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# Giving Debiasing Away

## Can Psychological Research on Correcting Cognitive Errors Promote Human Welfare?

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**ABSTRACT**—*Despite Miller's (1969) now-famous clarion call to "give psychology away" to the general public, scientific psychology has done relatively little to combat festering problems of ideological extremism and both inter- and intragroup conflict. After proposing that ideological extremism is a significant contributor to world conflict and that confirmation bias and several related biases are significant contributors to ideological extremism, we raise a crucial scientific question: Can debiasing the general public against such biases promote human welfare by tempering ideological extremism? We review the knowns and unknowns of debiasing techniques against confirmation bias, examine potential barriers to their real-world efficacy, and delineate future directions for research on debiasing. We argue that research on combating extreme confirmation bias should be among psychological science's most pressing priorities.*

On the eve of the 40th anniversary of George A. Miller's (1969) now-classic presidential address to the American Psychological Association, "Psychology as a Means of Promoting Human Welfare," scientific psychologists may be tempted to ponder a gnawing question: Do we matter?

In some domains, such as psychological assessment, behavior modification, stress management, human factors, personnel selection, and political surveys, the answer is surely "yes" (Fowler, 1999; Zimbardo, 2004). Here, the contributions of psychology to everyday life are undeniable. Still, 4 decades after Miller's (1969) bold challenge to "give psychology away" (p. 1071) to the general public, psychologists may justifiably ask themselves whether they have made as much of a real-world difference as they had hoped in the heady days of the 1960s.

In particular, with 15 to 20 major armed conflicts raging around the globe and terrorism on the rise (Strategy Page, 2005), the world is arguably as dangerous as ever, and festering problems of inter- and intragroup conflict still contribute immeasurably to human suffering (Sternberg, 2003). In the face of these overwhelming problems, psychology has proven largely or entirely impotent. As Miller (1969) observed: "We desperately need techniques for resolving conflicts, and for preventing them from becoming public confrontations from which reasonable retreat is impossible" (p. 1074). Yet as psychologists, how much have we contributed tangibly to these efforts (see T.R. Cohen & Insko, 2008; Lilienfeld, 2008)? The question nags.

To make substantial inroads into the dire problems of inter- and intragroup conflict and war, psychologists will almost certainly first need to crack the hard nut of ideological extremism. The most deadly political movements of the 20th and early 21st centuries—including Nazism, Stalinism, Mao-Tse Tung's cultural revolution, Pol Pot's Khmer Rouge, and now Islamic fundamentalism—share one cardinal characteristic: the unshakeable conviction that its proponents were right and righteous and that its opponents were wrong and despicable (Harrington, 2004; see also Beck, 1999). Although correlation is not causation, the causal role of ideology in these movements is difficult to deny (Calhoun, 2004). Yet with a handful of significant exceptions (e.g., Baumeister, 1997; Beck, 1999; Ross & Ward, 1996; Saucier, Akers, Shen-Miller, Knežević, & Stankow, 2009; Sternberg, 2003; Zimbardo, 2004), modern scientific psychology has largely neglected the 800-pound gorilla of ideological extremism.

### RESEARCH ON COGNITIVE BIASES AND OVERCOMING THEM

Undeniably, one of the crowning achievements of modern psychological science has been the program of research on human cognitive fallibility pioneered by Amos Tversky, Daniel Kahneman, Richard Nisbett, Lee Ross, Thomas Gilovich, Hal Arkes, Keith Stanovich, and others. Several notable dissenters aside (e.g., L.J. Cohen, 1981; Funder, 1987; Gigerenzer, 1996), there is growing consensus that such research demonstrates that human thinking is not nearly as rational as once commonly

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PERSPECTIVES on Psychological Science

believed (Dawes, 2001; Dawes, Faust, & Meehl, 1989; Gilovich, Griffin, & Kahneman, 2002; Kahneman & Tversky, 1996; Nisbett & Ross, 1980; Stanovich & West, 2000). Our judgment and decision making, although often reasonably accurate, are frequently clouded by a plethora of biases and heuristics. There is also widespread agreement that these biases and heuristics reflect the operation of basically adaptive processes that are misapplied in specific circumstances (Gigerenzer & Todd, 2002; Shepperd & Koch, 2005; Tversky & Kahneman, 1974). The scientific impact of research on heuristics and biases was formally recognized in 2002 by the awarding of the Nobel Memorial Prize in Economics to Daniel Kahneman (which he shared with economist Vernon Smith), the first Ph.D. psychologist to receive that honor.

### The Largely Uncharted Frontier of Debiasing

In striking contrast to the enormous corpus of psychological research concerning the impact of biases and heuristics on human judgment is the paucity of psychological research on debiasing (Arkes, 1991; Larrick, 2004). It seems fair to say that psychologists have made far more progress in cataloguing cognitive biases (see Krueger & Funder's, 2004, list of 42 such biases) than in finding ways to correct or prevent them. Indeed, a *PsycInfo* search (June 19, 2008) reveals that the phrases *cognitive bias* or *cognitive biases* yield 1,211 references, whereas the phrases *debias* or *debiasing* yield only 158 references.

More broadly, despite widespread calls to teach and disseminate critical thinking, which some authors (e.g., Lilienfeld, Lynn, Namy, & Woolf, 2009) define as thinking intended to overcome cognitive biases, relatively little research demonstrates that critical-thinking skills generalize beyond the tasks on which they are taught (cf., Halpern, 1998; Lehman & Nisbett, 1990). Indeed, critical thinking is often exasperatingly domain-specific, with weak or nonexistent transfer across domains being the rule rather than the exception (Willingham, 2007). Even among exceedingly intelligent scholars, the capacity to think critically is surprisingly nongeneralizable across disciplines (Feynman, 1985; Lykken, 1991). For example, two-time Nobel-prize winning chemist Linus Pauling (1980) was a devout believer in megavitamin (vitamin C) therapy for cancer despite overwhelming evidence against it, and Nobel-prize winning physicist Arthur Schawlow (1993) was convinced of the effectiveness of facilitated communication for autism—a technique that has been thoroughly discredited (Jacobson, Mulick, & Schwartz, 1995).

