Keep your enemies close: Adversarial collaborations will improve behavioral science

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Abstract

Behavioral scientists enjoy vast methodological freedom in how they operationalize theoretical constructs. This freedom may promote creativity in designing laboratory paradigms that shed light on real-world phenomena, but it also enables questionable research practices that undercut our collective credibility. Open Science norms impose some discipline but cannot constrain cherry-picking operational definitions that insulate preferred theories from rejection. All too often scholars conduct performative research to score points instead of engaging each other's strongest arguments—a pattern that allows contradictory claims to fester unresolved for decades. Adversarial collaborations, which call on disputants to co-develop tests of competing hypotheses, are an efficient method of improving our science's capacity for self-correction and of promoting intellectual competition that exposes false claims. Although individual researchers are often initially reluctant to participate, the research community would be better served by institutionalizing adversarial collaboration into its peer review process.

Keywords: motivated cognition, metascience, adversarial collaboration, research methods, science reform

Human societies have benefited immensely from scientific progress, enabled by institutional innovations over the last few centuries that have made science an efficient truth-discovery enterprise (Pinker, 2018; Strevens, 2020). Scientists compete to discover new phenomena and test causal hypotheses systematically in experiments. Peer review filters the flow of scientific reports to improve the ratio of signal to noise in the public record (Shema, 2014). And a recent innovation, *Open Science*, promotes transparency, reducing questionable research practices (QRPs) and allowing third-party scholars to verify findings more easily (e.g., McKiernan et al., 2016; Spellman et al., 2017). Empirical insights can then be applied to solve practical problems and improve global well-being more efficiently than trial-and-error at the policy level.

But the behavioral sciences are still young. Numerous obstacles to shortening the path toward truth remain. We are in no position for complacency—as evidenced by the continuous flow of reports that prominent findings do not replicate, promising interventions do not work, and that scholars have used deceptive techniques to exaggerate or fabricate results (Camerer et al., 2018; Ebersole et al., 2020; Ioannidis, 2012; Nosek et al., 2021; Open Science Collaboration, 2015; Simmons et al., 2011; Simmons & Simonsohn, 2017; Simonsohn et al., 2014; Singal, 2021; Vazire, 2018). Although Open Science constrains *some* deceptive techniques, scholars still have vast freedom to operationalize variables and fashion methodological procedures to confirm desired hypotheses, particularly in fields with many defensible ways of operationalizing variables and testing hypotheses (Flake & Fried, 2020).

This latitude allows rival scholars, who claim to be investigating the same phenomenon (e.g., aggression, inequality, jealousy, bias), to invent and rely on distinctive methods of hypothesis testing that confirm their contradictory hypotheses. Cohorts of rival scholars often talk past one another and dismiss alternative approaches, showing scant interest in finding common ground with critics (Tetlock & Levi, 1982; Tetlock & Manstead, 1985; Costello et al., 2021). They develop auxiliary hypotheses to explain away opponents' findings, often rendering their own hypothesis unfalsifiable (Lakatos, 1970) and causing conceptually contradictory theories to become empirically indistinguishable (Tetlock & Levi, 1982). The numerous flaws of the peer review system (e.g., opacity and lack of accountability, the singular authority of editors to select reviewers and make publication decisions) make it easy for incumbent scholars—who often have professional stakes in the research they evaluate—to squelch dissent by inventing arbitrary post-hoc rationalizations and critiques (Abramowitz et al., 1975; Ernst & Resch, 1994; Godlee et al., 1998; Koehler, 1993; Mahoney, 1977; Okike et al., 2016; Tomkins et al., 2017).

In principle, a core tenet of science is falsificationism: only after "bending over backwards" to prove ourselves wrong can we be confident in our hypotheses' verisimilitude (Feynman, 1974; Lilienfeld, 2010; Mayo, 2018; Popper, 1935/2002). In practice, though, scholars mostly work to confirm their hypotheses and to design the best methodological strategies for doing so (Skitka, 2020). Consequently, scholarly controversies can rage on for years or decades, with little to no convergence—each side convinced it is winning, or indeed, has already won. Ambiguity abounds creating unnecessary and unproductive fractures among the scientific community and its consumers (e.g., policy makers) and *delaying* scientific and human progress.

Here, we highlight a better path forward. Disagreeing scholars should work together (and with neutral third parties) to design mutually-agreed-on tests of competing hypotheses (rather than tailor tests likely to yield supportive evidence with likeminded collaborators). Kahneman (2003, 2011) calls such efforts *adversarial collaborations*, and scholars should engage in them regularly. Adversarial collaborations require scholars to precisely define terms, identify core disputes, commit to conditions of falsifiability, and put hypotheses to agreed-on rigorous tests, thereby stimulating direct competition of ideas and accelerating quality-based natural selection of science.

We start by laying out our psychological and epistemic assumptions by describing how the goals of human reasoning intersect with the institutional goals of science and society. Although certain norms and incentives in science leverage natural drivers of human cognition to improve public knowledge and policy, countervailing forces make it possible, too often, for scientists to lapse into self-justifying modes of thinking in which the social goal of *appearing* right eclipses the epistemic goal of *being* right. We then explain why it is in our collective scientific interest to implement, incentivize, and institutionalize adversarial collaborations.

The Goals of Human Cognition

Our starting assumption is that human cognition—like all animal cognition—evolved to promote fitness (Cosmides, 1989). Humans recruit, assimilate, and organize information in ways that help them survive and reproduce. Recurrent adaptive challenges (e.g., obtaining nourishment, avoiding danger, seeking acceptance and status within one's immediate social group, and balancing risks and rewards in uncertain environments) lead to at least three core motivational drivers of human reasoning: accuracy goals, social goals, and error-balancing goals.

People function like intuitive scientists when they pursue accuracy goals (Boudry & Vlerick, 2014; De Cruz et al., 2011). In many circumstances (e.g., appraising danger, obtaining nourishment), correct beliefs promote fitness-enhancing decisions, and so people pursue good information (Baumeister et al., 2018) and strive to hold accurate beliefs (Anglin, 2019; Tappin et al., 2020; Vlasceanu et al., 2021), especially when accuracy is obtainable and consequential for fitness. Indeed, the scientific enterprise is a testament to humans' commitment to pursue more accurate information. And our success as a species can be attributed in significant part to our ability to understand and manipulate environments to minimize threats to survival (everyday technical triumphs like learning to heat and insulate dwellings safely and discovering which medicines ward off illness).

But sometimes social goals supersede accuracy goals (Clark et al., 2019), and people reason to pursue belonging and status. Religious beliefs provide a straightforward example. Believing in non-existent metaphysical entities has little fitness impact, but contradicting the beliefs of one's inner circle can cut off social opportunities and even lead to imprisonment or death. Religious accuracy is evolutionarily inconsequential, but heresy can get you killed. Thus, human reasoning should favor socially advantageous beliefs over socially costly ones (sometimes, regardless of their accuracy) (e.g., Kunda, 1990). Socially motivated reasoning has been demonstrated many times (Clark & Winegard, 2020; Haidt, 2001, 2012), for example: (1) people seek favor by more generously evaluating in-group over outgroup members (e.g., Christenson & Kriner, 2017; Claassen & Ensley, 2016; Cohen, 2003; Hawkins & Nosek, 2012; Kahan et al., 2012), (2) people exaggerate their own social value and downplay their weaknesses (e.g., Alicke & Govorun, 2005; Brown, 1986; Hoorens, 1993; Sedikides et al., 2003), (3) people avoid information that challenges in-group views and seek out confirmatory information (e.g., DeMarree et al., 2017; Frimer et al., 2017; Stroud 2008, 2010), and (4) people are credulous toward information that reinforces in-group beliefs and skeptical of information that challenges them (e.g., Campbell & Kay, 2014; Ditto et al., 2019a, 2019b; Gampa et al., 2019; Kahan et al., 2017; Lord et al., 1979; Taber & Lodge, 2006). All this suggests that sometimes reasoning is motivated more by social goals (e.g., rising through the ranks of one's coalition) than by accuracy.

But the world is complex. People must balance accuracy goals and social goals by weighing (consciously or not) their relative risks and rewards. Such trade-offs are central to *error management theory* (Haselton & Buss, 2000). Consider the tendency for men to overestimate women's sexual interest. The belief "this woman likes me" carries social risk—if wrong, the man might be rejected. But the reward for being correct is higher. In contrast, the belief "this woman does not like me" carries little social risk, but if incorrect, the man misses out on a mating opportunity. The false negative error (missing out on a mate) is costlier than the false positive error (embarrassment), and so reasoning errs on the side of overestimating women's sexual interest. *Systematic inaccuracy* can have fitness advantages. This means that *biases* in human reasoning (a preference for certain conclusions) can be instrumentally rational (Weber, 1968), but insofar as biases deviate from pure pursuit of accuracy, biases are *epistemically* irrational.

Other cognitive constraints also shape reasoning and belief formation. Heuristics help us make fast, low-effort decisions but at an accuracy price, though how large is much debated (Gigerenzer & Gaissmaier, 2011; Tversky & Kahneman, 1974). Even when people are primarily concerned with accuracy, various non-social biases can interfere with this pursuit (Pinker, 2021), such as the tendency to seek confirmatory over disconfirmatory evidence in hypothesis testing (Wason & Johnson-Laird, 1972, Mynatt et al., 1977) or to ignore base rates when estimating probabilities (Kahneman, 2003; Tversky & Kahneman, 1981). Social goals can exacerbate or even reverse these tendencies—for example, when conclusions are undesirable (Dawson et al., 2002) or have social significance (Cosmides & Tooby, 1992), people are likelier to search for disconfirming evidence, sometimes to the point of excessive skepticism (Ditto & Lopez, 1992; Taber & Lodge, 2006).

In general, human reasoning should lead to dubious conclusions when accuracy has little relation to fitness (e.g., broad philosophical-religious beliefs, abstract moral-political viewpoints, superstitious practices), and when social penalties are high for holding discordant beliefs (Clark et al., 2015; Ditto et al., 2009; Tetlock, 2003). However, even when accuracy directly impacts survival (e.g., "will this vaccine reduce my risk of life-threatening illness?"), social goals sometimes still triumph if the information is too ambiguous or challenging (Kopko et al., 2011; Munro et al., 2010a, 2010b). When one senses the truth is unknowable, deferring to one's social group makes adaptive sense (Fernbach & Light, 2020).

Scientists are Humans

We take it as axiomatic that scientists are constrained by the same cognitive biases, limitations, and tradeoff calculations as mere mortals (Bowes et al., 2020; Clark et al., 2021a; Clark & Tetlock, 2021; Clark & Winegard, 2020; Duarte et al., 2015; Faust, 1984; Haidt, 2020; Lilienfeld et al., 2020; Mahoney, 1976; Proctor & Capaldi, 2012; Redding, 2001; Ritchie, 2020; Tetlock, 2020; Winegard & Clark, 2020; although see also Lai, 2020; Van Bavel et al., 2020). One sign that scientists engage in socially motivated research is the replication crisis and subsequent discovery of widespread *p*-hacking and other QRPs (Camerer et al., 2018; Ebersole et al., 2020; Flake & Fried, 2020; Ioannidis, 2012; Nosek et al., 2021; Open Science Collaboration, 2015; Simmons et al., 2011; Simmons & Simonsohn, 2017; Simonsohn et al., 2014; Singal, 2021; Vazire, 2018). Since 2012, the field has been rattled by a surge of non-replications of oft-cited findings, including growth mindset (Bahník & Vranka, 2017; Rienzo et al., 2015; Sisk et al., 2018; Stoet & Geary, 2012), power posing (Jonas et al., 2017; Simmons & Simonsohn, 2017), ego depletion (Hagger et al., 2016), priming (Pashler et al., 2012; Shanks et al., 2013; Steele, 2014), the influence of incidental disgust on moral evaluations (Landy & Goodwin, 2015; Jylkkä et al., 2020), the Mozart effect (Pietschnig et al., 2010), mortality salience effects (Klein et al., 2019; Sætrevik & Sjåstad, 2019), the relation between ovulatory phase and numerous outcomes (Bleske-Rechek et al., 2011; Hahn et al., 2020; Thomas et al., 2021; Wood et al., 2014) and the influence of analytic thinking on religious belief (Sanchez et al., 2017). Numerous in-depth investigations have uncovered questionable analytic techniques scholars use to generate publication-worthy findings, including running multiple studies and only writing up the impressive findings, playing the statistical significance lottery by including multiple dependent variables and only reporting those that "worked," and flat-out fraud by fabricating data or dropping participants from datafiles for erroneous reasons (Blanton & Mitchell, 2011; Simonsohn et al., 2021), among other tactics. Original authors often seem reluctant to change their minds after their work fails to replicate, making original authors and failed replicators suitable teams for adversarial collaborations (Koole & Lakens, 2012).

