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Bias Blind Spot: Structure, Measurement, and Consequences

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People exhibit a *bias blind spot*: they are less likely to detect bias in themselves than in others. We report the development and validation of an instrument to measure individual differences in the propensity to exhibit the bias blind spot that is unidimensional, internally consistent, has high test-retest reliability, and is discriminated from measures of intelligence, decision-making ability, and personality traits related to self-esteem, self-enhancement, and self-presentation. The scale is predictive of the extent to which people judge their abilities to be better than average for easy tasks and worse than average for difficult tasks, ignore the advice of others, and are responsive to an intervention designed to mitigate a different judgmental bias. These results suggest that the bias blind spot is a distinct metabias resulting from naïve realism rather than other forms of egocentric cognition, and has unique effects on judgment and behavior.

Keywords: bias blind spot; judgment and decision making; metacognition; self-awareness; advice taking; debiasing
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Introduction

People exhibit numerous systematic biases in judgment (Tversky and Kahneman 1974, Kahneman et al. 1982, Nisbett and Ross 1980), many of which are due to unconscious processes (Morewedge and Kahneman 2010, Wilson and Brekke 1994). A lack of conscious access to judgment-forming processes means that people are often unaware of their own biases (Nisbett and Wilson 1977) even though they can readily spot the same biases in the judgments of others. Consequently, most people tend to believe that, on average, they are less biased in their judgment and behavior than are their peers. Most people recognize that other people are likely to be biased when judging an attractive person, for example, but think that their own judgment of an attractive person is unaffected by this type of halo effect. Because the majority of people cannot be less biased their peers, this phenomenon is referred to as the *bias blind spot* (Pronin 2007; Pronin et al. 2002, 2004).

We show that people differ in their propensity to exhibit the bias blind spot, and develop a reliable and valid instrument to measure this individual difference. Bias blind spot appears to be a unique construct independent of intelligence and personality traits related to self-esteem, self-enhancement, and self-presentation. Bias blind spot appears to be independent of general decision-making competence. In other words, the belief that one is less biased than one's peers appears to reflect a biased perception of the self rather than a more general inferior decision-making ability, or an accurate reflection of one's superior judgment and decision-making ability. We find that the propensity to believe that one is less biased than one's peers has detrimental consequences on judgments and behaviors that rely on self–other accuracy comparisons, including decreasing receptivity to useful (i.e., debiasing) advice.

Bias Blind Spot

People exhibit a tendency to believe they are less biased than their peers. College students believe they are less biased than their classmates, airline passengers believe they are less biased than other passengers, and Americans believe they are less biased than their fellow citizens (Pronin et al. 2002). This common asymmetry in the assessment of bias in the self and in others has been observed across a variety of social and cognitive biases. This bias blind spot occurs whether people explicitly rate the extent of their bias relative to their peers, or rate the absolute extent of their bias and separately rate the extent of bias exhibited by their peers (Pronin et al. 2002, 2004; Pronin and Kugler 2007; Epley and Dunning 2000; West et al. 2012, Van Boven et al. 2000; Wilson et al. 1996).

The bias blind spot has been attributed to the interplay of two phenomena: the *introspection illusion* and *naïve realism* (Pronin et al. 2004, Pronin and Kugler 2007). The introspection illusion results from differences in the availability and perceived diagnostic value of introspection when assessing oneself and other people. When people evaluate the extent of bias in their own behavior, they base their evaluations on introspection (e.g., "I find Rodger attractive, but I have no memory of that fact influencing how I judge his speaking ability"). Because introspection is unlikely to reveal biased thought processes, people conclude that their judgment and behavior are unbiased. Naïve realism, the belief that one's perception reflects the true state of the world, then generates a false sense that these charitable self-assessments are genuine rather than positively biased (Pronin et al. 2004; Ross and Ward 1995, 1996).

When people evaluate the extent of bias in others, their assessments rely on behavior rather than on private thoughts, because the private thoughts of others are not accessible. Consequently, the biased behavior of others is not excused by an ostensibly unbiased thought process (e.g., "Joan might not realize it, but she probably thinks Rodger speaks eloquently because she is attracted to him"). Because people use different types of evidence when assessing bias in the self and in other people, less bias is perceived in the self than in others. The variety of social and cognitive biases for which this bias blind spot has been observed (Pronin et al. 2004, West et al. 2012) suggests that susceptibility to the bias blind spot may be a higher-order latent factor underlying the belief that one is less likely to exhibit a variety of specific biases than are one's peers.

Bias Blind Spot and Decision Making

The propensity to exhibit decision-making biases appears to vary systematically (Levin et al. 2002, Stanovich 1999, West and Stanovich 1997). Several studies have shown that performance across decision-making tasks tends to have high internal consistency (Blais et al. 2005; Bornstein and Zickafoose 1999; Klayman et al. 1999; Stankov and Crawford 1996, 1997; Stanovich and West 2000). Bruine de Bruin et al. (2007) demonstrated that decision-making competence, measured as composite performance on multiple decision-making tasks, reflects the outcome of reliable individual differences and predicts real-world decision-making ability.

In addition to clarifying the robustness and uniqueness of the bias blind spot, a major goal of the present research was to examine its relationship with general decision-making ability. If a single higher-order construct determines the extent to which people recognize their own bias, three possible relationships between the bias blind spot and general decision-making ability emerge.

First, people who are lowest in decision-making ability may be least aware of their own bias, and hence may be most likely to exhibit the bias blind spot. Indeed, the least skilled are often least able to assess their level of skill (Kruger and Dunning 1999, Dunning et al. 2003). If bias blind spot is simply one component of general decision-making ability, susceptibility to the bias blind spot should be negatively correlated with decision-making competence.

Second, people may accurately assess their degree of bias relative to their peers. In other words, people who believe they are less biased than their peers (those high in bias blind spot) may be correct. In this case, bias blind spot may not really reflect susceptibility to a blind spot at all, and there should be a positive correlation between bias blind spot and decision-making competence.

Third, susceptibility to the bias blind spot may be unrelated to general decision-making ability. People who have not been trained in decision making, and are therefore unaware of common biases in reasoning and judgment, show considerable variation in their decision-making competence (Bruine de Bruin et al. 2007). This suggests that superior decision making is a function of calibrated intuitions rather than awareness of appropriate decision-making strategies. Indeed, research on the limitations of introspection shows that people have limited insight into the processes by which their judgments and decisions are made (Nisbett and Wilson 1977, Wilson and Dunn 2004). Furthermore, tests comparing bias blind spot for several specific biases and the commission of those specific biases have revealed little to no relation between recognition of bias and its commission (Stanovich and West 2008, West et al. 2012).

Predictive Value of the Bias Blind Spot Scale

We suggest that the bias blind spot is weakly, if at all, related to general decision-making ability. More specifically, that the bias blind spot is a *metabias*—a bias in the recognition of other biases—that systematically biases judgment and behavior in unique and predictable ways. Rather than indicate an overly positive view of the self, it reflects the tendency to consider different evidence when making self–other accuracy comparisons. Thus, we predict that it should (a) serve as an index of bias for self–other comparisons that rely on similar cognitive mechanisms, whether those comparisons are favorable or unfavorable to the self. As an index of self–other accuracy comparisons, we suggest that bias blind spot should also influence judgments informed by these (social) comparisons such as (b) the weight placed on advice from others and (c) receptivity to debiasing training. Next, we unpack each of these predictions in turn.

A first prediction is that when evaluating their own abilities, people exhibiting more bias blind spot should exhibit more naïve realism in their initial assessments of their self (e.g., "I'm great at using a computer mouse but terrible at juggling") and less often correct those assessment for relevant information about others' abilities (e.g., "…as are most people"). Rather than simply view the self more positively, they should be more likely to exhibit biases reliant on similar cognitive mechanisms. For example, they should be more likely to exhibit a better-than-average effect when evaluating their ability to perform easy tasks, and a worse-than-average effect when evaluating their ability to perform difficult tasks (Kruger 1999).

A second prediction is that commission of bias blind spot should predict bias in judgments informed by self–other accuracy comparisons. People who think they are less vulnerable to bias than their peers, for example, may attend less to the opinions of others because they believe that others have a more biased perception of the world, consistent with the operation of naïve realism (Ross and Ward 1996, Pronin et al. 2004, Liberman et al. 2012). This should lead them to place less weight on the advice of others when given the opportunity to incorporate that advice into their own judgments.

As another example, people who think they are less vulnerable to bias than their peers should believe that their judgment and decision making is in less need of correction (Wilson and Brekke 1994). Analogous to interventions aiming to curb addiction, where awareness of the problem is a necessary first step in facilitating corrective action, awareness of bias may be an important precursor to bias mitigation (Kruger and Dunning 1999, Wilson and Brekke 1994). Consequently, greater commission of bias blind spot should reduce the likelihood of benefitting from bias-reducing interventions.

