Judgment and Decision Making, Vol. 16, No. 6, November 2021, pp. 1392–1412

Agency and self-other asymmetries in perceived bias and shortcomings: Replications of the Bias Blind Spot and link to free will beliefs

Subramanya Prasad Chandrashekar* Siu Kit Yeung† Ka Chai Yau†

Chung Yee Cheung‡ Tanay Kulbhushan Agarwal‡

Cho Yan Joan Wong‡ Tanishka Pillai‡ Thea Natasha Thirlwell‡

Wing Nam Leung‡ Colman Tse‡ Yan Tung Li‡ Bo Ley Cheng§

Hill Yan Cedar Chan§ Gilad Feldman¶§

Abstract

Bias Blind Spot (BBS) is the phenomenon that people tend to perceive themselves as less susceptible to biases than others. In three pre-registered experiments (overall N = 969), we replicated two experiments of the first demonstration of the phenomenon by Pronin et al. (2002). We found support of the BBS hypotheses, with effects in line with findings in the original study: Participants rated themselves as less susceptible to biases than others (d = –1.00 [–1.33, –0.67]). Deviating from the original, we found an unexpected effect that participants rated themselves as having fewer shortcomings (d = –0.34 [–0.46, –0.23]), though there was support for the target's main premise that BBS was stronger for biases than for shortcomings (d = –0.43 [–0.56, –0.29]). Extending the replications, we found that beliefs in own free will were positively associated with BBS (r ~ 0.17–0.22) and that beliefs in both own and general free will were positively associated with self-other asymmetry related to personal shortcomings (r ~ 0.16–0.24). Materials, datasets, and code are available on https://osf.io/3df5s/.

Keywords: bias blind spot, bias, free-will beliefs, replication, self-other asymmetries

*Lee Shau Kee School of Business and Administration, Hong Kong Metropolitan University. ORCID: 0000-0002-8599-9241

†Joint first author. Department of Psychology, University of Hong Kong, Hong Kong SAR.

‡Joint fourth author. Department of Psychology, University of Hong Kong, Hong Kong SAR.

§Department of Psychology, University of Hong Kong, Hong Kong SAR.

¶Corresponding author. Email: gfeldman@hku.hk. ORCID: 0000-0003-2812-6599

1 Introduction

There is a wealth of evidence that human judgment is often affected by motivational and cognitive factors (Kunda, 1990; Nisbett & Ross, 1980). For example, people often rate themselves as being better than average (Dunning et al., 1989), and attribute failure to uncontrollable external factors while claiming credit for success (Miller & Ross, 1975). In light of this, researchers have further sought to understand whether people are aware of their susceptibility to such biases, and demonstrated that self-assessments of one's own bias are often biased as well.

Bias blind spot (BBS) is the phenomenon that people perceive themselves to be less susceptible to biases than others. Research on BBS builds on previous work on actor-observer attributions documenting people's asymmetrical perceptions of themselves compared to others (Jones & Nisbett, 1972; Pronin et al., 2004), and it would seem that these misalignments extend to differing perceptions of one's own biases compared to those of others.

BBS holds important practical implications. Doctors view themselves as being immune to the impact of gifts from pharmaceutical industry representatives on their own judgments, while perceiving their peers' judgments to be strongly affected (Dana & Loewenstein, 2003). The illusion of objectivity associated with BBS has also been linked with discrimination in hiring (Uhlmann & Cohen, 2007).

If people are to improve their decision-making and overcome biases, they must first be able to recognize and understand their own biases (Hansen et al., 2014). Yet, BBS suggests that recognizing one's own biases is a tricky challenge, because people's understanding of their own biases is influenced by the very same biases they aim to better understand, thereby resulting in an ironic "blind spot".

We begin by introducing the literature on the BBS and the chosen article for replication, discussing the motivations for the current replication study. We then introduce free-will beliefs as a suggested extension and hypothesize about the relationship between free will beliefs and the bias blind spot effect.

1.1 Bias Blind Spot: Theoretical mechanisms

Bias blind spot has been theorized to be a result of the three possible sources: introspection illusion, naïve realism, and self-enhancement motives (Pronin & Kugler, 2007).

The introspection illusion (Nisbett & Wilson, 1977) is people's tendency to place more confidence in introspective information that they can access directly (Ross & Ward, 1996). People use introspection to access their own intentions, emotions, thoughts, and salient attitudes when seeking to understand and explain their own behaviors. Yet, when aiming

Subramanya Prasad Chandrashekar would like to thank Institute of International Business and Governance (IIBG), established with the substantial support of a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (UGC/IDS 16/17), for itssupport.

to understand and explain others' behaviors, others' thoughts and feelings are not directly accessible and inferences are considered unreliable. People must resort to focusing merely on evaluating others based on their behaviors, which leads to differences in how people perceive their own behavior and decision-making process compared to how they perceive others' (Nisbett & Ross, 1980). Many such biases in self-other perceptions have been documented over the years. For example, the widely discussed classic actor-observer bias (Jones & Nisbett, 1972) is the perception that others' behaviors reflect stable personality dispositions rather than contextual factors (Jones, 1990).

Naïve realism (Ross & Ward, 1995) describes people's tendency to believe that their own perceptions of the world are more objective and accurate than others'. Because one's own thoughts, attitudes, and beliefs come to mind readily and easily, they also appear to be devoid of subjective distortions. As a result, people can fairly easily detect subjectivity in others, yet fail to detect subjectivity in themselves (Pronin, 2007; Pronin et al., 2004; Ross & Ward, 1995; Wilson & Dunn, 2004). Biases are often considered a deviation from rational objectivity, and it therefore follows that people would perceive themselves as being less biased than others.

Finally, people tend to construe reality in a way that would make for more positive self-evaluations. Biases are commonly perceived as sub-optimal, often referred to as being "irrational", and so to maintain a positive self-image of being rational and objective, people would need to view themselves as being less biased (Pronin & Kugler, 2007). Ironically, they also resist revising their views about being biased, and persist in their biased perceptions even after having been made aware of their biases (Ehrlinger et al., 2005; Pronin, 2007).

Following the recent developments in psychological science and the growing recognition of the importance of reproducibility and replicability (e.g., Brandt et al., 2014; Open Science Collaboration, 2015; Van't Veer & Giner-Sorolla, 2016; Zwaan et al., 2018), we aimed to revisit the classic work on the BBS with independent replications. Very close direct pre-registered replications are needed to assess previous claims and obtain an accurate estimate of the effect size. We therefore embarked on a series of pre-registered close replications of Pronin et al.'s (2002) work, with added extensions to further our understanding of the phenomenon. Pronin et al. (2002) provided the first demonstration of the effect by examining people's ratings of susceptibility to common biases in themselves and in others, and showed that people tend to perceive themselves as being less biased, even when being made aware of their potential bias.

We conducted very close replications and extensions of Pronin et al. (2002) to revisit their original findings. We reproduced their materials, addressed and improved their methods and analysis, and examined new directions. Replications contribute to theory specification and form the basis of further theory development (Glöckner & Betsch, 2011).