Incorruptible truth-seekers entirely committed to accuracy should, by definition, never mislead their colleagues, students, or society at large. But partial truth-seekers, who *also* have social motives such as getting impressive jobs and prestigious awards, would do these kinds of things (Jussim et al., 2019). This does not mean scientists have bad intentions, only that they are people, with limited cognitive resources, social concerns, and career aspirations. The replication crisis revealed high numbers of false positives—scholars were biased against the null hypothesis—because doing so garnered them social benefits. We suspect many of these people genuinely believed in their scholarship and were fooled—or at least fooled *enough*—by their own faulty research practices (e.g., Simonsohn et al., 2021).

There are numerous other indicators of socially motivated reasoning among scholars. Recent reports indicate substantial self-censorship among academics (Clark et al., 2021b; Kaufmann, 2021). Scholars—like other humans—are vulnerable to peer pressures, and at minimum, these influence which empirical beliefs they will discuss openly, if not the empirical beliefs they hold. Many scholars admit to discriminating against researchers for political reasons (e.g., Honeycutt & Freberg, 2017; Inbar & Lammers, 2012; Peters et al., 2020), suggesting political concerns influence their judgments and that they are complicit in creating a high peer-pressure social environment. This ideological bias may explain why research tends to portray conservatives more negatively than liberals (Eitan et al., 2018; Tetlock, 2012) and why liberal scholars find themselves at more prestigious institutions than their less liberal but similarly productive peers (Rothman et al., 2005). Peer reviewers evaluate research more favorably when findings support rather than challenge their own theoretical orientations and political views (Abramowitz et al., 1975; Ernst & Resch, 1994; Koehler, 1993; Mahoney, 1977), ethics committees evaluate identical research proposals differently depending on the hypothesis (Ceci et al., 1992), and a recent survey of the *Society for Experimental Social Psychology* found evidence of political resistance to certain evolutionary theories (e.g., Buss & von Hippel, 2018; von Hippel & Buss, 2017).

Scholars, being human, (1) conduct their research in ways not optimally designed to pursue truth but rather to confirm preferred hypotheses, (2) create social pressures and conform to social pressures within their own discipline, and (3) evaluate information in ways that privilege certain conclusions.

Behavioral Sciences and Socially Motivated Research

More than other scientific disciplines, we suspect the behavioral sciences are particularly vulnerable to socially motivational distortions. First, *accuracy* consequences for behavioral scientists are comparatively low. Although many applied behavioral science findings impact society (e.g., personality and cognitive assessment; non-medicinal mental health interventions; education interventions; criminal justice interventions; economic policy; research bearing on legal matters), the behavioral scientists generating the faulty knowledge seldom pay a serious price (e.g., they are rarely sued for false promises). The consequences of being wrong are mostly limited to embarrassment.

Second, the behavioral sciences study provocative topics: moral-political issues bearing on status, relationships, and distributions of resources. Social concerns loom even larger for *applied* behavioral science research because its consequences are more visible to the broader community. Not only might scholars themselves have social desires that influence their conclusions, but society likely puts special pressures on behavioral scientists to draw socially desirable conclusions, for example, that beauty is in the eye of the beholder (Widemo & Sæther, 1999), that extreme wealth is bad (Doyle & Stiglitz, 2014), or that intelligence is not *that* important (Duckworth, 2006). Only 1-2% of people can be in the top 1-2% of physical attractiveness or socioeconomic status or intelligence, and so such conclusions would please most people (see e.g., Ward et al., 2021). And because humans are motivated to strive for self-improvement, society might urge behavioral scientists to design self-help interventions that supposedly improve difficult-to-measure, complexly determined life outcomes such as happiness, energy, concentration, motivation, success, and self-esteem. Behavioral scientists who give people the information they desire are rewarded with book deals, media appearances, talks, and other forms of status—whereas research debunking such findings is often ignored (Honeycutt & Jussim, 2020).

Third, the behavioral sciences often deal with variables that are abstract, multiply caused, difficult to measure and manipulate, and open to countless operationalizations (Flake & Fried, 2020). And many psychological constructs cannot be directly observed, so operationalizations can easily drift away from the original constructs of interest (e.g., Kovera & Evelo, 2021). Different investigators' decisions about how to operationalize variables (Schweinsberg et al., 2021) and analyze data (Silberzahn et al., 2018) can lead to starkly different conclusions (but also see Auspurg & Brüderl, 2021).

Sorting out causal relations becomes difficult, sometimes impossible. Effect sizes are frequently so small it is hard to know whether they have any real-world significance (but see Funder & Ozer, 2019). And it is uncommon for findings to be replicated across diverse populations—so generalizability is often unknown. Unlike physical laws, human cultures change: what was true 10 years ago may no longer be true today (see, e.g., reversals in certain gender biases [Card et al., 2021]). And behavioral science conclusions and constructs often embed value-laden assumptions. For example, the use of base rates in decision-making might be labeled an immoral bias among some scholars and rational by others (Tetlock et al., 2000).

In short, the behavioral sciences are a perfect storm for socially motivated research: the accuracy consequences are typically low because scholars are rarely held accountable for false claims, yet the social consequences are high because of the tight connection of much work to issues of public concern, and the topics of study often involve social constructs and latent variables that lend themselves to alternative operationalizations that cannot be easily compared to ground truth for validity. The behavioral sciences arguably require more stringent accountability than sciences that directly influence life or death (e.g., medical research), sciences that have little relevance to social issues (e.g., astrophysics), and sciences that deal with variables with well-established operational definitions (e.g., organic chemistry) and that study phenomena in extremely controlled environments (e.g., particle accelerators).

The Goals of Society and Science

Many organizations today prioritize epistemic goals for technocratic reasons: discovering the truth is seen as the cost-effective route to solving problems. So, numerous procedures are already in place to incentivize accuracy (e.g., fact-checking in journalism, liability in medicine, evidentiary support in courtrooms, peer review in science). But these epistemic-accountability systems are imperfect because they are controlled by imperfect human beings—and because of the impossibility of anticipating the shocks and temptations to which the systems will be subjected.

There are various philosophical and sociological perspectives on strategies for promoting scientific progress (e.g., Lakatos, 1970; Merton, 1973; Popper, 1935/2002; Rauch, 2021), but most scholars agree that the goal of science is to build knowledge about empirical reality and pursue truth by testing predictions and explanations against data. Even those who argue that a higher goal of science is to improve human flourishing still prioritize truth insofar as interventions have a better chance of success when grounded in facts. Unlike individual scientists, science—the institution—prioritizes *accuracy* and enforces strategies for testing claims, like experimentation and repeated observation, that not long ago were unfamiliar to humanity (Strevens, 2020). But there are myriad flaws and countervailing forces that have enabled the behavioral sciences to produce a great deal of false knowledge, obstruct true knowledge, and fail to make progress in resolving contradictory claims (Clark et al., 2021a).

Current Norms and Procedures and Their Shortcomings

Current scientific norms recognize that scientists are people and strive to align social goals with accuracy goals, for example, by portioning prestige to scientists who develop productive theories. By implicitly acknowledging that scientists want impressive titles and accolades, science has co-opted human status striving for truth striving. In some disciplines, it has done so successfully. Science and society have benefited from discoveries and innovations in countless ways (Pinker, 2018; Strevens, 2020).

But current norms also incentivize scholars to exaggerate the importance of their findings; they allow scholars to craft predictor and outcome variables in ways that reinforce their hypotheses and to tell attractive but unwarranted causal stories about correlational data; they tolerate tendentious narratives applied to ambiguous or complicated evidence; they expect scholars to work almost exclusively with teams of likeminded scholars and abide scholars' apparent refusals to work with adversaries and get to the bottom of disagreements; they encourage sequential debate rather than concurrent dialogue; they are unable to prevent strawman characterizations of intellectual opponents; and they rarely call on scholars to earnestly engage with their opponent's strongest arguments or subject their pet theories to risky tests (Clark & Winegard, 2020; Kahneman, 2003; Jussim et al., 2019; Meehl, 1978).

Peer review problems. Science has checks and balances to prevent scientists from baselessly declaring themselves authorities on various matters, acknowledging that it may not be possible to align the goals of individual humans with those of science entirely. In peer review, which emerged in the Enlightenment and was firmly institutionalized in the 20th century (Shema, 2014), subject matter experts review manuscripts, point outs flaws, and decide on publishability. This process likely improves the quality of the literature because authors must satisfy at least a few peers, and mini-crowdsourcing expertise likely generates insights that individuals missed (Surowiecki, 2004; van Gelder et al., 2020). But it has numerous flaws, including interrater reliability that is barely above chance (Bornmann et al., Forscher et al., 2019; Lee et al., 2012), the singular authority of editors to select the reviewers (often with awareness of reviewers' predilections), and its failure to prevent the replication crisis. Indeed—peer review may be partially to blame for the replication crisis. Editors and reviewers accepted low power, small sample designs and did not insist on transparency in data analysis (Davis et al., 2018), and tolerated refusals to share data (Wicherts et al., 2006). Peer review is also largely to blame for widespread publication biases because reviewers are likelier to reject nonsignificant findings (Atkinson et al., 1982; Emerson et al., 2010; Franco et al., 2014), and authors would often prefer to publish their non-significant findings if it were possible (Tsou et al., 2014).

Reviewers tend to be more critical of scholarship that challenges their own work than scholarship that supports it (Ernst & Resch, 1994). Reviewers also suffer from prestige bias, giving more favorable evaluations when prestigious authors' names and institutions are known than when unknown (Okike et al., 2016; Tomkins et al., 2017), and other author identity biases (Godlee et al., 1998). And a 2003 study found that 55% of authors had been asked to referee a manuscript that they were not competent to review, with 37% submitting a review despite their incompetence (Bedeian, 2003).

Frequently, scholars have expertise in an area because they have published many papers supporting or challenging a theory and have risen to prominence on that basis. Accordingly, reviewers often have a professional interest in being lenient or critical when evaluating papers in their wheelhouse (Ernst & Resch, 1994). If editors seek “balance” by selecting both proponents and opponents of a given theory to serve as reviewers (perhaps the most hopeful explanation for the low interrater reliability), this creates ambiguous feedback, and editors are left to “choose sides,” perhaps swayed by their own predilections. Consequently, individual editors, with their idiosyncratic flaws and motivations, have much discretion over which data and arguments make it into top journals.

It remains largely unknown how much peer review improves research quality relative to other options (Elson et al., 2020) and whether the effect size of this improvement justifies the massive time costs, inefficiencies, and knowledge delays generated by the process. But given the pervasiveness of false positive findings and contradictory claims, the behavioral sciences need more effective quality control procedures.

Open science and its limitations. New norms have emerged in the last decade that constrain scholars’ freedom to exaggerate the significance of their own work. Open Science practices, such as preregistration of hypotheses, methods, and analyses, reduce researcher degrees of freedom in the analysis stage and scholars’ ability to claim—after they have seen results—that they predicted those results *a priori* (Kerr, 1998). By requiring scholars to report methods in sufficient detail for exact replication by other scholars and to share data and analysis code publicly, the Open Science movement disincentivizes shady statistical and reporting practices by increasing the threat of detection. It has become harder for scholars to selectively omit or alter incongruous findings. And the focus on replicability improves the *reliability* of scientific findings: we can be more confident that particular methods produce particular results.

These developments mark a sea change. But they do not address the potent threat to scientific progress on which we focus here: scientists' freedom to operationalize theoretical constructs in ways that load the dice in favor of the theory ostensibly being tested. This permissiveness threatens the *validity* of scientific conclusions. *Even if particular methods reliably produce particular results, we do not know whether the theoretical inferences from those results are valid.* To take an extreme example, embedding conservative values such as "hard work" in "symbolic racism" scales (Kinder & Sears, 1981) made it easy to show that conservatism is a form of racism (Sniderman & Tetlock, 1986). But the empirical *validity* of this claim is suspect because it teeters on tautology. The patterns of attitude-behavior correlations reveal a messier story. On the one hand, low scorers on the scales have the strongest race-based preferences—and in favor of Black people over White people (Wright et al., 2021)—and research increasingly shows that conservatives treat people of different races more similarly than do liberals (Clark et al., 2020). On the other hand, liberalism is also associated with stronger desires to live in racially diverse communities (e.g., Motyl et al., 2020) and stronger commitments to racial equality (Pew, 2021), highlighting how conclusions can vary as operationalizations vary.

Studies have also claimed that their measures of anti-Black implicit racial bias predict anti-Black behavioral discrimination: "As physicians' prowhite implicit bias increased, so did their likelihood of treating white patients and not treating black patients with thrombolysis" (Green et al., 2007, p. 1231) and "those who revealed stronger negative attitudes toward Blacks (vs Whites) on the IAT had more negative social interactions with a Black (vs a White) experimenter" (McConnell & Leibold, 2001, p. 435). However, these statements obscure the fact that the observed discrimination was against the majority group by those with a stronger preference for African Americans (Blanton et al., 2009; Dawson & Arkes, 2009). Low scorers were more likely to treat the Black than the White patient and had more positive interactions with the Black than the White experimenter, whereas high scorers demonstrated no racial preference. Questionable interpretations of reliable findings are not uncommon (Clark & Tetlock, 2021; Clark & Winegard, 2020; Mitchell & Tetlock, 2009; Purser & Harper, 2020). And given that scholars often publish conclusions that contradict other published conclusions, we can be confident that many reliable results produce conclusions of dubious validity.

