited amount of cognitive resources that can be allocated to on-line cognitive tasks (Kahneman, 1973; Norman & Bobrow, 1975; Wickens, 1984). The presence of cognitive resources allows working memory to sustain attention effectively toward information processing that is goal relevant. Consequently, given that the choice of cognitive strategies reflects the corresponding motivational state that the individual is in (Kruglanski & Freund, 1983; Pyszczynski & Greenberg, 1987; Sorrentino & Higgins, 1986), processing capacity may be as important for reaching both accurate and biased judgments. The latter statement is congruent with the Elaboration Likelihood Model of persuasion (ELM, Petty & Cacioppo, 1986) which proposes that motivation channels available cognitive resources toward its fulfillment. Consequently: “A wide variety of variables can affect a person’s motivation and ability to consider issue-relevant arguments in either a relatively objective or in a relatively biased manner” (Cacioppo et al., 1986, p. 152).

In circumstances where cognitive resources are allocated elsewhere or have been exhausted by a prior fatiguing task, they may be insufficient to accomplish the motivational goal. Consequently, insufficient cognitive resources may undermine the probability of effective goal-pursuit. A case in point is Thompson and colleagues’ (1994) work showing that individuals are able to form accurate impressions only when their accuracy motivation is paired with sufficient cognitive resources. Accuracy motivated individuals under cognitive load, made impressions similar to individuals lacking the

motivation to be accurate.

Recently, Chen (2009) obtained evidence that the process involved in the fulfillment of the accuracy motivation seems also involved in the fulfillment of directional motivations, resulting in motivational biases. In her study, participants led to identify with their University through a subliminal priming manipulation were more likely to favor their school's sport team over a rival team for a national athletic award only if they had the necessary cognitive resources. These findings are interesting as they run counter to the hypothesis that “more is better”, that is, that the more processing capacity one has the more accurate is one's judgment. In sum, it appears that cognitive resources can be beneficial to reach either accurate or biased judgments. The question is under what conditions they would do either.

The Present Research

From the various streams of evidence reviewed above, several principles can be derived concerning the conditions under which accurate or biased judgments will occur, and the role that resources will play in the formation of such judgments. First, motivation influences the choice of cognitive strategies that are preferred in a given situation. Motivation introduces goals to which the strategies constitute means. Accuracy motivation fosters revision of beliefs and leads individuals to process information more deeply before committing to a judgment. Directional motivation orients cognitive processes toward reaching a desired conclusion. Second, the decision making process is constrained, but not entirely limited, by the cognitive task environment in which the judgments are made. Some task environments afford an easier accomplishment of one's goal than other environments. The more difficult is goal accomplishment in a given

environment the more cognitive resources are required to do so. Third, cognitive resources are channeled to the appropriate set of cognitive processes suggested by the dominant motivation. The presence of cognitive resources allows information processing to be directed at either reaching an accurate decision, or overcoming the reality constraints. Assuming that resources are needed, in their absence the dominant motivation, whether it be accuracy or directional motivation, will have a lesser impact on judgments. In the absence (vs. presence) of resources salient situational cues may determine judgments to a greater degree irrespective of the motivational relevance of those cues.

The foregoing three principals suggest two major hypotheses: (1) under dominant accuracy motivation, accurate judgments will occur, except, when the judgment maker does not have the necessary cognitive resources to process the information, and when the environment is conducive to judgment biases; in other words, when the environment is conducive to judgmental biases (reality constraints are weak, and biasing information is highly accessible), reaching unbiased judgments will be positively related to the availability of cognitive resources. However, (2) under dominant directional motivation judgments will generally be biased, except in situations where the judgment maker does not have the necessary cognitive resources to outmatch the reality constraints.

In the following two studies, we put these hypotheses to empirical test. To increase confidence in the conclusions, we rely on a convergent approach that allows the validation of our findings via alternative operations of the major constructs. Specifically, in Study 1, motivation was manipulated through subliminal priming, whereas in Study 2 motivation was elicited through accountability instructions. Different manipulations of

cognitive resources were employed; Study 1 directly manipulated cognitive resources through a cognitive load manipulation, whereas in Study 2 individuals' circadian cycle combined with different testing periods were used as a proxy for the presence of cognitive resources. Finally, different operationalizations of reality constraints were also used across studies. In Study 1, Situational affordances (reality constraints) were manipulated through stimulus saliency, whereas Study 2 examined in these terms the influence of stimulus ambiguity.

Study 1

The goal of Study 1 was to carry out the first empirical test of our model integrating motivation, situational affordances, and cognitive resources as these may conjointly determine individuals' judgments. The primary focus of Study 1 concerned motivated reasoning in the realm of perceptual judgments. Specifically, we addressed whether motivation, situational affordances, and cognitive resources may shape individuals' responses to social rejection. In their review on the need to belong, Baumeister & Leary (1995) have advanced that forming and maintaining social bonds is a fundamental human motivation. In line with this proposition, several authors have found evidence that individuals can be very sensitive to cues indicating potential rejection (Pickett & Gardner, 2005) and engage in affiliation efforts (e.g., imitating others) in response to social exclusion (Lakin & Chartrand, 2005). Based on this reasoning, we argue that making individuals feel rejected might induce a directional motivation to regain a sense of belonging which would translate into perceiving warm traits in others.

Thus in line with our theoretical framework, we hypothesized that rejected

individuals (directional motivation) would perceive more warm traits in others, except in situation where the environment is not conducive to such judgments (hard to distort) and participants are under cognitive load. When individuals are motivated to reach an accurate judgment, we hypothesized that individuals will process all information at their disposal before reaching a judgment. Under cognitive load, we hypothesized that individuals with an accuracy motivation would not fully take into account the environmental information and thus rely on salient information to make a judgment. Consequently, when accuracy motivated individuals are deprived of cognitive resources they would be more likely to succumb to an environmentally prompted stimulus bias.

Method

Participants and Design

Two-hundred and twenty-six University of Maryland undergraduates (126 women, $M_{\text{age}} = 19.92$ years, $SD_{\text{age}} = 2.17$) participated and received partial credit toward fulfillment of a course requirement. Participants were randomly assigned to a 2 (Motivation: accuracy vs. rejection) X 2 (Cognitive resources: load vs. no-load) X 2 (Situational affordances: eyes vs. mouth) between-subjects design.