Despite the formidable obstacles standing in the way of debiasing efforts, a plausible case can be made that debiasing people against errors in thinking could be among psychology's most enduring legacies to the promotion of human welfare. By debiasing methods, we mean not only techniques that eliminate biases but also those that diminish their intensity or frequency. At the risk of sounding hopelessly idealistic, one might even be so bold to suggest that if researchers found debiasing to be efficacious and implemented it on a grand scale, it could prove to be scientific psychology's most important contribution to reducing ideological extremism and both inter- and intragroup conflict (Lilienfeld, 2008).

### Confirmation Bias and Ideological Extremism

Arguably, the bias most pivotal to ideological extremism and inter- and intragroup conflict is confirmation bias, the tendency to seek out evidence consistent with one's views, and to ignore, dismiss, or selectively reinterpret evidence that contradicts them (Garb, 1998; Kida, 2006; Tavris & Aronson, 2007). Relatively mild forms of confirmation bias are ubiquitous in everyday life interactions, such as our evaluations of the personality traits of people about whom we harbor preconceptions (Snyder & Swann, 1978). Because it typically results in selective perception of evidence ("tunnel vision"), confirmation bias often predisposes us to *belief perseverance*: the propensity to cling to views even after they have been unambiguously discredited (Ross, Lepper, & Hubbard, 1975).

Unfortunately, more extreme forms of confirmation bias are far from rare. Like most large-scale cult movements (Galanter, 1980; Lalich, 2004), virtually all violent regimes fan the flames of extreme confirmation bias in their citizens, especially their youth, by presenting them with only one point of view and assiduously insulating them from all others. Under Hitler, the Nazi government effectively hijacked the educational system by mandating a uniform curriculum emphasizing Aryan superiority, Jewish depravity, and the necessity of racial purity and by subjecting teachers to a month of systematic training in Nazi principles (Noakes & Pridham, 1983; Staub, 1989). Educational materials that "contradict[ed] German feelings" (Noakes & Pridham, 1983, p. 437) were expunged, and teachers who deviated from the party line were fired. In contemporary Saudi Arabia, which spawned 15 of the 19 September 11, 2001, hijackers, curricula must adhere strictly to Wahhabi Islamist principles, and textbooks are screened carefully by the government for conformity to these principles. A number of widely used Saudi elementary school textbooks exhort their readers to spread Islam across the world through jihad, describe all non-Islamic religions as false, and inform students that Allah turned Jews and Christians into apes and pigs (Carlson, 2004).

Although confirmation bias is a cognitive phenomenon, it is hardly independent of affect. As Kunda (1990) and others have noted, affect and arousal—often inflamed by propaganda—predispose us to motivated reasoning, thus rendering confirmation bias especially likely. In turn, such confirmation bias may feed back to persuade believers that their viewpoint is the only correct one, further intensifying affect and arousal, and so on.

The protean phenomenon of confirmation bias appears in a host of incarnations in the literature (Nickerson, 1998). *Myside*

*bias* (Perkins, 1989; see also Baron, 1995) refers to the tendency to more readily generate arguments for one's side of an argument and to evaluate those arguments as superior to those on the other side. Snelson (1993) referred to the "ideological immune system" as our coordinated system of psychological defenses against evidence that contradicts our entrenched views. Some authors (e.g., Shermer, 2002) have conjectured that highly intelligent people possess especially effective ideological immune systems because they are adept at generating plausible counterarguments against competing claims, although this possibility has yet to be tested systematically. Glenn Morton (2002), an ex-creationist who initially resisted the scientific evidence for natural selection, described his own ideological immune system vividly by invoking a hypothetical entity he called "Morton's demon":

> Morton's demon was a demon who sat at the gate of my sensory input apparatus and if and when he saw supportive evidence coming in, he opened the gate. But if he saw contradictory data coming in, he closed the gate. In this way, the demon allowed me to believe that I was right and to avoid any nasty contradictory data. (p. 1)

Confirmation bias can lead us to draw distorted conclusions regarding evidence that runs counter to our views (a process often termed *biased assimilation*), such as our beliefs about whether capital punishment is effective or our opinions of presidential candidates (Lord, Ross, & Lepper, 1979; Westen, Blagov, Harenski, Kilts, & Hamann, 2006). Although confirmation bias is often relatively innocuous, in extreme forms it almost surely contributes to ideological certainty and even ideological fanaticism by insulating our ideological immune systems from potentially contrary evidence (see Tavris & Aronson, 2007, for a wealth of real-world examples). As Calhoun (2004) observed, ideological fanaticism is marked by "an epistemological position regarding the incontrovertible authority of one's own opinion" and a "complete lack of epistemological humility" (p. 350). Moreover, the educational indoctrination practiced by genocidal and otherwise murderous regimes (Noakes & Pridham, 1983; Sternberg, 2003) fosters confirmation bias by persuading children that their viewpoint is the only correct one.