The current scientific climate—even with Open Science practices—perpetuates reliable but invalid claims. Advancing scientific debates can be unsettling for scientists accustomed to performative displays that have little power to gauge the explanatory merits of competing views but leave face-saving interpretive wiggle room for almost everyone. If scholars holding contradictory views engaged in true competitions, fewer would emerge full victors (though many could still be correct within better specified boundary conditions). Science advances by ruling out incorrect views, yet few scientists contribute to this advance by admitting their own doubts or mistakes. Normalizing adversarial collaborations could change this.

Adversarial Collaboration: A Gold Standard for Scientific Dispute Resolution

Adversarial collaborations are a method of encouraging scholars who disagree to *work together* to resolve their scientific disputes. As conceived by Kahneman (2011), adversarial collaborations call on scholars to: (1) understand and articulate their opponents' perspective so well that each side feels fairly characterized; (2) work together to design mutually agreed upon studies that have potential to adjudicate competing hypotheses and that they agree, *ex ante,* could change their minds; and (3) jointly publish the results, regardless of the outcome. Each collaborator serves as a check on the other to ensure that methods are not rigged; studies, not file-drawered; and interpretations, duly circumspect.

Adversarial collaborations are appropriate when scholars disagree over whether a phenomenon exists, in what contexts it exists, or over how best to explain it. In the business-as-usual scenario, a scholar would write a critical commentary or conduct a follow-up study to refute a published claim; in the adversarial-collaboration scenario, the scholar invites the authors of the original article to work together to clarify the disagreement and resolve it, either empirically or conceptually. The key in most adversarial collaborations is the collection of *new* data, with mutually agreed upon methods for testing which theory makes better predictions. This process facilitates what Platt (1960) termed *strong* inference and allows the parties to escape the traps of selective attention to different findings and selective interpretation of the same findings that often stalemate scientific debates and that can escalate into accusations of cherry-picking and bad faith. For classic cases, see the exchanges about childhood abuse and repressed memories (Alpert et al., 1998a, 1998b; Ornstein et al., 1998a, 1998b) or exchanges about the usefulness of implicit bias for understanding and eliminating discrimination in organizations (Jost et al., 2009a, 2009b; Tetlock & Mitchell, 2009a, 2009b, 2009c).

Guidelines for Participation

Although scholars sometimes successfully innovate their own ways of running adversarial collaborations, we recommend the guidelines in Table 1, which draw on the work of Mellers and colleagues (2001, p. 270) and Clark and Tetlock (2021, p. 21-22).

Table 1

Guidelines for Participating in Adversarial Collaborations

1. **Consider the temperaments of potential adversaries**. Some scholars may be able to participate in adversarial collaborations more successfully than others (e.g., successful adversarial collaboration may be associated with higher intellectual humility [Bowes et al., 2020; 2021], open-mindedness, and agreeableness, and with lower dogmatism, neuroticism, narcissism, and ideological extremism [van Prooijen & Krouwel, 2019; Zmigrod et al., 2020]). For many scientific disputes, different "sides" are supported by numerous scholars, and so it may be useful to select an adversary among them who seems capable of carrying out an adversarial collaboration successfully.

2. **Involve a trusted, neutral third-party colleague to be a moderator**. The moderator should be mutually agreed upon by all adversaries and will coordinate the effort, referee disagreements, and collect and analyze the data and write up the results. The data should remain under the control of the moderator throughout the project. At the outset, the adversaries and the moderator should agree that the moderator will pursue publication even if one or more adversaries refuses to cooperate and drops out. (This should also disincentivize "dropping out" because the paper will be published anyway, and the scholar simply misses out on co-authorship.)

3. **An initial discussion should identify a *clearly defined* disagreement**. Both sides should be able to articulate their own perspective in concrete terms as well as the strongest version of their adversary's perspective and the disagreement in terms all parties agree with. This discussion should leave all parties feeling understood, not caricatured. The moderator should take notes of all discussions; this allows for records that remind adversaries of their earlier statements and commitments.

4. **Agree on the details of an initial study designed to subject the opposing claims to an informative empirical test**. The participants should seek to identify results that would change their mind, at least to some extent, and should explicitly anticipate their interpretations of outcomes that would be inconsistent with their theoretical expectations.

5. **Strive for achievable, incremental progress**. Accept in advance that the initial study will be inconclusive. Allow each side to propose additional experiments to exploit the fount of hindsight wisdom that commonly becomes available when disliked results are obtained. Additional studies should be planned jointly, with the moderator resolving disagreements as they occur.

6. **Be flexible with collaborators**. There is rarely one way to answer a question, so if there is resistance to one approach, simply move on to a new one. If one study goes awry (i.e., one or more collaborators are not convinced by the findings), figure out why and fix the ambiguities for the next study.

7. **Take advantage of preregistration**. Preregistering an adversarial collaboration can help lock both scholars into a research plan, which will minimize scholars' ability to renege if unfavorable results are found.

8. **If significant disagreements remain after all data are collected, write individual discussion sections**. The length of these discussions should be determined in advance and monitored by the moderator.

These guidelines anticipate ways in which adversarial collaborations can fail and aim to pre-empt them. Although some adversarial collaborations proceed harmoniously (e.g., Fiske, 2017), in which case these precautions are overkill, we think it wise to prepare for the worst and hope for the best. Disputes with high symbolic or policy stakes—such as the controversies over the accuracy of suppressed memories (e.g., Karon & Widener, 1998; Loftus, 2005; Pendergrast, 1999), the consequences of affirmative action (e.g., Crosby et al., 2006; Sander, 2004), the causes of gender gaps in STEM (e.g., Cheryan et al., 2017; Williams & Ceci, 2015), racial disparities in police use of force (e.g., Cesario et al., 2019, Geller et al., 2020; Hollis & Jennings, 2018), or the influence of implicit bias (e.g., Jost et al., 2009a; Tetlock & Mitchell, 2009b)—can quickly become contentious.

How They Will Improve Empirical Accuracy

Adversarial collaborations can highlight perverse scientific norms—and motivate change—in a host of ways.

More competition of ideas. Evolutionary epistemology studies the process by which knowledge is generated through a competition of ideas with selection based on survival of the truest (Bradie & Harms, 2020). Whereas current norms allow numerous contradictory hypotheses to co-exist with little convergence over time, adversarial collaboration requires the two to compete until one wins or both come out modified. Adversarial collaboration provides a harsher competitive environment with clearer terms of battle, allowing for more rapid and efficient quality-based ideational selection. Bad ideas will die faster, and good ideas will elevate with greater clarity and become more refined with each round of collaboration. This will reduce ambiguity and contradiction in the published literature, equipping other scholars to make better, more productive hypotheses themselves.

Checks and balances and higher standards. Adversarial collaborations constrain researcher degrees of freedom throughout the entire research process—from initial framing of questions to write-ups of discussion sections. Because methodological designs must be approved by all parties, parties subject their own hypotheses to a genuinely stringent test: one that their opponent expects them to fail. Scholars are prevented from rigging the methods in their favor and designing predictor variables that are confounded with outcome variables—adversaries would not allow it. Ultimately, by holding one another to the same set of (high) standards, adversaries will design tests that are fairer, more rigorous, and better able to adjudicate between the competing hypotheses (Kahneman, 2003).

These checks and balances work more efficiently than peer review, in which flaws are pointed out when the project is *finished*, and by over-worked, under-compensated reviewers. The power asymmetry between authors and reviewers allows harsh reviewers to obstruct a paper even when they may have approved of the methodological design before seeing the results. Adversarial collaborations hold authors and hostile reviewers to the same evidentiary standards and require that all parties commit to those standards ex ante. Registered reports—in which journals approve of study methods prior to seeing the results—accomplish something similar, but adversarial collaborations go further, incorporating the critic into the research process from start to finish. And the requirement that both parties commit to publishing the results eliminates the file-drawer option, which should reduce publication biases in the literature.

Open exchange and allowing data to resolve disputes. Academic debates at conferences, in journals, and on social media, often come down to clever argumentation. Scholars deploy data, but often Scholar A claims those data are devastating to Scholar B, and Scholar B disagrees. Strawman arguments, ad hominem attacks, motte-and-bailey mix ups, and red herrings are common tactics—and often successful (Pinker, 2021). Adversarial collaborations short-circuit these repressive tactics and allow disagreements to mature in the sunlight of open exchange.

Creating epistemic accountability and clarifying disagreements. Adversarial collaborations require scholars to clarify their own positions and their disagreements. Whereas current norms incentivize scholars to exaggerate the scope and importance of their hypotheses (Jussim et al., 2019), adversarial collaborations do the opposite. Scholars, knowing they will soon be accountable to strong empirical tests, with few retreat options, are incentivized to be pre-emptively self-critical about limits and boundary conditions (Lerner & Tetlock, 1999). Adversaries must be able to articulate their opponent's position to their opponent's satisfaction and identify points of actual disagreement, not just perceived disagreement. And they must distill their disputes into testable propositions. This requires scholars to clear up the ambiguities in their own thinking and specify data patterns that could falsify their hypotheses or at least modify them.

In our own adversarial collaborations, we have been surprised by three things:

1. Disagreements are harder to articulate than expected.
2. Disagreements are smaller and more nuanced than expected.
3. Adversaries begin to merge in their perspectives before data collection even begins.

We suspect these surprises occur because scholars often start off with exaggerated views of their opponent's perspectives and then moderate their own perspectives when they engage with the actual, not an imagined, opponent. These conversations alone are critical for finding common ground. Indeed, in an adversarial review by Kahneman and Klein (2009), two scholars who were leaders of clashing theoretical camps on intuitive judgment and expertise were surprised to discover how minor some of their disagreements were.

Even failures will be useful. If an adversarial collaboration fails (e.g., the scholars cannot agree on their disagreement or to methods, or the results cause a falling-out), these failures can still be informative. Failure to agree on the disagreement could be a sign there is no disagreement—the adversaries are using the same vague language to describe two different phenomena. Similarly, a failure to agree on methods could suggest a lack of conceptual clarity, and if each side forwarded more precise claims, the disagreement would dissolve (Cowan et al., 2020). Generally, if proponents and opponents tend to use different methods between groups and similar methods within groups, this suggests that proponents and opponents know which methods "work" for their preferred hypotheses and use them precisely for that reason. Disagreeing scholars might not disagree on which methods produce which results, but on what those results *mean* (questions of validity, not reliability), an indication that those methods produce ambiguous results and are generally not useful for adjudicating the debate. Scholars can then identify those ambiguities to design better methods (e.g., Is the metric confounded with something or otherwise imprecise? Are there alternate explanations that need to be ruled out? Is there a missing moderator?).

Good for Science, *and* Good for the Scientist

There are many reasons the benefits of adversarial collaborations can far outweigh their (admittedly higher-than-average) costs for individual scientists, and these benefits could increase substantially if institutions incentivized them properly. We suspect there are three big barriers to participation: fear of not confirming one's hypothesis, concerns about time and effort, and aversion to interpersonal conflict. These challenges are not insurmountable for most scholars.

Participating in adversarial collaborations might seem risky. Often scholars become known for a particular idea, one that got them their job, on a Best Seller list, or millions of TED talk views, not to mention dozens of publications, involving numerous colleagues and protégés.

To put that idea at risk of disconfirmation may seem like a risk of being labeled a charlatan. But it often will be in scholars' best interest to put their own theories to more rigorous tests. In the worst-case scenario that a theory is completely incorrect, over time, it will fail to make successful predictions or to deliver the expected impacts, and eventually, someone else will point out the error (and get credit for doing so). Not rigorously testing it only delays the inevitable. Scholars who join in dismantling their theoretical framework and publicly change their mind contribute far more to scientific progress than those who hunker down and stay the course—and science should recognize and reward that.

But adversarial collaborations will rarely reveal that "Scholar A is 100% right and Scholar B 100% wrong." More likely, they will reveal boundary conditions or a moderate position that falls between the two. And we suspect scholars will enjoy some reputation benefits for participating in adversarial collaborations—they signal that one is more interested in contributing good information than in saving face. The costs are especially low and benefits high for early career researchers, who have not yet tied their reputations to theories and may use adversarial collaborations to avoid investments in counterproductive research areas.

Insofar as adversarial collaborators hold each other to higher standards than a scholar would hold himself or herself, adversarial collaborations may save time at the review stage—flaws will have been identified and corrected before they occur. But still, designing and carrying out a study with an adversary will almost inevitably take more time and effort than an average study. We consider this to be an investment in higher quality work, similar to how registered reports and meta-analyses take additional time but tend to produce more reliable findings than average studies. More reliable findings that scholars can depend upon to formulate their own hypotheses should garner more citations in the long-run and have impact for a longer period, just as Open Science practices benefit scholars with higher citations, media attention, and job and funding opportunities (McKiernan et al., 2016), and so adversarial collaborations likely make better long-term career investments.