Overview of the Studies

We adopted a psychometric approach to the analysis of the bias blind spot. Our first two studies report the development of our individual-difference measure to assess the extent to which a person believes she is less biased than her peers, the evaluation of its reliability, the verification of its factorial structure, and the analysis of its discriminant validity in relationship with potentially related constructs such as intelligence, cognitive reflection, decision-making ability, and personality traits related to self-esteem, self-enhancement, and self-presentation. Our last three studies report tests of our three judgmental and behavioral predictions.

Study 1

In Study 1, we generated 27 scale items and then submitted them to a purification process resulting in a 14-item bias blind spot scale with good reliability and stability. We used an item-generation process aimed at capturing a broad sense of the construct to develop the scale. In accordance with the underlying theory (Pronin 2008), we reasoned that the bias blind spot is a metabias that is exhibited across multiple self-assessments. Therefore, we treated the bias blind spot as a latent variable that causes an asymmetry in the assessment of bias in the self and in others with respect to several biases, both in the social and cognitive domains. Accordingly, we approached the conceptualization and the operationalization of susceptibility to the bias blind spot as a reflective measurement model (Bollen and Lennox 1991, Edwards and Bagozzi 2000). That is, a model in which the direction of causality is from the construct to the indicators, and in which changes in the underlying construct are hypothesized to cause changes in the indicators. According to the proposed conceptualization, changes in individual susceptibility to the bias blind spot (i.e., a latent variable), will cause changes in the extent to the bias blind spot is observed for specific biases in judgment and behavior.

Method

Participants. *Initial Sample*. A total of 172 Amazon Mechanical Turk (AMT) workers (86 women; $M_{age} = 32.4$ years, $SD = 10.5$) accessed and completed a survey on the Internet and received $4 as compensation. In all studies we restricted participation to residents of the United States. Participation in any study reported here resulted in ineligibility for participation in subsequent studies (i.e., no person participated in more than one study). Participants were 79.7% White, 7% Black, 5.2% multiracial, 4.1% Asian, and 1.2% Native American; 2.9% did not indicate their ethnicity. AMT workers have been shown to exhibit susceptibility to biases in judgment and decision making similar to traditional college samples with respect to common tasks such as the Asian disease problem, the conjunction fallacy and outcome bias; to exhibit similar levels of risk aversion; and to exhibit similar levels of cooperation in behavioral economics games such as the prisoner's dilemma (Berinsky et al. 2012, Horton et al. 2011, Paolacci et al. 2010).

Follow-Up Sample. A total of 83 participants in the initial sample completed a follow-up survey consisting of the items in the purified scale for an additional $4 in compensation (43 women; $M_{\text{age}} = 32.7$ years, $SD = 10.0$) yielding a 52% retention rate. Participants in this subsample were 75.9% White, 9.6% Black, 7.2% Asian, 4.8% multiracial, and 1.2% Native American; 1.2% did not indicate their ethnicity. There were no differences between the initial sample and the follow-up sample in terms of age ($F = 0.05$, $p > 0.80$), gender ($\chi^2 = 1.00$, $p > 0.60$), or ethnicity ($\chi^2 = 2.41$, $p > 0.70$).

Materials. *Item Generation*. We began developing scale items by identifying existing indicators of the construct in the literature. We drew some questions from Pronin et al. (2002) verbatim, modified questions from this source, and wrote new questions with the same structure. Each question was structured so that it described a bias and asked respondents to indicate the incidence of the bias for two different targets: the self and the average American (for examples, see Table 1). Each bias was described as a psychological tendency or effect, avoiding (when possible) the use of positively connoted words or negatively connoted words such as bias or error. After reading a description of each bias, participants rated the extent to which they exhibit that bias and the extent to which the average American exhibits that bias on 7-point scales with endpoints, *not at all* (1) and *very much* (7).

Item Scoring. Bias blind spot scores were calculated by subtracting the perceived self-susceptibility to each bias from the perceived susceptibility of the average American to that bias, for each bias, and then by averaging those relative differences. For each participant, the size of the average difference between self and average American bias ratings was used as a measure of the magnitude of her bias blind spot.

Procedure. Participants rated their vulnerability and the vulnerability of the average American to commit biases on 27 unique items. Item order was random. After completing all 27 items, participants reported their age, gender, and ethnicity. To assess the test-retest reliability of the instrument, all participants in the initial sample were invited by means of the AMT messaging system to complete the purified version of the scale eight days after the initial administration.

Results

Purification. We first reduced the number of items to improve the psychometric properties of the instrument. We removed items that assessed bias blind spot by describing different occurrences of the same underlying judgmental bias. We then computed the correlations between each item and the rest of the scale, and removed items with item-to-total correlations lower than 0.40. This purification process led to a final instrument containing 14 items (see Table 1 for the full list of items).

Reliability. The 14-item scale shows high reliability ($\alpha = 0.86$), well above the acceptable threshold of 0.70 (Nunnally 1978). All items appeared to be worth retention. No question eliminations would yield a higher value of the Cronbach's alpha coefficient (α-if-item-deleted$_i < \alpha$). Of the 91 pairwise correlations between the items ($M = 0.30$), 85 were positive and significant, 3 were positive and marginally significant, and 3 were positive but not significant (ps < 0.42; see Table 2). Each item correlated well with the scale, as signaled by an average item-to-total correlation equal to 0.52. All further analyses, in this and subsequent studies, use this 14-item scale. For all 14 biases, the majority of participants rated the average American as more susceptible to bias than themselves; all ts ≥ 6.26, all ps < 0.001 (for all means, see Table 3).

Exploratory Factor Analysis. We submitted the 14 bias blind spot items to a principal-components factor analysis (PCA) followed by a parallel analysis (Horn 1965). The parallel analysis suggests an underlying single-factor structure, with only the first eigenvalue observed in the data being higher than a parallel average random eigenvalue based on the same sample size and number of variables. In the single-factor model, all 14 items load onto a single factor accounting for 35% of the total variance, and each item has a high correlation with that factor (all λs > 0.48; see Table 3).

Test-Retest Reliability. An analysis of the second administration of the scale indicated that the instrument has consistently high reliability ($\alpha = 0.88$), and high test-retest reliability ($r(81) = 0.80$, $p < 0.001$), signaling stability of the bias blind spot scale over time.

Discussion

Study 1 provided evidence for individual differences in susceptibility to the bias blind spot. High inter-item correlations and factors loadings suggest that some people have a higher susceptibility to the bias blind spot than do others across a variety of judgmental biases. The results from this first study suggest that our instrument reliably assessed individual differences in susceptibility to the bias blind spot. In addition, the instrument captures a single latent variable as proposed by our construct operationalization. Furthermore, the high test-retest reliability observed

Table 1 Scale Items and Corresponding Biases

Item	Description	Bias
1	Some people show a tendency to judge a harmful action as worse than an equally harmful inaction. For example, this tendency leads to thinking it is worse to falsely testify in court that someone is guilty, than not to testify that someone is innocent.	Action-inaction bias
2	Psychologists have claimed that some people show a tendency to do or believe a thing only because many other people believe or do that thing, to feel safer or to avoid conflict.	Bandwagon effect
3	Many psychological studies have shown that people react to counterevidence by actually strengthening their beliefs. For example, when exposed to negative evidence about their favorite political candidate, people tend to implicitly counterargue against that evidence, therefore strengthening their favorable feelings toward the candidate.	Confirmation bias
4	Psychologists have claimed that some people show a "disconfirmation" tendency in the way they evaluate research about potentially dangerous habits. That is, they are more critical and skeptical in evaluating evidence that an activity is dangerous when they engage in that activity than when they do not.	Disconfirmation bias
5	Psychologists have identified an effect called "diffusion of responsibility," where people tend not to help in an emergency situation when other people are present. This happens because as the number of bystanders increases, a bystander who sees other people standing around is less likely to interpret the incident as a problem, and also is less likely to feel individually responsible for taking action.	Diffusion of responsibility
6	Research has found that people will make irrational decisions to justify actions they have already taken. For example, when two people engage in a bidding war for an object, they can end up paying much more than the object is worth to justify the initial expenses associated with bidding.	Escalation of commitment
7	Psychologists have claimed that some people show a tendency to make "overly dispositional inferences" in the way they view victims of assault crimes. That is, they are overly inclined to view the victim's plight as one he or she brought on by carelessness, foolishness, misbehavior, or naivetë.	Fundamental attribution error
8	Psychologists have claimed that some people show a "halo" effect in the way they form impressions of attractive people. For instance, when it comes to assessing how nice, interesting, or able someone is, people tend to judge an attractive person more positively than he or she deserves.	Halo effect
9	Extensive psychological research has shown that people possess an unconscious, automatic tendency to be less generous to people of a different race than to people of their race. This tendency has been shown to affect the behavior of everyone from doctors to taxi drivers.	Ingroup favoritism
10	Psychologists have identified a tendency called the "ostrich effect," an aversion to learning about potential losses. For example, people may try to avoid bad news by ignoring it. The name comes from the common (but false) legend that ostriches bury their heads in the sand to avoid danger.	Ostrich effect
11	Many psychological studies have found that people have the tendency to underestimate the impact or the strength of another person's feelings. For example, people who have not been victims of discrimination do not really understand a victim's social suffering and the emotional effects of discrimination.	Projection bias
12	Psychologists have claimed that some people show a "self-interest" effect in the way they view political candidates. That is, people's assessments of qualifications, and their judgments about the extent to which particular candidates would pursue policies good for the American people as a whole, are influenced by their feelings about whether the candidates' policies would serve their own particular interests.	Self-interest bias
13	Psychologists have claimed that some people show a "self-serving" tendency in the way they view their academic or job performance. That is, they tend to take credit for success but deny responsibility for failure. They see their successes as the result of personal qualities, like drive or ability, but their failures as the result of external factors, like unreasonable work requirements or inadequate instructions.	Self-serving bias
14	Psychologists have argued that gender biases lead people to associate men with technology and women with housework.	Stereotyping

indicates that the individual difference tapped by our scale is stable over time.