Procedure and Materials

Upon their arrival at the lab, participants were invited to participate in two unrelated studies. In the first study, they were told that the researchers were interested in investigating people's speed in distinguishing words from non-words. Participants engaged in a lexical decision task during which they were subliminally primed with either 8 words relating to accuracy (e.g., accurate, correct, true), or 8 rejection-related

words (e.g., rejected, isolated, castaway). In the lexical decision task, participants were asked to indicate whether strings of letters constitute meaningful words or not. Some of the letter strings were neutral words (e.g. lamp), or pronounceable non-words (e.g. pagie). Prior to each letter string, subliminal primes were presented for a period of 17 milliseconds, backward masked. It was expected that the rejection primes would enhance the motivation to seek social acceptance, whereas the accuracy related-words were expected to enhance accuracy motivation. Participants were then ushered to another room in order to participate in the second study that allegedly pertained to artistic judgments. Participants were told that they would see a painting on a computer screen for a period of 20 seconds, and that their artistic opinion would then be sought.

Following these instructions, participants in the cognitive load condition were told that the researchers were interested in how people perceive art when they are thinking of something else, and therefore, they would memorize and retain a 9-digit number until the end of the experiment. These participants were then given twenty seconds to retain this number. Participants in the no-load condition waited 20 seconds for the next part of the study without having to memorize any numbers.

Subsequently, all participants were presented with the Mona Lisa painting for twenty seconds. The Mona Lisa painting was selected because of its capacity to elicit perceptual and judgmental biases. Livingstone's work (2002) on the biological mechanisms of perception has recently elucidated a curious optical illusion. Livingstone found that the Mona Lisa's smile (which is widely referred to as *elusive*) can be perceived differently depending on how one looks at the painting. According to Livingstone's research, the famous Mona Lisa smile is almost entirely drawn in low-spatial

frequencies¹ which are best seen by our peripheral vision (Livingstone, 2000). Hence, by looking at the Mona Lisa's eyes or the background, her expression appears more cheerful than when one focuses directly at her mouth. As Livingstone puts it: "*She (the Mona Lisa) smiles until you look at her mouth, and then it fades, like a dim star that disappears when you look directly at it*". Based on these findings, we developed a manipulation in which the Mona Lisa's eyes or mouth was rendered salient by temporarily adding glitters for a few milliseconds (every 5 seconds) on these particular areas. Based upon Livingstone's evidence, reality constraints suggesting a lack of smiling should be harder to overcome when the mouth is made salient than when the eyes are made salient.

After exposure to the painting, participants were asked to rate the extent to which the Mona Lisa is agreeable, friendly, welcoming, and smiling, on a 7-point Likert scale ranging from -3 (*Not Agreeable at All*) to +3 (*Very Agreeable*). Serving as a manipulation check, participants under cognitive load were asked to type in the 9-digit number retained throughout the experiment. Participants were then be fully debriefed and thanked for their participation.

Rejected individuals were expected to perceive the Mona Lisa as more agreeable, welcoming, friendly, and smiling, except in the condition in which her mouth was made salient (harder to distort) and they were under cognitive load. Individuals primed with accuracy words were expected to perceive the Mona Lisa with warmer traits when their

¹ Spatial frequency is a measure of how detailed an image is. Pictures with higher spatial frequency are sharper and more detailed than pictures with lower spatial frequency. Every picture is composed of both high and low spatial frequency patterns. These patterns are layered on top of each other and visual perception depends on how one looks at them. Central vision is the work of the macula and the millions of cone cells facilitate the perception of fine grain details (high spatial frequency), whereas peripheral vision treats broad patterns (low spatial frequency) with the rod cells outside the macula area. In the case of the Mona Lisa, her smile is drawn in a low-spatial frequency pattern which is then more easily seen by the peripheral vision (i.e., indirect look).

attention was drawn to her eyes (easy to distort) and they were under cognitive load.

Results

Manipulation Check. To ensure that participants in the cognitive load condition were indeed under constrained processing capacity, we examined whether they remembered the 9-digit number that they had to retain throughout the experiment. Based on Miller's (1956) work on information processing capacity, individuals who remembered at least 7 out of 9 digits were kept in the analyses. Nine individuals failed to respect this cut-off point, leaving two-hundred and seventeen participants for subsequent analyses.

Perception of Warmth. In our first analysis, we subjected the agreeable, friendly, welcoming, and smiling items to a principal-components analysis (PCA). This analysis produced a one-component solution that accounted for 71% of the total variance. The scree test and Kaiser's rule all indicated the extraction of one component. The eigenvalue for this component was 2.85. Consequently, the four items were averaged into a single score indicating perception of warmth. Table 1 describes the loading of each item.

Table 1

Principal Component Analysis of Perceived Warm Traits (Study 1).

Items	Factor 1
Agreeable	.805
Friendly	.889
Smiling	.784
Welcoming	.898

Note: Extraction Method: Principal Component Analysis.

Main Analyses. A 2 (Cognitive resources: load vs. no load) X 2 (Situational affordances: eyes vs. mouth) ANOVA was performed on the perception of Mona Lisa's warmth for each motivational state.² Table 2 displays the means and standard deviations for all experimental conditions.

² Despite that we hypothesized two different result patterns between accuracy and directional motivation, the expected patterns are not meant to be detected by a three-way interaction. This is so because the angle at which the lines intersect are expected to be the same across plots, the only difference being that the simple effect of cognitive resources at each level of the environment variable is shifted up by a constant from one graph to the other.

Table 2

Means and Standard Deviation of Perceived Warm Traits as a Function of Motivational factors, Situational Affordances, and Cognitive Resources (Study 1).

Estimate	Accuracy				Rejection			
	Load		No-Load		Load		No-Load	
	M	SD	M	SD	M	SD	M	SD
Mouth	.82	.78	.85	.67	.70	1.07	1.38	.76
Eyes	1.70	.74	1.07	.96	1.49	.74	1.43	.97

Under accuracy motivation, results indicated a marginal main effect of resources, $F(1, 103) = 3.54, p = .06$. Participants perceived greater warmth under cognitive load ($M = 1.30, SD = .87$) than under no load ($M = .98, SD = .85$). Results also indicated a main effect of situational affordances. Consistent with Livingstone's (2000) findings, participants perceived greater warmth in the eyes condition ($M = 1.40, SD = .90$) than in the mouth condition ($M = .84, SD = .72$), $F(1, 103) = 12.04, p = .001$. More importantly, these main effects were qualified by a significant interaction, $F(1, 103) = 4.29, p = .04$. Orthogonal planned comparisons were performed to test our first hypothesis that under dominant accuracy motivation judgments would be more likely to succumb to environmentally prompted stimulus bias when judgment makers do not have the necessary cognitive resources to process the information, and when the environment is conducive to judgmental biases. Participants in the eyes/cognitive load condition (+3) were thus compared to all three other cells (all given a weight of -1). Planned comparisons revealed a significant contrast, indicating that participants in the

eye/cognitive load condition perceived the Mona Lisa has warmer than any other cells under accuracy motivation, $t(103) = 4.52, p < .001$. Other contrasts were conducted in order to examine if the three other groups significantly distinguished themselves among each other. As hypothesized, no difference was found (all $ps > .05$). Figure 1a illustrates the pattern of results.