Perhaps the greatest psychological barrier to adversarial collaborations is aversion to interpersonal conflict (Ulbig & Funk, 1999). Empirical disagreements can lead to acrimony and cause long-term awkwardness at conferences and in other professional activities. There is no simple solution here, but such cases should become the exception rather than the rule (e.g., Fiske, 2017) if scholars follow guidelines, such as avoiding adversaries with reputations as temperamental or dogmatic. Adversarial collaborations also provide opportunities to resolve conflict, build relationships, and produce more enlightening exchanges than traditional commentaries with their all-too-common snark (Kahneman, 2003). In our experience, scholars have been cordial and accommodating, and early conversations have been intellectually invigorating. Scholars can increase the odds of this outcome by being courteous themselves.

Some scholars may be too dogmatic or risk averse to participate in adversarial collaborations, but we suspect (and hope) that most scientists are open-minded enough to work with colleagues with different views. Normalizing adversarial collaborations would help reveal which scholars balk, allowing the rest of the scientific community to adjust their confidence in associated works. However, some topics may be so flammable that few scholars will be willing to engage. This would be unfortunate, but no worse than the current climate in which scholars avoid studying topics with high controversy potential (Clark et al., 2021b).

Adversarial collaborations may not be necessary or helpful for research questions where there are virtually no competing hypotheses, either because there are no hypotheses (e.g., exploratory work) or because the phenomenon under investigation is established beyond reasonable doubt. Outside of these cases, we see no empirical question that is open to competing plausible interpretations that would not benefit from an adversarial approach.

The Past, Present, and Future of Adversarial Collaboration

In one of the earliest adversarial collaborations, Latham and colleagues (1998) tested whether setting goals leads to higher goal commitment than having goals assigned. Although the collaborators did not converge on all points, they did agree on a variety of moderators that likely explained their different sets of prior results. That same year, Gilovich, Medvec, and Kahneman (1998) worked together to resolve an earlier dispute regarding regrets for action and inaction. The former two had argued that action regrets start off intense but fade quickly whereas inaction regrets linger longer and thus hurt more in the long run (Gilovich & Medvec, 1995). Kahneman (1995) disagreed—arguing that there are different kinds of regret and that inaction regrets are nostalgic and so not particularly painful compared to hotter and more intense action regrets. They discovered both sides were partially right (and partially wrong): action regrets did elicit primarily hot emotions and inaction regrets were sometimes wistful and sometimes more painful.

The first paper to call itself as an adversarial collaboration involved competing explanations for conjunction fallacies offered by Kahneman and Hertwig (Mellers et al., 2001). Kahneman proposed that the conjunction fallacy is better viewed as a judgmental error rooted in over-reliance on simple heuristics, whereas Hertwig proposed that supposedly fallacious judgments were actually rational responses to conversational norms activated by the presentation of questions about sets of possibilities (e.g., Linda is a bankteller) and subsets of possibilities (e.g., Linda is a bankteller and a feminist) (Mellers et al., 2001). Together, they worked out conditions under which the conjunction fallacy waxes or wanes in strength, explored reasons for their discordant findings in the past, admitted which findings they had not predicted *a priori* and how those findings shifted their understanding of conjunction effects, and identified remaining empirically testable disagreements.

In another earlier adversarial collaboration, Bateman and colleagues (2005) explored whether and when people perceive money spent on goods as a loss. Both groups agreed on the validity of the tests, concluded that money outlays *are* perceived as losses, identified moderators, and updated their effect size estimates. Although they did not reach perfect consensus, their disagreements shrank, and both teams offered new sets of testable explanations for their remaining disagreements. Adversarial collaborations may rarely produce breakthroughs, but they do facilitate cumulative exchanges of views—something that is frustratingly difficult for editors to achieve when they supervise scientific back-and-forths (see, e.g., Alpert et al., 1998a, 1998b; Ornstein et al., 1998a, 1998b).

Some teams have sustained adversarial collaborations for years. One team in Germany has focused on studies testing theories of consciousness (Melloni et al., 2021). And for over a decade, skeptics and proponents of psychic ability worked together on a series of studies to assess whether people can psychically detect when another person is staring at them (e.g., Schlitz et al., 2006; Wiseman & Schlitz, 1997, 1999). Over the years, some studies yielded significant effects, others did not (often depending on which team collected the data), and they came to agree on the findings within individual studies but did not converge. In this case, a third-party data collector might have helped. Procedural glitch aside, they did publish several joint papers and identified plausible explanations for their respective findings over the years (Schlitz et al., 2006; Wiseman & Schlitz, 1997, 1999).

Cowan and colleagues (2020) have been working on a three-way extended adversarial collaboration on theories of working memory in young adults and cognitive aging (e.g., Doherty et al., 2019). In addition to developing their own guidelines for successful adversarial collaboration (Cowan et al., 2020, p. 1015), they noted numerous advantages to the adversarial approach: (1) by agreeing on a set of methods, they all trusted the results, unlike traditional disagreements where proponents of different theories use distinct methods and dismiss opponents' methods (and hence their results), (2) by accounting for a growing, common set of results, the theories gradually became more similar, (3) conclusions in the general discussion were more nuanced than they would have been if one team controlled the interpretations, and (4) regardless of any disagreements that remained among the main scholars, their collaboratively published research provided more balanced information for other scholars who are less committed to a particular view. It is unreasonable to expect one or two new datasets to drastically alter theoretical predictions grounded in years of previous research. Instead, new results will likely lead to small adjustments to one or more adversaries' prior positions. And the longer adversaries collaborate, simultaneously incorporating numerous identical sets of results into their own theoretical models, the more their models will converge.

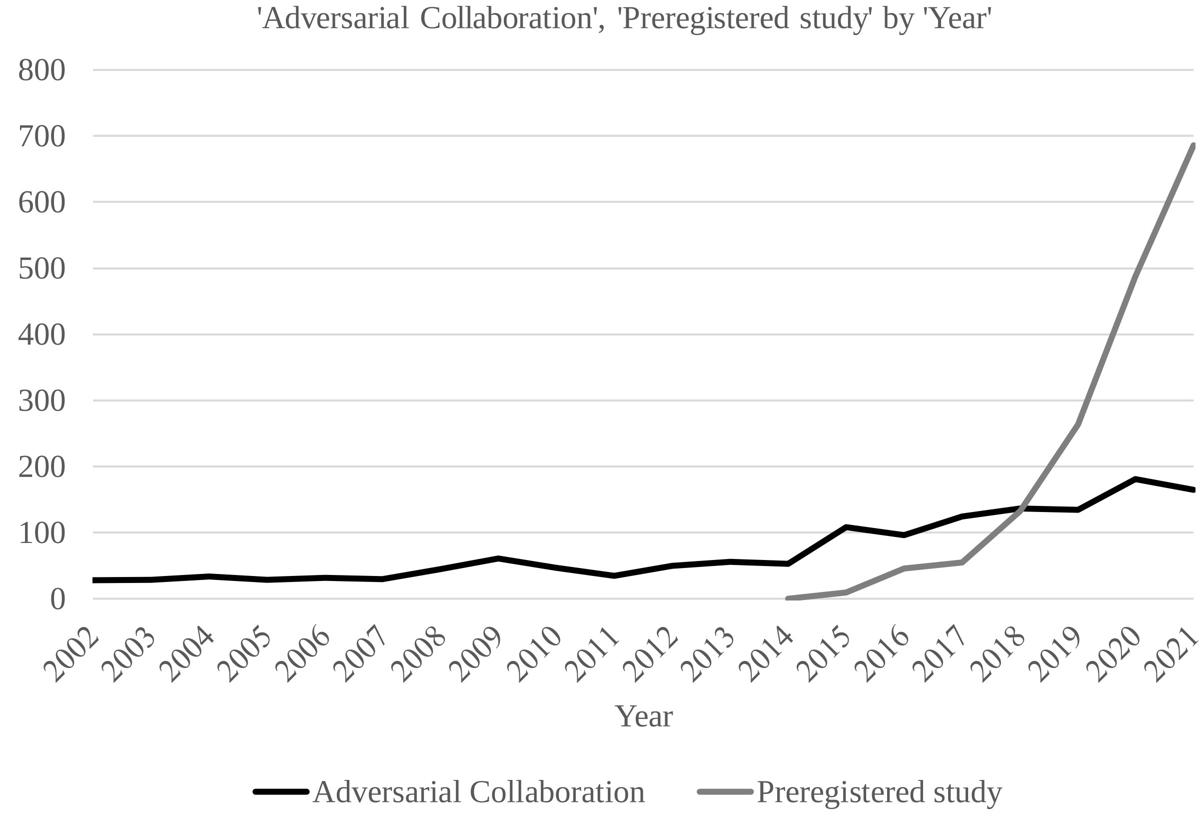
Most adversarial collaborations thus far have explored low-political-controversy topics. The scholars involved had clashing expectations, but the expectations did not carry a strong moral-political charge or have obvious policy significance. For example, adversarial teams have explored the effects of horizontal saccadic eye movements on retrieval of episodic memories (Matzke et al., 2015), the consequences of repeated rounds and price feedback in second-price auctions (Corrigan et al., 2012), the mechanisms underlying approach and avoidance instructions on implicit associations (Van Dessel et al., 2017), moderators of when the minimal group paradigm leads to ingroup favoritism (Kerr et al., 2018), influences on the shapes of utility and probability weighting functions (Alempaki et al., 2019), how costs and benefits affect the voluntary provision of threshold public goods (Cadsby et al., 2008), and the extent to which people spontaneously differentiate social groups' warmth/communion vs. agency/competence and ideological beliefs (Koch et al., 2020).

However, adversarial collaborations on even politically sensitive topics have been conducted with success. For instance, Stern and Crawford (2021) examined whether liberals and conservatives exhibit prejudice against those who hold different views on political and non-political topics. Both authors predicted that the relationships between *political* dissimilarity and prejudice would be symmetrically strong among liberals and conservatives. But for *nonpolitical* dissimilarity, one author predicted the relationships would be stronger for conservatives than liberals, whereas the other predicted symmetry. In contrast to either of their expectations, the relationship between political dissimilarity and prejudice tended to be stronger among *liberals* than conservatives (although the relationship was not always significant). In the non-political domain, the results were quite ambiguous, with some studies and measures of prejudice showing no interaction (consistent with the symmetry prediction) and others showing a significant interaction with the relationship being stronger among conservatives (consistent with the asymmetry prediction). The authors concluded, together, that the relationships may vary and that any effect of asymmetry may be small. This is progress.

Popularity

Despite a veneer of enthusiasm about adversarial collaboration, and little to no public criticism of the approach, they have yet to be widely adopted. Figure 1 compares a google search for “adversarial collaboration” starting in 2001 (when the first self-declared “adversarial collaboration” was published) to a search for “preregistered study” starting in 2013 (when Gelman and Loken introduced that term). Scholars have been far faster to adopt the latter.

Figure 1. Google Scholar search results for ‘Adversarial Collaboration’ and ‘Preregistered Study’ by year since their first introduction to the literature (as of November, 2021)



We can think of a few reasons scholars have been slower to adopt adversarial collaborations. Both adversarial collaborations and preregistered studies restrict researcher degrees of freedom in a way that scholars seeking hypothesis-confirmation might find inconvenient, but adversarial collaborations are more restrictive. Preregistration can be done in minutes whereas adversarial collaborations require numerous negotiations over days, weeks, and months, and whereas like-minded collaborators can expedite hypothesis testing and confirmation, adversarial collaborators slow things down, with every step of the research process requiring more thought and care. Preregistration requires giving up a bit of freedom and power in the least creative parts of the research process: data collection and analyses. Adversarial collaboration requires giving up freedom and power in the study *design* phase. Precisely because study design is so critical to hypothesis confirmation, people are probably reluctant to let someone else get their hands on the reins—especially someone who does not share their research agenda. And, preregistration has received institutional backing, with journals giving badges and other benefits to scholars who preregister their studies. Adversarial collaborations have received little institutional support.

One journal, *Thinking & Reasoning*, posted an editorial in 2015 requesting adversarial collaboration submissions (with a submission process similar to registered reports; Rakow et al., 2015). However, to date, the journal has had no takers, and one collaboration that an editor tried to organize failed because the adversaries could not agree on the research question. This lack of uptake is understandable, given the greater effort required and the degree of freedom scholars must give up for the greater good of science. To balance these costs, institutions that depend on scientists for accurate information should incentivize adversarial collaborations.

