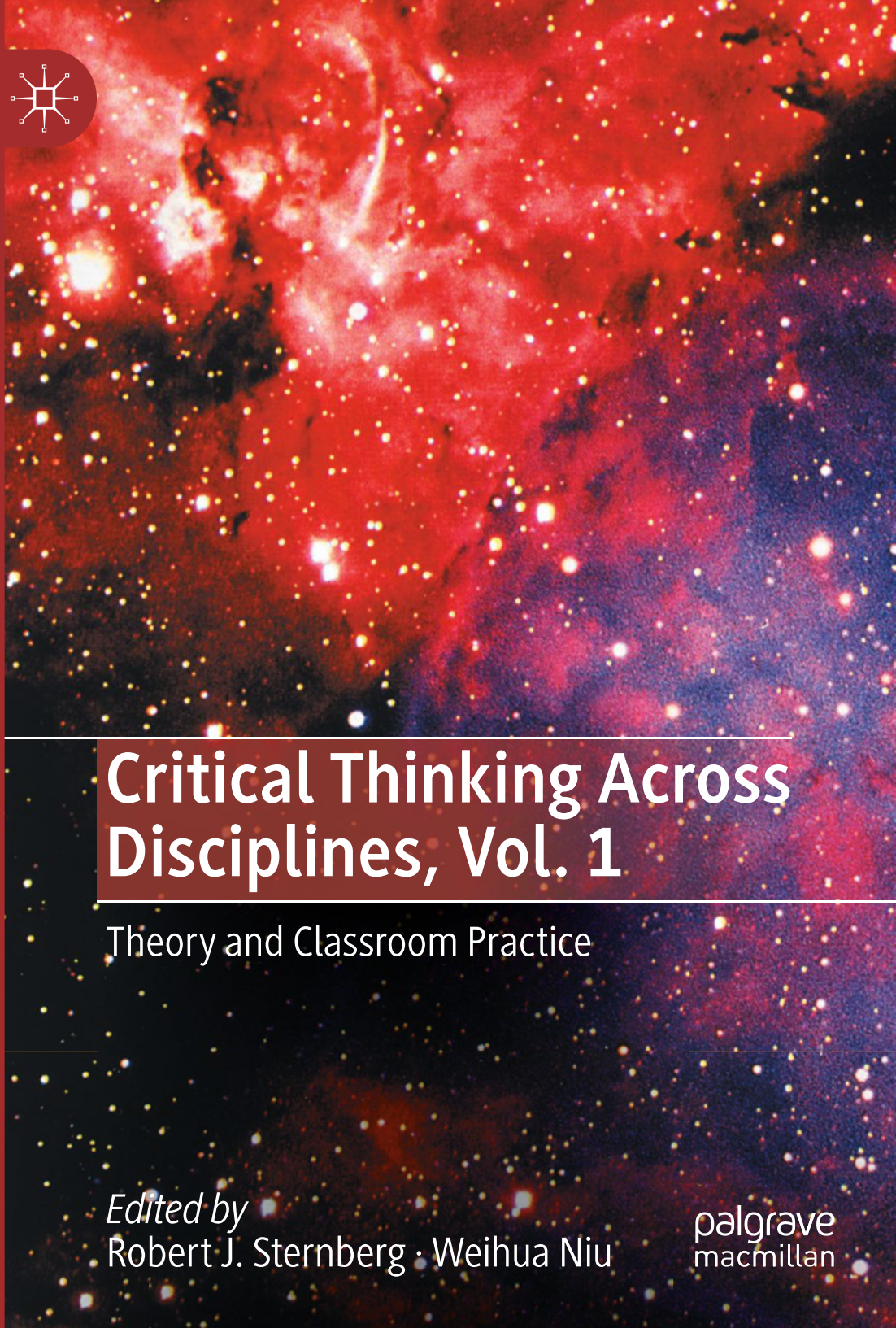

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The Puzzle of Myside Bias and Actively Open-Minded Thinking in the Conceptualization of Critical Thinking

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In the critical thinking literature, the ability to evaluate evidence and arguments independently of one's prior beliefs and opinions is a skill that is strongly emphasized (Baron, 2008; Dole & Sinatra, 1998; Ennis, 1996; Kuhn, 2005; Nussbaum & Sinatra, 2003; Ritchhart & Perkins, 2005; Sternberg, 1997, 2001, 2003; Sternberg et al., 2023). The disposition toward such unbiased reasoning is almost universally viewed as a characteristic of good thinking. For example, Norris and Ennis (1989) argue that one fundamentally important characteristic of critical thinking is the disposition to "reason from starting points with which we disagree without letting the disagreement interfere with reasoning" (p. 12). Zechmeister and Johnson (1992) list as one characteristic of the critical thinker the ability to "accept statements as true even when they don't agree with one's own position" (p. 6). Similarly, Nickerson (1987) stresses that critical