Confirmation bias predisposes us not merely to interpret evidence in a self-fulfilling manner, but to seek out evidence supporting only one side of a polarized issue. Ideological partisanship, a milder and less malignant variant of ideological extremism, is mirrored in the familiar U.S. red-state/blue-state divide. Although several political commentators have suggested that the red-state/blue-state divide is exaggerated (Tierney, 2004) or even imaginary, the book-buying habits of Americans at the very least point to ideologically polarized groups. Using data from Amazon.com, Krebs (2007) found that readers of politically liberal books (such as *The Fall of the House of Bush* and *What Liberal Media?*) were far more likely than other readers to buy other liberal books, whereas readers of politically conservative books (such as *The O'Reilly Factor* and *If Democrats Had Any Brains*) were far more likely than other readers to buy other conservative books, with remarkably little crossover in buying habits across political camps (Eakin, 2004). On both poles of the political spectrum, talk radio programs and the blogosphere have made it easier for extreme partisans to seek out confirming information and screen out disconfirming information (Jamieson & Cappella, 2008).

### Other Cognitive Influences on Ideological Extremism

Conspiring with confirmation bias in contributing to ideological extremism are at least four interrelated phenomena to which we are all vulnerable (see also Pettigrew, 1979, on the ultimate attribution error). Along with confirmation bias, these phenomena probably fuel humans' deep-seated tendencies toward ingroup and outgroup bias (Brewer, 1979; Olsson, Ebert, Banaji, & Phelps, 2005).

First, naive realism is the tendency to believe that the world is exactly as we see it: "seeing is believing" (Ross & Ward, 1996). Most of us assume that our raw perceptions are accurate and unbiased reflections of the world, uncontaminated by our preferences, preconceptions, and interpretations (Segall, Campbell, & Herskovitz, 1966). Because of naive realism, we are prone to viewing those who do not share our views as "lazy, irrational, or otherwise unable or unwilling to proceed in a normative fashion from objective evidence to reasonable conclusions" (Ross & Ward, 1996, p. 111; see also Hackley, Bazerman, Ross, & Shapiro, 2005). As a consequence, naive realism is probably a significant contributor to ideological extremism and a barrier to reconciliation between ingroup and outgroup members (De Dreu, 1996; Ross & Ward, 1996). As Calhoun (2004) noted, "The fanatic, like the tyrant, presumes that he possesses the absolute truth and that his own opinions define reality" (p. 350).

Second, the term *bias blind spot* (Pronin, Gilovich, & Ross, 2004), more informally called the "not me fallacy" (Felson, 2002), refers to the belief that others are biased but that we are not. Research shows that people readily recognize confirmation bias and related biases in others, but not in themselves (Pronin et al., 2004). The bias blind spot, which we can think of as a "meta-bias," leads us to believe that only others, not ourselves, interpret evidence in a distorted fashion.

Third, the false consensus effect (Ross, Greene, & House, 1977) is the tendency to overestimate the extent to which others share our views. This effect can bolster our confidence that our views and those of our ingroup are correct, as many people erroneously use the prevalence of beliefs as a cue to evaluating their validity (the "ad populum fallacy"; Walton, 1998).

Fourth and probably related to the false consensus effect, confirmation bias may be fueled by what Kahneman and Lovallo (1993) termed "an insider perspective," that is, a position that

neglects to consider how people outside one's insulated ingroup might perceive the situation at hand (e.g., "If I were not raised and schooled in Country X, would I necessarily perceive Country Y as evil?"). As a consequence of this perspective, ingroup members may be more convinced of the correctness of their position than they should be.

### The Central Research Question

If one accepts the dual propositions that ideological extremism is a significant contributor to inter- and intragroup conflict and human suffering and that confirmation bias and its cognitive cousins (naive realism, bias blind spot, false consensus effect, insider perspective) are significant contributors to ideological extremism, the central research question becomes: "Can scientific psychology promote human welfare by debiasing the general public?" More specifically, can scientific psychology (a) develop tools to debias a substantial number of people against confirmation bias and its close relatives and (b) would doing so contribute, even in some modest way, to decreasing inter- and intragroup conflict by tempering ideological extremism?

At this point, we are not close to answering either question, although we will soon examine the research bearing on Question 1. Before doing so, however, we should address one potential objection to efforts to debias individuals against confirmation bias. Specifically, some might contend that debiasing efforts could lead to a naive cultural or moral relativism in which all perspectives are valued equally. Indeed, we view this as one potential hazard of debiasing programs, especially when one side of an argument, such as the case for terrorism against innocent civilians, is exceedingly weak or nonexistent (Tetlock, 1992). Nevertheless, the goal of debiasing techniques should be to help people grasp and appreciate alternative points of view, not necessarily to accept them as equally valid or moral. Indeed, to the extent that understanding others' points of view allows us to better detect erroneous zero-order assumptions in their thinking (e.g., a suicide terrorist's incorrect belief that the Western world intends to exterminate his religion) that predispose one to other erroneous beliefs, debiasing may actually help us to identify deep-seated logical flaws in others' belief systems.

## DEBIASING AGAINST CONFIRMATION BIAS: TECHNIQUES AND EFFICACY

When examining the literature on debiasing techniques against confirmation bias, one is struck by three glaring facts: the paucity of research on the topic, the lack of theoretical coherence among differing debiasing techniques, and the decidedly mixed research evidence concerning their efficacy (Arkes, 1991). Still, there have been a few promising advances. Despite their surface differences, most or all of these techniques are designed to shift cognitive processing largely from what Stanovich and West (2000; see also Epstein, 1994; Kahneman, 2003) referred to as a System 1 mode of thinking (automatic, heuristic) to a System 2 (controlled, rule-governed) mode of thinking. This shift may permit System 2 processing to "override" more automatic propensities to consider only one's point of view (Stanovich & West, 2000).