The Future

In early 2021, we launched an initiative at the University of Pennsylvania, the Adversarial Collaboration Project, which supports adversarial collaborations across a variety of ongoing scientific disputes. Thus far, we are supporting nine projects, involving nearly four dozen scholars. Some of the issues are not particularly contentious outside of the laboratory. For instance, with Jon Haidt, Peter Ditto, Dave Rand, and Gordon Pennycook, we are exploring the extent to which reasoning is socially motivated. But some do touch on more contentious topics. With Jay Van Bavel and Jarret Crawford, we are testing for political bias in the psychology literature; with Luke Conway, Chadly Stern, Jan-Willem van Prooijen, and Madalina Vlasceanu, we are exploring whether political conservatism is associated with cognitive rigidity; and with a large team of collaborators, we are testing whether behavioral scientists systematically self-censor their empirical beliefs.

Assembling teams of open-minded scholars with differing perspectives can lead to progress on seemingly intractable debates. The behavioral sciences are plagued by *zombie ideas* (Barrett, 2019; Krugman, 2013), decades-old controversies, and popular theories that are so vague as to render them unfalsifiable. The ensuing debates, often stalemated, counterproductive, confusing, and costly, decorate the pages of peer-reviewed journals and undergraduate textbooks. Table 2 lists a few dozen contenders that would make appropriate adversarial collaborations if the warring parties were willing. This list is by no means exhaustive, but it may be a helpful starting place.

Table 2

Examples of Candidate Debates That Could Benefit from Adversarial Collaboration

1. Are STEM fields gender biased? And if so, in favor of men or women?
2. How reliable is children's testimony?
3. Can grit be cultivated? If so, when and in whom?
4. Is perceived harm a fundamental component of all moral judgment?
5. When, if ever, do violent video games increase violence?
6. When, if ever, do implicit racial attitudes predict racial discrimination?
7. Is human reasoning designed to pursue truth first and foremost?
8. To what extent are stereotypes a self-fulfilling prophecy vs. a reflection of empirical reality?
9. To what extent does racial bias among police explain the disproportionate shooting of minority civilians?
10. Is the political right more prone to motivated and inflexible thinking than the political left?
11. What do IQ tests measure?
12. How reliable are eyewitness identifications?
13. Do everyday people think scientific determinism is compatible with free will?
14. Does religion promote prosocial behavior?
15. Are the social sciences politically biased?
16. How well can laboratory findings inform policy in applied settings?
17. Do men and women have different psychological characteristics? If so, where do they come from?
18. Does ovulation influence female mating behavior?
19. What is the relationship between biological sex and gender?
20. Are there average psychological and cognitive differences between ethnic groups? If so, what causes them?
21. Is the mind modular?
22. Under what conditions, if any, does a Universal Basic Income disincentive work?
23. What causes fake news acceptance?

24. How much variance do genes explain in (fill in outcome here)?
25. Are political rightists more authoritarian than leftists?
26. How easily implanted are false memories?
27. What are the causes of inequality? And how much variance can each explain?
28. Is the Dunning-Kruger effect real?
29. What are the causes and consequences of microaggressions?
30. How much can personality change?
31. Do some psychotherapeutic interventions cause more harm than good?
32. Is social media harmful to children? When and in whom?
33. How large is the gender pay gap and what are the causes?
34. Why do people attribute more intentionality to harmful side-effects than helpful ones?
35. What, if anything, does mindfulness improve?
36. Does attachment to parents influence attachment to romantic partners?
37. Does contact with the criminal just system increase or decrease recidivism and under what circumstances?
38. When, if ever, do mindsets matter?
39. In what contexts does priming influence mind and behavior?
40. In what contexts does diversity improve organizational performance?

We can only imagine the progress that could have been made on these issues had the scholars on various sides worked *together* from the discovery of their disagreements rather than continued to defend their perspectives for decades on end. *The widespread implementation of adversarial collaborations would transform many hundreds or thousands of debates currently unfolding in the behavioral sciences.*

Incentivizing Scholars to Seek Truth

The best way to promote accuracy goals among behavioral scientists is to align social goals with epistemic goals. Many scholars have relinquished some of their researcher degrees of freedom with open science practices because such practices are rewarded with more favorable evaluations in review, on the job market, and in the eyes of peers (McKiernan et al., 2016), and because journals punish *not* participating by rejecting papers that do not use open science practices. Scholars would be more willing to pay the price of adversarial collaborations if such efforts were similarly rewarded and if standard performative research practices were rejected.

Professional organizations and universities could reward participation with more favorable evaluations in awards, hiring, and promotion decisions. And given the time costs for *all* participants in adversarial collaborations, adversarial collaboration publications could be given similar weight as first authored papers. Indeed, adversarial collaborations inevitably will be more of a collaborative team effort than traditional approaches in which the lead author frequently does 75%-95% of the work. This would help remove barriers to participation for untenured faculty.

When a paper claims to oppose or challenge another hypothesis or theory, editors could insist on adversarial collaborations. In the long run, this approach would benefit journals because it would produce higher quality science that will be more helpful to other scholars (and thus should get cited more often). Top journals could host annual special issues of adversarial collaborations that are accepted based on registered reports. If established journals are satisfied with the status quo, newer journals could distinguish themselves by focusing on adversarial collaborations, incentivizing them by focusing peer review on recommendations for improvement rather than acceptance versus rejection (similar to journals that solicit proposals, such as *Current Directions* journals) or by making them eligible for immediate editorial decision. Generally, peer review will be less necessary for adversarial collaborations because peer review is built into the research process, and editors will know that at least one or more hostile reviewers has already reviewed the paper (and much more thoroughly than a 500-word critique) and signed off. Adversarial collaborations might improve the validity and quality of research *better* than peer review, and in a way that is more efficient, less biased, less likely to delay progress, and more rewarding for the "reviewers" (because they are co-authors).

Certain kinds of organizations may have similar social motives as individual scientists and wish to publicize their involvement in particular research agendas for reputational and political reasons, and those organizations might prefer to fund performative research over accuracy-seeking research. But many organizations care about solving societal problems and designing effective policy, and *these* organizations likely do care first and foremost about accuracy. When such funders put out their calls for submissions, they could require that all submissions be adversarial collaborations (at least where appropriate). Just as participation in adversarial research might signal which scholars care about truth over advancing their own careers, funding adversarial research might signal which organizations care about problem-solving and effective policy over advancing their own political reputations and agendas.

As Mellers et al. (2001, p. 275) noted: "In an ideal world, scholars would feel obliged to accept an offer of adversarial collaboration. Editors would require adversaries to collaborate prior to, or instead of, writing independent exchanges. Scientific meetings would allot time for scholars engaged in adversarial collaboration to present their joint findings. In short, adversarial collaboration would become the norm, not the exception." More generally, if our knowledge-production systems capitalized on researcher disagreements to build more nuanced consensuses instead of perpetuating and polarizing disagreements, we would be better situated, as a society, to advance evidence-based approaches to collective problems.

Conclusion

Adversarial collaborations invigorate the spirit of falsificationism that prominent philosophers of science have long promoted. Many scientists seek to protect their research as much as they seek truth, and the freedom to design research in ways that avoid risky testing of theories allows unnecessary debates to continue. Normalizing adversarial collaborations could promote a scientific climate in which status-truth trade-offs disappear—and updating one's empirical beliefs is not viewed as a sign of failure and foolishness but of integrity and progress.

Tetlock and Mitchell (2009b) have commented that adversarial collaboration is most needed and least feasible in domains in which "the scientific community lacks clear criteria for falsifying points of view, disagrees on key methodological issues, relies on second- or third-best substitute methods for testing causality, and is fractured into opposing camps that engage in ad hominem posturing and have intimate ties to political actors who see any concession as weakness" (p. 31). Put differently, the more contentious the policy debates, and the more imprecise the science and contradictory the conclusions in the literature, the greater will be both the potential yield from adversarial collaborations and the reluctance of scholars to participate. Nonetheless, if any approach has a chance to move the needle on these difficult debates, it will be getting scholars to swallow their pride and earnestly engage their intellectual adversaries.

Adversarial collaborations look risky partly because they are unfamiliar, and scholars are so rarely called upon to acknowledge error in the ways that other professionals routinely must: engineers, lawyers, athletes, doctors, and detectives. But discovering one's weaknesses is a crucial part of learning. The so-called "soft" sciences are hard—and it would be astonishing if the true error rates were not much higher than the self-acknowledged error rates. Adversarial collaboration will shrink the gap between those numbers, improving empirical accuracy for individual scholars and expediting progress for science and society at large.

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References

Abramowitz, S. I., Gomes, B., & Abramowitz, C. V. (1975). Publish or politic: Referee bias in manuscript review. Journal of Applied Social Psychology, 5, 187-200.

Alempaki, D., Canic, E., Mullett, T. L., Skylark, W. J., Starmer, C., Stewart, N., & Tufano, F. (2019). Reexamining how utility and weighting functions get their shapes: A quasi-adversarial collaboration providing a new interpretation. *Management Science*, *65*(10), 4841-4862.

Alicke, M.D., Govorun, O. (2005). The better-than-average effect. In Alicke, M.D., Dunning, D.A., Krueger, J.I. (Eds.), Studies in self and identity (pp. 85–106). New York: Psychology Press.

Alpert, J. L., Brown, L. S., Ceci, S. J., Courtois, C. A., Loftus, E. F., & Ornstein, P. A. (1998a). Final conclusions of the American Psychological Association working group on investigation of memories of childhood abuse. *Psychology Public Policy and Law*, *4*(4), 933-940.

Alpert, J. L., Brown, L. S., & Courtois, C. A. (1998b). Comment on Ornstein, Ceci, and Loftus (1998): Adult recollections of childhood abuse. *Psychology, Public Policy, and Law, 4*(4), 1052–1067.

Anglin, S. M. (2019). Do beliefs yield to evidence? Examining belief perseverance vs. change in response to congruent empirical findings. *Journal of Experimental Social Psychology*, *82*, 176-199.

Atkinson, D. R., Furlong, M. J., & Wampold, B. E. (1982). Statistical significance, reviewer evaluations, and the scientific process: Is there a (statistically) significant relationship?. *Journal of Counseling Psychology, 29*(2), 189.

Auspurg, K., & Brüderl, J. (2021). Has the Credibility of the Social Sciences Been Credibly Destroyed? Reanalyzing the "Many Analysts, One Data Set" Project. *Socius*, *7*, 23780231211024421.

Bahník, Š., & Vranka, M. A. (2017). Growth mindset is not associated with scholastic aptitude in a large sample of university applicants. *Personality and Individual Differences*, *117*, 139-143.

Barrett, L. F. (2019). Zombie ideas. *APS Observer*, *32*(8).

Bateman, I., Kahneman, D., Munro, A., Starmer, C., & Sugden, R. (2005). Testing competing models of loss aversion: An adversarial collaboration. *Journal of Public Economics*, *89*(8), 1561-1580.

Baumeister, R. F., Maranges, H. M., & Vohs, K. D. (2018). Human self as information agent: Functioning in a social environment based on shared meanings. *Review of General Psychology*, *22*(1), 36-47.

Bedeian, A. G. (2003). The manuscript review process: The proper roles of authors, referees, and editors. *Journal of Management Inquiry*, *12*(4), 331-338.

Blanton, H., Jaccard, J., Klick, J., Mellers, B., Mitchell, G., & Tetlock, P. E. (2009). Strong claims and weak evidence: reassessing the predictive validity of the IAT. *Journal of Applied Psychology*, *94*(3), 567.

Blanton, H., & Mitchell, G. (2011). Reassessing the predictive validity of the IAT II: Reanalysis of Heider & Skowronski (2007). *North American Journal of Psychology*, *12*(1), 99-106.

Bleske-Rechek, A., Harris, H. D., Denkinger, K., Webb, R. M., Erickson, L., & Nelson, L. A. (2011). Physical cues of ovulatory status: A failure to replicate enhanced facial attractiveness and reduced waist-to-hip ratio at high fertility. *Evolutionary Psychology*, *9*(3), 147470491100900306.

Boudry, M., & Vlerick, M. (2014). Natural selection does care about truth. *International Studies in the Philosophy of Science*, *28*(1), 65-77.

Bornmann, L., Mutz, R., & Daniel, H. D. (2010). A reliability-generalization study of journal peer reviews: A multilevel meta-analysis of inter-rater reliability and its determinants. *PloS one*, *5*(12), e14331.

Bowes, S. M., Ammirati, R. J., Costello, T. H., Basterfield, C., & Lilienfeld, S. O. (2020). Cognitive biases, heuristics, and logical fallacies in clinical practice: A brief field guide for practicing clinicians and supervisors. *Professional Psychology: Research and Practice, 51*(5), 435–445.

Bowes, S. M., Blanchard, M. C., Costello, T. H., Abramowitz, A. I., & Lilienfeld, S. O. (2020). Intellectual humility and between-party animus: Implications for affective polarization in two community samples. *Journal of Research in Personality, 88*, 103992.

Bowes, S. M., Costello, T. H., Lee, C., McElroy-Heltzel, S., Davis, D. E., & Lilienfeld, S. O. (2021). Stepping Outside the Echo Chamber: Is Intellectual Humility Associated with Less Political Myside Bias?. *Personality and Social Psychology Bulletin*.