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thinking entails the ability to recognize "the fallibility of one's own opinions, the probability of bias in those opinions, and the danger of differentially weighting evidence according to personal preferences" (p. 30). The informal reasoning literature likewise emphasizes the importance of detaching one's own beliefs from the process of argument evaluation (Baron, 1995; Klaczynski & Lavallee, 2005; Kuhn, 2001, 2007; Kuhn & Udell, 2007; Voss et al., 1991).

Such an emphasis on separating prior opinion from evidence evaluation would seem to put the critical thinking literature squarely on the side of recommending that people overcome myside bias—one of the most ubiquitous biases studied in cognitive psychology and in decision-making research. Myside bias occurs when people evaluate evidence, generate evidence, and test hypotheses in a manner biased toward their own prior beliefs, opinions and attitudes (Stanovich, 2021). This bias occurs when people violate the critical thinking strictures mentioned above—when they allow their prior opinions to affect their evaluation of evidence. Thus, overcoming myside bias would appear to be a process central to the critical thinking endeavor. There is a problem with this centrality however, that is little recognized in the critical thinking literature. That problem is that it has been remarkably difficult for philosophers and cognitive scientists to demonstrate that the tendency toward myside thinking violates strictures of rational thought (Stanovich, 2021; van Doorn, 2024).

Difficulties in Showing that Myside Bias is Epistemically Irrational

The literature on Bayesian reasoning (e.g., de Finetti, 1989; Earman, 1992; Fischhoff & Beyth-Marom, 1983; Howson & Urbach, 1993) would at least *seem* to provide justification for the emphasis on unbiased evidence evaluation in the critical thinking literature. The Bayesian formula is often used as the formal standard for the important task of belief updating—how the belief in a particular hypothesis should be updated based on the receipt of new evidence that is relevant to the hypothesis. Expressed verbally, the Bayesian formula, in odds form, is:

posterior odds favoring the focal hypothesis = prior odds x likelihood ratio

The components are:

posterior odds = P(H/D)/P(~H/D)
prior odds = P(H)/P(~H)
likelihood ratio = P(D/H)/P(D/~H)

These formulas contain a couple of fundamental concepts: the focal hypothesis under investigation (labeled H; and the complementary non-focal hypothesis, labelled ~H) and new data that are collected relevant to the hypothesis (labeled D). The verbal formula tells us that the odds favoring the focal hypothesis (H) after receipt of the data are arrived at by multiplying together the other two terms.

The key normative principle captured by Bayes' theorem is that the evaluation of the diagnosticity of the evidence (the likelihood ratio) should be conducted *independently* of the assessment of the prior odds favoring the focal hypothesis. The point is *not* that prior beliefs should not affect the posterior probability of the hypothesis. They most certainly should. A Bayesian analysis is an explicit procedure for factoring in such prior beliefs. The point is that they should not be factored in *twice*. Prior beliefs are encompassed in one of two multiplicative terms that define the posterior probability, but the diagnosticity of the evidence should be assessed *separately* from the prior belief. Thus, the concern in the critical thinking literature for segregating prior belief from evidence evaluation seems to receive support from the Bayesian literature (see Fischhoff & Beyth-Marom, 1983).

However, such a conclusion would be premature because it would *only* apply to myside reasoning experiments where the subject is given numerical information that allows the likelihood ratio to be mathematically calculated with precision (e.g., Fischhoff & Beyth-Marom, 1983; Stanovich & West, 1998b). But in most of the myside paradigms in the literature, the subject is not given specific numerical information with which to calculate the likelihood ratio. Instead, subjects must evaluate informal arguments or they must rate the quality of a hypothetical experiment that produces data relevant to the focal hypothesis. This

information is much more ambiguous than actual numerical values for the two components of the likelihood ratio in that it requires considerable interpretation and inference to derive a subjective likelihood ratio from it. It is usually assumed that the Bayesian stricture here is that the subject should give equal likelihood ratios to the same information regardless of whether the information confirms or refutes their prior belief. This was the assumption in the early heuristics and biases literature of the 1970s and 1980s. Since the 1990s, a growing consensus is that this stricture does not apply in these paradigms.