1.2 Choice of target article: Pronin et al. (2002)

We chose Pronin et al.'s (2002) studies for replication for their importance to the self-other asymmetry literature. Specifically, Pronin et al. (2002) found empirical evidence for the view that the sources of BBS are not restricted to self-serving motives. The findings emphasize the primary role of the introspection illusion and naïve realism on BBS effects. The article has had a significant impact on research in social psychology and judgment and decision-making. At the time of writing (March 2021), Google Scholar indicated 1129 citations of the article, laying ground to broader theories about human sense-making and objectivity (Pronin, 2007; Pronin et al., 2004). More recent theoretical assertions from Scopelliti et al. (2015) claim the BBS effect is a meta-bias that can be measured at the individual level. To the best of our knowledge, there are no published direct replications of Pronin et al. (2002).

Given the significance of Pronin et al.'s (2002) work, it is important to ascertain the replicability of the findings using high powered samples. Across the four studies reported in the original paper, the sample size ranged from 24 to 91, with an average sample size of 55 per study. Pronin et al. (2002) specifically argued that people's introspection fails to detect unconscious processes involved in biases, whereas people's introspection regarding own personal shortcomings — such as the tendency to procrastinate, the fear of public speaking, and the planning fallacy — are more visible and more accessible. Based on this argument, the authors predicted that the self-versus-others asymmetry is larger for biases than for personal shortcomings. Study 1 Survey 2 of Pronin et al. (2002) found empirical support for the view that people rate themselves, compared with others, to be less susceptible to biases, whereas there was no support for self-other asymmetry in ratings of personal shortcomings. Authors interpreted the findings as the demonstration of the stronger role of introspective illusions on BBS. The argument was that introspection may work to reduce self-other asymmetry in personal shortcomings, because shortcomings are more readily accessible and easier to contemplate than cognitive biases. However, it is possible that the original studies reported the lack of significant self-other differences in ratings on susceptibility to shortcomings because of the underpowered samples. Similarly, the same issues with power may have been the reason why they were able to detect the hypothesized effect in only four of the eight self-serving bias items tested. One of the goals of the current replication was to test the replicability of the BBS effects reported in Pronin et al. (2002) with high-powered samples.

In the current replication, we also respond to recent calls for the empirical testing of theories in non-Western populations. Scholars note that the psychology literature is lopsided, with 80% of study participants in psychology coming from Western, educated, industrialized, rich and democratic (WEIRD) societies (Henrich et al., 2010). Here, we also tested the replicability of the BBS effect among Hong Kong participants.

1.3 Extension: Free will beliefs and differences in self-other attributions

We extended our replication and literature on the BBS to examine associations with individual differences. So far, there is little work examining individual differences as predictors of BBS, although one example is by West et al. (2012) who reported failing to find support for associations between cognitive ability and sophistication and the BBS. We were specifically interested in possible associations with free will beliefs as laybeliefs regarding self-regulation and own choice and control (Baumeister & Monroe, 2014).

Belief in free will is the generalized belief that human behavior is free from internal and external constraints across situations (Feldman, 2017; Monroe & Malle, 2014). Studies on the folk understanding of free will found that people normally associate free will with having choice, and understand free will as the absence of internal and external constraints (Baumeister, 2008; Feldman et al., 2014; Monroe et al., 2014; Monroe & Malle, 2010; Vonasch et al., 2018). Free will beliefs have been found to be associated with a range of behavioral and psychological factors, such as academic and job performance (Feldman et al., 2016; Stillman et al., 2010), job satisfaction (Feldman et al., 2018), cooperation (Protzko et al., 2016), and well-being and meaning in life (Crescioni et al., 2016).

How would the concept of free-will relate to biases? First, by definition, people have limited to no control over their own biases, and these seem to mostly occur to regardless of one's own choice, affecting individuals without their awareness. Therefore, stronger beliefs in one's capacity to choose one's path are likely to be associated with perceiving oneself as less biased.

Second, free will beliefs have been linked with counterfactual thinking (Alquist et al., 2015; Fillon et al., 2021), reflecting stronger introspection, which could contribute to learning to avoid similar mistakes in the future (Feldman et al., 2016). If that is the case, stronger self-reflection associated with stronger free will beliefs may indicate that the accentuated introspection illusion underlies the bias blind spot.

Third, in a previous study by Pronin and colleague about free will attributions, they demonstrated that "people believe they have more free-will than others" (Pronin & Kugler, 2010). They explained their findings as a new take on the actor-observer bias, arguing that people perceive others' behavior as more constrained (stable and unchanging personalities, hindering free will), whereas they tend to view their own behavior as intentional and reflective (responsive to situations, adaptive, and changing).

Fourth, free will beliefs were found to be associated with an overestimation of the influence of internal (dispositional and fixed) factors as compared to external (varying and adaptable) factors when evaluating others' behavior (Genschow et al., 2017).

Therefore, we explored the possibility that belief in free will would be positively related to the BBS.

We note that we did not pre-register a priori predictions regarding associations between free will beliefs and the bias blind spot regarding susceptibility to biases. Our predictions

focused on self-other differences in personal shortcomings. Given the link between free will and differences in attributions when comparing oneself and others, stronger beliefs in one's choice and in control over one's own actions are likely to be associated with the perception that one's own shortcomings are freely chosen, and less of a flaw. In comparison, stronger free will beliefs are also likely to be associated with the view that others' shortcomings are a result of their dispositions, and therefore are more enduring flaws. Combined, these two possibilities are suggestive of a positive relationship between free will beliefs and self-other differences regarding personal shortcomings.

1.4 Chosen studies for replication: Studies 1 and 2

Our target article for replication, Pronin et al. (2002), consisted of three experiments, and of those we chose to focus on Studies 1 and 2.

In Study 1, participants separately rated their own and the average American's susceptibility to eight biases and three personal shortcomings. Pronin et al. (2002) proposed and found support for three hypotheses: 1) participants rate themselves as less susceptible to biases than others, 2) there are no self-other differences detected for ratings of personal shortcomings (null hypothesis), and, therefore, 3) self-other differences are larger for biases than for shortcomings.

In Study 2, participants compared themselves to others on six personality dimensions, three positive and three negative. Findings were in support of the better than average effect, with participants rating themselves higher on the positive personality dimensions and lower on negative ones, in comparison to others. In support of the bias blind spot, a large majority of participants who exhibited the better than average bias insisted that their ratings were accurate or too modest, even after reading about the better than average effect and their potential bias.

2 Method

2.1 Pre-registrations and open data/code

In each of the replication studies, we first pre-registered the experiment on the Open Science Framework (OSF), and data collection was launched within one week of registration. Pre-registrations, disclosures, power analyses, and all materials are available in the Supplementary Materials. These, together with datasets and R/RMarkdown code, were made available on the OSF at https://osf.io/3df5s/. All measures, manipulations, and exclusions for this investigation are reported, and data collection was completed before analyses. Pre-registrations are all available on the OSF: Study 1a — https://osf.io/f4rb6/; Study 1b — https://osf.io/tez7m/; Study 2 — https://osf.io/4m35x/; Study 3 — https://osf.io/kqatx/.