Bradie, M., & Harm, W. (2020). Evolutionary epistemology. In E.N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*. Retrieved from https://plato.stanford.edu/archives/spr2020/entries/epistemology-evolutionary/

Brown, J. D. (1986). Evaluations of self and others: Self-enhancement biases in social judgments. *Social Cognition*, *4*(4), 353-376.

Buss, D. M., & von Hippel, W. (2018). Psychological barriers to evolutionary psychology: Ideological bias and coalitional adaptations. Archives of Scientific Psychology, 6(1), 148-158.

Cadsby, C. B., Croson, R., Marks, M., & Maynes, E. (2008). Step return versus net reward in the voluntary provision of a threshold public good: An adversarial collaboration. *Public Choice*, *135*(3), 277-289.

Camerer, C. F., Dreber, A., Holzmeister, F., Ho, T. H., Huber, J., Johannesson, M., ... & Wu, H. (2018). Evaluating the replicability of social science experiments in Nature and Science between 2010 and 2015. *Nature Human Behaviour*, *2*(9), 637-644.

Campbell, T. H., & Kay, A. C. (2014). Solution aversion: On the relation between ideology and motivated disbelief. *Journal of Personality and Social Psychology*, *107*(5), 809-824.

Card, D., DellaVigna, S., Funk, P., & Iriberri, N. (2021). Gender differences in peer recognition by economists. Unpublished manuscript.

Ceci, S. J., Peters, D., & Plotkin, J. (1985). Human subjects review, personal values, and the regulation of social science research. American Psychologist, 40, 994–1002.

Cesario, J., Johnson, D. J., & Terrill, W. (2019). Is there evidence of racial disparity in police use of deadly force? Analyses of officer-involved fatal shootings in 2015–2016. *Social Psychological and Personality Science*, *10*(5), 586-595.

Cheryan, S., Ziegler, S. A., Montoya, A. K., & Jiang, L. (2017). Why are some STEM fields more gender balanced than others?. *Psychological Bulletin*, *143*(1), 1-35.

Christenson, D. P., & Kriner, D. L. (2017). Constitutional qualms or politics as usual? The factors shaping public support for unilateral action. *American Journal of Political Science*, *61*(2), 335-349.

Clark, C. J., Chen, E. E., & Ditto, P. H. (2015). Moral coherence processes: Constructing culpability and consequences. *Current Opinion in Psychology*, *6*, 123-128.

Clark, C. J., Honeycutt, N., & Jussim, L. (2021a). Replicability and the psychology of science. In S. Lilienfeld, A. Masuda, & W. O'Donohue (Eds.), *Questionable Research Practices in Psychology*. New York: Springer.

Clark, C. J., Liu, B. S., Winegard, B. M., & Ditto, P. H. (2019). Tribalism is human nature. *Current Directions in Psychological Science*, *28*(6), 587-592.

Clark, C. J., Fjeldmark, M., Lu, L., Baumeister, R. F., Ceci, S., German, K., Reilly, W., Tice, D., von Hippel, W., Williams, W., Winegard, B. M., & Tetlock, P. E. (2021b). Taboos and self-censorship in the social sciences [Unpublished manuscript]. Department of Psychology, University of Pennsylvania, Philadelphia, PA.

Clark, C. J., & Tetlock, P. E. (2021). Adversarial collaboration: The next science reform. In C. L. Frisby, R. E. Redding, W. T. O'Donohue, & S. O. Lilienfeld (Eds.), *Political Bias in Psychology: Nature, Scope, and Solutions*. New York: Springer.

Clark, C. J., & Winegard, B. M. (2020). Tribalism in war and peace: The nature and evolution of ideological epistemology and its significance for modern social science. *Psychological Inquiry*, *31*(1), 1-22.

Clark, C. J., Winegard, B. M., & Farkas, D. (2020). A cross-cultural analysis of censorship on campuses. [Unpublished manuscript]. Department of Psychology, Durham University, Durham, UK.

Claassen, R. L., & Ensley, M. J. (2016). Motivated reasoning and yard-sign-stealing partisans: Mine is a likable rogue, yours is a degenerate criminal. *Political Behavior*, *38*(2), 317-335.

Cohen, G. L. (2003). Party over policy: The dominating impact of group influence on political beliefs. *Journal of Personality and Social Psychology*, *85*(5), 808-822.

Corrigan, J. R., Drichoutis, A. C., Lusk, J. L., Nayga Jr, R. M., & Rousu, M. C. (2012). Repeated rounds with price feedback in experimental auction valuation: An adversarial collaboration. *American Journal of Agricultural Economics*, *94*(1), 97-115.

Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. *Cognition*, *31*(3), 187-276.

Cosmides, L. , & Tooby, J. (1992). Cognitive adaptations for social exchange. In Barkow, J. , Cosmides, L. , & Tooby, J. , The adapted mind: Evolutionary psychology and the generation of culture (pp. 162–228). New York: Oxford University Press.

Costello, T. H., Clark, C. J., & Tetlock, P. E. (in press). Shoring up the shaky psychological foundations of a micro-Economic model of ideology: Adversarial collaboration solutions. Commentary on The market for belief systems: A formal model of ideological choice (T. Gries, V. Müller, J. T. Jost), *Psychological Inquiry.*

Cowan, N., Belletier, C., Doherty, J. M., Jaroslawska, A. J., Rhodes, S., Forsberg, A., ... & Logie, R. H. (2020). How do scientific views change? Notes from an extended adversarial collaboration. *Perspectives on Psychological Science*, *15*(4), 1011-1025.

Crosby, F. J., Iyer, A., & Sincharoen, S. (2006). Understanding affirmative action. *Annual Review of Psychology.*, *57*, 585-611.

Davis, W. E., Giner-Sorolla, R., Lindsay, D. S., Lougheed, J. P., Makel, M. C., Meier, M. E., ... & Zelenski, J. M. (2018). Peer-review guidelines promoting replicability and transparency in psychological science. *Advances in Methods and Practices in Psychological Science*, *1*(4), 556-573.

Dawson, N. V., & Arkes, H. R. (2009). Implicit bias among physicians. *Journal of General Internal Medicine*, *24*(1), 137-140.

Dawson, E., Gilovich, T., & Regan, D. T. (2002). Motivated reasoning and performance on the Wason Selection Task. *Personality and Social Psychology Bulletin*, *28*(10), 1379-1387.

De Cruz, H., Boudry, M., De Smedt, J., & Blancke, S. (2011). Evolutionary approaches to epistemic justification. *Dialectica*, *65*(4), 517-535.

DeMarree, K. G., Clark, C. J., Wheeler, S. C., Briñol, P., & Petty, R. E. (2017). On the pursuit of desired attitudes: Wanting a different attitude affects information processing and behavior. *Journal of Experimental Social Psychology*, *70*, 129-142.

Ditto, P. H., Liu, B. S., Clark, C. J., Wojcik, S. P., Chen, E. E., Grady, R. H., ... & Zinger, J. F. (2019a). At least bias is bipartisan: A meta-analytic comparison of partisan bias in liberals and conservatives. *Perspectives on Psychological Science, 14*(2), 273-291.

Ditto, P. H., Clark, C. J., Liu, B. S., Wojcik, S. P., Chen, E. E., Grady, R. H., ... & Zinger, J. F. (2019b). Partisan bias and its discontents. *Perspectives on Psychological Science*, *14*(2), 304-316.

Ditto, P. H., & Lopez, D. F. (1992). Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions. *Journal of Personality and Social Psychology, 63*(4), 568-584.

Ditto, P. H., Pizarro, D. A., & Tannenbaum, D. (2009). Motivated moral reasoning. *Psychology of Learning and Motivation*, *50*, 307-338.

Doherty, J. M., Belletier, C., Rhodes, S., Jaroslawska, A., Barrouillet, P., Camos, V., ... & Logie, R. H. (2019). Dual-task costs in working memory: An adversarial collaboration. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *45*(9), 1529-1551.

Doyle, M. W., & Stiglitz, J. E. (2014). Eliminating extreme inequality: A sustainable development goal, 2015–2030. *Ethics & International Affairs*, *28*(1), 5-13.

Duarte, J. L., Crawford, J. T., Stern, C., Haidt, J., Jussim, L., & Tetlock, P. E. (2015). Political diversity will improve social psychological science 1. *Behavioral and Brain Sciences*, *38,* e130.

Duckworth, A. L. (2006). *Intelligence is not enough: Non-IQ predictors of achievement*. University of Pennsylvania.

Ebersole, C. R., Mathur, M. B., Baranski, E., Bart-Plange, D. J., Buttrick, N. R., Chartier, C. R., ... & Szecsi, P. (2020). Many Labs 5: Testing pre-data-collection peer review as an intervention to increase replicability. *Advances in Methods and Practices in Psychological Science*, *3*(3), 309-331.

Elson, M., Huff, M., & Utz, S. (2020). Metascience on Peer Review: Testing the Effects of a Study's Originality and Statistical Significance in a Field Experiment. *Advances in Methods and Practices in Psychological Science*, *3*(1), 53-65.

Emerson, G. B., Warme, W. J., Wolf, F. M., Heckman, J. D., Brand, R. A., & Leopold, S. S. (2010). Testing for the presence of positive-outcome bias in peer review: a randomized controlled trial. *Archives of Internal Medicine*, *170*(21), 1934-1939.

Ernst, E., & Resch, K. L. (1994). Reviewer bias: a blinded experimental study. *The Journal of Laboratory and Clinical Medicine*, *124*(2), 178-182.

Faust, D. (1984). *The limits of scientific reasoning*. Minneapolis: University of Minnesota Press.

Fernbach, P. M., & Light, N. (2020). Knowledge is Shared. *Psychological Inquiry*, *31*(1), 26-28.

Feynman, R. P. (1974). Cargo cult science. *Engineering and Science*, *37*(7), 10-13.

Fiske, S. T. (2017). Going in many right directions, all at once. *Perspectives on Psychological Science*, *12*(4), 652-655.

Flake, J. K., & Fried, E. I. (2020). Measurement schmeasurement: Questionable measurement practices and how to avoid them. *Advances in Methods and Practices in Psychological Science*, *3*(4), 456-465.

Forscher, P. S., Cox, W. T. L., Devine, P. G., Brauer, M. (2019). How many reviewers are required to obtain reliable evaluations of NIH R01 grant proposals? *PsyArXiV*. Retrieved from https://psyarxiv.com/483zj/

Franco, A., Malhotra, N., & Simonovits, G. (2014). Publication bias in the social sciences: Unlocking the file drawer. *Science*, *345*(6203), 1502-1505.

Frimer, J. A., Skitka, L. J., & Motyl, M. (2017). Liberals and conservatives are similarly motivated to avoid exposure to one another's opinions. *Journal of Experimental Social Psychology*, *72*, 1-12.

Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science*, *2*(2), 156-168.

Gampa, A., Wojcik, S. P., Motyl, M., Nosek, B. A., & Ditto, P. H. (2019). (Ideo) logical reasoning: Ideology impairs sound reasoning. *Social Psychological and Personality Science*, *10*(8), 1075-1083.

Geller, A., Goff, P. A., Lloyd, T., Haviland, A., Obermark, D., & Glaser, J. (2020). Measuring racial disparities in police use of force: methods matter. *Journal of Quantitative Criminology*, 1-31.

Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, *62*, 451-482.

Gilovich, T., & Medvec, V. H. (1995). The experience of regret: what, when, and why. *Psychological Review*, *102*(2), 379-395.

Gilovich, T., Medvec, V. H., & Kahneman, D. (1998). Varieties of regret: A debate and partial resolution. *Psychological Review*, *105*(3), 602-605.

Godlee, F., Gale, C. R., & Martyn, C. N. (1998). Effect on the quality of peer review of blinding reviewers and asking them to sign their reports: a randomized controlled trial. *Jama*, *280*(3), 237-240.

Green, A. R., Carney, D. R., Pallin, D. J., Ngo, L. H., Raymond, K. L., Iezzoni, L. I., & Banaji, M. R. (2007). Implicit bias among physicians and its prediction of thrombolysis decisions for black and white patients. *Journal of General Internal Medicine*, *22*(9), 1231-1238.

Hagger, M. S., Chatzisarantis, N. L., Alberts, H., Anggono, C. O., Batailler, C., Birt, A. R., ... & Zwienenberg, M. (2016). A multilab preregistered replication of the ego-depletion effect. *Perspectives on Psychological Science*, *11*(4), 546-573.

Hahn, A. C., DeBruine, L. M., Pesce, L. A., Diaz, A., Aberson, C. L., & Jones, B. C. (2020). Does women's anxious jealousy track changes in steroid hormone levels?. *Psychoneuroendocrinology*, *113*, 104553.

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review, 108*(4), 814–834.

Haidt, J. (2012). *The righteous mind: Why good people are divided by politics and religion*. New York, NY: Vintage.