Study 2

In Study 2, we verified the factorial structure of the bias blind spot scale that emerged in Study 1 by submitting the 14 items to a confirmatory factor analysis. Since the development of a valid and reliable measurement scale introduces the possibility to clarify the relationship between susceptibility to the bias blind spot and related constructs that compose its nomological network (Cronbach and Meehl 1955), we also tested the discriminant validity of the bias blind spot scale in relation to a set of established scales and measures assessing potentially related psychological constructs. Such comparisons determine whether individual differences in bias blind spot reflect individual differences in more basic or established personality traits.

Specifically, by using five different samples of respondents, we examined the correlations between the bias blind spot scale and measures of intelligence, inclination toward cognitive activities, and decision-making ability (i.e., SAT scores, Need for cognition, performance on the Cognitive Reflection Test, and decision-making competence), measures of personality traits related to self-esteem and self-enhancement (i.e., self-esteem, superiority, need for uniqueness, narcissism, and over-claiming tendency), self-presentation (i.e., self-monitoring, self-consciousness, and

Table 2 Correlations Between the 14 Selected Scale Items

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Action-inaction bias														
2 Bandwagon effect	0.287**													
3 Confirmation bias	0.326**	0.478**												
4 Diffusion of responsibility	0.440**	0.347**	0.331**											
5 Disconfirmation bias	0.189*	0.236**	0.347**	0.240**										
6 Escalation of commitment	0.317**	0.413**	0.253**	0.309**	0.267**									
7 Fundamental attribution error	0.268**	0.222**	0.271**	0.304**	0.061	0.216**								
8 Halo effect	0.356**	0.469**	0.328**	0.273**	0.250**	0.379**	0.331**							
9 Ingroup favoritism	0.217**	0.321**	0.371**	0.329**	0.245**	0.286**	0.352**	0.398**						
10 Ostrich effect	0.256**	0.368**	0.313**	0.359**	0.390**	0.329**	0.134	0.270**	0.238**					
11 Projection bias	0.397**	0.244**	0.237**	0.218**	0.136°	0.082	0.198**	0.362**	0.281**	0.147°				
12 Self-interest bias	0.336**	0.272**	0.358**	0.323**	0.296**	0.281**	0.249**	0.197**	0.302**	0.261**	0.228**			
13 Self-serving bias	0.383**	0.403**	0.399**	0.418**	0.357**	0.295**	0.250**	0.447**	0.300**	0.412**	0.172*	0.334**		
14 Stereotyping	0.280**	0.386**	0.233**	0.253**	0.085	0.305**	0.340**	0.426**	0.313**	0.150°	0.378**	0.311**	0.256**	

Note. Asterisks indicate significant correlations: $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\circ}p < 0.10$.

social desirability), and more general personality traits (i.e., the Big Five Inventory (BFI)).

Method

Participants. Study 2 made use of five unique samples that totaled to 661 respondents (344 women; $M_{\text{age}} = 32.6$ years, $SD = 11.2$). For each sample, the content of the questionnaire varied as described next. All participants were AMT workers residing in the United States who accessed and completed a survey on the Internet in exchange for compensation varying based on the length of the study (Sample 1: \$5; Sample 2: \$4; Sample 3: \$6; Sample 4: \$2; Sample 5: \$4). Participants were 77.0% White, 7.0% Black, 7.0% Asian, 5.1% multiracial, 1.6% Native American, and 2.4% did not indicate their ethnicity. The five samples did not differ in terms of bias blind spot scores $F < 1$.

Materials and Procedure. *Sample* 1. Participants ($n = 260$) first completed all 14 items of the bias blind spot scale in a random order. Participants then completed a series of personality scales measuring extant psychological constructs potentially related to the bias blind spot: the 10-item Rosenberg self-esteem scale (Rosenberg 1965), the need for uniqueness scale (32 items; Snyder and Fromkin 1977), the self-consciousness scale (22 items; Feingstein et al. 1975), the need for cognition scale (NFC; 18 items; Cacioppo et al. 1984), the self-monitoring scale (25 items; Snyder 1974), the superiority scale (10 items; Robbins and Patton 1985), the NPI-16 short measure of narcissism (16 items; Ames et al. 2006), and the social desirability scale (33 items; Crowne and Marlowe 1960). Each scale was administered using its original answer format and coding scheme. Both the order of the scales and the order of the items were randomized,

Table 3 Bias Blind Spot by Scale Item, Factor Loadings from Exploratory Factor Analysis, and Completely Standardized Parameters from Confirmatory Factor Analysis

	Average American		Self			Factor	Completely
Bias	*M*	*SD*	*M*	*SD*	$t(171)$	loading (EFA)	standardized parameter (CFA)
1 Action-inaction bias	5.12	1.33	3.96	1.69	9.86***	0.613	0.660
2 Bandwagon effect	5.73	1.06	3.60	1.68	15.07***	0.675	0.504
3 Confirmation bias	5.55	1.27	3.98	1.60	11.90***	0.642	0.552
4 Diffusion of responsibility	5.51	1.27	4.11	1.77	10.05***	0.613	0.564
5 Disconfirmation bias	5.31	1.17	4.48	1.52	7.31***	0.482	0.552
6 Escalation of commitment	5.36	1.13	3.57	1.67	14.28***	0.575	0.583
7 Fundamental attribution error	4.63	1.24	3.16	1.54	12.16***	0.496	0.476
8 Halo effect	5.89	1.02	4.16	1.69	12.13***	0.674	0.511
9 Ingroup favoritism	5.01	1.29	3.45	1.69	11.97***	0.598	0.599
10 Ostrich effect	5.20	1.15	4.35	1.74	6.26***	0.558	0.520
11 Projection bias	5.32	1.33	4.19	1.65	7.83***	0.477	0.476
12 Self-interest bias	5.75	1.24	4.75	1.62	8.10***	0.568	0.355
13 Self-serving bias	5.69	1.08	4.14	1.59	13.28***	0.681	0.677
14 Stereotyping	5.46	1.15	3.62	1.81	13.32***	0.579	0.490

Notes. EFA, exploratory factor analysis; CFA, confirmatory factor analysis. Asterisks indicate significant results: $^{***}p < 0.001$.

with scale items nested within scale. Participants also reported their scores on the math and verbal sections of the SAT (if they had taken the SAT). To facilitate the accuracy of participants who might have taken the test several years before, participants reported approximate SAT scores on a 12-point scale increasing in 50-point increments from 200 to 800. Last, participants reported their age, gender, ethnicity, and highest level of education completed.

Sample 2. Participants ($n = 101$) first completed all 14 items of the bias blind spot scale in a random order. They then completed the original three-item Cognitive Reflection Test (CRT; Frederick 2005) in open-ended format. Given the diffusion of the three original CRT on AMT and the ease of retrieving the solution to those three questions, participants were also administered nine additional and less common CRT questions (Frederick, personal communication) resulting in a total of 12 CRT items. Next, participants reported their scores on the math and verbal sections of the SAT if they had taken the test (as did Sample 1). Finally, participants reported their age, gender, ethnicity, and highest level of education completed.