Although relatively few researchers have attempted to debias participants against confirmation bias per se, some have targeted related cognitive errors that bear implications for this bias (Parmley, 2006). Galinsky and colleagues have reported some success with using perspective taking as a means of diminishing outgroup stereotypes (Galinsky & Ku, 2004; Galinsky & Moskowitz, 2000). Others (e.g., Anderson, 1982; Anderson & Sechler, 1986; Hirt & Markman, 1995; Hoch, 1985; Lord, Lepper, & Preston, 1984) have found that "consider-the-opposite" or "consider-an-alternative" strategies can be at least somewhat effective in combating confirmation bias and related biases. Using these approaches, researchers instruct participants to generate rival points of view or imagine counterfactual outcomes for a set of events (Hoch, 1985; Koriat, Lichtenstein, & Fischhoff, 1980). In many respects, all of the aforementioned techniques bear similarities to Sternberg's (2001) program to inculcate wisdom in children by helping them understand and appreciate others' points of view and to Baron's (2008) goal of teaching "active open-mindedness"; that is, the capacity to thoughtfully consider arguments on multiple sides of an issue.

Still other researchers have found that delayed decision making (Spengler, Strohmer, Dixon, & Shivy, 1995) decreases confirmation bias among clinicians asked to make diagnostic judgments. Encouraging practitioners to slow down and reflect on their decisions may permit them to consider and evaluate alternative viewpoints (Parmley, 2006). Nevertheless, the extent to which this technique generalizes to situations beyond the clinical realm is unknown.

In some but not all studies, basic education about specific cognitive biases (e.g., brief and nontechnical tutorials on confirmation bias) also decreases participants' tendency to fall prey to certain errors, including confirmation bias (Evans, Newstead, Allen, & Pollard, 1994; Kurtz & Garfield, 1978; Mynatt, Doherty, & Tweney, 1977; Newstead, Pollard, Evans, & Allen, 1992; Tweney et al., 1980). Nevertheless, the question of whether instruction alone is sufficient to disabuse people of confirmation bias and related errors is controversial. Arkes (1981) maintained that psychoeducational methods by themselves are "absolutely worthless" (p. 326), largely because people are typically oblivious to cognitive influences on their judgments. In contrast, others (e.g., Parmley, 2006) believe that psychoeducational programs may often be efficacious. For example, Willingham (2007) argued that although critical-thinking programs are, at best, modestly effective, the most successful methods teach participants "metacognitive rules," such as reminding them to consider alternative points of view in pertinent situations.

Nisbett and colleagues (Lehman, Lempert, & Nisbett, 1988; Lehman & Nisbett, 1990; Nisbett, Fong, Lehman, & Cheng,

1987) have reported weak and statistically nonsignificant effects of training participants in rules of formal logic to combat confirmation bias, such as that observed on the familiar Wason (1966) card-selection task. Nevertheless, this task may be too abstract and ecologically invalid to yield marked effects of debiasing for most participants.

## DEBIASING: KNOWNS, UNKNOWNS, AND FUTURE DIRECTIONS

The still nascent and mixed literature on debiasing against confirmation bias offers grounds for cautious optimism, as this research suggests some beneficial effects of encouraging participants to consider alternative positions. Still, this body of work raises at least as many questions as answers. In particular, it points to both potential obstacles and potentially fruitful directions for research.

### Potential Barriers to Debiasing

Putting aside the formidable pragmatic difficulties of implementing educational debiasing efforts on a massive scale, there are a host of reasons why even the best conceptualized debiasing efforts against confirmation bias may fail. First, many people may be unreceptive to debiasing efforts because of the bias blind spot (i.e., they do not perceive themselves as biased and therefore in need of remediation; Pronin et al., 2004). The extent to which the efficacy of debiasing efforts may be enhanced, or may even hinge on, first demonstrating to participants the existence of their biases is unknown.

Second, many individuals may be unreceptive to debiasing efforts because they do not perceive these efforts as relevant to their personal welfare. Research suggests that at least some cognitive biases may be reduced by enhancing participants' motivation to examine evidence thoughtfully (e.g., by increasing their accountability to others), thereby promoting less perfunctory processing of information (Arkes, 1991; Tetlock & Kim, 1987). Therefore, some debiasing efforts may succeed only if participants can be persuaded that their biases result in poor decisions of real-world consequence to them.

Third, as we have seen, research on critical thinking suggests that such thinking is often disappointingly domain-specific and often may not generalize beyond the specific tasks administered, to real-world situations, or over time (Willingham, 2007). The extent to which debiasing efforts may need to be applied to multiple and diverse problems to be efficacious in the long term is unclear. Nor is it clear whether debiasing programs may either need to be sustained over time or supplemented with periodic booster sessions. In the domain of antisocial behavior, Kazdin (1987) contrasted one-shot interventions that are expected to generate enduring effects with a chronic disease model, which regards certain psychological conditions as requiring lasting or even lifelong treatments, much as Type I diabetes requires continual injections of insulin. Whether debiasing efforts will similarly need to be maintained over time to be efficacious is unknown.

Fourth, individual and cultural differences in personality, cognitive styles, and developmental level may predict the efficacy of debiasing efforts (Stanovich & West, 2000). For example, levels of such variables as openness to experience (Costa & McCrae, 1985), dogmatism (Rokeach, 1960), need for closure (Neuberg, Judice, & West; 1997; Webster & Kruglanski, 1994), and integrative complexity (Suedfeld, Tetlock, & Streufert, 1992) may interact statistically with debiasing manipulations. Because many Asian (e.g., Chinese) cultures are more open than most European-American cultures to holding seemingly contradictory views at the same time (Peng & Nisbett, 1999), cultural variables may also predict the success of debiasing techniques. In addition, because Piagetian formal operational thinking may be necessary for resisting confirmation bias on certain measures (Klaczynski, Fauth, & Swanger, 1998), such as the Wason (1966) card-selection task, debiasing efforts against this bias may be relatively ineffective among those with a limited capacity to think abstractly (see also Bloom & Weisberg, 2007, for a discussion of developmental precursors to adults' resistance to scientific thinking).