Haidt, J. (2020). Tribalism, forbidden baserates, and the telos of social science. *Psychological Inquiry*, *31*(1), 53-56.

Haselton, M. G., & Buss, D. M. (2000). Error management theory: a new perspective on biases in cross-sex mind reading. *Journal of Personality and Social Psychology*, *78*(1), 81-91.

Hawkins, C. B., & Nosek, B. A. (2012). Motivated independence? Implicit party identity predicts political judgments among self-proclaimed independents. *Personality and Social Psychology Bulletin*, *38*(11), 1437-1452.

Heyman, T., Moors, P., & Rabagliati, H. (2020). The benefits of adversarial collaboration for commentaries. *Nature Human Behaviour*, *4*(12), 1217-1217.

Hollis, M. E., & Jennings, W. G. (2018). Racial disparities in police use-of-force: a state-of-the-art review. *Policing: An International Journal*, *41*, 178-193.

Honeycutt, N., & Freberg, L. (2017). The liberal and conservative experience across academic disciplines: An extension of Inbar and Lammers. *Social Psychological and Personality Science, 8*, 115–123.

Honeycutt, N., & Jussim, L. (2020). A model of political bias in social science research. *Psychological Inquiry*, *31*(1), 73-85.

Hoorens, V. (1993). Self-enhancement and superiority biases in social comparison. *European Review of Social Psychology*, *4*(1), 113-139.

Inbar, Y., & Lammers, J. (2012). Political diversity in social and personality psychology. *Perspectives on Psychological Science, 7*, 496-503.

Ioannidis, J. P. (2012). Why science is not necessarily self-correcting. *Perspectives on Psychological Science*, *7*(6), 645-654.

Jonas, K. J., Cesario, J., Alger, M., Bailey, A. H., Bombari, D., Carney, D., ... & Tybur, J. M. (2017). Power poses–where do we stand?. *Comprehensive Results in Social Psychology*, *2*(1), 139-141.

Jost, J. T., Rudman, L. A., Blair, I. V., Carney, D. R., Dasgupta, N., Glaser, J., & Hardin, C. D. (2009a). The existence of implicit bias is beyond reasonable doubt: A refutation of ideological and methodological objections and executive summary of ten studies that no manager should ignore. *Research in Organizational Behavior*, *29*, 39-69.

Jost, J. T., Rudman, L. A., Blair, I. V., Carney, D. R., Dasgupta, N., Glaser, J., & Hardin, C. D. (2009b). An invitation to Tetlock and Mitchell to conduct empirical research on implicit bias with friends,“adversaries,” or whomever they please. *Research in Organizational Behavior*, (29), 73-75.

Jussim, L., Careem, A., Goldberg, Z., Honeycutt, N., & Stevens, S. (in press). IAT scores, racial gaps, and scientific gaps. In J. A. Krosnick, T. H. Stark, & A. L. Scott (Eds.), *The Future of Research on Implicit Bias*.

Jussim, L., Krosnick, J. A., Stevens, S. T., & Anglin, S. M. (2019). A social psychological model of scientific practices: Explaining research practices and outlining the potential for successful reforms. *Psychologica Belgica*, *59*(1), 353-372.

Jylkkä, J., Härkönen, J., & Hyönä, J. (2021). Incidental disgust does not cause moral condemnation of neutral actions. *Cognition and Emotion*, *35*(1), 96-109.

Kahan, D. M., Hoffman, D. A., Braman, D., Evans, D., & Rachlinski, J. J. (2012). They saw a protest: Cognitive illiberalism and the speech-conduct distinction. *Stan. L. Rev.*, *64*, 851.

Kahan, D. M., Peters, E., Dawson, E. C., & Slovic, P. (2017). Motivated numeracy and enlightened self-government. *Behavioural Public Policy*, *1*(1), 54–86.

Kahneman, D. (1995). Varieties of counterfactual thinking. In Roese, N. J., Olson, J. M. (Eds.), *What might have been: The social psychology of counterfactual thinking* (pp. 375–396). Mahwah, NJ: Erlbaum.

Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *American Psychologist*, *58*(9), 697-720.

Kahneman, D. (2003). Experiences of collaborative research. *American Psychologist, 58*(9), 723-730.

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus, and Giroux.

Kaufmann, E. (2021). Academic freedom in crisis: Punishment, political discrimination, and self-censorship. *Center for the Study of Partisanship and Ideology, 2,* 1-195.

Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: a failure to disagree. *American Psychologist, 64*(6), 515-526.

Karon, B. P., & Widener, A. (1998). Repressed memories: The real story. *Professional Psychology: Research and Practice, 29*(5), 482–487.

Kerr, N. L. (1998). HARKing: Hypothesizing after the results are known. *Personality and Social Psychology Review*, *2*(3), 196-217.

Kerr, N. L., Ao, X., Hogg, M. A., & Zhang, J. (2018). Addressing replicability concerns via adversarial collaboration: Discovering hidden moderators of the minimal intergroup discrimination effect. *Journal of Experimental Social Psychology*, *78*, 66-76.

Kinder, D. R., & Sears, D. O. (1981). Prejudice and politics: Symbolic racism versus racial threats to the good life. *Journal of Personality and Social Psychology, 40*(3), 414-431.

Klein, R. A., Cook, C. L., Ebersole, C. R., Vitiello, C. A., Nosek, B. A., Chartier, C. R., . . . Ratliff, K. A. (2019). Many Labs 4: Failure to replicate mortality salience effect with and without original author involvement. doi:10.31234/osf.io/vef2c

Koch, A., Imhoff, R., Unkelbach, C., Nicolas, G., Fiske, S., Terache, J., ... & Yzerbyt, V. (2020). Groups' warmth is a personal matter: Understanding consensus on stereotype dimensions reconciles adversarial models of social evaluation. *Journal of Experimental Social Psychology, 89*, 103995.

Koehler, J. J. (1993). The influence of prior beliefs on scientific judgments of evidence quality. Organizational Behavior and Human Decision Processes, 56, 28-55.

Koole, S. L., & Lakens, D. (2012). Rewarding replications: A sure and simple way to improve psychological science. *Perspectives on Psychological Science*, *7*(6), 608-614.

Kopko, K. C., Bryner, S. M., Budziak, J., Devine, C. J., & Nawara, S. P. (2011). In the eye of the beholder? Motivated reasoning in disputed elections. *Political Behavior*, *33*(2), 271-290.

Kovera, M. B., & Evelo, A. J. (2021). Eyewitness identification in its social context. *Journal of Applied Research in Memory and Cognition*.

Krugman, P. (2013, February 14). Rubio and the zombies. *The New York Times*. Retrieved from https://www.nytimes.com/2013/02/15/opinion/krugman-rubio-and-the-zombies.html

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

Lai, C. K. (2020). Ordinary claims require ordinary evidence: a lack of direct support for equalitarian bias in the social sciences. *Psychological Inquiry*, *31*(1), 42-47.

Lakatos, I. (1970). Falsification and the methodology of scientific research programmes. In I. Lakatos & A. Musgrave (Eds.), *Criticism and the growth of knowledge* (pp. 205–259). New York, NY: Cambridge University

Landy, J. F., & Goodwin, G. P. (2015). Does incidental disgust amplify moral judgment? A meta-analytic review of experimental evidence. *Perspectives on Psychological Science, 10*(4), 518-536.

Latham, G. P., Erez, M., & Locke, E. A. (1988). Resolving scientific disputes by the joint design of crucial experiments by the antagonists: Application to the Erez–Latham dispute regarding participation in goal setting. *Journal of Applied Psychology*, *73*(4), 753-772.

Lee, C. J., Sugimoto, C. R., Zhang, G., & Cronin, B. (2013). Bias in peer review. *Journal of the American Society for Information Science and Technology, 64*, 2-17.

Lerner, J. S., & Tetlock, P. E. (1999). Accounting for the effects of accountability. *Psychological Bulletin*, *125*(2), 255-275.

Lilienfeld, S. O. (2010). Can psychology become a science?. *Personality and Individual Differences*, *49*(4), 281-288.

Lilienfeld, S. O., Basterfield, C., Bowes, S. M., & Costello, T. H. (2020). Nobelists gone wild: Case studies in the domain specificity of critical thinking. In R. J. Sternberg & D. F. Halpern (Eds.), *Critical thinking in psychology* (2nd ed.). New York, NY: Cambridge University Press.

Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. *Learning & Memory*, *12*(4), 361-366.

Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology, 37*(11), 2098–2109.

Mahoney, M. J. (1976). *Scientist as subject: The psychological imperative.* Ballinger.

Mahoney, M. J. (1977). Publication prejudices: An experimental study of confirmatory bias in the peer review system. Cognitive Therapy and Research, 1, 161-175.

Matzke, D., Nieuwenhuis, S., van Rijn, H., Slagter, H. A., van der Molen, M. W., & Wagenmakers, E. J. (2015). The effect of horizontal eye movements on free recall: A preregistered adversarial collaboration. *Journal of Experimental Psychology: General, 144*(1), e1.

Mayo, D. G. (2018). *Statistical inference as severe testing*. Cambridge: Cambridge University Press.

McConnell, A. R., & Leibold, J. M. (2001). Relations among the Implicit Association Test, discriminatory behavior, and explicit measures of racial attitudes. *Journal of Experimental Social Psychology*, *37*(5), 435-442.

McKiernan, E. C., Bourne, P. E., Brown, C. T., Buck, S., Kenall, A., Lin, J., ... & Yarkoni, T. (2016). Point of view: How open science helps researchers succeed. *Elife, 5*, e16800.

Meehl, P. E. (1978). Theoretical risks and tabular asterisks: Sir Karl, Sir Ronald, and the slow progress of soft psychology. *Journal of Consulting and Clinical Psychology*, *46*(4), 806-834.

Mellers, B., Hertwig, R., & Kahneman, D. (2001). Do frequency representations eliminate conjunction effects? An exercise in adversarial collaboration. *Psychological Science*, *12*(4), 269-275.

Melloni, L., Mudrik, L., Pitts, M., & Koch, C. (2021). Making the hard problem of consciousness easier. *Science*, *372*(6545), 911-912.

Merton, R. K. (1973). *The sociology of science: Theoretical and empirical investigations*. Chicago, IL: University of Chicago Press.

Mitchell, G., Tetlock, P. E. (2009). Disentangling reasons and rationalizations: Exploring perceived fairness in hypothetical societies. In Jost, J., Kay, A. C., Thorisdottir, H. (Eds.), *Social and psychological bases of ideology and system justification* (pp. 126–157). New York, NY: Oxford University Press.

Motyl, M., Prims, J. P., & Iyer, R. (2020). How ambient cues facilitate political segregation. *Personality and Social Psychology Bulletin*, *46*(5), 723-737.

Munro, G. D., Lasane, T. P., & Leary, S. P. (2010a). Political partisan prejudice: Selective distortion and weighting of evaluative categories in college admissions applications. *Journal of Applied Social Psychology*, *40*(9), 2434-2462.

Munro, G. D., Weih, C., & Tsai, J. (2010b). Motivated suspicion: Asymmetrical attributions of the behavior of political ingroup and outgroup members. *Basic and Applied Social Psychology*, *32*(2), 173-184.

Mynatt, C. R., Doherty, M. E., & Tweney, R. D. (1977). Confirmation bias in a simulated research environment: An experimental study of scientific inference. *Quarterly Journal of Experimental Psychology*, *29*(1), 85-95.

Nier, J. A., & Campbell, S. D. (2013). Two outsiders' view on feminism and evolutionary psychology: An opportune time for adversarial collaboration. *Sex Roles*, *69*(9-10), 503-506.

Nosek, B. A., Hardwicke, T. E., Moshontz, H., Allard, A., Corker, K. S., Almenberg, A. D., ... & Vazire, S. (2021). Replicability, robustness, and reproducibility in psychological science. Unpublished manuscript.

Okike, K., Hug, K. T., Kocher, M. S., & Leopold, S. S. (2016). Single-blind vs double-blind peer review in the setting of author prestige. *Jama*, *316*(12), 1315-1316.

Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science*, *349*(6251).

Ornstein, P. A., Ceci, S. J., & Loftus, E. F. (1998a). Comment on Alpert, Brown, and Courtois (1998): The science of memory and the practice of psychotherapy. *Psychology, Public Policy, and Law, 4*(4), 996-1010.

Ornstein, P. A., Ceci, S. J., & Loftus, E. F. (1998b). More on the repressed memory debate: A reply to Alpert, Brown, and Courtois (1998). *Psychology, Public Policy, and Law, 4*(4), 1068–1078.

Pashler, H., Coburn, N., & Harris, C. R. (2012). Priming of social distance? Failure to replicate effects on social and food judgments. *PLoS ONE 7*(8): e42510.

Pendergrast, M. (1999). Smearing in the name of scholarship. *Professional Psychology: Research and Practice, 30*(6), 623–625.

Peters, U., Honeycutt, N., Block, A. D., & Jussim, L. (2020). Ideological diversity, hostility, and discrimination in philosophy. *Philosophical Psychology,* 1–38.