Sample 3. Participants ($n = 100$) first completed all 14 items of the bias blind spot scale in a random order. Then they completed the Adult Decision-Making Competence inventory (A-DMC; Bruine de Bruin et al. 2007), a comprehensive instrument assessing general judgment and decision-making ability. Participants completed the six behavioral decision-making batteries of measures composing the A-DMC: *resistance to framing* (14 paired items), which measures whether value assessment is affected by irrelevant variations in problem descriptions; *recognizing social norms*, which measures how well people assess peer social norms (16 items); *under/overconfidence*, which measures how well participants recognize the extent of their own knowledge (34 items); *applying decision rules*, which asks participants to indicate, for hypothetical individual consumers using different decision rules, which products they would buy out of a choice set (10 items); *consistency in risk perception*, which measures the ability to follow probability rules (16 paired items); and *resistance to sunk costs*, which measures the ability to ignore prior investments when making decisions (10 items). These tasks measure different aspects of the decision-making process and decision-making skills, such as the ability to assess value and the ability to integrate information. Both the order of the batteries and the order of the items were randomized, with scale items nested within battery. Participants reported their scores on the math and verbal sections of the SAT if they had taken the test (as did Sample 1). Finally, participants reported their age, gender, ethnicity, and highest level of education completed.

Sample 4. Participants ($n = 102$) first completed all 14 items of the bias blind spot scale in a random order. They then completed 11 Over-Claiming Questionnaire (OCQ) batteries. In these batteries, respondents indicate their familiarity with a list of items, some of which exist (e.g., plate tectonics) and some of which do not actually exist (e.g., plates of parallax). These familiarity ratings serve as the basis for a claiming response bias index (OCQ bias) measuring self-enhancing tendencies: a statistical estimate of how strong familiarity with an item has to be for a respondent to express familiarity with it (Macmillan and Creelman 1991). The 11 batteries covered topics including rap artists, rock artists, country artists, horror movies, comedies, dramas, foreign movies, soap operas, football, world leaders, and fashion designers (Paulhus et al. 2003). Each battery included seven real items and three bogus items. Participants were asked to rate their familiarity with each item on a 7-point scale with endpoints, *not at all familiar* (0) and *very familiar* (6). Both the order of the batteries and the order of the items were randomized, with items nested within battery. Finally, participants reported their age, gender, ethnicity, and highest level of education completed.

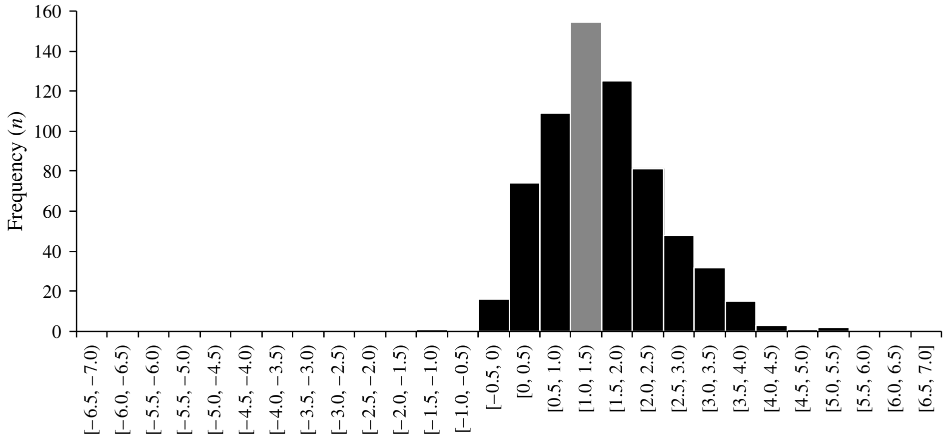
Sample 5. Participants ($n = 98$) first completed all 14 items of the bias blind spot scale in a random order. Next, participants completed a short-form (44-item) version of McCrae and Costa's (1987) BFI (John and Srivastava 1999). Participants reported their scores on the math and verbal sections of the SAT if they had taken the test (as did Sample 1). Finally, participants reported their age, gender, ethnicity, and highest level of education completed.

Results

Confirmatory Factor Analysis. To test the factorial structure that emerged in the exploratory factor analysis in Study 1, we conducted a confirmatory factor analysis on the data collected from Sample 1. We first evaluated the assumption of multivariate normality of the data that is a necessary condition for the use of maximum likelihood estimation. Toward this end, we computed Mardia's (1980) test of multivariate skewness and kurtosis. The test was significant ($\chi^2 = 299.51$, $p < 0.001$), signaling that the assumption of multivariate normality of the data was violated. As a consequence we opted for a robust maximum likelihood estimation.

The confirmatory factor analysis suggested that the single-factor model emerged in the exploratory factor analysis from Study 1 fit the data in Study 2 well, with a goodness-of-fit index of 0.93, a Bentler's comparative fit index of 0.98, a non-normed fit index of 0.97, and a root mean square error of approximation (RMSEA) of 0.05, suggesting a good fit between

Figure 1 Distribution of Bias Blind Spot Scores in Study 2



Notes. Scale ranges from 7 to −7. Scores greater than zero indicate bias blind spot. Median column is indicated by gray bar.

the model and the observed data. The factor-loading estimates are reported in Table 3 and were all significant; all ts > 5.49, all ps < 0.001.

Descriptive Statistics. To examine the distribution of susceptibility to the bias blind spot, we computed bias blind spot scores on the five samples following the same procedure as in Study 1 ($\alpha = 0.84$). Across the five samples, the distribution of the scores appeared to be positively skewed with an observed range from −1.50 to 5.14 (see Figure 1). On average, participants exhibited a significant bias blind spot ($M = 1.48$, $SD = 0.95$; significantly different from 0; $t(660) = 40.29$, $p < 0.001$). Furthermore, for each of the 14 biases that composed the bias blind spot scale, participants rated the average American as more susceptible to that bias than themselves; all Ms > 0.90, all ts$(659) > 16.85$, all ps < 0.001. At the individual level, a large majority (85.2%) of participants exhibited a significant bias blind spot across the 14 items, with the averages of their scores being marginally or significantly greater than 0; all ts$(13) > 1.79$, all ps < 0.10. Only one participant (0.1%) had an average bias blind spot score that was significantly lower than 0 ($t(13) = -2.46$, $p = 0.03$).

We then examined whether demographic variables accounted for some differences in bias blind spot scores. Gender appeared unrelated to bias blind spot, as the scores of male ($M = 1.45$, $SD = 0.95$) and female participants ($M = 1.51$, $SD = 0.95$) were not significantly different; $F < 1$. Similarly, the correlation between age and bias blind spot scores was not significant, $r = -0.04$, $p = 0.30$. Bias blind spot scores were significantly and negatively affected by level of education, following approximately a linear pattern (linear contrast: $F(1, 653) = 11.42$, $p = 0.001$).

Discriminant Validity. We next examined whether the bias blind spot scale is distinct from related constructs: (i) measures of intelligence, inclination toward cognitive activities, and decision-making ability (i.e., SAT scores, NFC, CRT, A-DMC); (ii) personality traits related to self-esteem and self-enhancement tendencies (i.e., self-esteem, superiority, need for uniqueness, narcissism, over-claiming tendency); (iii) personality traits related to self-presentation (i.e., self-monitoring, self-consciousness, and social desirability); and (iv) and general personality traits (i.e., BFI).

For each of the samples we computed bias blind spot scores (Alphas ranging between 0.82 and 0.85). For each of the constructs that were measured using multi-item scales, we computed overall average scores after reverse scoring appropriate items, and we examined the correlation of these scores with bias blind spot scores. Table 4 presents these scales and measures, their Cronbach's alpha coefficients, means, standard deviations, and their zero-order correlations with the bias blind spot scale.

Intelligence, Inclination Toward Cognitive Activities, and Decision-Making Ability. We first examined whether bias blind spot is merely a manifestation of intelligence and cognitive ability in four ways. First, we examined SAT scores, as both the verbal and math scores load highly on psychometric g or general intelligence (Brodnick and Ree 1995, Frey and Detterman 2004, Unsworth and Engle 2007). Of the 559 participants in Samples 1, 2, 3, and 5, 248 reported their SAT test scores. The correlation between bias blind spot scores and the verbal SAT scores was not significant ($r(247) = 0.10$, $p = 0.13$), whereas the correlation between bias blind spot scores and the math SAT scores ($r(247) = -0.13$, $p = 0.05$), was significant, albeit very small.