2.2 Data collections

The present investigation included three data collections. We summarized an overview of the three studies in Table 1.

TABLE 1: Summary of studies.

#	N	Sample	Effect tested	Measures
1	45	rgraduate students from HK	Bias blind spot	Pronin et al. (2002)
	43	Undergraduate students from HK	Better than average effect	Pronin et al. (2002)
2	310	MTurk participants from the USA	Bias blind spot	Pronin et al. (2002)
			Better than average effect	Pronin et al. (2002)
			Extension: Belief in free will	Free Will Inventory (FWI) and Free Will and Determinism (FAD)
3	621	MTurk participants from the USA	Bias blind spot	Pronin et al. (2002)
			Better than average effect	Pronin et al. (2002)
			Extension: Belief in free will	Free Will Inventory (FWI), Free Will and Determinism (FAD), and Free will and Determinism plus scale (FAD+)

Studies 1a and 1b were meant as a pre-test of the effects in an undergraduate class covering topics of open science and social psychology, and were designed to replicate the bias blind spot (BBS) effect (Study 1 Survey 2) and the better than average effect (BAE) (Study 2), reported in the target study.

Study 2 was a separate replication of the BBS effect, designed by a different replication team, and with a larger, well-powered sample of different demographics. The data collection for Study 2 was conducted separately within two weeks of the data collection for Studies 1a/b.

In light of findings from the first two studies, a year later we followed up with a third data collection. Study 3 aimed to replicate and extend the findings, especially regarding the free will beliefs extensions proposed and tested in Study 2, using an even larger sample that would allow for detecting smaller effects. Also, in Study 3 we tested for replicability of both BBS and BAE reported in the target article.

We briefly introduce the studies below, and detailed procedures for each of the three studies are reported in the Supplementary Materials.

2.3 Study 1a and Study 1b

Undergraduate students taking a social psychology class at the University of Hong Kong designed the replication studies, and were invited to take part in their classmates' studies as participants. A total of 75 students enrolled in the class were invited to participate, and of those 49 undergraduate students chose to take part in the online survey. Of those, we excluded four students who designed Study 1a and six other students who designed Study 1b, resulting in a sample of 45 for Study 1a (M_{age} = 20.20, SD = 0.99; 31 females) and 43 for Study 1b (M_{age} = 20.23, SD = 1.04; 32 females).

Participants in Study 1a were presented with descriptions of eight biases and three personal shortcomings in randomized order: self-serving attributions for success or failures, dissonance reduction after free choice, positive halo effect, biased assimilation of new information, reactive devaluation of proposal from one's negotiation counterparts, perceptions of hostile media bias toward one's group or cause, the fundamental attribution error, self-interest, procrastination, fear of public speaking, and the planning fallacy. Full descriptions are detailed in the Supplementary Materials. For each of the descriptions, participants rated their own susceptibility (biases: α = 0.58; personal shortcomings: α = 0.71) and perceived susceptibility of the average student at the university (biases: α = 0.73; personal shortcomings: α = 0.58). Participants responded to the following: "Indicate to what extent you believe that [you/others] show this effect or tendency?" on a nine-point scale (1 = *not at all*; 5 = *somewhat*; 9 = *strongly*).

Participants in Study 1b were presented with three positive and three negative personality traits in randomized order. The positive personality dimensions assessed were dependability, objectivity, and consideration (α = 0.30). The negative personality dimensions assessed were snobbery, deceptiveness, and selfishness (α = 0.60). The ratings were made on a 9-point scale (1 = *much lower than the average student*; 5 = *same as the average student*; 9 = *much higher than the average student*).

After rating their personalities, participants were briefed about the better than average effect and asked to reassess their personalities (1 - *Objective measures would rate me lower on positive characteristics and higher on negative characteristics than I rated myself*; 2 - *Objective measures would rate me neither more positively nor more negatively than I rated myself*; 3 - *Objective measures would rate me higher on positive characteristics and lower on negative characteristics than I rated myself*).

2.4 Study 2

A total of 310 American Amazon Mechanical Turk (MTurk) participants completed the study using TurkPrime.com (Litman et al., 2017). Of those, seven participants were excluded based on pre-registered exclusion criteria[1], leaving 303 participants included in the analysis

[1]We excluded 7 participants based on pre-registered criteria: self-reported not being serious about filling in the survey (2), not from the USA (6), and failed both the criteria (1).

(M_{age} = 38.45, SD = 11.58; 166 females).

Participants first rated their free will beliefs on two scales (randomized order) and then rated their own and others' susceptibility to biases and personal shortcomings. Display of conditions was counterbalanced in a 2 (reference: self vs. others) by 2 (attributes: biases and personal shortcomings) within-subject design (see the Supplementary Materials for more details and full measures). The materials used for testing BAE and BBS effects in Study 2 were the same as those of Study 1a.

For the extension, free will beliefs were measured before the replication using two free will belief subscales: Free Will Inventory (FWI) (Nadelhoffer et al., 2014) (5 items; 1 = *Strongly disagree*, 7 = *Strongly agree*; α = 0.91) and Free Will and Determinism (FWD) personal agency subscale (Rakos et al., 2008) (4 items; 1 = *Not true at all*, 5 = *Almost always true*; α = 0.92). FWI was chosen as one of the most recently developed measurements of generalized free will beliefs, improving on many of the issues identified in earlier scales. FWD was chosen as it focuses specifically on free will beliefs in the self, which we thought might differ from the more generalized FWI scale. Full measures are provided in the Supplementary Materials.

2.5 Study 3

A total of 629 American MTurk participants completed the study using TurkPrime.com. Of those, eight participants were excluded based on pre-registered exclusion criteria[2], leaving 621 participants included in the analysis (M_{age} = 39.15, SD_{age} = 11.88; 346 females). We prevented participants who took part in Study 2 from participating in Study 3.

The study included three parts: 1) free will beliefs, 2) replication of BBS effects (similar to Study 2), 3) replication of BAE (similar to Study 1b). Participants rated their own and other average Americans on susceptibility to biases (self: α = 0.79; others: α = 0.79) and personal shortcomings (self: α = 0.49; others: α = 0.55) (1 = *not at all*; 9 = *strongly*), and positive (α = 0.45) and negative personalities (α = 0.74) (1 = *much lower than the average American*; 5 = *same as the average American*; 9 = *much higher than the average American*).

In addition to the free will beliefs measures we collected in Study 2, we added an additional measure of generalized free will beliefs, using an older scale by Paulhus and Carey (2011). This was meant to help reexamine our interpretation of the extension findings in Study 2 about differences between free will beliefs in self, and generalized free will beliefs.