Fifth, researchers must be cognizant of the possibility that efforts to combat confirmation bias may occasionally backfire (Wilson, Centerbar, & Brekke, 2002). Researchers have observed a backfire effect in the literature on hindsight bias (Sanna, Schwarz, & Stocker, 2002), in which asking participants to generate many alternative outcomes for an event paradoxically increases their certainty that the original outcome was inevitable. This effect may arise because participants asked to think of numerous alternative outcomes find doing so difficult, leading them (by means of the availability heuristic; Tversky & Kahneman, 1973) to conclude that there weren't so many alternative outcomes after all. Whether similar backfire effects could result from efforts to debias participants against confirmation bias by encouraging them to consider alternative viewpoints is unclear. Moreover, because research on attitude inoculation (McGuire, 1962) suggests that exposure to weak versions of arguments may actually immunize people against these arguments, exposing people to alternative positions may be effective only to the extent that these arguments are presented persuasively.

Sixth, as we intimated earlier, it is exceedingly unlikely that ideological extremism is underpinned only by confirmation bias and other purely cognitive errors. Because ideological extremism contains a marked "hot" (affective) component of hatred that contributes significantly to its intensity (Harrington, 2004; Sternberg, 2003), purely cognitive methods of debiasing may take us only so far. Nevertheless, to the extent that confirmation bias leads us to perceive our enemies in sharply polarized ways and regard them as evil, it may strongly predispose us to exceedingly negative affective appraisals of them. Moreover, potent affective reactions may exacerbate confirmation bias

through motivated reasoning (Kunda, 1990; Westen et al., 2006), leading us to seek out evidence that seemingly corroborates our malevolent preconceptions of outgroup members.

### Debiasing: Quo Vadis?

Although scientific psychology has a long way to go before it can argue for giving debiasing away to the general public, there is a pressing need for additional research on concerted efforts to combat confirmation bias and related biases. In particular, more research is required to develop effective debiasing methods, ascertain their crucial effective ingredients, and examine the extent to which their efficacy generalizes to real-world behaviors and over time. Arkes's (1991) tripartite taxonomy of cognitive biases may provide a helpful starting point for crafting such interventions.

Many current debiasing techniques may not be sufficiently robust to generate enduring attitudinal or behavioral changes. Most of the debiasing techniques developed thus far, including psychoeducational methods, do not expose people to real-world situations. For example, when combating confirmation bias in the domain of racial prejudice, at least some direct contact with people of differing races may be necessary to disconfirm ingrained stereotypes.

In addition, research needs to examine whether repeated training in debiasing leads to more enduring and generalizable effects than do one-shot debiasing interventions (e.g., Kazdin, 1987). In particular, repeated training may be needed to shift the habit of considering alternative viewpoints from a controlled to an automatic processing mode.

Finally, although we have focused primarily on debiasing adults, there is a need for preventative research to determine whether debiasing techniques can immunize children and adolescents against indoctrination techniques (Sternberg, 2003) that foster confirmation bias. Given that much of what we term "the scientific method" is an assorted toolbox of safeguards against confirmation bias (Lilienfeld et al., 2009; Tavris & Aronson, 2007), such research will almost certainly need to take into account childhood sources of resistance to scientific thinking (Bloom & Weisberg, 2007).

## CONCLUDING THOUGHTS

In advocating for further research on the efficacy of debiasing techniques, we unabashedly count ourselves among what Stanovich (1999) termed *meliorists*, namely those who believe that human thinking often departs from rational standards and that such departures may be rectifiable by intervention efforts. At the same time, we acknowledge that the ultimate success of these efforts remains to be seen. Indeed, it is possible that given the formidable barriers against debiasing we have outlined, even the most efficacious of intervention efforts may meet with only partial success.

Still, we agree with Shneour (1998) that merely planting a seed of doubt in the minds of true believers can be an enormously worthy goal. Shneour quoted Oliver Cromwell's famous 1650 plea, "I beseech you, in the bowels of Christ, think it possible you may be mistaken" as a realistic credo for critical-thinking efforts aimed at people with firmly entrenched views. Shneour argued, in our view persuasively, that instilling even mild doubts can often attenuate the intensity of fanatical beliefs and open the door to further questioning of these beliefs. It may also render ideological extremists less willing to act on their convictions.

As Sternberg (2001) "wisely" noted, the field of psychological science needs to take the construct of wisdom at least as seriously as it does the construct of intelligence. Indeed, research on terrorist networks suggests that, contrary to popular misconception, many or most suicide terrorists are highly educated and intelligent individuals (Sageman, 2004). These findings remind us that high levels of intelligence may offer scant immunity against ideological extremism (Shermer, 2002). To the extent that one crucial element of wisdom is an awareness of one's fallibilities and a sense of humility concerning the limits of one's knowledge (Meacham, 1990), debiasing the general public against confirmation bias and related biases may be an essential step toward a wiser—and perhaps ultimately safer—world. Psychologists would be wise to make this effort a priority.

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## REFERENCES

Anderson, C.A. (1982). Inoculation and counter-explanation: Debiasing techniques in the perseverance of social theories. *Social Cognition*, *1*, 126–139.