The reason that it is sometimes rational to use one's prior belief to assess evidence is that often people (and scientists) are not presented with information that is of perfect reliability (Hahn & Harris, 2014). The quality and credibility of the evidence has to be assessed. For example, in an important study, Koehler (1993) found that both parapsychologists and scientific critics of parapsychology gave lower ratings to studies that disagreed with their prior positions on extrasensory perception. But Koehler (1993) went on to analyze in detail whether it is really non-normative[1] for a person to let their prior beliefs influence the evaluation of a study's quality as the subjects in his experiments were doing. His analysis demonstrated that in a paradigm like his—where the reliability of the information presented is in question—some degree of myside bias can be normatively justified.

We now know that the Bayesian stricture that the prior belief probability not infect the evaluation of the likelihood ratio is considerably weakened in paradigms where the subject is presented with information whose source reliability has to be assessed (Hahn & Harris, 2014). This is true in paradigms like that used by Koehler (1993), where the subject is presented with a hypothetical experiment but has no other contextual knowledge that one would have in actual science, such as the credibility of the research lab in question and its track record. In such a situation, it would seem natural to evaluate the credibility of the study in part by whether the results appear plausible in light of our prior beliefs about the hypothesis. This would seem to be especially true for the scientist subjects

[1] Note that what normative means in cognitive science is performance that is optimal according to a model of perfect rationality, not the response that is most common, in the sense of "norm".

in Koehler's experiment who had years of methodological training and experience in assessing behavioral claims. The issue that Koehler analyzed was whether they were correct in using the size of the discrepancy between the outcome of the study and their prior belief as a cue to study quality. Koehler (1993) presented two formal proofs demonstrating that such a projection of prior belief was justified.

In fact, as I pointed out in a 1999 book (Stanovich, 1999), although Koehler's (1993) paper was unusual in providing a formal proof, the argument that letting a prior belief affect the evaluation of new evidence had reappeared many times in the cognitive psychology literature in that era, as well as in the philosophy of science literature (for a discussion in the latter discipline, see Kornblith, 1993, pp. 104–105). It was so common that, over twenty years ago, I gave it a name: the knowledge projection argument. The label provides a handle for the argument that it is sometimes appropriate to let prior beliefs become implicated in the process of evaluating new information.

The knowledge projection argument, basically, is that in a natural ecology where most of our prior beliefs are true, projecting our beliefs on to new data will lead to faster accumulation of knowledge. For example, Alloy and Tabachnik (1984) defend knowledge projection in their discussion of the covariation detection literature on humans and other animals: "when individuals' expectations accurately reflect the contingencies encountered in their natural environments… it is not irrational for them to assimilate incoming information about covariation between events to these expectations" (p. 140). Of course, Alloy and Tabachnik (1984) emphasize that we must project from a largely accurate set of beliefs in order to obtain the benefit of knowledge projection. In a sea of inaccurate beliefs, the situation is quite different.

Evans et al. (1993) rely on a variant of this argument when considering the normative status of belief bias in syllogistic reasoning. Only when faced with unbelievable conclusions do subjects engage in logical reasoning about the premises. Evans et al. (1993) consider whether such a processing strategy could be rational in the sense of serving to achieve the person's goals, and they conclude that it could. Again, their strategy works only when it is applied using a subset of beliefs that are largely true in the relevant domain (see Edwards & Smith, 1996, for a similar argument).

Knowledge projection is only efficacious in the *aggregate*—in domains where most of our beliefs are true. However, when the subset of beliefs that the individual is projecting contains substantial false information, knowledge projection will delay the assimilation of the correct information.

In summary, on an overall statistical basis, knowledge projection may well increase the rate of acquisition of true beliefs. But this does not prevent particular individuals with particularly ill-formed initial beliefs from projecting them and developing beliefs which are even less in correspondence with reality. Nevertheless, Koehler's (1993) proof reinforces a range of scholarship showing that when the likelihood ratio is not quantitatively specified, the prior probability can also, validly, be used in the evidence evaluation process, especially when issues of source credibility and trust are at stake (Druckman & McGrath, 2019; Gentzkow & Shapiro, 2006; Hahn & Harris, 2014; Kim et al., 2020; O'Connor & Weatherall, 2018; Tappin & Gadsby, 2019; Tappin et al., 2020; van Doorn, 2024). Because these issues are common in real-world evidence evaluation, it is clear that in many cases it will be extremely difficult to show that myside reasoning is normatively inappropriate.