Free will beliefs scales included were: Free Will Inventory (FWI; 5 items; Nadelhoffer et al., 2014) (1 = *Strongly disagree*, 7 = *Strongly agree*; α = 0.89), Free Will and Determinism personal will sub-scales (FWD; 8 items; Rakos et al., 2008) (0 = *Not true at all*, 4 = *Almost always true*; α= 0.74), and Free Will and Determinism plus scale (FAD+; 7 items; Paulhus

[2]We excluded 8 participants based on pre-registered criteria: self-reported not being serious about filling in the survey (2), and not from the USA (6).

& Carey, 2011) (1 = *Not at all true*, 5 = *Always true;* α= 0.85; recoded from a scale of 0 to 4 to match the original scale range).

2.6 Mini meta-analysis summary and evaluation criteria for replication design and findings

To summarize the replication results across the three samples, we conducted a mini meta-analysis of the effect sizes observed across the three replication studies (Goh et al., 2016; Lakens & Etz, 2017). The mini meta-analysis is not only helpful in succinctly summarizing the findings across studies but also in yielding a more precise estimate of the effect size (Braver et al., 2014; Cumming, 2014).

We characterize the current replications as "very close replications" based on the framework for classification of replications using the criteria by LeBel et al. (2018) (see Table S25 in the Supplementary Materials).

To interpret the replication results we followed the framework by LeBel et al. (2019). They suggested a replication evaluation using three factors: (a) whether a signal was detected (i.e., the confidence interval for the replication Effect size (ES) excludes zero), (b) consistency of the replication ES with the original study's ES, and (c) precision of the replication's ES estimate (see Figure S18 in the supplementary material).

3 Results

We first conducted replication tests mirroring the tests conducted by Pronin et al. (2002). Descriptive statistics are provided in Table 2. For the proposed extension, we calculated correlations between measures of free will beliefs and BBS measures. Detailed results for each of the three studies are reported in the Supplementary Materials section (see Table S3).

3.1 Susceptibility to biases and personal shortcomings

We conducted a series of one-tailed paired samples t-tests, and found that participants showed a general tendency to view themselves as less susceptible to biases across the three samples (Study 1a: M_d = –0.75, $t(44)$ = –4.54, p <.001, d_z = –0.68, 95% CI [–1.01, –0.35]; Study 2: M_d = –1.15; $t(302)$ = –16.16, p < .001; d_z = –0.93, 95% CI [–1.06, –0.79]; Study 3: M_d = –1.80; $t(620)$ = –32.04, p <.001, d_z = –1.29, 95% CI [–1.39, –1.18]). We conclude these findings to be in support of the BBS hypothesis and the original findings.

Contrary to the predictions made in the original study, we found support for differences in ratings of personal shortcomings comparing self and others in Study 2 (M_d = –0.52; $t(302)$ = –5.22, p < .001; d_z = –0.30 , 95% CI [–0.42, –0.18]) and Study 3 (M_d = –0.73; $t(620)$ = –10.54, p <.001, d_z = –0.42, 95% CI [–0.51, -0.34]), yet with the weaker effect

Table 2: Descriptive statistics for all studies.

	Mean	S.D.	Skewness	Kurtosis
Study 1a (N = 45)				
Self: biases	5.60	0.86	0.69	1.00
Self: personal shortcomings	6.20	1.78	–0.30	–1.02
Others: biases	6.35	0.91	–0.04	–0.05
Other: personal shortcomings	6.49	1.23	–0.48	0.04
Study 1b (N = 43)				
Positive personality dimensions	5.74	0.96	–0.18	–0.16
Negative personality dimensions	4.16	1.22	0.27	–0.11
Denial of bias	1.98	0.64	0.02	–0.38
Study 2 (N = 303)				
Self: biases	4.64	1.35	–0.22	0.05
Self: personal shortcomings	5.35	1.88	–0.28	–0.40
Others: biases	5.78	1.16	–0.15	0.73
Others: personal shortcomings	5.87	1.35	–0.03	–0.04
Study 3 (N = 621)				
Self: biases	4.69	1.30	0.02	0.29
Self: personal shortcomings	5.52	1.71	–0.12	–0.47
Others: biases	6.48	1.04	–0.29	0.28
Others: personal shortcomings	6.25	1.16	–0.04	–0.37
Positive personality dimensions	6.43	1.11	–0.11	0.22
Negative personality dimensions	3.22	1.47	0.47	–0.12
Denial of bias	2.07	0.65	–0.07	–0.62

failing to show support for differences in Study 1a ($M_{d\,=}$ –0.29; $t(44) = –1.13$, $p = .265$; d_z = –0.17, 95% CI [–0.47, 0.13]).

Finally, we found support for differences between the mean self-other bias asymmetry (across all biases) and the mean self-other personal shortcomings asymmetry (across all shortcomings) across all three samples (Study 1a: $M_d = –0.46$, $t(44) = –1.97$, $p = .055$, d_z = –0.29, 95% CI [–0.60, 0.01]; Study 2: $M_d = –0.62$; t (302) = –6.39, $p < .001$, $d_z = –0.37$, 95% CI [–0.48, –0.25]; Study 3: $M_d = –1.06$; t (620) = –13.01, $p <.001$, $d_z = –0.52$, 95% CI [–0.61, –0.44]).[3]

[3]We also tested self-other asymmetry within each bias and personal shortcomings measures and the results

3.2 Denying personal susceptibility to the better than average effect

We conducted one-sample one-tailed t-tests and found that participants rated themselves as having personality characteristics that are more positive (Study 1b: $M = 5.74$, $t(42) = 5.09$, $p < .001$, $d_z = 0.78$, 95% CI [0.43, 1.11]; Study 3: $M = 6.42$; $t(620) = 31.74$, $p < .001$; $d_z = 1.27$, 95% CI [1.17, 1.38]) and less negative (Study 1b: $M = 4.16$, $t(42) = –4.55$, $p < .001$, $d_z = –0.69$, 95% CI [–1.02, –0.36]; Study 3: $M = 3.21$; t (620) = –30.38, $p <.001$; $d_z = –1.22$, 95% CI [–1.32, –1.11]) than others'. We conclude support of the better than average effect.

We then proceeded to conduct chi-squared tests to examine denial of susceptibility to the better than average effect, comparing to a 50%-50% split. In Study 1b, we found that despite being made aware of their potential bias, only 9 of the 43 participants (21%) acknowledged any potential bias, leaving 79% of participants still claiming to be better than their average peers (χ^2 (1, $N = 43$) = 14.53, $p < .001$, $d_z = 1.43$, 95% CI [0.69, 2.16]). We found similar results in Study 3, with only 109 of the 621 participants (18%) admitting bias, leaving 82% denying the bias (χ^2 (1, $N = 621$) = 261.53, $p < .001$; $d_z = 1.71$, 95% CI [1.50, 1.91]).

We conclude that our findings are in support of denial of the better than average effect bias. The effect size of the replications (Study 1b: $d_z = 1.43$; Study 3: $d_z = 1.27$) was around twice the effect size of the original study ($d_z = 0.70$).