Anderson, C.A., & Sechler, E.S. (1986). Effects of explanation and counterexplanation on the development and use of social theories. *Journal of Personality and Social Psychology*, *50*, 24–34.

Arkes, H. (1981). Impediments to accurate clinical judgment and possible ways to minimize their impact. *Journal of Consulting and Clinical Psychology*, *49*, 323–330.

Arkes, H. (1991). Costs and benefits of judgment errors: Implications for debiasing. *Psychological Bulletin*, *110*, 486–498.

Baron, J. (1995). Myside bias in thinking about abortion. *Thinking and Reasoning*, *1*, 221–235.

Baron, J. (2008). *Thinking and deciding* (4th ed.). New York: Cambridge University Press.

Baumeister, R.F. (1997). *Evil: Inside human violence and cruelty*. New York: W.H. Freeman.

Beck, A.T. (1999). *Prisoners of hate: The cognitive basis of anger, hostility, and violence*. New York: HarperCollins.

Bloom, P., & Weisberg, D.S. (2007). Childhood origins of adult resistance to science. *Science*, *316*, 996–997.

Brewer, M.B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin*, *17*, 475–482.

Calhoun, L. (2004). An anatomy of fanaticism. *Peace Review*, *16*, 349–356.

Carlson, A. (2004, March 11). Education and indoctrination in the Muslim world. *Policy Analysis*, *511*. Retrieved June 25, 2008, from http://www.cato.org/pubs/pas/pa511.pdf

Cohen, L.J. (1981). Can human irrationality be experimentally demonstrated? *Behavioral and Brain Sciences*, *4*, 317–331.

Cohen, T.R., & Insko, C.A. (2008). War and peace: Possible approaches to reducing intergroup conflict. *Perspectives on Psychological Science*, *3*, 87–93.

Costa, P.T., & McCrae, R.R. (1985). *The NEO Personality Inventory manual*. Odessa, FL: Psychological Assessment Resources.

Dawes, R.M. (2001). *Everyday irrationality: How pseudoscientists, lunatics, and the rest of us fail to think rationally*. Boulder, CO: Westview.

Dawes, R.M., Faust, D., & Meehl, P.E. (1989). Clinical versus actuarial judgment. *Science*, *243*, 1668–1674.

De Dreu, C.K.W. (1996). Gain–loss frame in outcome-interdependence: Does it influence equality or equity considerations? *European Journal of Social Psychology*, *26*, 315–324.

Eakin, E. (2004). *Study finds a nation of polarized readers*. Retrieved from http://www.nytimes.com/2004/03/13/books/study-finds-a-nation-of-polarized-readers.html

Epstein, S. (1994). Integration of the cognitive and psychodynamic unconscious. *American Psychologist*, *49*, 709–724.

Evans, J., Newstead, E., Allen, J., & Pollard, P. (1994). Debiasing by instruction: The case of belief bias. *European Journal of Cognitive Psychology*, *6*, 263–285.

Felson, M. (2002). *Crime in everyday life*. Upper Saddle River, NJ: Prentice Hall.

Feynman, R. (1985). *Surely you're joking, Mr. Feynman: Adventures of a curious character*. Princeton, NJ: Princeton University Press.

Fowler, R. (1999). Giving psychology away. *APA Monitor Online*, *30*. Retrieved June 22, 2008, from http://www.apa.org/monitor/may99/rc.html

Funder, D.C. (1987). Errors and mistakes: Evaluating the accuracy of social judgment. *Psychological Bulletin*, *101*, 75–90.

Galanter, M. (1980). Psychological induction into the large group: Findings from a modern religious sect. *American Journal of Psychiatry*, *137*, 1574–1579.

Galinsky, AD., & Ku, G. (2004). The effects of perspective-taking on prejudice: The moderating role of self-evaluation. *Personality and Social Psychology Bulletin*, *30*, 594–604.

Galinsky, A., & Moskowitz, G. (2000). Perspective-taking: Decreasing stereotype expression, stereotype accessibility, and in-group favoritism. *Journal of Personality and Social Psychology*, *78*, 708–724.

Garb, H. (1998). *Studying the clinician: Judgment research and psychological assessment*. Washington, DC: American Psychological Association.

Gigerenzer, G. (1996). On narrow norms and vague heuristics: A reply to Kahneman and Tversky. *Psychological Review*, *103*, 592–596.

Gigerenzer, G., & Todd, P.M. (2002). *Simple heuristics that make us smart*. New York: Oxford University Press.

Gilovich, T., Griffin, D., & Kahneman, D. (2002). *Heuristics and biases: The psychology of intuitive judgment*. Cambridge, United Kingdom: Cambridge University Press.

Hackley, S., Bazerman, M., Ross, L., & Shapiro, D.L. (2005). Psychological dimensions of the Israeli settlements issue: Endowments and identities. *Negotiation Journal*, *21*, 209–219.

Halpern, D.F. (1998). Teaching critical thinking for transfer across domains. *American Psychologist*, *53*, 449–455.

Harrington, E.R. (2004). The social psychology of hatred. *Journal of Hate Studies*, *3*, 49–82.

Hirt, E., & Markman, K. (1995). Multiple explanation: A consider-an-alternative strategy for debiasing judgments. *Journal of Personality and Social Psychology*, *69*, 1069–1086.

Hoch, S.J. (1985). Counterfactual reasoning and accuracy in predicting personal events. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *11*, 719–731.

Jacobson, J.W., Mulick, J.A., & Schwartz, A.A. (1995). A history of facilitated communication: Science, pseudoscience, and antiscience. *American Psychologist*, *50*, 750–765.

Jamieson, K.H., & Capella, J.N. (2008). *The echo chamber: Rush Limbaugh and the conservative media establishment*. New York: Oxford University Press.