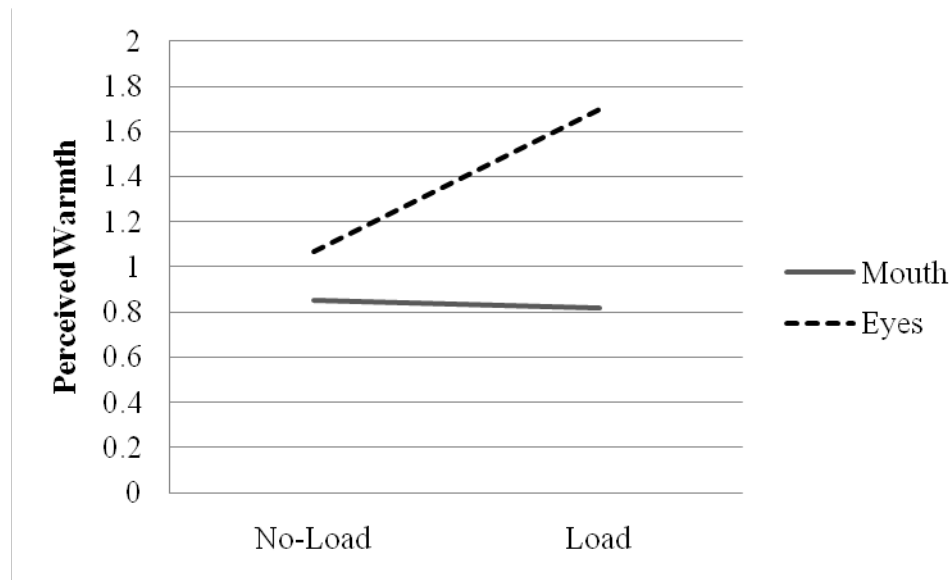


Figure 1a. Perception of the Mona Lisa's Warmth under Accuracy Motivation as a Function of Cognitive Resources and Situational Affordances.

Under directional motivation, results indicated a marginal main effect of resources, $F(1, 106) = 3.29, p = .07$, indicating that participants perceived greater warmth in the no-load condition ($M = 1.41, SD = .87$) than in the load condition ($M = 1.14, SD = .97$). Results also indicated a main effect of situational affordances.

Participants perceived greater warmth in the eyes condition ($M = 1.46, SD = .84$) than in the mouth condition ($M = 1.02, SD = .99$), $F(1, 106) = 6.08, p = .01$, replicating, once again, Livingstone's (2000) findings. These main effects were qualified by a significant

interaction $F(1, 103) = 4.55, p = .03$. Orthogonal planned comparisons were performed to test our second hypothesis that under dominant directional motivation judgment makers would tend to perceive greater warmth in the Mona Lisa, except in situations where they do not have the necessary cognitive resources to outmatch the reality constraints. Participants in the mouth/cognitive load condition (+3) were thus compared to all three other cells (all given a weight of -1). Planned comparisons revealed a significant contrast $t(106) = -3.65, p < .001$, indicating that under directional motivation, participants in the mouth/cognitive load condition indeed gave lower warmth ratings to the Mona Lisa than any other cells. Other contrasts were conducted in order to see if the three other groups significantly distinguished themselves among each other. As hypothesized, no difference was found (all $ps > .05$). Figure 1b illustrates the pattern of results.

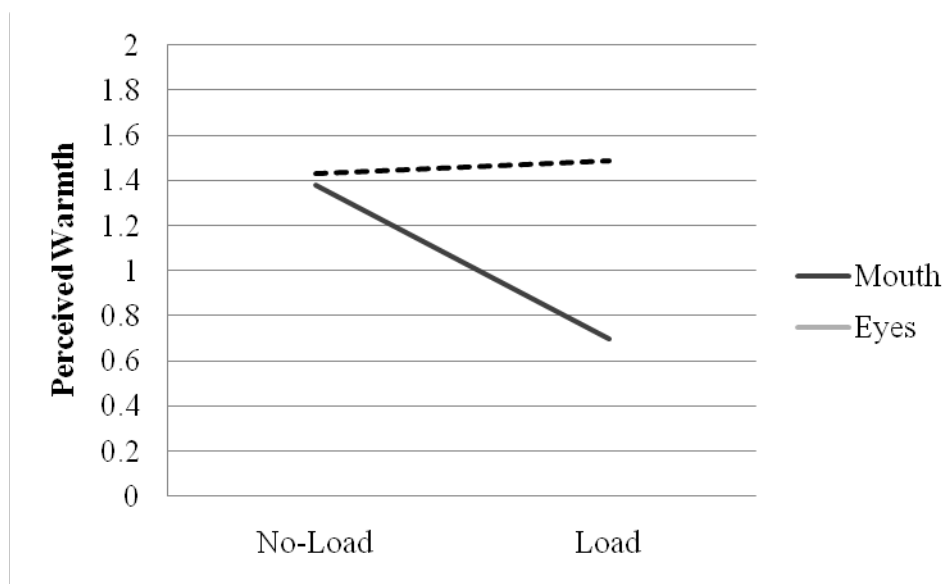


Figure 1b. Perception of the Mona Lisa's Warmth under Directional Motivation as a Function of Cognitive Resources and Situational Affordances.

Discussion

Results of Study 1 provide initial evidence for our model of motivated reasoning based on the role of motivation, cognitive resources, and situational affordances in a situation of perceptual judgment. Across cells, individuals under dominant accuracy motivation kept a relatively positive impression of the Mona Lisa, seeing her as warm, agreeable, friendly, and welcoming. However, such impression was exacerbated when information processing capacity was restrained by the cognitive load manipulation and biasing information was made accessible by attracting individuals' attention on the Mona Lisa's eyes. These results thus suggest that when processing capacity is insufficient, accuracy motivation is unable to follow its course and judgments tend to be predicated on accessible information. In instances where biasing information was made more accessible (eyes condition), processing capacity coupled with accuracy motivation allowed one to resist biasing information. Consequently under those conditions, participants' impression did not become overly positive.

Results also indicated that across cells, individuals under dominant directional motivation also kept a relatively positive impression of the Mona Lisa. However, results indicated a different pattern of results such that impressions were kept at higher levels, except in the cell where individuals were deprived of cognitive resources and the biasing information was less accessible (mouth condition). These results thus suggest that limited processing capacity impedes one from overcoming reality constraints and from reaching a motivationally congruent judgment – in this case perceiving that the Mona Lisa with warm traits (a judgment one would be motivated to see if one had been rejected). In addition, as predicted by our model, when the biasing information was made

highly accessible (eyes condition), cognitive resources were not necessary to reach a favorable judgment.