Combining the findings of the three replications in a mini-meta analysis, we summarize the following: (1) participants rated themselves as less susceptible to biases than others, (2) participants rated themselves as less prone to personal shortcomings than others, (3) self-other differences for biases were larger than self-other differences for personal shortcomings, (4) participants rated themselves as possessing more positive personality characteristics and less negative personality characteristics than others, and (5) participants denied correcting for the better than average bias even after having been made aware of it.

3.3 Extension: Free will beliefs and shortcomings

We examined the link between free will beliefs and perceived personal shortcomings in self and others. We summarized our findings in Table 3.

All free will beliefs scales were negatively correlated with perceived personal shortcomings in self ($r \sim –0.22$ [–0.32, –0.11] to –0.09 [–0.17, –0.01]). However, for four out of five free will beliefs measures, we found no support for a link between free will beliefs and perceived personal shortcomings in others ($r \sim 0.00$ [–0.11, 0.12] to 0.05 [–0.03, 0.13]; FWD in Study 3, $r \sim 0.11$ [0.03, 0.18]). These findings seem to indicate that free will beliefs correlate more strongly with perceived shortcomings in self than in others. Supporting this notion, we examined perceived shortcomings in self and in others together, and free will

are reported in supplementary materials section (see Table S7, Table S13, and Table S19).

TABLE 3: Summary of the extensions' hypotheses (confirmatory hypotheses).

Predictions	Effect size and CIs (r)	NHST p	Summary
Study 2: United States (N = 303)			
BFW and personal shortcomings: Self			
FWI	–0.22 [–.32, -.11]	< .001	Supported
FWD	–0.17 [–.28, -.06]	0.003	Supported
BFW and personal shortcomings: Others			
FWI	0.00 [–.11, .12]	0.941	Not supported
FWD	0.05 [–.06, .16]	0.357	Not supported
BFW and personal shortcomings: Self-other differences			
FWI	–0.24 [–.34, -.13]	< .001	Supported
FWD	–0.22 [–.33, -.11]	< .001	Supported
Study 3: United States (N = 621)			
BFW and personal shortcomings: Self			
FWI	–0.16 [–.23, -.08]	< .001	Supported
FAD+	–0.15 [–.22, -.07]	< .001	Supported
FWD	–0.09 [–.17, -.01]	0.022	Supported
BFW and personal shortcomings: Others			
FWI	0.02 [–.05, .10]	0.551	Not supported
FAD+	0.05 [–.03, .13]	0.231	Not supported
FWD	0.11 [.03, .18]	0.007	Supported
BFW and personal shortcomings: Self-other differences			
FWI	–0.17 [–.25, -.09]	< .001	Supported
FAD+	–0.18 [–.25, -.10]	< .001	Supported
FWD	–0.16 [–.24, -.09]	< .001	Supported

Note. r = Pearson correlation coefficient. BFW = belief in free will; FWI = Nadelhoffer et al. (2014); FAD+ = Paulhus and Carey (2011); FWD = Rakos, Laurene, Skala, and Slane, (2008). Hypotheses and related findings regarding BBS in susceptibility to bias are provided in the Supplementary Materials.

beliefs negatively correlated with personal shortcomings self-other asymmetry ($r \sim$ –0.24 [–0.34, –0.13] to –0.16 [–0.24, –0.09]).[4]

Additional exploratory findings are reported in the Supplementary Materials (See Table

[4]We also examined the correlations between the measures of free will and individual measures of biases and shortcomings. The supplementary section reports the results (see Table S14, Table S15, Table S22, and Table S23).

S24). These suggested that stronger perceptions of personal free will were associated with stronger bias blind spot, but associations were much weaker for generalized free will beliefs.

3.4 General summary: Mini meta-analysis of replication findings

We summarized the replications of Pronin et al. (2002) across the three samples using a mini meta-analysis in Table 4, and plotted the results in Figure 1. We ran the mini meta-analysis with a random-effects model method using the meta package in R (Schwarzer, 2007; see Figure S15-S16 for detailed forest plots in the Supplementary Materials section).

We found support for self-other differences in perceived susceptibility to bias (d = –1.00 [–1.33, –0.67]), self-other differences in perceived personal shortcomings (d = –0.34 [–0.46, –0.23]), and the effects were stronger for perceived susceptibility to bias compared to perceived personal shortcomings (d = –0.43 [–0.56, –0.29]). We found support for better than average effects, with higher rating for positive personality dimensions (d = 1.05 [0.57, 1.54]), negative personality dimensions (d = –0.98 [–1.49, –0.47]), and denial of better than average effect (d = 1.69 [1.49, 1.88]).

Our evaluation of the replication findings based on the LeBel et al. (2019) criteria is summarized in the right column in Table 4 (separate analyses for each study are provided Table S4 of the Supplementary Materials). We conclude strong support for the main hypotheses of the target article, with effects comparable and at times larger than the original's (see Figure 1).

4 Discussion

4.1 Replications of the bias blind spot

We conducted three close replication studies of the bias blind spot effect. Our findings were in support of the main predictions of the BBS effect. The findings of our replication samples are consistent in the samples from USA and Hong Kong. The current replication contributes to the theory development of BBS effects for three main reasons.

Firstly, we empirically qualify the theoretical assertions of Pronin et al. (2002). We addressed one of the potential methodological shortcomings, the underpowered samples in the original study. Using a larger sample of participants, we found support for self-other differences for personal shortcomings, whereas the original article hypothesized and argued findings were in support of a null effect. It is very likely that the null findings reported in the target article were mostly due to insufficient power. Specifically, in their Study 1, the authors expected weaker effects for self-other differences for personal shortcomings than for bias, yet failed to provide evidence for rejecting the null findings. We, on the other hand, did find support for self-other asymmetry in personal shortcomings. Pronin and colleagues (2002) interpreted the findings as being in support of the null, a demonstration that participants are

TABLE 4: Summary and comparison of mini meta-analysis effects of the replication to the original article.