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

Kahneman, D., & Lovallo, D. (1993). Timid choices and bold forecasts: A cognitive perspective on risk-taking. *Management Science*, *39*, 17–31.

Kahneman, D., & Tversky, A. (1996). On the reality of cognitive illusions. *Psychological Review*, *103*, 582–591.

Kazdin, A.E. (1987). Treatment of antisocial behavior in children: Current status and future directions. *Psychological Bulletin*, *102*, 187–203.

Kida, T. (2006). *Don't believe everything you think: The 6 basic mistakes we make in thinking*. Amherst, NY: Prometheus Books.

Klaczynski, P.A., Fauth, J.M., & Swanger, A. (1998). Adolescent identity: Rational vs. experiential processing, formal operations, and critical thinking belief. *Journal of Youth and Adolescence*, *27*, 185–207.

Koriat, A., Lichtenstein, S., & Fischoff, B. (1980). Reasons for confidence. *Journal of Experimental Psychology: Human Learning and Memory*, *6*, 107–118.

Krebs, V. (2007). *A new political pattern emerges*. Retrieved June 24, 2008, from http://www.orgnet.com/divided.html

Krueger, J.I., & Funder, D.C. (2004). Towards a balanced social psychology: Causes, consequences and cures for the problem-seeking approach to social behavior and cognition. *Behavioral and Brain Sciences*, *27*, 313–327.

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

Kurtz, R., & Garfield, S. (1978). Illusory correlation: A further exploration of Chapman's paradigm. *Journal of Consulting and Clinical Psychology*, *46*, 1009–1015.

Lalich, J. (2004). *Bounded choice: True believers and charismatic cults*. Berkeley: University of California Press.

Larrick, R.P. (2004). Debiasing. In D.J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (pp. 316–338). Oxford, United Kingdom: Blackwell.

Lehman, D.R., Lempert, R.O., & Nisbett, R.E. (1988). The effects of graduate training on reasoning: Formal discipline and thinking about everyday-life events. *American Psychologist*, *43*, 431–442.

Lehman, D.R., & Nisbett, R.E. (1990). A longitudinal study of the effects of undergraduate training on reasoning. *Developmental Psychology*, *26*, 952–960.

Lilienfeld, S.O. (2008). Can psychology save the world? *British Psychological Society Research Digest*. Retrieved June 20, 2008, from

http://bps-research-digest.blogspot.com/2007/09/can-psychology-save-world.html

Lilienfeld, S.O., Lynn, S.J., Namy, L., & Woolf, N. (2009). *Psychology: From inquiry to understanding*. Boston: Allyn & Bacon.

Lord, C., Lepper, M., & Preston, E. (1984). Considering the opposite: A corrective strategy for social judgment. *Journal of Personality and Social Psychology*, *47*, 1231–1243.

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*, 2098–2109.

Lykken, D.T. (1991). What's wrong with psychology. In D. Cichetti & W.M. Grove (Eds.), *Thinking clearly about psychology: Essays in honor of Paul Everett Meehl* (Vol. 1, pp. 1–39). Minneapolis: University of Minnesota Press.

McGuire, W.J. (1962). Resistance to persuasion conferred by active and passive prior refutation of same and alternative counterarguments. *Journal of Abnormal and Social Psychology*, *63*, 326–332.

Meacham, J.A. (1990). The loss of wisdom. In R.J. Sternberg (Ed.), *Wisdom: Its nature, origins, and development* (pp. 181–211). Cambridge, United Kingdom: Cambridge University Press.

Miller, G.A. (1969). Psychology as a means of promoting human welfare. *American Psychologist*, *24*, 1063–1075.

Morton, G.R. (2002). *Morton's demon*. Retrieved from http://home.entouch.net/dmd/mortonsdemon.htm

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

Neuberg, S.L., Judice, T.N., & West, S.G. (1997). What the need for closure scale measures and what it does not: Toward differentiating among related epistemic motives. *Journal of Personality and Social Psychology*, *72*, 1396–1412.

Newstead, S., Pollard, P., Evans, J., & Allen, J. (1992). The source of belief bias in syllogistic reasoning. *Cognition*, *45*, 257–284.

Nickerson, R. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, *2*, 175–220.

Nisbett, R.E., Fong, G.L., Lehman, D.R., & Cheng, P.W. (1987). Teaching reasoning. *Science*, *238*, 625–631.

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

Noakes, J., & Pridham, G. (Eds.). (1983). *Nazism: A history in documents and eyewitness accounts, 1919–1945*. Exeter, United Kingdom: Department of History and Archaeology, University of Exeter.

Olsson, A., Ebert, J.P., Banaji, M.R., & Phelps, E.A. (2005). The role of social groups in the persistence of learned fear. *Science*, *309*, 785–787.

Parmley, M.C. (2006). *Effects of the confirmation bias on diagnostic decision making*. Unpublished doctoral dissertation, Drexel University, Philadelphia.

Pauling, L. (1980). Vitamin C therapy and advanced cancer. *New England Journal of Medicine*, *302*, 694.

Peng, K., & Nisbett, R. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist*, *54*, 741–754.

Perkins, D.N. (1989). Reasoning as it is and could be: An empirical perspective. In D.M. Topping, D.C. Crowell, & V.N. Kobayashi (Eds.), *Thinking across cultures: The third international conference on thinking* (pp. 115–120). Hillsdale, NJ: Erlbaum.

Pettigrew, T.F. (1979). The ultimate attribution error: Extending Allport's cognitive analysis of prejudice. *Personality and Social Psychology Bulletin*, *5*, 461–467.