Second, we examined the correlation between bias blind spot and NFC, which refers to the extent to

Table 4 Scale Descriptive Statistics, Reliabilities, and Correlations with Bias Blind Spot (Study 2)

Construct	Sample	*M*	*SD*	α	*N*	*r*
Intelligence	1–3, 5					
SAT math		605.04	111.55	—	248	-0.13^{*}
SAT verbal		640.32	93.22	—	248	0.10
Need for cognition	1	63.65	13.21	0.93	260	0.16^{*}
Cognitive Reflection Test	2					
12 items		3.67	3.00	0.82	101	-0.23^{*}
3 original items		1.30	1.25	0.79	101	-0.19°
9 new items		2.38	2.02	0.71	101	-0.22^{*}
Decision-making competence	3					
Resistance to framing		1.45	0.54	0.58	100	0.14
Recognizing social norms		0.51	0.26	0.89	100	0.07
Under/overconfidence		0.91	0.07	0.89	100	0.06
Applying decision rules		0.77	0.16	0.50	100	0.02
Consistency in risk perception		0.75	0.15	0.71	100	0.09
Resistance to sunk costs		4.40	0.62	0.40	100	0.08
Big Five personality traits	5					
Neuroticism		24.30	5.65	0.87	98	0.06
Extraversion		22.84	7.42	0.88	98	0.03
Openness		36.62	6.81	0.85	98	0.33^{**}
Agreeableness		31.76	5.30	0.83	98	0.10
Conscientiousness		33.02	6.42	0.83	98	0.07
Self-esteem	1	19.96	6.26	0.92	260	0.15^{*}
Superiority	1	35.13	7.39	0.75	260	−0.02
Need for uniqueness	1	101.23	17.34	0.89	260	0.16^{**}
Narcissism	1	20.40	3.65	0.82	260	0.04
Over-claiming	4	0.50	0.26	0.95	102	-0.25^{*}
Self-consciousness	1					
Public		18.62	4.58	0.82	260	−0.05
Private		25.45	4.57	0.73	260	0.07
Social anxiety		16.10	5.01	0.87	260	−0.10
Self-monitoring	1	11.18	4.43	0.74	260	0.05
Social desirability	1	3.30	6.80	0.97	260	−0.05

$^{\circ}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$.

which people "engage in and enjoy effortful cognitive activities" (Cacioppo and Petty 1982, p. 1). People who are high in NFC expend more effort processing information, and perform better on arithmetic problems, anagrams, trivia tests, and college coursework (Cacioppo et al. 1996). In line with the results of West et al. (2012), we observed a small but significant and positive correlation between bias blind spot scores and need for cognition ($r(258) = 0.16$, $p = 0.01$). This significant correlation suggests that people with a high NFC tend to believe that they are less susceptible to biases than their peers.

Third, we examined whether participants with higher bias blind spot scores make more use of intuition than of deliberate reasoning by examining the correlation between bias blind spot scores and the CRT (Frederick 2005), a set of questions that each have an incorrect intuitive response and a correct response that can be reached through deliberate reasoning. We computed a composite measure of performance on the CRT by assigning a score of one to each correct answer, a score of zero to each incorrect answer, and summing all items ($M = 3.67$, $SD = 3.00$). Bias blind spot scores were significantly and negatively correlated with CRT scores ($r(99) = -0.22$, $p = 0.02$). This pattern of correlations was consistent irrespective of which CRT items were considered: all 12 items: $r = -0.23$, $p = 0.02$; the three "original" items: $r = -0.19$, $p = 0.06$; or the nine "new" items: $r = -0.22$, $p = 0.03$. Participants who believed themselves to be less vulnerable to bias than others were more likely to rely on their intuition and less likely to engage in cognitive reflection and deliberation (i.e., were less accurate).

Finally, we computed scores for each A-DMC battery as recommended by Bruine de Bruin et al.[1] (2007). Bias blind spot scores were uncorrelated with performance on all of the A-DMC batteries; all *r*s < 0.14, all *p*s > 0.18, average $r = 0.08$.

Self-Esteem and Self-Enhancement. We next examined the possibility that the bias blind spot is the manifestation of more basic perceptions of being superior to others or being different from others (e.g., Taylor and Brown 1988, Snyder and Fromkin 1980) by examining

[1] The levels of reliability for each battery reported in Table 4 are generally consistent with those reported by Bruine de Bruin et al. (2007).

the correlations between bias blind spot and superiority, self-esteem, need for uniqueness, narcissism, and over-claiming. If the domain of these constructs significantly overlaps with that of the bias blind spot, we should observe high correlations between those traits and bias blind spot scores.

The superiority scale (Robbins and Patton 1985) measures whether people believe that they are superior to others. People who believe they are superior to others may believe that they are less susceptible to cognitive and social biases than inferior others. However, perceived self-superiority did not correlate with bias blind spot scores ($r(258) = -0.02$, $p = 0.72$).

We then examined the correlation between bias blind spot and self-esteem (Rosenberg 1965), since people holding high levels of self-esteem may be more likely to see themselves as immune from bias and therefore show higher susceptibility to the bias blind spot. We found evidence for a significant and positive correlation between bias blind spot scores and self-esteem ($r(258) = 0.15$, $p = 0.02$), suggesting that people who believe they are less vulnerable to bias than their peers tend to have higher levels of self-esteem. The small size of the correlation, however, suggests that the two constructs are theoretically distinct.

We also examined the possibility that the belief that one is less vulnerable to bias than one's peers is a manifestation of a need for uniqueness (Snyder and Fromkin 1977), the desire to be dissimilar from others. The correlation between bias blind spot scores and need for uniqueness was positive and significant ($r(258) = 0.16$, $p < 0.01$). This small significant correlation suggests that people high in bias blind spot have a higher desire to distinguish themselves from others, but that the two constructs are theoretically distinct.

Finally, we examined the relationship between the bias blind spot and two different operationalizations of self-enhancement, a narcissism scale (Ames et al. 2006), and over-claiming (Paulhus 1998). Narcissism, a personality trait that involves a pervasive pattern of grandiosity, self-focus, and self-importance accompanied by preoccupation with success and demands for admiration (Morf and Rhodewalt 2001), has been used as a measure of trait self-enhancement (Paulhus 1998). The narcissism scale did not correlate with bias blind spot scores ($r(258) = 0.04$, $p = 0.49$). Over-claiming, a measure that can discriminate accuracy from self-enhancement in response patterns, was assessed by using the OCQ (Paulhus et al. 2003). We computed OCQ bias indexes, corresponding to the mean of the hit rate and the false-alarm rate for real and false OCQ items (Paulhus et al. 2003), for each battery of items, and averaged across batteries. Higher values of OCQ bias indicate lower self-enhancing tendencies, as they indicate that a higher sense of familiarity needs to be experienced in order for a respondent to claim familiarity with an item. The correlation between bias blind spot scores and OCQ bias was negative and significant, $r(101) = -0.25$, $p = 0.01$, suggesting that higher bias blind spot scores are associated with higher self-enhancing tendencies as measured by over-claiming, but that the two constructs are sufficiently discriminated.

Self-Presentation. We examined whether the bias blind spot is the manifestation of other personality traits related to self-presentation. Self-consciousness is an acute sense of self-awareness, articulated in three dimensions: private self-awareness (i.e., a tendency to introspect and examine one's inner self and feelings), public self-consciousness (i.e., a tendency to think about how the self is viewed by others), and social anxiety (i.e., a sense of apprehensiveness over being evaluated by others in a social context; Feingstein et al. 1975). We did not observe a significant correlation between bias blind spot scores and private self-awareness ($r(258) = 0.07$, $p = 0.24$), public self-consciousness ($r(258) = -0.05$, $p = 0.46$), or social anxiety ($r(258) = -0.10$, $p = 0.11$). Self-monitoring measures the extent to which one consciously employs impression management strategies in social interactions (Snyder 1974). We did not observe a significant correlation between bias blind spot scores and self-monitoring ($r(258) = 0.05$, $p = 0.40$). Lastly, we sought to test whether there was a negative correlation between bias blind spot and the tendency to answer in a way that would be viewed favorably by others (Crowne and Marlowe 1960). The correlation was negative but not significant ($r(258) = -0.05$, $p = 0.41$).

Big Five Personality Traits. Finally, we examined the correlations between bias blind spot and the Big Five personality traits (McCrae and Costa 1987). Bias blind spot scores appeared to be uncorrelated with agreeableness ($r(96) = 0.10$, $p = 0.32$), extraversion ($r(96) = 0.03$, $p = 0.80$), neuroticism ($r(96) = 0.06$, $p = 0.57$), and conscientiousness ($r(96) = 0.07$, $p = 0.49$), but moderately correlated with openness to experience ($r(96) = 0.33$, $p < 0.01$). Participants who reported significantly higher openness to experience had higher bias blind spot scores, although the moderate size of the coefficient suggests that the two constructs are sufficiently discriminated. This result was not predicted. Because open-minded thinking has been shown to correlate with superior cognitive ability in a number of domains (Stanovich and West 2007, West et al. 2008), it is possible that if people high in openness to experience have both superior cognitive ability and some awareness of that ability, they might accurately report that they are less susceptible to bias than their peers.

Discussion

Bias blind spot appears to be a latent unidimensional construct that induces people to see themselves as less biased than other people across multiple judgmental biases (i.e., a meta bias). Bias blind spot scores did not appear to be correlated with demographic variables such as gender and age, although bias blind spot decreased significantly as level of education increased. The results of Study 2 support the discriminant validity of the bias blind spot by showing that the construct is not a derivative of several potentially related constructs such as measures of intelligence and cognitive ability, decision-making ability, self-esteem and self-enhancement, self-presentation, and general personality traits. Many of the correlations between these traits and bias blind spot were not significant. Other correlations were in the low to moderate range (0.17 to 0.33; Cohen 1988), suggesting that the bias blind spot scale is assessing a distinct construct.