Pew (2021). Beyond red vs. blue: The political typology. Retrieved from: https://www.pewresearch.org/politics/2021/11/09/beyond-red-vs-blue-the-political-typology-2/

Pietschnig, J., Voracek, M., & Formann, A. K. (2010). Mozart effect–Shmozart effect: A meta-analysis. *Intelligence*, *38*(3), 314-323.

Pinker, S. (2018). *Enlightenment now: The case for reason, science, humanism, and progress*. New York, NY: Penguin.

Pinker, S. (2021). *Rationality: What it is, why it seems scare, why it matters.* New York, NY: Viking.

Platt, J. (1998). *A history of sociological research methods in America, 1920-1960* (Vol. 40). New York, NY: Cambridge University Press.

Popper, K. (2002). The logic of scientific discovery (Popper, K., Trans.). New York, NY: Routledge Classics. (Original work published 1935)

Proctor, R. W., & Capaldi, E. J. (Eds.). (2012). *Psychology of science: Implicit and explicit processes*. New York: Oxford University Press.

Purser, H., & Harper, C. A. (2020). Low system justification drives ideological differences in joke perception: A critical commentary and re-analysis of Baltiansky et al. (2020). Unpublished manuscript.

Rakow, T., Thompson, V., Ball, L., & Markovits, H. (2015). Rationale and guidelines for empirical adversarial collaboration: A Thinking & Reasoning initiative. *Thinking & Reasoning*, *21*, 167-175.

Rauch, J. (2021). *The Constitution of Knowledge: A Defense of Truth*. Washington D.C.: Brookings Institution Press.

Redding, R. E. (2001). Sociopolitical diversity in psychology: The case for pluralism. *American Psychologist*, *56*(3), 205.

Rienzo, C., Rolfe, H., & Wilkinson, D. (2015). Changing mindsets: Evaluation report and executive summary. *Education Endowment Foundation*.

Ritchie, S. (2020). Science Fictions: How Fraud, Bias, Negligence, and Hype Undermine the Search for Truth. New York, NY: Metropolitan Books.

Rothman, S., Lichter, S. R., & Nevitte, N. (2005). Politics and professional advancement among college faculty. *The Forum*, *3*.

Sætrevik, B., & Sjåstad, H. (2019, May 17). Failed pre-registered replication of mortality salience effects in traditional and novel measures. https://doi.org/10.31234/osf.io/dkg53

Sanchez, C., Sundermeier, B., Gray, K., & Calin-Jageman, R. J. (2017). Direct replication of Gervais & Norenzayan (2012): No evidence that analytic thinking decreases religious belief. *PLoS One*, *12*(2), e0172636.

Sander, R. H. (2004). A systemic analysis of affirmative action in American law schools. *Stanford Law Review.*, *57*, 367-483.

Schlitz, M., Wiseman, R., Watt, C., & Radin, D. (2006). Of two minds: Sceptic-proponent collaboration within parapsychology. *British Journal of Psychology*, *97*(3), 313-322.

Schweinsberg, M., Feldman, M., Staub, N., van den Akker, O. R., van Aert, R. C., Van Assen, M. A., ... & Schulte-Mecklenbeck, M. (2021). Same data, different conclusions: Radical dispersion in empirical results when independent analysts operationalize and test the same hypothesis. *Organizational Behavior and Human Decision Processes*.

Sedikides, C., Gaertner, L., & Toguchi, Y. (2003). Pancultural self-enhancement. *Journal of Personality and Social Psychology*, *84*(1), 60-79.

Shanks, D. R., Newell, B. R., Lee, E. H., Balakrishnan, D., Ekelund, L., Cenac, Z., ... & Moore, C. (2013). Priming intelligent behavior: An elusive phenomenon. *PloS one*, *8*(4), e56515.

Shema, H. (2014). The birth of modern peer review. *Scientific American*, 156-60.

Silberzahn, R., Uhlmann, E. L., Martin, D. P., Anselmi, P., Aust, F., Awtrey, E., ... & Nosek, B. A. (2018). Many analysts, one data set: Making transparent how variations in analytic choices affect results. *Advances in Methods and Practices in Psychological Science*, *1*(3), 337-356.

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359-1366.

Simmons, J. P., & Simonsohn, U. (2017). Power posing: P-curving the evidence. *Psychological Science*, *28*, 687-693.

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: a key to the file-drawer. *Journal of Experimental Psychology: General*, *143*(2), 534-547.

Simonsohn, U., Simmons, J. P., & Nelson, L. (2021). Evidence of fraud in an influential field experiment about dishonesty. *Data Colada*, *98*. Retrieved from: https://datacolada.org/98

Singal, J. (2021). The quick fix: Why fad psychology can’t cure our social ills. New York, NY: Farrar, Straus, and Giroux.

Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science, 29*(4), 549-571.

Skitka, L. J. (2020). An optimistic take on avoiding liberal (and other sources of) bias. *Psychological Inquiry, 31*, 88-89.

Sniderman, P. M., & Tetlock, P. E. (1986). Symbolic racism: Problems of motive attribution in political analysis. *Journal of Social Issues*, *42*(2), 129-150.

Spellman, B., Gilbert, E., & Corker, K. S. (2017). Open science: What, why, and how.

Steele, K. M. (2014). Failure to replicate the Mehta and Zhu (2009) color-priming effect on anagram solution times. *Psychonomic Bulletin & Review*, *21*(3), 771-776.

Stern, C., & Crawford, J. T. (2021). Ideological conflict and prejudice: An adversarial collaboration examining correlates and ideological (a) symmetries. *Social Psychological and Personality Science*, *12*(1), 42-53.

Strevens, M. (2020). *The knowledge machine: How irrationality created modern science*. New York: Liveright Publishing.

Stoet, G., & Geary, D. C. (2012). Can stereotype threat explain the gender gap in mathematics performance and achievement?. *Review of General psychology*, *16*(1), 93-102.

Stroud, N. J. (2008). Media use and political predispositions: Revisiting the concept of selective exposure. *Political Behavior*, *30*(3), 341-366.

Stroud, N. J. (2010). Polarization and partisan selective exposure. *Journal of Communication*, *60*(3), 556-576.

Surowiecki, J. (2004). *The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies, and nations*. London: Little, Brown.

Taber, C. S., & Lodge, M. (2006). Motivated skepticism in the evaluation of political beliefs. *American Journal of Political Science*, *50*(3), 755-769.

Tappin, B. M., Pennycook, G., & Rand, D. G. (2020). Bayesian or biased? Analytic thinking and political belief updating. *Cognition*, *204*, 104375.

Tetlock, P. E. (2003). Thinking the unthinkable: Sacred values and taboo cognitions. *Trends in Cognitive Sciences*, *7*(7), 320-324.

Tetlock, P.E. (2006). Adversarial collaboration: Least feasible when most needed? Least needed when most feasible? Presentation to Board of Directors of Russell Sage Foundation, New York City.

Tetlock, P. E. (2012). Rational versus irrational prejudices: How problematic is the ideological lopsidedness of social psychology?. *Perspectives on Psychological Science*, *7*(5), 519-521.

Tetlock, P. E. (2020). Gauging the politicization of research programs. *Psychological Inquiry, 31*(1), 86–87.

Tetlock, P. E., Kristel, O. V., Elson, S. B., Green, M. C., & Lerner, J. S. (2000). The psychology of the unthinkable: taboo trade-offs, forbidden base rates, and heretical counterfactuals. *Journal of Personality and Social Psychology*, *78*(5), 853-870.

Tetlock, P. E., & Levi, A. (1982). Attribution bias: On the inconclusiveness of the cognition-motivation debate. *Journal of Experimental Social Psychology*, *18*(1), 68-88.

Tetlock, P. E., & Manstead, A. S. (1985). Impression management versus intrapsychic explanations in social psychology: A useful dichotomy?. *Psychological Review*, *92*(1), 59-77.

Tetlock, P. E., & Mitchell, G. (2009a). Implicit bias and accountability systems: What must organizations do to prevent discrimination?. *Research in Organizational Behavior*, *29*, 3-38.

Tetlock, P. E., & Mitchell, G. (2009b). Adversarial collaboration aborted but our offer still stands. *Research in Organizational Behavior*, *29*, 77-79.

Tetlock, P. E., & Mitchell, G. (2009c). A renewed appeal for adversarial collaboration. *Research in Organizational Behavior*, (29), 71-72.

Thomas, A. G., Armstrong, S. L., Stewart-Williams, S., & Jones, B. C. (2021). Current fertility status does not predict sociosexual attitudes and desires in normally ovulating women. *Evolutionary Psychology*, *19*(1), 1474704920976318.

Tomkins, A., Zhang, M., & Heavlin, W. D. (2017). Reviewer bias in single-versus double-blind peer review. *Proceedings of the National Academy of Sciences*, *114*, 12708-12713.

Tsou, A., Schickore, J., & Sugimoto, C. R. (2014). Unpublishable research: Examining and organizing the ‘file drawer’. *Learned Publishing*, *27*(4), 253-267.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124-1131.

Tversky, A., & Kahneman, D. (1981). Evidential impact of base rates. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 153–160). New York, NY: Cambridge University Press.

Ulbig, S. G., & Funk, C. L. (1999). Conflict avoidance and political participation. *Political Behavior*, *21*(3), 265-282.

Van Bavel, J. J., Reinero, D. A., Harris, E., Robertson, C. E., & Pärnamets, P. (2020). Breaking groupthink: Why scientific identity and norms mitigate ideological epistemology. *Psychological Inquiry*, *31*(1), 66-72.

Van Dessel, P., Gawronski, B., Smith, C. T., & De Houwer, J. (2017). Mechanisms underlying approach-avoidance instruction effects on implicit evaluation: Results of a preregistered adversarial collaboration. *Journal of Experimental Social Psychology*, *69,* 23-32.

van Gelder, T., Kruger, A., Thomman, S., de Rozario, R., Silver, E., Saletta, M., ... & Burgman, M. (2020). Improving Analytic Reasoning via Crowdsourcing and Structured Analytic Techniques. *Journal of Cognitive Engineering and Decision Making, 14*(3), 195-217.

van Prooijen, J. W., & Krouwel, A. P. (2019). Psychological features of extreme political ideologies. *Current Directions in Psychological Science, 28*(2), 159-163.

Vazire, S. (2018). Implications of the credibility revolution for productivity, creativity, and progress. *Perspectives on Psychological Science, 13*(4), 411-417.

Vlasceanu, M., Morais, M. J., & Coman, A. (2021). The effect of prediction error on belief update across the political spectrum. *Psychological Science,* 0956797621995208.

von Hippel, W., & Buss, D. M. (2017). Do ideologically driven scientific agendas impede the understanding and acceptance of evolutionary principles in social psychology. In J. T. Crawford & L. Jussim. *Frontiers of Social Psychology Series: The Politics of Social Psychology* (pp. 7–25). New York, NY: Routledge.

Ward, A., English, T., & Chin, M. (2021). Physical attractiveness predicts endorsement of specific evolutionary psychology principles. *Plos one*, *16*(8), e0254725.

Wason, P. C., & Johnson-Laird, P. N. (1972). *Psychology of reasoning: Structure and content* (Vol. 86). Cambridge, MA: Harvard University Press.

Weber, M. (1968). Economy and Society. New York: Bedminster.

Wicherts, J. M., Borsboom, D., Kats, J., & Molenaar, D. (2006). The poor availability of psychological research data for reanalysis. *American Psychologist*, *61*(7), 726.

Widemo, F., & Sæther, S. A. (1999). Beauty is in the eye of the beholder: Causes and consequences of variation in mating preferences. *Trends in Ecology & Evolution*, *14*(1), 26-31.

Williams, W. M., & Ceci, S. J. (2015). National hiring experiments reveal 2: 1 faculty preference for women on STEM tenure track. *Proceedings of the National Academy of Sciences*, *112*(17), 5360-5365.

Winegard, B. M., & Clark, C. J. (2020). Without contraries is no progression. *Psychological Inquiry*, *31*(1), 94-101.

Winegard, B. M., Clark, C. J., Hasty, C. R., & Baumeister, R. F. (2018). *Equalitarianism: A source of liberal bias*. Manuscript submitted for publication.

Wiseman, R., & Schlitz, M. (1997). Experimenter effects and the remote detection of staring. *Journal of Parapsychology*, *61*, 197–207.

Wiseman, R., & Schlitz, M. (1999). Replication of experimenter effect and the remote detection of staring. *Proceedings of the 42nd Annual Convention of the Parapsychological Association*, 471–479.

Wright, J. D., Goldberg, Z., Cheung, I., & Esses, V. M. (2021). Clarifying the meaning of symbolic racism. Unpublished manuscript.

Zmigrod, L., Rentfrow, P. J., & Robbins, T. W. (2020). The partisan mind: Is extreme political partisanship related to cognitive inflexibility?. *Journal of Experimental Psychology: General*, *149*(3), 407-418.