Whereas Study 1 empirically supported our theoretical model in the realm of perceptual judgments of others, Study 2 aimed at generalizing our model to judgments toward the self.

Study 2

The goal of Study 2 was to conceptually replicate the findings of Study 1 using a different methodology. Study 2 investigated the phenomenon of self-serving biases, and its most common demonstration, the well-known "above average" effect. This effect refers to people's propensity to assess their own capacities as above average when comparing themselves to their peers (Svenson, 1981; Dunning et al., 1989). The underlying paradox of the above average effect revolves around the fact that for any given attribute it is mathematically impossible for everyone to be systematically above the mean. It has been found that the above average effect is a very common bias across very different domains, such as driving ability (Svenson, 1981), ethics (Baumhart, 1968), health (Larwood, 1978; Weinstein, 1980), and managerial skills (Larwood & Whittaker, 1977). In a series of experiments, Dunning and colleagues (1989) demonstrated that ambiguously defined traits were subjected to the above average effect to a greater extent than clearly defined traits. Such view is consistent with our paradigm. However, as Dunning and colleagues (1989) underscored, their research did not provide any insights regarding factors that may prompt the occurrence of self-serving biases. Our paradigm appears well suited to provide such insights in terms of the interplay between motivation and cognitive processes as described above. Consequently, we revisited Dunning and

colleagues' research (1989) and included the variables implied by the present analysis to afford a fuller comprehension of the above average effect.

In Study 2, accuracy and directional motivations were activated consciously, instead of unconsciously. In addition, we operationally defined the amount of cognitive resources available to the individual in terms of this person's circadian rhythm, a procedure that has proven successful in past research (e.g., Bodenhausen, 1990; Kruglanski & Pierro, 2008). The rationale for this procedure is predicated upon self-report evidence that show that most individuals possess a consistent preference for daytime or nighttime activities. These preferences arise presumably because they reflect times where individuals experience their physical and mental peak (Smith, Reilly, & Midkiff, 1989). These self-report claims are also substantiated by biological reports showing better cognitive performance for individuals who's daily functioning is in synchrony with their circadian rhythm, compared to individuals in circadian rhythm asynchrony (Dijk, Duffy, & Czeisler, 1992).

Method

Participants and Design

One hundred and fifty University of Maryland undergraduates (89 women, $M_{age} = 19.41$ years, $SD_{age} = 1.26$) participated and received partial credit toward fulfillment of a course requirement. The experiment proceeded in two phases. During the first phase, participants filled out a morningness scale. In the second phase, which occurred 2 days later, participants performed a writing task and compared themselves to their peers on multiple personality dimensions. In the second phase, participants were randomly

assigned to a 2 (Motivation: accuracy vs. directional) X 2 (Cognitive resources: circadian match vs. mismatch) X 2 (Situational affordances: ambiguous vs. clear-cut personality traits) mixed-design ANOVA.

Procedure and Materials

Phase 1. The Morningness Scale (Smith et al., 1989) was administered to participants at the onset of phase 1. The Morningness Scale is a 13-item instrument assessing people's preferences for morning and evening activities. A sample item is, "During the first half hour after having awakened in the morning, how tired do you feel?". Responses to this question are made on the following scale: 1 = *Very tired*, 2 = *Fairly tired*, 3 = *Fairly refreshed*, and 4 = *Very refreshed*. A composite morningness score was then computed by summing across the participant's responses to the items. Scores range from 13 (*extreme evening type*) to 55 (*extreme morning type*). Based on this score, participants were classified as evening or morning-type person based on a median split procedure.

Phase 2. Participants categorized as morning or as evening individuals on the basis of the Morningness Scale of Phase 1 were randomly assigned to a morning or evening lab session in Phase 2. Therefore, during Phase 2, morning-type participants coming to the lab in the morning and evening-type participants coming in the evening (circadian-match conditions), were expected to be at their peak in terms of cognitive resources. We expected the opposite to occur for participants in the circadian-mismatch condition. The morning and the evening lab sessions were held at 8-9 a.m. and 7-8 p.m., respectively. During Phase 2 session, participants were asked to indicate the extent to which they felt "energized" on a 5-point Likert scale ranging from 1 (*Not at all*) to 5

(Extremely).

Participants were then randomly assigned to one of 2 writing tasks. Participants assigned to the directional motivation condition were asked to:

Write about a time in which you felt intense failure in an intellectual domain, a time that you felt as if you were not very smart. This failure can be academic in nature (e.g. a time in which you failed a class or an exam) or can be a failure outside of school (e.g. a time in which you tried but failed to understand something important).

Similar reliving tasks have proven to be effective at producing experiences of intellectual failure (Knowles & Gardner, 2008). In their meta-analyses, Campbell and Sedikides's (1999) have demonstrated a robust self-serving bias in response to self-esteem threats. In line with their work, we expected that our manipulation of intellectual failure would instigate a strong motivation for individuals to regain a positive self-image through self-serving judgments.

Participants assigned to the accuracy motivation were also given a writing task, of a neutral kind intended to have them engage in the same activity as their counterparts in the directional motivation condition. Participants in the accuracy condition were specifically asked to:

Write about the food that you had yesterday at lunchtime. For example, describe the texture, the temperature, and the type of cuisine that you had. You can also include where you were and the period of the day at which

this event occurred.

Following the writing task, participants were presented with a personality questionnaire in which they were asked to assess their standing among other UMD students on 28 different personality traits. In addition to these instructions, participants in the accuracy condition were told about the importance of "accurate self-perception", that honesty is crucial when performing the upcoming task because the validity of the test is at stake. Moreover, participants in the accuracy condition were told that they would discuss their answers with the experimenter at the end of the experiment. This procedure has been previously found to be successful in manipulating accuracy motivation and attenuating motivational biases (Freund & Kruglanski, 1985, Kruglanski & Freund, 1983, Tetlock, 1983; 1985). Additionally, to strengthen the accuracy manipulation even further, participants pledged on their honor that they would be as accurate as possible by transcribing a modified version of the University honor code.

Participants were then presented with the personality questionnaire. The 28 personality traits were exactly the same as those employed by Dunning and colleagues (1989) and can be divided into 4 categories: *ambiguous positive* (i.e., sensitive, sophisticated, idealistic, disciplined, sensible, ingenious, quick), *ambiguous negative* (i.e., neurotic, inconsistent, impractical, naive, submissive, compulsive, insecure), *unambiguous positive* (i.e., neat, well read, mathematical, thrifty, athletic, studious, punctual), and *unambiguous negative* (i.e., sarcastic, wordy, sloppy, clumsy, gullible, gossipy, bragging). These personality traits appeared on the questionnaire in no particular order. Participants indicated their standing on each trait among UMD students using a 7-point scale ranging from -3 (*I exhibit this trait much less than other UMD students*) to 0

(*I exhibit this trait to about the same degree as other UMD students*) to +3 (*I exhibit this trait much more than other UMD students*). This procedure replicates Dunning and colleagues' (1989) methodology.