All of the arguments in favor of the normative appropriateness of myside bias given previously have concerned epistemic rationality only. However, there is a further set of arguments in favor of myside bias being *instrumentally* rational because of the social benefits of that kind of thinking. The social benefits of myside reasoning have been explored by many others (Barlev & Neuberg, 2024; Clark & Winegard, 2020; Haidt, 2012: Hannon & de Ridder, 2021; Mercier & Sperber, 2017; Norman, 2016; Tetlock, 2002; Van Leeuwen, 2023; Williams, 2021) and thus will not be pursued here other than to note that they complement the epistemic analysis in showing that it is difficult to show, on a net-net basis, that mysided processing is non-normative.

Theoretically, it is thus difficult to show that mysided thinking is irrational. But in a book published a couple of decades ago (Stanovich, 1999; see also Stanovich & West, 2000) I argued that individual differences might provide an empirical clue to which response in a rational thinking task should be considered the optimal one. I suggested that individual differences could be used to help adjudicate the normative disputes in the

heuristics and biases literature—particularly in cases where investigators were championing alternative responses as normative.

I suggested that the directionality of individual difference correlations could have at least some probative value in indicating which response was normative. I proposed using Spearman's (1904, 1927) positive manifold as an adjudication device. For a number of classic tasks in the literature (though not all), it was demonstrated that the traditional response considered in the heuristics and biases literature to be normative was positively correlated with intelligence, and the response championed by critics of the heuristics and biases tradition showed a negative correlation with intelligence. The directionality of the correlations with intelligence is embarrassing for critics who argue for an alternative normative response. Surely, we would want to avoid the conclusion that individuals with more computational power are systematically computing the non-normative response. Such an outcome would be an absolute first in a psychometric field that is over one hundred years and thousands of studies old. It would mean that Spearman's positive manifold for cognitive tasks—virtually unchallenged for one hundred years—had finally broken down.

The argument was, essentially, that the response that preserves positive manifold is statistically more likely to be the optimal response (for the fleshed-out argument, see Stanovich, 1999, 2004; Stanovich & West, 2000). Likewise, given that positive manifold is the norm among cognitive tasks, a negative correlation or a zero correlation between the response traditionally considered normative and standard cognitive ability measures might be taken as a signal that the wrong normative model is being applied or that there are alternative models that are equally appropriate. We have in fact observed the latter outcome with some tasks in the heuristics and biases literature (Stanovich, 1999; Stanovich & West, 1998a). And, in fact, our tests of myside bias failed to confirm that avoiding the bias was correlated with cognitive sophistication.

Does Cognitive Ability Attenuate Myside Bias?

Some years ago, Perkins et al. (1991) reported the interesting finding that although intelligence was moderately related to the total number of ideas produced in an argument generation task, it was virtually unrelated to the number of arguments generated which were *counter* to the subject's own position. The Perkins et al. finding lay dormant for many years until a flurry of more recent studies indicated that it was replicable and generalizable.

In a paradigm similar to that of Perkins et al. (1991), our research group (Toplak & Stanovich, 2003) had subjects generate arguments relevant to controversial issues (e.g., should people be allowed to sell their organs). We found a substantial myside bias on the task (people tended to give more arguments in favor of their position than against), but the degree of myside bias was not correlated with cognitive ability. MacPherson and Stanovich (2007) replicated the main finding that cognitive ability did not correlate with the myside effect in an argument generation task, and also found a lack of correlation using an experiment evaluation task.

In a series of experiments, Klaczynski (1997; Klaczynski & Lavallee, 2005; Klaczynski & Robinson, 2000) presented subjects with flawed hypothetical experiments and arguments that led to either opinion-consistent or opinion-inconsistent conclusions. Klaczynski and colleagues found that verbal ability was related to the overall quality of the reasoning in both the opinion-consistent and opinion-inconsistent conditions. However, verbal ability was not correlated with the magnitude of the myside-bias effect—the tendency to critique opinion-inconsistent experimental results more harshly than opinion-consistent ones. In parallel, Sanchez and Dunning (2021) found that people believed inaccurate political statements that flattered their partisan side more than they believed inaccurate political statements when they impeached their political allies. However, measures of intelligence did not attenuate this tendency.