	Replications mini-meta-analysis Cohen's *d*	Original article Cohen's *d*	NHST summary	Replications summary
Replication summary				
Bias blind spot (BBS)				
Self-other asymmetry in susceptibility to biases	–1.00 [–1.33, –0.67]	–0.86 [–1.28, –0.43]	Supported	Signal - consistent
Self-other asymmetry in personal shortcomings	–0.34 [–0.46, –0.23]	0.28 [–0.10, 0.65]	Not supported	Signal - inconsistent, negative effect
Differences in self-other asymmetry between susceptibility to biases and personal shortcomings	–0.43 [–0.56, –0.29]	–0.61 [–1.01, –0.21]	Supported	Signal - inconsistent, smaller
Better than average effects				
Positive personality dimensions compared to others	1.05 [0.57, 1.54]	1.60 [1.26, 1.93]	Supported	Signal - inconsistent, larger
Negative personality dimensions compared to others	–0.98 [–1.49, –0.47]	–1.23[–1.52, –0.94]	Supported	Signal - consistent
Denial of better than average effect	1.69 [1.49, 1.88]	0.76 [0.29, 1.23]	Supported	Signal - inconsistent, larger
Extension hypothesis — correlations with Belief in free will	**Range of effect size**	**NHST results**	**Summary of extension hypothesis**	
BFW and personal shortcomings: Self	–0.09 [–.17, -.01] to -0.22 [–.32, -.11]	Supported	Supported	
BFW and personal shortcomings: Other	0.00 [–.11, .12] to 0.11 [.03, .18]	Not supported	Not supported	
BFW and personal shortcomings: Self-other differences	–0.16 [–.24, -.09] to -0.24 [–.34, -.13]	Supported	Supported	

Note. Effect size is Cohen's *d*. Replication summary directly based on LeBel et al., (2018) that considered the following three statistical aspects: (1) whether a signal was detected (i.e., whether the 95% confidence interval, or CI, represented here by the error bars, excludes 0); (2) the consistency of the replication effect-size (ES) estimate with that observed in the original study (i.e., whether the replication's CI includes the original ES point estimate); and (3) the precision of the replication's ES estimate (i.e., the width of its CI relative to the CI in the original study). NHST summary is based on the interpretation of a one-tail p-value with alpha set at 0.05. See Table S3-S4 (Figure S15-S16) of the Supplementary Materials for detailed results of three replication studies. BFW = belief in free will.

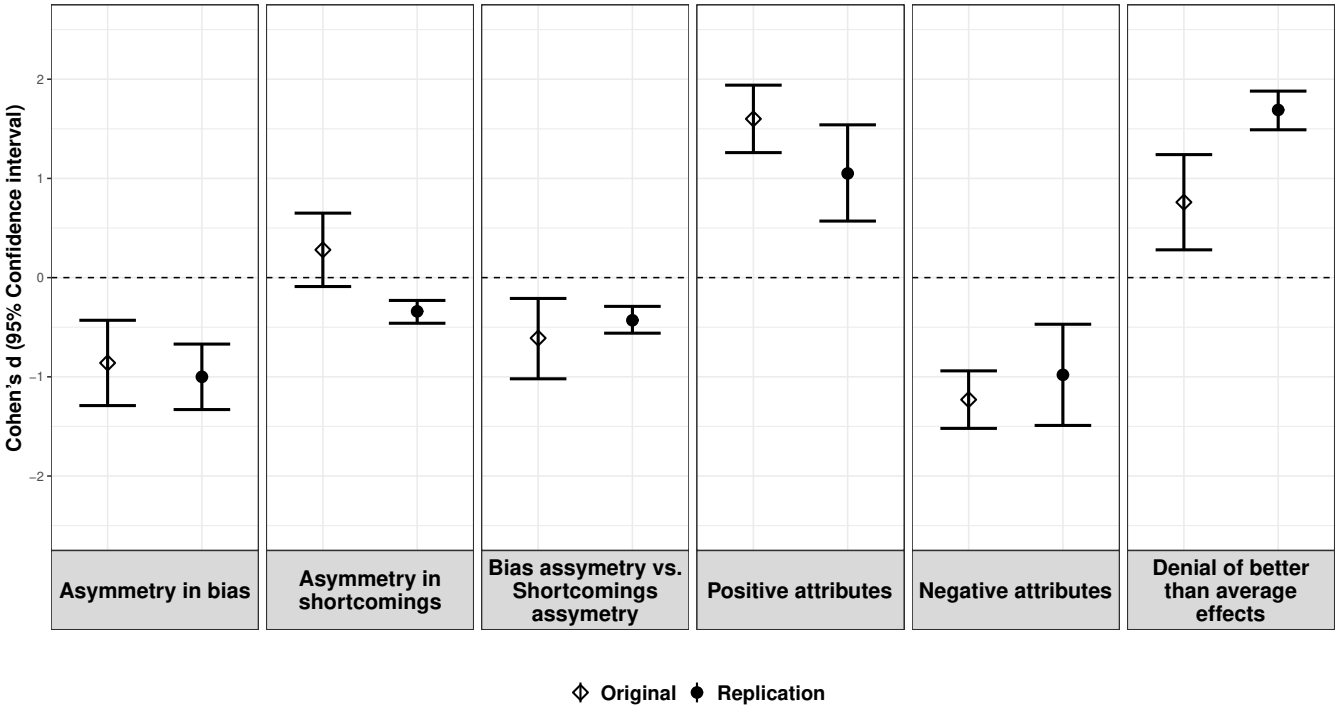

FIGURE 1: Comparison of findings in Pronin et al. (2002) to the replications' mini meta-analysis summary.

as aware of their own personal shortcomings as they are of others'. Our replication findings suggest that there exists a bias also for personal shortcomings.

Pronin et al. (2002) failed to reject the null regarding specific hypotheses, and so their conclusion was that "in these cases, participants saw themselves as being just as flawed as their peers, if not more so" (p. 372), hinting about support for the null. We found support for rejecting the null regarding that specific case. Replicators often focus on findings that were able to reject the null hypothesis, which is understandable given that the vast majority of findings in published articles until 2011 were about rejecting the null. Yet, our findings here suggest that there might be value in attempting replications for null effects, in cases where an effect was found in one domain but not in another related domain, and especially so when the original sample size was severely underpowered and there were reasons to believe there should have been an effect.

Despite the above divergence in findings, we believe that the theoretical grounds of the target paper remain relevant and that the replications are in support of the original theory and findings, as the replication results lend support for the main introspection hypothesis that self-other differences are larger for susceptibility to bias than for personal shortcoming. Our main recommendation for those studying the BBS is to revise the original conclusions for a null effect for personal shortcomings into expecting an effect, though a weaker effect than for biases.

Secondly, we contribute to understanding of the BBS effect in a cross-cultural setting.

We find support for BBS effects across samples from the USA and Hong Kong. For instance, Study 1 used a sample of non-naive students from Hong Kong, who were familiar with heuristics and biases in judgment and decision-making. The sample was slightly underpowered, and yet we were able to detect the effects reported in the classic article. Despite knowledge of other biases, and despite possible cultural differences, the findings were highly consistent with the findings in the classic article and the two MTurk samples. We advise caution in over-interpreting these, given the small sample and the singular bias under examination, yet it offers some support for BBS being robust enough to withstand concerns such as non-naivete and cross-cultural differences. Concerns around cultural relativity of the findings in psychology seems to be less of a concern with BBS effects (Gergen, 1973; Henrich et al., 2010).