Most importantly, the perception that one is less vulnerable to bias than one's peers truly appears to constitute a blind spot in self-awareness. The lack of correlation with general decision-making competence suggests that susceptibility to bias blind spot (a) does not reflect generally poorer decision-making ability, and (b) does not reflect an accurate self-assessment of decision-making ability. The negative correlation observed between susceptibility to bias blind spot and CRT scores could be interpreted as supporting a positive relation to more general cognitive ability, but also lends support our suggestion that the bias blind spot is a distinct meta-bias reflected in the different consideration of evidence when making self and other assessments. In other words, people who are more likely to rely on their intuition may more biased, but also be less likely to correct their initial introspective self-assessments by considering additional evidence, such as their behavior. A more direct test of this assumption was performed in Study 3.

Study 3: Bias Blind Spot and Self-Assessment

In Study 3, we further elucidated the cognitive mechanisms underlying the bias blind spot by examining the relationship between susceptibility to the bias blind spot and the asymmetric use of evidence in another set of self–other comparisons: relative performance assessments. When evaluating their own skills and abilities relative to their peers, people tend to focus on their own capabilities and neglect the capabilities of others. Because they neglect the fact that easy activities are easy for most people and difficult activities are difficult for most people, they rate themselves as better than the average person when assessing their ability at easy activities, but as worse than the average person when assessing their ability at difficult activities (Kruger 1999).

If the bias blind spot is simply due to overly positive self-perceptions, then people high in bias blind spot should be more susceptible to the better-than-average effect, but not to the worse-than-average effect. That is, they should rate themselves as better than average for both easy and difficult activities. If susceptibility to the bias blind spot is due to greater naïve realism and confidence in initial self-assessments (e.g., "I'm great at using a computer mouse but terrible at juggling"), coupled with a failure to correct those assessment to account for other's abilities (e.g., "... as are most people"), people high in susceptibility to the bias blind spot should be more susceptible to both the better-than-average effect and the worse-than-average effect.

Method

Pretest. In a pretest, 100 AMT workers (47 women; $M_{age} = 28.6$ years, $SD = 10.4$) were presented with a list of 34 activities in an online survey and compensated $1 for participating. Included in that list were the activities used by Kruger (1999, Study 2). Participants rated the difficulty of each activity on a 9-point scale (1 = not difficult at all; 9 = very difficult). We selected the two activities rated least difficult and the two activities rated most difficult: *operating a computer mouse* ($M_{difficulty} = 1.34$, $SD = 0.84$), *copying and pasting text* ($M_{difficulty} = 1.43$, $SD = 1.13$), *programming a computer* ($M_{difficulty} = 7.58$, $SD = 2.58$), and *juggling* ($M_{difficulty} = 7.68$, $SD = 2.28$). A one-way repeated measures ANOVA accompanied by planned comparisons revealed that the two difficult activities were perceived as significantly more difficult than the two easy activities ($F(1, 99) = 1{,}105.52$, $p < 0.001$), that the two easy activities were perceived as equally easy, and that the two difficult activities were perceived as equally difficult ($Fs < 1$).

Participants. A new sample of 156 AMT workers (90 women; $M_{age} = 32.0$ years, $SD = 12.0$) received $2.50 for participating in Study 3. Participants were 79.5% White, 8.3% Black, 4.5% Asian, 3.2% multiracial, and 0.6% Native American; 3.8% did not indicate their ethnicity.

Materials and Procedure. Participants completed the 14-item bias blind spot scale in a random order. Then they rated their comparative ability on the two easy (*operating a computer mouse* and *copying and pasting text*) and on the two difficult activities (*programming a computer* and *juggling*) on 100-point scales (0 = I'm at the very bottom; 100 = I'm at the very top). Activity rating order was random. Last, participants reported their age, gender, and ethnicity.

Results and Discussion

Bias blind spot scores were computed following the procedure described in Study 1 ($\alpha = 0.83$). A mixed model analysis was used to estimate the effect of susceptibility to the bias blind spot, type of activity (easy versus difficult), and their interaction on comparative ability ratings. Since each participant assessed her ability on both the easy and the difficult activities, we let the intercept vary randomly to take into account the lack of independence between the observations. We estimated the following model:

$$CA_{ij} = \alpha_0 + \beta_1 BBS_i + \beta_2 TA_j + \beta_3 BBS_i \times TA_j + U_i + \varepsilon_{ij}$$

where CA refers to comparative ability, index i refers to participants and index j refers to the type of activity (easy versus difficult). The dependent variable was thus the average comparative ability rating expressed by each participant on easy or difficult activities. The explanatory variables were each participant's bias blind spot score (BBS_i), the type of activity (TA_j, dummy coded, with $0 = \text{easy}$, $1 = \text{difficult}$) and the interaction between these two variables, and U_i indicated each participant's random effect. Both bias blind spot scores and comparative ability ratings were standardized. Results are based on a total of 624 observations, where each observation is a comparative ability rating on an activity provided by a participant. The results revealed a significant interaction between susceptibility to the bias blind spot and type of activity (easy vs. difficult) on comparative ability assessments ($b = 0.27$, $SE = 0.06$, $t = -4.84$, $p < 0.001$). Table 5 reports the results of this estimation and the comparison of this factorial model with an alternative model that includes only the main effects.

The interaction between bias blind spot and the type of activity was further explored by conducting a simple slope analysis. Bias blind spot was associated with higher comparative ability ratings on easy activities ($\beta = 0.13$, $t = 3.19$, $p = 0.002$), and lower comparative ability ratings on difficult activities ($\beta = -0.14$, $t = -3.51$, $p < 0.001$). These results suggest that people high in susceptibility to the bias blind spot are more susceptible to both the better-than-average effect and the worse-than-average effect. These results provide further evidence that the bias blind spot is a form of egocentric cognition driven by an asymmetric consideration of evidence when evaluating the self and others, rather than by a general self-enhancement motive that induces a person to see herself as superior to her peers.

Study 4: Bias Blind Spot and Advice Taking

In Study 4, we began to examine our last set of predictions, that bias blind spot affects judgments informed by self–other accuracy comparisons. Specifically, we examined the effect of the bias blind spot on the weight given to advice from other people (Yaniv and Kleinberger 2000). If bias blind spot does influence bias in judgments reliant on self–other accuracy comparisons, people who are more susceptible to the bias blind spot should view their judgments to be more accurate than the judgments of other people, because they believe their judgments are based on more objective perceptions of the world (Pronin et al. 2004). Consequently, people high in bias blind spot should give less weight to advice received from others. They should be less likely to correct their initial (self-informed) judgments when subsequently given the opportunity to incorporate others' judgments into their own.

Method

Participants. A total of 178 AMT workers (109 women; $M_{age} = 33.8$ years, $SD = 12.2$) received \$8 for completing Study 4. Participants were 75.3% White, 6.7% Black, 6.7% multiracial, 6.2% Asian, and 1.7% Native American; 3.4% did not indicate their ethnicity.

Table 5 Regression Results for the Effects of Bias Blind Spot and Type of Activity (Easy vs. Difficult) on (Standardized) Comparative Ability Ratings (Study 3)

	Main effect model				Factorial model			
Variable	b^a	*SE*	*t*	*p*	b^a	*SE*	*t*	*p*
Intercept	0.72	0.04	19.67	<0.001	0.72	0.04	19.53	<0.001
Type Activity[b]	−1.44	0.06	−24.21	<0.001	−1.44	0.06	−25.35	<0.001
BBS[c]	0.04	0.03	1.22	0.22	0.13	0.04	3.55	<0.001
Type Activity[b] × *BBS*[c]					−0.27	0.06	−4.84	<0.001
−2 Log-likelihood	1,286.19				1,263.85			
Degrees of freedom	6				7			
Akaike information criterion	1,298.19				1,277.85			
Bayesian information criterion	1,324.81				1,308.90			
Likelihood ratio test					22.34 (1), $p < 0.001$			

[a]Unstandardized coefficients.
[b]Dummy coded.
[c]Standardized.

Materials and Procedure. Participants completed the 14-item bias blind spot scale in a random order. Next, they estimated the weight of 30 household objects (e.g., a trash can, a statue, a doll house), one at a time. For each object they were shown a color picture and were provided with the object's dimensions (length, height, and width). After making each initial weight estimate, participants were given advice in the form of the guess of another "randomly selected participant" in the study (i.e., the average estimate of two pilot participants), and were then given the opportunity to estimate the weight of the object again. Thus, participants had the option to revise their original estimate based on the advice that they received from the other participant. The order in which objects were judged was random. Finally, participants reported their age, gender, and ethnicity.