Pronin, E., Gilovich, T., & Ross, L. (2004). Objectivity in the eye of the beholder: Divergent perceptions of bias in self versus others. *Psychological Review*, *111*, 781–799.

Rokeach, M. (1960). *The open and closed mind*. New York: Basic Books.

Ross, L., Greene, D., & House, P. (1977). The false consensus effect: An egocentric bias in social perception and attributional processes. *Journal of Experimental Social Psychology*, *13*, 279–301.

Ross, L., Lepper, M.R., & Hubbard, M. (1975). Perseverance in self-perception and social perception: Biased attributional processes in the debriefing paradigm. *Journal of Personality and Social Psychology*, *32*, 880–892.

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

Sageman, M. (2004). *Understanding terror networks*. Philadelphia: University of Pennsylvania Press.

Sanna, L.J., Schwarz, N., & Stocker, S.L. (2002). When debiasing backfires: Accessible content and accessibility experiences in debiasing hindsight. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *28*, 497–502.

Saucier, G., Akers, L.G., Shen-Miller, S., Knežević, G., & Stankow, L. (2009). Patterns of thinking in militant extremism. *Perspectives on Psychological Science*, *4*, 256–271.

Schawlow, A.L. (1993). *Is facilitated communication real*? Retrieved from http://home.vicnet.net.au/~dealcc/Front6.htm

Segall, M.H., Campbell, D.T., & Herskovitz, M.H. (1966). *The influence of culture on visual perception*. New York: Bobbs-Merrill.

Shepperd, J.A., & Koch, E.J. (2005). Pitfalls in teaching judgment heuristics. *Teaching of Psychology*, *32*, 43–46.

Shermer, M. (2002). *Why people believe weird things: Pseudoscience, superstition, and other confusions of our time* (2nd ed.). New York: W.H. Freeman.

Shneour, E.A. (1998). Planting a seed of doubt. *Skeptical Inquirer*, *22*, 40–42.

Snelson, J.S. (1993). The ideological immune system: Resistance to new ideas in science. *Skeptic*, *1*, 444–455.

Snyder, M., & Swann, W.B. Jr. (1978). Hypothesis-testing processes in social interaction. *Journal of Personality and Social Psychology*, *36*, 1202–1212.

Spengler, P.M., Strohmer, D.C., Dixon, D.N., & Shivy, V.A. (1995). A scientist-practitioner model of psychological assessment: Implications for training, practice, and research. *Counseling Psychologist*, *23*, 506–534.

Stanovich, K.E. (1999). *Who is rational? Studies of individual differences in reasoning*. Mahwah, NJ: Erlbaum.

Stanovich, K.E., & West, R.F. (2000). Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences*, *23*, 645–665.

Staub, E. (1989). *The roots of evil: The origins of genocide and other group violence*. New York: Cambridge University Press.

Sternberg, R.J. (2001). Why schools should teach for wisdom: The balance theory of wisdom in educational settings. *Educational Psychologist*, *36*, 227–245.

Sternberg, R.J. (2003). A duplex theory of hate and its development and its application to terrorism, massacres, and genocides. *Review of General Psychology*, *7*, 299–328.

Strategy Page. (2005). *Why the decline in wars?* Retrieved from http://www.strategypage.com/qnd/wars/articles/20050923.aspx

Suedfeld, P., Tetlock, P.E., & Streufert, S. (1992). Conceptual/integrative complexity. In C.P. Smith, J.W. Atkinson, D.C. McClelland, & J. Veroff (Eds.), *Motivation and personality: Handbook of*

*thematic content analysis* (pp. 393–400). New York: Cambridge University Press.

Tavris, C., & Aronson, E. (2007). *Mistakes were made (but not by me): Why we justify foolish beliefs, bad decisions, and hurtful acts*. New York: Harcourt.

Tetlock, P.E. (1992). The impact of accountability on judgment and choice: Toward a social contingency model. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 25, pp. 331–376). San Diego, CA: Academic Press.

Tetlock, P.E., & Kim, J.I. (1987). Accountability and judgment processes in a personality prediction task. *Journal of Personality and Social Psychology*, *52*, 700–709.

Tierney, J. (2004). *A nation divided? Who says?* Retrieved from http://www.nytimes.com/2004/06/13/weekinreview/13tier.html

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, *5*, 207–232.

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

Tweney, R.D., Doherty, M.E., Worner, W.J., Pliske, D.B., Mynatt, C.R., Gross, K.A., & Arkkelin, D.L. (1980). Strategies of rule discovery in an inference task. *Quarterly Journal of Experimental Psychology*, *32*, 109–123.

Walton, D.N. (1998). *Appeal to popular opinion*. University Park, PA: Penn State Press.

Wason, P.C. (1966). Reasoning. In B.M. Foss (Ed.), *New horizons in psychology* (pp. 135–151). Harmondsworth, United Kingdom: Penguin.

Webster, D., & Kruglanski, A. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, *67*, 1049–1062.

Westen, D., Blagov, P., Harenski, K., Kilts, C., & Hamann, S. (2006). The neural basis of motivated reasoning: An fMRI study of emotional constraints on political judgment during the U.S. presidential election of 2004. *Journal of Cognitive Neuroscience*, *18*, 1947–1958.

Willingham, D.T. (2007). Critical thinking: Why is it so hard to teach? *American Educator*, *31*, 8–19.

Wilson, T., Centerbar, D., & Brekke, N. (2002). Mental contamination and the debiasing problem. In T. Gilovich & D. Griffin (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 185–200). New York: Cambridge University Press.

Zimbardo, P.G. (2004). Does psychology make a significant difference in our lives? *American Psychologist*, *59*, 339–351.