Thirdly, going beyond the BBS, we believe that our investigation offers additional insights into the BBS effect. In Studies 2 and 3, we examined the link between free will beliefs and the bias blind spot effects (see summary in Table 3). Overall, our findings supported our predictions that belief in free will would be associated with stronger self-other differences in perceived personal shortcomings ($r \sim 0.16$–0.24). The differences between self and other ratings of personal shortcomings were mostly driven by the negative association between free will beliefs and personal shortcomings in self. We also found support for an association between free will beliefs and the BBS in susceptibility to bias ($r \sim 0.17$–0.22), but only with for the free will beliefs scale that concerned the self, rather than in general. In Study 2, these findings were discovered in exploratory analyses, and in Study 3 we pre-registered the predictions and found very consistent effects, suggesting that these were not accidental.

The results suggest that free will belief associations are more about viewing oneself to be free of biases and shortcomings, and less about viewing others as more susceptible to biases and shortcomings. This indicates that free will beliefs in reference to the self are related to the nature of introspection accessed, complementing previous work that argued that free will beliefs impact fundamental socio-cognitive processes (Genschow et al., 2017). Our take-aways from the extensions are the following: 1) free will beliefs are associated with self-other differences in perceived personal shortcoming, 2) free will beliefs in reference to the self are associated with BBS regarding susceptibility to bias, and 3) different free will beliefs scales gauge different aspects of agency. We advise free will beliefs researchers to incorporate both types of scales and make predictions differentiating between personal and generalized free will beliefs. It is possible that these differences would be especially relevant for biases regarding differences in attributions or perceptions comparing self to others. Overall, given the findings, we see much promise in the direction of examining links between free will beliefs and attribution biases.

It is important to note that our evidence for the relation between belief in free will and BBS effects is correlational only. Therefore, current findings do not allow for causal inferences. However, future research may aim to reproduce our findings by implementing

experimental designs that manipulate free will beliefs. Furthermore, future research could extend current work in various ways. For example, future work can explore the role of belief in free will on the tendency to attribute responsibility or blame to people susceptible to cognitive biases.

References

Alquist, J. L., Ainsworth, S. E., Baumeister, R. F., Daly, M., & Stillman, T. F. (2015). The making of might-have-beens: Effects of free will belief on counterfactual thinking. *Personality and Social Psychology Bulletin*, *41*(2), 268–283.

Baumeister, R. F. (2008). Free Will in Scientific Psychology. *Perspectives on Psychological Science*, *3*, 14–19. https://doi.org/10.1111/j.1745-6916.2008.00057.x.

Baumeister, R. F., & Monroe, A. E. (2014). Recent research on free will: Conceptualizations, beliefs, and processes. In *Advances in Experimental Social Psychology* (Vol. 50, pp. 1–52). Academic Press. https://doi.org/10.1016/B978-0-12-800284-1.00001-1.

Brandt, M. J., I Jzerman, H., Dijksterhuis, A., Farach, F. J., Geller, J., Giner-Sorolla, R., ... & Van't Veer, A. (2014). The replication recipe: What makes for a convincing replication? *Journal of Experimental Social Psychology*, *50*, 217–224. https://doi.org/10.1016/j.jesp.2013.10.005.

Braver, S. L., Thoemmes, F. J., & Rosenthal, R. (2014). Continuously cumulating meta-analysis and replicability. *Perspectives on Psychological Science*, *9*(3), 333–342.

Crescioni, A. W., Baumeister, R. F., Ainsworth, S. E., Ent, M., & Lambert, N. M. (2016). Subjective correlates and consequences of belief in free will. *Philosophical Psychology*, *29*, 41–63. https://doi.org/10.1080/09515089.2014.996285.

Cumming, G. (2014). The new statistics: Why and how. *Psychological Science*, *25*(1), 7–29.

Dana, J., & Loewenstein, G. (2003). A social science perspective on gifts to physicians from industry. *Jama*, *290*(2), 252–255. https://psycnet.apa.org/10.1001/jama.290.2.252.

Dunning, D., Meyerowitz, J. A., & Holzberg, A. D. (1989). Ambiguity and self-evaluation: The role of idiosyncratic trait definitions in self-serving assessments of ability. *Journal of Personality and Social Psychology*, *57*(6), 1082–1090. https://psycnet.apa.org/doi/10.1037/0022-3514.57.6.1082.

Ehrlinger, J., Gilovich, T., & Ross, L. (2005). Peering into the bias blind spot: People's assessments of bias in themselves and others. *Personality and Social Psychology Bulletin*, *31*, 680–692. https://doi.org/10.1177/0146167204271570.

Feldman, G. (2017). Making sense of agency: Belief in free will as a unique and important construct. *Social and Personality Psychology Compass*, *11,* 1–15. https://doi.org/10.1111/spc3.12293.

Feldman, G., Baumeister, R. F., & Wong, K. F. E. (2014). Free will is about choosing: The link between choice and the belief in free will. *Journal of Experimental Social*

Psychology, 55, 239–245. https://doi.org/10.1016/j.jesp.2014.07.012.

Feldman, G., Chandrashekar, S. P., & Wong, K. F. E. (2016). The freedom to excel: Belief in free will predicts better academic performance. *Personality and Individual Differences*, *90*, 377–383. https://doi.org/10.17605/OSF.IO/J4K9Z.

Feldman, G., Farh, J. L., & Wong, K. F. E. (2018). Agency beliefs over time and across cultures: Free will beliefs predict higher job satisfaction. *Personality and Social Psychology Bulletin*, *44*, 304–317. https://doi.org/10.17605/OSF.IO/C6WM5.

Fillon, A., Lantian, A., Feldman, G., & N'gbala, A. (2021). Exceptionality Effect in Agency: Exceptional Choices Attributed Higher Free Will Than Routine. Manuscript under review. Preprint retrieved March 2021 from https://psyarxiv.com/sep8f/.

Genschow, O., Rigoni, D., & Brass, M. (2017). Belief in free will affects causal attributions when judging others' behavior. *Proceedings of the National Academy of Sciences*, *114*, 10071–10076. https://doi.org/10.1073/pnas.1701916114.

Gergen, K. J. (1973). Social psychology as history. *Journal of Personality and Social Psychology*, *26*(2), 309–320.

Glöckner, A., & Betsch, T. (2011). The empirical content of theories in judgment and decision making: Shortcomings and remedies. *Judgment & Decision Making*, *6*(8), 711–721.

Goh, J. X., Hall, J. A., & Rosenthal, R. (2016). Mini meta-analysis of your own studies: Some arguments on why and a primer on how. *Social and Personality Psychology Compass*, *10*(10), 535-549.

Hansen, K., Gerbasi, M., Todorov, A., Kruse, E., & Pronin, E. (2014). People claim objectivity after knowingly using biased strategies. *Personality and Social Psychology Bulletin, 40*, 691–699. https://doi.org/10.1177/0146167214523476.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, *466*(7302), 29–29.

Jones, E. E. (1990). *Interpersonal perception.* New York: Freeman

Jones, E. E., & Nisbett, R. E. (1972). The actor and the observer: Divergent perceptions of the causes of behavior. In E. E. Jones et al. (Eds.), *Attribution: Perceiving the causes of behavior.* Morristown, NJ: General Learning Press.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*(3), 480–498.