Results and Discussion

We computed bias blind spot scores following the procedure described in Study 1 ($\alpha = 0.82$). We computed the weight on advice (*WOA*) relative to each object, by computing the difference between the original estimate and the estimate made after receiving the advice of the other participant (as in Gino and Moore 2007, Gino 2008, Harvey and Fischer 1997, Yaniv 2004). *WOA* reflects how much a participant uses the advice she receives (Yaniv 2004) and is defined as

$$WOA = \frac{\textit{final estimate} - \textit{initial estimate}}{\textit{advice} - \textit{initial estimate}}.$$

WOA is equal to 0 when participants entirely discount the advice. In such a case, final estimates are equal to initial estimates, meaning that participants did not revise their estimates after receiving the advice. *WOA* is equal to 1 when participants' final estimate is equal to the advice received. In this case participants give maximum weight to the advice received. Finally, *WOA* equals a value between 0 and 1, when participants weigh both their initial estimate and the received advice positively. Following the procedure used in prior research (Gino and Moore 2007, Gino 2008, Yaniv 2004), cases in which the advice equaled the initial estimate were excluded from the analysis, since *WOA* in those cases equaled a number divided by 0, making it impossible to quantify how much a participant did or did not use the advice. For cases in which the final estimate did not fall between the initial estimate and the advice (e.g., participants provide revised estimates that are further away from the advice than initial estimates), and *WOA* was thus greater than 1, values above 1 were adjusted to 1.[2] One participant whose aggregate *WOA* score value was more than five standard deviations above the mean *WOA* score was excluded from all subsequent analyses. No other participants were excluded. Results are based on a total of 5,049 observations, each observation being the weight of an object estimated by a participant.

A mixed model analysis was used to estimate the effect of susceptibility to the bias blind spot on *WOA*. Because each participant evaluated the weight of multiple objects, we let the intercept vary randomly to take into account the lack of independence between the observations. We estimated the following model,

$$WOA_{ij} = \alpha_0 + b_1 BBS_i + U_i + \varepsilon_{ij},$$

where index i referred to participants and index j refers to objects. The dependent variable was thus the value for *WOA* for each participant and for each object. The explanatory variable was each participant's bias blind spot score (BBS_i), and U_i indicated each participant's random effect. The results revealed a significant and negative effect of susceptibility to the bias blind spot on *WOA* ($b_1 = -0.03$, $SE = 0.01$, $t = -3.23$, $p = 0.001$). On average, participants with bias blind spot scores one standard deviation below the mean placed six percent more weight on the advice of others than participants with bias blind spot scores one standard deviation above the mean ($WOA = 0.223$ vs. $WOA = 0.164$).

This analysis was complemented by the estimation of a logit mixed model that examined the relationship between bias blind spot scores and the rate at which participants completely ignored advice ($WOA = 0$). We estimated the following model:

$$NO\_WOA_{ij} = \alpha_0 + b_1 BBS_i + U_i + \varepsilon_{ij},$$

where index i referred to participants and index j refers to objects. The dependent variable was a dummy variable that indicates the complete ignorance of advice (i.e., $D = 1$ when $WOA = 0$; $D = 0$ otherwise) for each participant and for each object. The explanatory variable was each participant's bias blind spot score (BBS_i), and U_i indicated each participant's random effect. Consistent with the previous model, the results revealed a significant and positive effect of susceptibility to the bias blind spot on the likelihood of completely ignoring advice ($b_1 = 0.104$, $SE = 0.044$, $z = 2.34$, $p = 0.02$). Susceptibility to the bias blind spot increased participants' likelihood of confirming their initial estimate and completely neglecting advice.

In short, participants who exhibited high levels of bias blind spot were more likely to ignore the advice provided, whereas participants who exhibited low levels of bias blind spot weighed the advice more heavily. These results are consistent with the results of Liberman et al. (2012), who showed that naïve

[2] We estimated the same model on *WOA* scores that were not subject to this recommended adjustment, and the effect of susceptibility to the bias blind spot is even stronger: $b_1 = -0.05$, $SE = 0.01$, $t = 3.65$, $p < 0.001$.

realism, by making people believe that their own perceptions of the world are objective, leads them to underweight the input of their peers. Our results extend those by Liberman et al. (2012) by showing how individual differences in susceptibility to the bias blind spot significantly affect the extent to which people incorporate others' advice in their judgments. Furthermore, our results provide additional evidence in support of the role of naïve realism as the process underlying the bias blind spot (Pronin et al. 2004).

Study 5: Bias Blind Spot and Bias Reduction

In Study 5, we expanded our analysis of bias blind spot to see whether people characterized by higher susceptibility to the bias blind spot are more resistant to debiasing procedures. There is little evidence that people who are more aware of their own biases are better able to overcome them. West et al. (2012) examined the effect of the bias blind spot on the incidence of six cognitive biases, and observed no evidence that people characterized by lower bias blind spot scores were less likely to commit bias. A relationship between bias blind spot and decision-making ability might emerge, however, after an intervention aimed at reducing bias.

We predicted that the perception that one is less vulnerable to bias than others may constitute a barrier to the activation of corrective strategies aimed at avoiding bias (Wilson and Brekke 1994). This barrier may prevent people who believe that others are more susceptible to bias from actively responding to training procedures designed to correct biased judgments. In order to test this prediction, we had participants read an article designed to increase awareness of the occurrence of a specific bias, the fundamental attribution error (FAE) that also suggested how to mitigate that bias. We predicted that susceptibility to the bias blind spot would moderate the effect of this debiasing training on subsequent commission of the FAE.

Method

Participants. A total of 297 AMT workers (170 women; $M_{age} = 31.7$ years, $SD = 10.7$) completed an online survey and received $2 for their participation. Participants were 76.4% White, 7.4% multiracial, 6.4% Black, 5.7% Asian, and 1.0% Native American; 3.0% did not indicate their ethnicity.

Procedure. Participants completed the 14-item bias blind spot scale with items in random order. Next, participants were randomly assigned to one of two conditions: debiasing training or control. Participants assigned to the debiasing training condition read an explanatory article about the FAE, a tendency to overestimate the impact of individual dispositions on behaviors whereas underestimating the impact of situational variables (Jones and Harris 1967). The article described the existence of the FAE, provided examples of its occurrence, and explained how one might correct the bias (see the section "debiasing training" in the appendix). Participants assigned to the control condition read an article of equal length reporting the results of a research study on trust (see the section "control training" in the appendix). All participants then answered nine questions designed to test the occurrence of the FAE in judgments inspired by existing paradigms, in a random order (Jones and Harris 1967, Snyder and Frankel 1976, Scopelliti et al. 2015). Finally, participants reported their age, gender, and ethnicity.

Results and Discussion

Bias blind spot scores were computed following the procedure described in Study 1 ($\alpha = 0.80$). Answers to the nine FAE questions were highly correlated with one another ($\alpha = 0.80$). We summed the number of questions in which participants exhibited the FAE that served as our primary dependent variable ($M = 4.17$, $SD = 2.73$). The FAE scores were neither normally distributed, nor could be normalized by log transformation. Therefore we estimated a Poisson regression, appropriate to model count dependent variables that have only non-negative integer values.

We predicted that the debiasing training would reduce the incidence of bias more for participants who were less susceptible to the bias blind spot. This prediction was tested using the procedures outlined by Aiken and West (1991) to decompose the predicted interaction using regression analysis. First, bias blind spot scores were mean-centered by subtracting the mean bias blind spot score from all observations. Second, we created the interaction term of (dummy-coded) training factor (debiasing vs. control) by (mean-centered) bias blind spot score. Next, the FAE scores were regressed on the training factor (debiasing vs. control), bias blind spot scores, and the interaction between these two variables.

The analysis revealed a significant interaction between training and susceptibility to the bias blind spot ($\chi^2(1) = 4.73$, $p = 0.03$). To shed light on the nature of this interaction, we conducted a floodlight analysis (Spiller et al. 2013) estimating the marginal effect of training on commission of the FAE at all levels of susceptibility to the bias blind spot. Table 6 reports the results of this estimation and the comparison of this factorial model with an alternative model that includes only the main effects. We used the Johnson-Neyman technique to identify the range of bias blind spot scores for which the effect of the debiasing training was significant. This analysis revealed that there was a significant positive effect of debiasing training

Table 6 Poisson Regression Results for the Effects of Bias Blind Spot and Type of Training on Fundamental Attribution Error Commission (Study 5)

	Main effect model				Factorial model			
Variable	b[a]	*SE*	Wald χ^2	*p*	b[a]	*SE*	Wald χ^2	*p*
Intercept	1.71	0.06	819.41	<0.001	1.81	0.07	605.62	<0.001
Type of Training[b]	−0.36	0.06	39.27	<0.001	−0.57	0.11	26.20	<0.001
BBS[c]	−0.08	0.03	5.87	0.02	−0.15	0.05	10.48	<0.001
Type Training[b] × *BBS*[c]					0.15	0.07	4.73	0.03
−2 Log-likelihood	1,471.535				1,466.813			
Degrees of freedom	4.000				3			
Akaike information criterion	1,477.535				1,474.813			
Bayesian information criterion	1,488.617				1,489.588			
Likelihood ratio test					4.72 (1), $p = 0.03$			

[a]Unstandardized coefficients.
[b]Dummy coded.
[c]Mean centered.

on reducing FAE commission for bias blind spot scores lower than 2.55 (original scale) ($\chi^2(1) = 3.87$, $p = 0.05$), but not for bias blind spot scores higher than 2.55.