We expected that under dominant accuracy motivation, self-serving biases would be greater when personality traits are ambiguous (easy to distort) and individuals do not have sufficient cognitive resources (mismatch condition). We predicted that this pattern of results would occur independently of the valence of the personality traits being assessed.

We also predicted that accuracy motivation would allow one to suppress the self-serving bias entirely by showing personality assessment non-different from 0 (indicating *I'm average*). However, we predicted that individuals would succumb to the *above average effect* when assessing ambiguous personality traits without sufficient cognitive resources.

In contrast, under dominant directional motivation, self-serving biases were expected to be of a lesser magnitude when the personality traits being assessed are clear-cut (hard to distort) and individuals do not have the necessary cognitive resources to overcome the reality constraints (mismatch condition). We predicted that this pattern of results would occur independently of the valence of the personality traits being assessed. In addition, under similar conditions, we also predicted that participants would not succumb to the *above average effect*. All other conditions were expected to show self-rating significantly different from zero.

Results

Fourteen participants did not show up to the second phase of the study, thus

leaving one hundred and thirty-six participants left for analyses.

Manipulation Check. An ANOVA was conducted on the self-report measures administered at the onset of Phase two to assess participants' level of energy. The analysis revealed that participants in the circadian mismatch condition ($M = 2.91$, $SD = 1.19$) felt they had less energy than participants in the circadian match condition ($M = 3.37$, $SD = 1.20$), $F(1, 134) = 4.96$, $p = .02$. These findings suggest that, as intended, our manipulation of resources depletion via circadian rhythm mismatch was effective.

Main Analyses. A 2 (Cognitive resources: circadian match vs. mismatch) X 2 (Situational affordances: ambiguous vs. clear-cut traits) X 2 (Traits valence: positive vs. negative) mixed design ANOVA was conducted on participants' ratings of self versus others when under accuracy motivation. The three-way interaction yielded significant results $F(1, 69) = 15.71$, $p < .001$. Thus, we investigated this interaction by looking at the 2 two-way interactions composing it. Figure 2a and 2b illustrate the pattern of results.

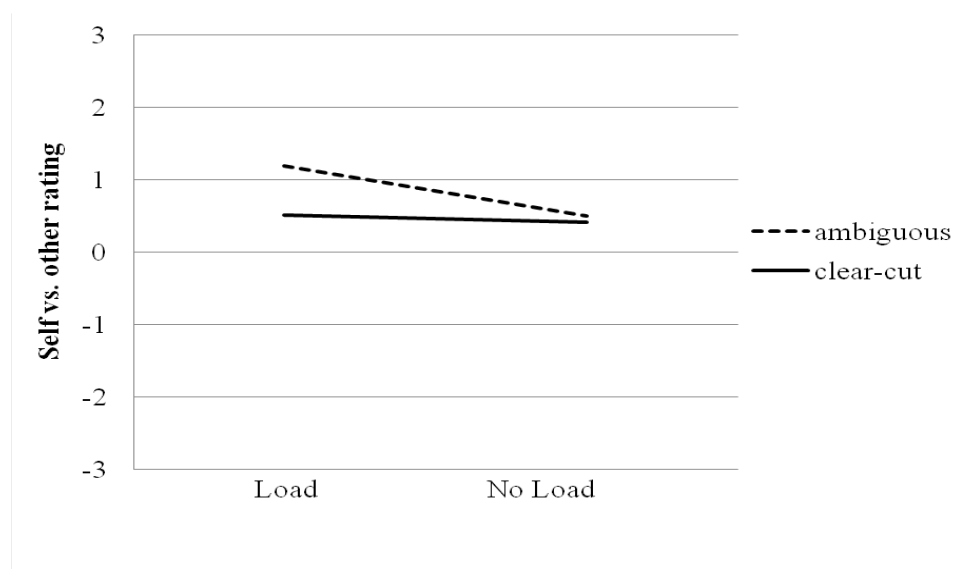


Figure 2a. Self vs. Other Rating of Positive Personality Traits under Accuracy Motivation as a Function of Cognitive Resources and Situational Affordances.

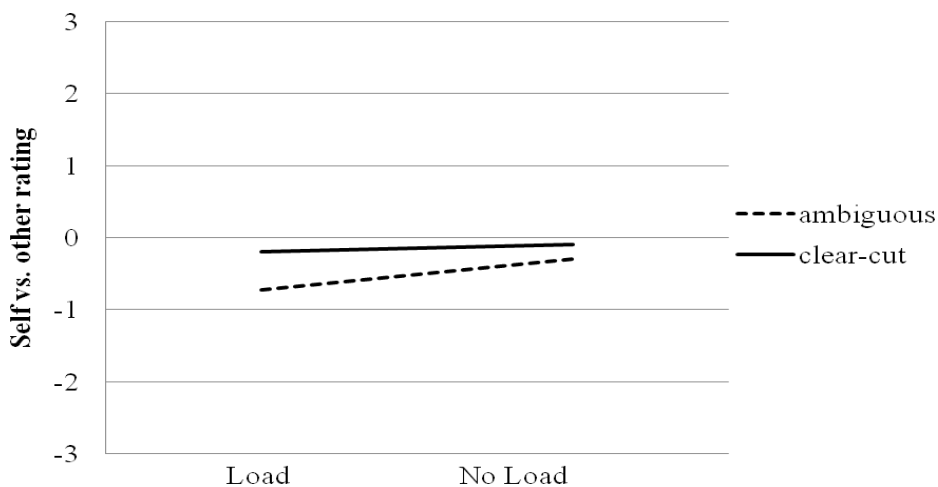


Figure 2b. Self vs. Other Rating of Negative Personality Traits under Accuracy

Motivation as a Function of Cognitive Resources and Situational Affordances.

A 2 (Cognitive resources) X 2 (Situational affordances) mixed-design ANOVA was conducted on the positive personality traits ratings. Results revealed a main effect of situational affordances, which indicated that participants tended to rate themselves more highly on ambiguous traits ($M = .79$, $SD = .64$) than on clear-cut traits ($M = .45$, $SD = .62$), $F(1, 69) = 22.06$, $p < .001$, replicating Dunning and colleagues (1989) ambiguity effect. A main effect of cognitive resources was also significant showing that participants tended to rate themselves more highly on personality traits in the mismatch ($M = .85$, $SE = .08$) than in the match condition ($M = .45$, $SE = .07$), $F(1, 69) = 11.74$, $p = .001$. The two-way interaction was found to be statistically significant, $F(1, 69) = 12.60$, $p = .001$. Simple effects revealed that when personality traits were clear-cut, personal ratings did not differ between the match ($M = .41$, $SD = .66$) and mismatch conditions ($M = .51$, $SD = .57$), $t(69) = -.71$, $p = .47$. However, as expected, when personality traits were ambiguous, participants in the mismatch ($M = 1.19$, $SD = .54$) condition rated themselves

more highly on positive personality than in the match condition ($M = .50, SD = .55$), $t(69) = 5.19, p < .05$. Further analyses revealed that self-serving biases were significantly greater for participants in the mismatch condition rating themselves on positive ambiguous traits than on positive clear-cut traits ($M = .51, SD = .57$), $t(29) = 6.30, p < .05$, and on positive clear-cut traits given by participants in the match condition ($M = .41, SD = .66$), $t(69) = 5.26, p < .05$.