Lakens, D., & Etz, A. J. (2017). Too true to be bad: When sets of studies with significant and nonsignificant findings are probably true. *Social Psychological and Personality Science*, *8*(8), 875–881.

LeBel, E. P., McCarthy, R. J., Earp, B. D., Elson, M., & Vanpaemel, W. (2018). A unified framework to quantify the credibility of scientific findings. *Advances in Methods and Practices in Psychological Science*, *1*(3), 389–402.

LeBel, E. P., Vanpaemel, W., Cheung, I., & Campbell, L. (2019). A brief guide to evaluate replications. *Meta-Psychology*, *3*.

Litman, L., Robinson, J., & Abberbock, T. (2017). TurkPrime. com: A versatile crowdsourcing data acquisition platform for the behavioral sciences. *Behavior Research Methods*, *49*(2), 433–442.

Miller, D. T., & Ross, M. (1975). Self-serving biases in the attribution of causality: Fact or fiction? *Psychological Bulletin*, *82*(2), 213–225. https://psycnet.apa.org/doi/10.1037/h0076486.

Monroe, A. E., & Malle, B. F. (2010). From uncaused will to conscious choice: The need to study, not speculate about people's folk concept of free will. *Review of Philosophy and Psychology,1*(2), 211–224. http://dx.doi.org/10.1007/s13164-009-0010-7.

Monroe, A. E., & Malle, B. F. (2014). Free will without metaphysics. In A. R. Mele (Ed.), *Surrounding free will. New York, NY: Oxford University Press*

Monroe, A. E., Dillon, K. D., & Malle, B. F. (2014). Bringing free will down to Earth: People's psychological concept of free will and its role in moral judgment. *Consciousness and Cognition*, *27*, 100-108. http://dx.doi.org/10.1016/j.concog.2014.04.011.

Nadelhoffer, T., Shepard, J., Nahmias, E., Sripada, C., & Ross, L. T. (2014). The free will inventory: Measuring beliefs about agency and responsibility. *Consciousness and Cognition*, *25*, 27–41.

Nisbett, R. E., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment*. Englewood Cliffs, NJ: Prentice Hall.

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review,* 8: 231–259. https://doi.org/10.1037/0033-295X.84.3.231.

Open Science Collaboration. (2015, August 28). Estimating the reproducibility of psychological science. *Science,* 349. https://doi.org/10.1126/science.aac4716.

Paulhus, D. L., & Carey, J. M. (2011). The FAD–Plus: Measuring lay beliefs regarding free will and related constructs. *Journal of Personality Assessment*, *93*(1), 96–104.

Pronin, E. (2007). Perception and misperception of bias in human judgment. *Trends in Cognitive Sciences*, *11*, 37–43. https://doi.org/10.1016/j.tics.2006.11.001.

Pronin, E., & Kugler, M. B. (2007). Valuing thoughts, ignoring behavior: The introspection illusion as a source of the bias blind spot. *Journal of Experimental Social Psychology*, *43(4)*, 565–578. https://doi.org/10.1016/j.jesp.2006.05.011.

Pronin, E., & Kugler, M. B. (2010). People believe they have more free will than others. *Proceedings of the National Academy of Sciences*, *107*(52), 22469–22474. http://dx.doi.org/10.1073/pnas.1012046108.

Pronin, E., Gilovich, T., & Ross, L. (2004). Objectivity in the eye of the beholder: Divergent perceptions of bias in self versus others. *Psychological Review*, *111*(3), 781–799. https://doi.org/10.1037/0033-295X.111.3.781.

Pronin, E., Lin, D. Y., & Ross, L. (2002). The bias blind spot: Perceptions of bias in self-versus others. *Personality and Social Psychology Bulletin*, *28*, 369–381. https://doi.org/10.1177/0146167202286008.

Protzko, J., Ouimette, B., & Schooler, J. (2016). Believing there is no free will corrupts intuitive cooperation. *Cognition*, *151*, 6–9. https://doi.org/10.1016/j.cognition.2016.02.014.

Rakos, R. F., Laurene, K. R., Skala, S., & Slane, S. (2008). Belief in free will: Measurement and conceptualization innovations. *Behavior and Social Issues*, *17*(1), 20–40.

Ross, L., & Ward, A. (1995). Psychological Barriers to Dispute Resolution. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 27, pp. 255–304). Academic Press. https://doi.org/10.1016/S0065-2601(08)60407-4

Ross, L., & Ward, A. (1996). Naive realism in everyday life: Implications for social conflict and misunderstanding. In T. Brown, E. S. Reed, & E. Turiel (Eds.), *Values and knowledge. The Jean Piaget symposium series* (pp. 103–135). Hillsdale, NJ: Erlbaum.

Schwarzer, G. (2007). meta: An R package for meta-analysis. *R news*, *7*(3), 40–45.

Scopelliti, I., Morewedge, C. K., McCormick, E., Min, H. L., Lebrecht, S., & Kassam, K. S. (2015). Bias Blind Spot: Structure, Measurement, and Consequences. *Management Science*, *61*, 2468–2486. https://doi.org/10.1287/mnsc.2014.2096.

Stillman, T. F., Baumeister, R. F., Vohs, K. D., Lambert, N. M., Fincham, F. D., & Brewer, L. E. (2010). Personal philosophy and personnel achievement: Belief in free will predicts better job performance. *Social Psychological and Personality Science*, *1*, 43–50. https://doi.org/10.1177/1948550609351600

Uhlmann, E. L., & Cohen, G. L. (2007). "I think it, therefore it's true": Effects of self-perceived objectivity on hiring discrimination. *Organizational Behavior and Human Decision Processes*, *104*(2), 207–223. https://doi.org/10.1016/j.obhdp.2007.07.001.

Van't Veer, A. E., & Giner-Sorolla, R. (2016). Pre-registration in social psychology—A discussion and suggested template. *Journal of Experimental Social Psychology*, *67*, 2–12. https://doi.org/10.1016/j.jesp.2016.03.004.

Vonasch, A. J., Baumeister, R. F., & Mele, A. R. (2018). Ordinary people think free will is a lack of constraint, not the presence of a soul. *Consciousness and Cognition, 60*, 133–151. https://doi.org/10.1016/j.concog.2018.03.002.

West, R. F., Meserve, R. J., & Stanovich, K. E. (2012). Cognitive sophistication does not attenuate the bias blind spot. *Journal of Personality and Social Psychology*, *103*(3), 506–519. https://doi.org/10.1037/a0028857.

Wilson, T. D., & Dunn, E. W. (2004). Self-knowledge: Its limits, value, and potential for improvement. *Annual Review of Psychology*, *55*, 493–518. https://doi.org/10.1146/annurev.psych.55.090902.141954.

Zwaan, R. A., Etz, A., Lucas, R. E., & Donnellan, M. B. (2018). Making replication mainstream. *Behavioral and Brain Sciences*, e120. https://doi.org/10.1017/S0140525X17001972.