The effect of a training procedure designed to reduce commission of the FAE was stronger for participants with a lower susceptibility to the bias blind spot than for participants with a higher susceptibility to the bias blind spot. The results suggest that high susceptibility to the bias blind spot may constitute a barrier to bias reduction.

General Discussion

The foregoing studies provide an in-depth portrait of the bias blind spot. We found that the tendency for people to be better able to identify bias in the judgments and behaviors of others than in their own judgment and behavior is captured by a single latent factor, and that there is substantial individual variation in susceptibility to this meta-bias. Using a psychometric approach, we developed and validated an instrument to measure individual differences in susceptibility to the bias blind spot. We found that the bias blind spot is discriminated from intelligence, cognitive ability, cognitive reflection, and personality traits related to self-esteem, self-enhancement, and self-presentation. Moreover, the bias blind spot does not appear to be a facet of general decision-making ability or an accurate perception of the extent to which one is biased. Rather, susceptibility to the bias blind spot appears to be a true blind spot in self-awareness, because of asymmetric consideration of evidence when assessing the self and other people.

Susceptibility to bias blind spot appears to predict at least two kinds of bias in social judgment. First, bias blind spot predicts the extent to which people exhibit biases reliant on similar cognitive mechanisms, namely the consideration of different evidence in self–other comparisons. Participants higher in susceptibility to bias blind spot were more likely to ignore the abilities of others when judging their own abilities, resulting in a greater propensity to believe that they were better than average on easy tasks and worse than average on difficult tasks than their peers (Study 3). Second, bias blind spot predicts bias in judgments reliant on self–other accuracy comparisons. It predicted the extent to which people ignored the advice of others, as participants high in bias blind spot placed less weight on advice than did participants low in bias blind spot (Study 4). Susceptibility to the bias blind spot was also associated with reduced responsiveness to training designed to reduce the incidence of a different judgmental bias (Study 5).

Consequences and Implications of the Bias Blind Spot

The identification of individual differences in susceptibility to the bias blind spot has important implications for the incidence of bias and the improvement of judgment and decision making. As we have demonstrated, awareness of one's vulnerability to bias is an important antecedent of openness to advice that in turn affects decision quality. Research maintains that integrating advice from external sources improves decision making (Larrick and Soll 2006, Johnson et al. 2001, Budescu and Rantilla 2000, Yaniv 2004; see Bonaccio and Dalal 2006 for a review). People high in bias blind spot, for example, may be particularly likely to ignore the advice of peers or experts when engaging in financial or medical decision making and require alternative forms of guidance to improve the quality of their decisions.

Second, awareness of one's susceptibility to bias blind spot appears to be an important indicator of receptivity to efforts to improve one's decision making. Indeed, Wilson and Brekke (1994) suggest that a critical impediment to the correction of the contaminating influence of biases on judgment is people's lack of humility about their vulnerability to bias. When people are unaware of their bias, they are unlikely to adopt corrective strategies to avoid the sources of bias that influence their judgment. Consequently, people who are more susceptible to bias blind spot are less prone to improve their decision making by engaging in bias reduction strategies, responding to training, and taking advice. Consequently they may need more persuasion or evidence that their decision making is subject to error to acknowledge their potential for bias.

Our results corroborate this view by showing that people who believe that they are relatively immune to bias are less likely to enact corrective strategies, even when correcting strategies are explained and explicitly suggested. In the work place, the results suggest that employees high in bias blind spot may be less receptive to training designed to improve their decision making, and may need more or different kinds of training. At home, the results suggest that people high in bias blind spot may need more or different forms of guidance to improve their ability to make consequential decisions affecting their personal life. It has been proposed that decision making may be a teachable skill (Baron and Brown 1991, Bruine de Bruin et al. 2007, Fischhoff 1982, Larrick 2004), and correlational evidence has suggested that people who have received formal training in decision making may obtain better life outcomes (Larrick et al. 1993). If so, then the bias blind spot represents an obstacle to improving the quality of both work and life because it bolsters resistance to debiasing training aimed at improving decision-making ability. This influence is not irrevocable. We have found that propensity to exhibit bias blind spot can be reduced by as much as 39% in a related research program consisting of scenarios in which participants could exhibit bias blind spot and were then provided with critical feedback and training (Symborski et al. 2014).

Third, some have argued that the bias blind spot is a critical determinant of misunderstanding, mistrust, and pessimism when attempting to reach agreements in interpersonal, political and professional relationships as it obstructs the resolution of conflicts (Pronin et al. 2004), and have highlighted the importance of mitigating bias blind spot to promote dialogue, diplomacy, and peace processes (Pronin et al. 2004). Pronin et al. (2006), for example, elucidated the consequences of perceiving others as more biased than oneself in the context of terrorism. When terrorists were depicted as biased and irrational rather than objective and rational, people indicated a greater preference for a military over a diplomatic resolution to a conflict, which is likely to result in a spiral of conflict escalation. Assessing individual differences in bias blind spot may help predict the likelihood of interpersonal conflict, misunderstanding, and the need for dispute resolution. For example, high susceptibility to the bias blind spot may exacerbate the perception of the gap between antagonists in a controversy (i.e., false polarization, Robinson et al. 1995, Pronin et al. 2002). People high in bias blind spot, being more likely to believe that their view is correct, may be less likely to take the necessary steps to arrive at an agreement. More generally, susceptibility to the bias blind spot is likely to predict problematic interpersonal interactions when those interactions require one to acknowledge the potential for bias or error in one's own thinking and reasoning.

Limitations and Directions for Future Research

Of course, the present research is not without its own limitations. We relied upon samples drawn from AMT that are not representative samples. Fortunately, AMT samples have been shown to exhibit vulnerability to biases in judgment and decision making similar to traditional college samples (Berinsky et al. 2012, Horton et al. 2011, Paolacci et al. 2010). We thus expect that the results should generalize to other samples.

In the discriminant validity testing conducted in Study 2, we collected measures to test multiple relationships within the same sample (Sample 1). Most of the correlation coefficients computed on this sample were not significant, but we did observe three small significant correlations. Considering the fact that these significant correlations were obtained within a larger set of multiple comparisons, it is possible that their significance level is inflated. We have refrained from drawing strong inferences from those results.

Although our discriminant validity test shows how the bias blind spot is distinct from and independent of several other constructs, in Studies 3–5 we did not pit our scale against other potential predictors of the judgments and behaviors investigated. Our choice not to include measures for which we would expect to find null results was driven by the tradeoff between ruling out a potential alternative and using a lengthier study likely to induce participant fatigue and at an additional cost. Future research may compare the predictive power of the bias blind spot scale with that of other traits and biases.

Conclusion

We find that bias blind spot is a latent factor in self-assessments of relative vulnerability to bias. This meta-bias affected the majority of participants in our samples, but exhibited considerable variance across participants. We present a concise, reliable, and valid measure of individual differences in bias blind spot that has the ability to predict related biases in self-assessment, advice taking, and responsiveness to bias reduction training. Given the influence of bias blind spot on consequential judgments and decisions, as well as receptivity to training, this measure may prove useful across a broad range of domains such as personnel assessment, information analysis, negotiation, consumer decision making, and education.

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Appendix. Fundamental Attribution Error Training

Debiasing Training
Please read the following:

A mistake in judgment that people often make is underestimating how much a situation can determine someone's behavior. This error occurs when we think another person's action tell us something meaningful about their personality when instead anyone placed in their shoes would have acted the same way. For example, one might see people in anxiety-inducing situations (e.g., bungee jumping for the first time), and infer that they are anxious people in general, rather than infer that they are average people in a nerve-racking situation. Similarly, one may think that an author paid to write in favor of a political leader has actually a favorable opinion of that political leader.

To combat this error, we have to acknowledge the importance of situations in determining behavior.

Control Training
Please read the following:

Our decisions to trust people with our money are based more on how they look then how they behave, according to a new study. Researchers found people are more likely to invest money in someone whose face is generally perceived as trustworthy, even when they are given negative information about this person's reputation.

The researchers found that 13 out of 15 participants invested more, on average, in the trustworthy identities. In a second experiment, the researchers gave the volunteers information about whether the trustees had good or bad histories. Even with this inside information, the average amount invested in those who looked "trustworthy" was 6% higher.

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