A 2 (Cognitive resources) X 2 (Situational affordances) repeated-measure ANOVA was conducted on the *negative* personality traits ratings given by participants under accuracy motivation. Results indicated a main effect of trait situational affordances, with participants rating themselves more highly on negative ambiguous traits ($M = -.48, SD = .68$) than on negative clear-cut traits ($M = -.13, SD = .66$), $F(1, 69) = 17.91, p < .001$. A main effect of cognitive resources was also significant, showing that ratings were less positive in the mismatch ($M = -.46, SE = .10$) than in the match ($M = -.19, SE = .08$) condition, $F(1, 69) = 3.99, p < .05$. The two-way interaction was found to be marginally significant, $F(1, 69) = 3.36, p = .07$. Simple effects revealed that when personality traits were clear-cut no rating difference were found between the match ($M = -.09, SD = .71$) and mismatch conditions ($M = -.20, SD = .60$), $t(69) = -.65, p = .51$. However, as expected, participants in the mismatch ($M = -.72, SD = .59$) condition rated themselves lower on ambiguous traits than in the match condition ($M = -.30, SD = .68$), $t(69) = 2.72, p < .05$. Further analyses revealed that for negative traits, ratings on ambiguous characteristics by participants in the mismatch condition were also significantly higher than ratings given on clear-cut traits given by participants in the mismatch condition ($M = -.20, SD = .60$), $t(29) = -4.07, p < .05$, and clear-cut ratings given by participants in the

match condition ($M = -.09$, $SD = .71$), $t(69) = 3.94$, $p < .05$.

A 2 (Cognitive resources: circadian match vs. mismatch) X 2 (Situational affordances: ambiguous vs. clear-cut traits) X 2 (Traits valence: positive vs. negative) mixed design ANOVA was conducted on participants' ratings of self versus others when under directional motivation. The three-way interaction yielded significant results $F(1, 63) = 10.77$, $p < .05$. Thus, we investigated this interaction by looking at the 2 two-way interactions composing it. Figure 2c and 2d illustrate this pattern of results.

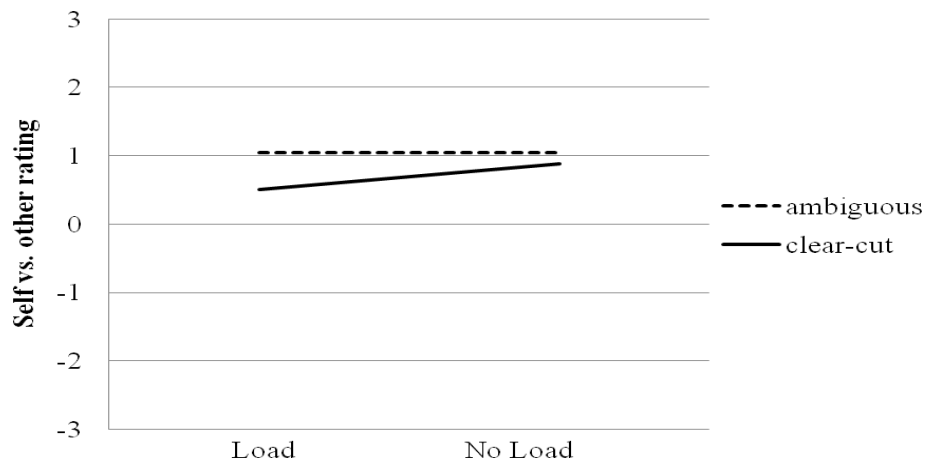


Figure 2c. Self vs. Other Rating of Positive Personality Traits under Directional Motivation as a Function of Cognitive Resources and Situational Affordances.

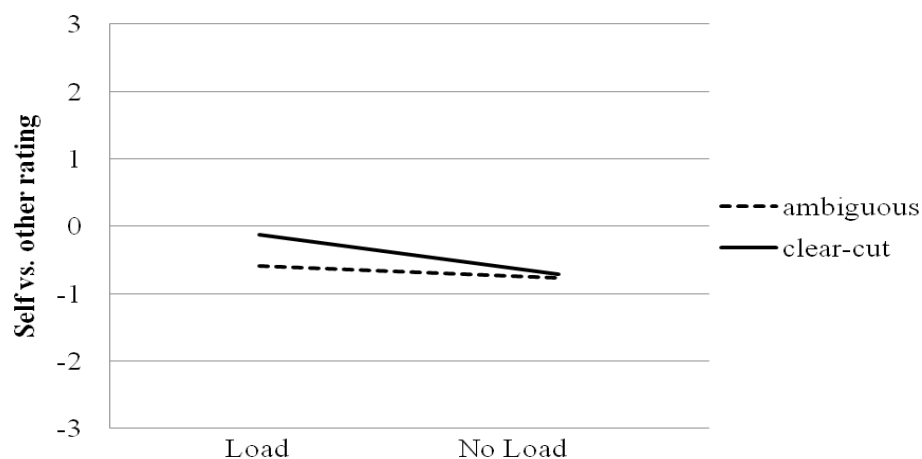


Figure 2d. Self vs. Other Rating of Negative Personality Traits under Directional Motivation as a Function of Cognitive Resources and Situational Affordances.

A 2 (Cognitive resources) X 2 (Situational affordances) mixed-design ANOVA was conducted on the positive personality traits ratings. Results indicated a main effect of situational affordances with ambiguous traits ($M = 1.04$, $SD = .47$) being rated more positively than clear-cut traits ($M = .66$, $SD = .60$), $F(1, 63) = 22.33$, $p < .001$. The main effect of cognitive resources was also significant with ratings in the match condition ($M = .96$, $SE = .07$) being more positive than ratings in the mismatch condition ($M = .74$, $SE = .07$), $F(1, 63) = 4.85$, $p = .03$. The two-way interaction was also found to be statistically significant, $F(1, 63) = 7.28$, $p < .05$. Simple effects revealed that when positive personality traits were clear-cut participants gave higher ratings in the match ($M = .88$, $SD = .60$) than in the mismatch condition ($M = .44$, $SD = .51$), $t(63) = 3.15$, $p < .05$. In line with our predictions, ambiguous positive personality traits were not rated differently in the match ($M = 1.05$, $SD = .47$) than in the mismatch condition ($M = 1.04$, $SD = .48$), $t(63) = .02$, $p = .98$. Further analyses revealed that self-ratings on positive clear-cut traits

by participants in the mismatch condition were also significantly lower than self-ratings given on positive ambiguous traits given by participants in the match condition ($M = 1.04$, $SD = .47$), $t(63) = -4.93$, $p < .05$, and ambiguous ratings in mismatch condition ($M = 1.04$, $SD = .48$), $t(31) = -5.86$, $p < .05$.

A 2 (Cognitive resources) X 2 (Situational affordances) mixed-design ANOVA was conducted on the negative personality traits ratings given by participants under directional motivation. Results indicated a main effect of trait situational affordances, with ambiguous traits ($M = -.68$, $SD = .69$) being rated more negatively than clear-cut trait ($M = -.42$, $SD = .76$), $F(1, 63) = 7.15$, $p = .01$. A main effect of cognitive resources was also significant, showing that ratings were more negative in the match ($M = -.74$, $SE = .10$) than in the mismatch ($M = -.36$, $SE = .10$) condition, $F(1, 63) = 7.04$, $p < .05$. The two-way interaction was found to be statistically significant, $F(1, 63) = 4.24$, $p = .04$. Simple effects revealed that when personality traits were clear-cut, participants in the match condition ($M = -.71$, $SD = .74$) gave lower rating than in the mismatch condition ($M = -.12$, $SD = .66$), $t(63) = 3.33$, $p < .05$. However, as expected, no ratings difference were found on the negative ambiguous traits between the match ($M = -.77$, $SD = .59$) and mismatch conditions ($M = -.59$, $SD = .79$), $t(63) = 1.03$, $p = .30$. Further analyses revealed that ratings on clear negative traits by participants in the mismatch condition ($M = -.12$, $SD = .66$) were also significantly higher than ratings given on negative ambiguous traits given by participants in the match condition ($M = -.77$, $SD = .59$), $t(63) = 4.13$, $p < .05$, and ambiguous ratings in the mismatch condition ($M = -.59$, $SD = .79$), $t(31) = 3.69$, $p < .05$.

Self-Serving biases. Self-rating means of every experimental condition were

analyzed to assess whether they were significantly different from zero, which in this cases indicates an “I’m average” response. Results indicated that all cells means were different from zero, showing that people stated that they are anything but average. As can be seen in Table 3, only two cell means did not conform to this pattern. As predicted, the results indicated that under accuracy motivation, participants’ self-ratings in the match condition did not succumb to the “more than average effect” when assessing negative clear-cut traits, $t(40) = .83, p = .40$. Similarly, participants under directional motivation in the mismatch condition did not show evidence of self-serving biases when rating negative clear-cut traits, $t(31) = 1.10, p = .27$. However, contrary to our hypotheses, participants under accuracy motivation and directional motivation were shown to self-served when rating positive clear-cut personality traits.

Table 3

Mean Rating of Self Versus Other Students as a Function of Motivation, Cognitive Resources, Trait Desirability, and Ambiguity (Study 2).

Trait	Situational	Accuracy				Directional			
		Load		No-Load		Load		No-Load	
		M	SD	M	SD	M	SD	M	SD
Ambiguous	Negative	-.72*	.59	-.30*	.68	-.59*	.79	-.77*	.59
	Positive	1.19*	.54	.50*	.55	1.04*	.47	1.04*	.47
Clear-cut	Negative	-.20*	.60	-.09	.71	-.12	.66	-.71*	.74
	Positive	.51*	.57	.41*	.66	.44*	.51	.88*	.60

Note, n = 136. Subjects responded on scale ranging from -3 (I exhibit trait much less than other UMD students) to 0 (I exhibit trait to the same degree as other UMD students) to 3 (I exhibit trait much more than other UMD students).

* Significantly different from zero, $p < .001$.

Discussion

The results of Study 2 provide additional support for our model of motivated reasoning in the domain of self-related judgments. Specifically, the results of Study 2 replicate previous findings by Dunning and colleagues (1989) on the role of trait ambiguity in prompting the above average effect. However, our results expand on these findings by integrating the role of motivation and cognitive resources affording further understanding of factors underlying the magnitude and occurrence of self-serving biases. Three major findings were evidenced:

The first finding concerns judgments under accuracy motivation. Our results indicate that under accuracy motivation the magnitude of self-serving biases is greater when processing capacity is limited and the object of one's judgment affords leeway for interpretation (i.e., ambiguous personality traits). This suggests that the absence of cognitive resources increases one's penchant to succumb to an environmentally prompted stimulus bias. In addition, the pattern of results also indicates that when processing capacity is not similarly limited, the magnitude of self-serving biases diminishes, even when the stimuli are ambiguous and hence easy to distort in a motivationally desirable direction. These results are thus consistent with the notion that under accuracy motivation cognitive resources may be channeled towards reducing the magnitude of biases in judgments by overriding the (biased) conclusions that readily come to mind.

The second finding concerns judgments under directional motivation. Our results demonstrate that the magnitude of self-serving biases under directional motivation is reduced when information processing capacity is limited and stimuli are well-defined. This exemplifies the importance of reality constraints in judgments, as proposed by Kunda (1990). Specifically, when reality constraints are important, the lack of sufficient cognitive resources impedes one from reaching a desirable self-judgment. Indeed, our results show that the availability of cognitive resources yields self-serving biases of a greater magnitude irrespective of situational affordances, which suggests that under directional motivation, cognitive resources are utilized to overcome reality constraints.

Taken together, our results suggest that stimulus ambiguity facilitates self-enhancing judgments, whereas clear-cut stimuli have the opposite effect. However, individuals motivated to be accurate can limit the temptation to distort ambiguous stimuli

given that sufficient information processing capacity is available to them. In parallel, individuals motivated to reach a desired conclusion can overcome the constraints imposed by the environment given that sufficient information processing capacity is at their disposal.

A third important finding was also brought to light in Study 2. Despite self-serving biases being relatively less prominent under accuracy motivation, our results indicate that accuracy motivation does not entirely curb the above average effect. In the same vein, one's desired judgment under directional motivation may occasionally stay a pie in the sky. Across our analyses, only two experimental groups appear not to have succumbed to such favorable, and apparently, impossible assessments of ability: participants under accuracy motivation with cognitive resources assessing negative clear-cut personality traits and participants under directional motivation without cognitive resources assessing negative clear-cut traits. These findings seem to illustrate specific cases in which self-enhancement may be a tough nut to crack even for the most motivationally driven judgment makers. These results also suggest that negative clear-cut traits are more difficult to spin in a motivationally-congruent way than positively valenced clear-cut traits. This seems to suggest that individuals may generally be more motivated to achieve a positive self-image than motivated to achieve a less negative self-image, a possibility that could be profitably pursued in subsequent research.

General Discussion

Motivation introduces goals to which cognitive strategies constitute means. Accuracy motivation fosters revision of beliefs and leads individuals to process information more deeply before committing to a judgment, whereas directional

motivation orients cognitive processes toward reaching a desired conclusion. The reality constraints in which a given cognitive task occurs specifies on a continuum the difficulty of motivated distortion. Cognitive resources are channeled to the appropriate set of cognitive processes suggested by the dominant motivation. The presence of cognitive resources allows information processing to be directed at either reaching an accurate decision, or overcoming reality constraints. In the absence of cognitive resources the dominant motivation, whether it be accuracy or directional motivation, has a lesser impact on judgment when reaching the desired judgment is made difficult. In such a case, salient situational cues and ambiguous information may determine judgments to a greater degree irrespective of the motivational congruence of those cues. The present research based on the integration of motivation, cognitive resources, and situational affordances yielded results consistent with the foregoing perspective.

Specifically, the present results offer consistent support for our model of motivated reasoning in two unrelated domains; Study 1 examined its applicability to perceptual judgments, whereas Study 2 investigated self-related judgments. In both studies, it was found that under accuracy motivation the magnitude of biases in judgment was stronger when reality constraints were low and cognitive resources were limited. In contrast, it was found that under directional motivation, the magnitude of judgment bias was at its lowest when insufficient cognitive resources were available to overcome challenging reality constraints.

The confidence in these findings is bolstered by different experimental manipulations for every component of our model. In Study 1, motivation was subliminally primed using a lexical decision task, whereas in Study 2 motivation was

manipulated by giving accountability instructions and a recall task of academic failure.

Aside from showing that our model of motivated reasoning is not limited to specific motives such as the need to belong (Study 1) or self-enhancement motives (Study 2), the converging effects of our different motivation manipulations support the notion that accuracy and directional motivation can either be consciously or unconsciously activated. This finding is consistent with the goal literature that generally shows that conscious and unconscious goal-pursuit produce similar outcomes (Dijksterhuis, Chartrand, & Aarts, 2007; Fitzsimons & Bargh, 2004).

Along the same lines, Study 2 also demonstrates that cognitive resources can be manipulated differently than by traditional methods (i.e., digit-retention; Miller, 1956). Our circadian rhythm methodology, which succeeded in reducing participants' processing capacity, constitutes an ecologically valid manipulation with both applied and theoretical implications. For instance, many mental functions are dependent upon the presence of sufficient cognitive resources. As a consequence, testing periods in laboratory settings may need to be carefully recorded for one to fully take into account the potential influence of circadian rhythms.

Study 1 and Study 2 also used different manipulations of situational affordances. In Study 1, visual cues were used to manipulate information accessibility, whereas in Study 2, we relied on stimulus ambiguity to manipulate reality constraints. Our results thus suggest that our model applies to different expressions of reality constraints.

Theoretical Implications

The case for motivated reasoning has been a topic of intense debate over the years. After the rivalry between “hot” (motivational) versus “cold” (cognitive)

perspectives finally subsided, the motivated reasoning research agenda then prioritized the investigation of the boundary conditions of the influence of motives on judgment. Research's first forays into these topics concerned the studying of "reality constraints" (Kunda, 1990) and "elasticity" (Hsee, 1996), two analogous concepts addressing the relevance of environmental influences on judgment making. According to these concepts, the extent of motivated distortion is constrained by one's ability to construct rational justifications to support one's judgment. As a consequence, ambiguous information and available justifications ease off the difficulty of spinning information in a motivationally-congruent way.

The present research offers additional insights into the phenomenon of motivated reasoning by suggesting that "reality constraints" aren't absolute and overcoming them is possible in the presence of sufficiently abundant cognitive resources and the right motivational state. In this sense, "more" (resources) is not necessarily "better" if by that term one understands a lessened bias. Indeed, across our studies we have seen time and again that given the presence of directional motivation and a sufficiently clear-cut (hence difficult to contort) informational stimulus, bias may occur only with the aid of adequate resources, presumably affording more extensive processing of the information in service of the desired judgment.

In addition to these findings, the present research also illustrates that cognitive resources may also serve to attenuate motivational biases. Specifically, in cases where judgments are made under accuracy motivation, resources may help to override the (biased) conclusions that readily come to mind and therefore, lead to less biased judgments. However, as our results showed in Study 2, despite bringing grist to the mill

of accuracy, the presence of cognitive resources does not necessarily warrant the extinction of biases, but certainly helps to reduce their sheer magnitude.

Future Research Directions

Although the present results are compelling, they do not fully address the scope of motivational biases. Additional work is needed to afford a fuller appreciation of the determinants and conditions of the occurrence of motivational biases. Specifically, two research questions require further probing in this regard: (1) the role of motivational magnitude in producing bias and (2) the underlying cognitive processes mediating (motivationally) biased and unbiased judgments. These are briefly considered in turn.

Whereas the present studies varied the presence/absence of cognitive resources needed to accomplish the motivationally guided biasing work, it seems plausible to assume that given sufficient magnitude of the biasing motivation such resources would be mobilized. Indeed, anecdotal evidence suggests that highly motivated individuals (e.g., terminally ill patients, or person who have lost beloved others) are able to deny what others appears as undeniable realities, simply by “wishing it so” (Kubler-Ross, 1969; Stroebe Hansson, Stroebe, & Schut, 2001). Thus, further research is needed to explore the possibility that even highly constraining (i.e., unambiguous) information can be distorted if the biasing motivation is appropriately strong.

Finally, the mechanisms for motivated reasoning also merit a careful empirical exploration. Several possible *underlying mechanisms* mediating the effect of motives on judgment have been proposed. For instance Freud (1920) proposed that desired judgments can be achieved through the suppression, or even the denial, of undesirable anxiety-provoking information. Alternatively, Kunda (1990) has suggested that biased

memory search may be able to explain the entire gamut of motivational biases. Further work may seek to empirically document the functioning of such processes in motivated biases and the conditions under which each may be employed to afford the motivationally desired judgments and conclusions.

Conclusion

The present research proposes a new interactive model of motivated reasoning where motivation, situational affordances, and cognitive resources play a pivotal role in predicting biases in judgment. By integrating these variables into a systematic model, we hope to reach a more complete understanding of the interplay of these variables in human reasoning. The current model provides a parsimonious framework to explain a large array of findings in the motivated reasoning literature, and pave the way to new theoretically based research into judgment and decision making.

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