This finding of independence between intelligence and myside reasoning also occurs in what we might call more naturalistic reasoning paradigms—ones where the subject is not cued by the nature of the task or

the instructions that there is an evaluative component to the experiment at all. For example, my research group has studied a variety of biased beliefs based on one's social and demographic status (Stanovich & West, 2007, 2008). The paradigm was one in which the subject simply had to agree or disagree with facts that put the status in a positive or negative light. Myside-biased beliefs were rampant in our studies: smokers were less likely to acknowledge the negative health effects of secondhand smoke; people who were more highly religious were more likely to think that religious people were more honest than nonreligious people; those voting for George Bush were more likely to think that the invasion of Iraq made us safer from terrorists than those voting for John Kerry; and so on. However, we examined not just whether these biases exist, but whether intelligence serves to attenuate them. The results were clear-cut. We examined 15 different myside biases (Stanovich & West, 2008). Not one of these biases was attenuated by high intelligence.

The failure of general intelligence to attenuate myside bias extends to variables that are highly related to intelligence such as numeracy, scientific literacy, and general knowledge. For example, Drummond and Fischhoff (2019) tested subjects who were either supporters or critics of the Affordable Care Act (ACA). Their individual difference variable was not intelligence, but was a direct measure of scientific reasoning skills. Subjects read and evaluated a description of a scientific study finding positive effects of the ACA and another showing negative effects. Not surprisingly, they observed a myside bias effect. But like the Klaczynski research and our own work, Drummond and Fischhoff (2019) found that their measure of scientific reasoning skills did not correlate with the amount of myside bias displayed. Indeed, they ran several studies, and in some of them there was a slight tendency for those higher in scientific reasoning skills to show even larger myside bias effects than those of lower skill levels. This counterintuitive finding occasionally appears in the myside literature, most notably in the work of Kahan (2013; Kahan et al., 2012; Kahan et al., 2017).

Kahan et al. (2012) found that, not surprisingly, left-leaning subjects thought that climate change posed more risks to health and safety than did right-leaning subjects. What was surprising was that this difference between groups was larger among subjects who were high in measured

numeracy than among subjects who were low in numeracy. One generally expects that greater degrees of intelligence, numerical skill, and knowledge will bring people together in their views, but this was not the case in the Kahan et al. (2012) study. Numerical sophistication was associated with increased group polarization.

Using a paradigm that more directly measured myside bias, Kahan (2013) again found group polarization based on a different individual difference indicator—the Cognitive Reflection Test (CRT; Frederick, 2005). The CRT is psychometrically complex (tapping thinking dispositions and numeracy, as well as cognitive capacity; see Attali & Bar-Hillel, 2020; Liberali et al., 2012; Otero et al., 2022; Patel et al., 2019; Sinayev & Peters, 2015; Stanovich et al., 2016; Toplak et al., 2011, 2014a)—but this just makes the finding even more fascinating. Kahan (2013) measured myside bias by assessing how much subjects tended to endorse the validity of an indicator when it yielded an outcome consistent with their beliefs versus how much they endorsed its validity when it yielded an outcome inconsistent with their beliefs. The degree of myside bias displayed was, again, statistically larger among those who scored higher on the CRT.

Kahan et al. (2017) observed the same thing using the 2 x 2 covariation detection paradigm (Stanovich & West, 1998b)—a very different myside paradigm in that it involves very direct processing of numerical information. The polarizing issue in their experiment was gun-control, with half of the sample being in favor and half of the sample being opposed. The individual difference variable was numeracy in this experiment. The results clearly indicated that subjects were more accurate in their covariation assessments when the gun control data supported their prior opinion than they were when the gun control data contradicted their prior opinion. However, higher numeracy was associated with more myside bias for each of the groups on either side of the issue.

In a study by Van Boven et al. (2019), the subject had to choose which of two conditional probabilities (the hit rate or the inverse conditional probability) was the most relevant in evaluating data on two politically charged issues. The myside bias displayed was actually larger for the subjects who were more highly numerate. People apparently used their superior numerical reasoning skills not to reason in an unbiased manner

across the different conditions, but to figure out which probability looked more favorable to their side of the issue (Evans, 2019; Mercier & Sperber, 2017).

Converging with the results[2] of Kahan and Van Boven et al. (2019) is the literature in political science showing that various indices of cognitive sophistication such as educational level, knowledge level, and political awareness not only do not attenuate partisan bias but can often increase it. For example, Joslyn and Haider-Markel (2014) found that highly educated partisans were in more disagreement about policy-relevant facts than were less educated partisans. Numerous studies have shown that cognitive elites display more polarization on a variety of political issues (Drummond & Fischhoff, 2017; Ehret et al., 2017; Fischer et al., 2022; Hamilton, 2011; Henry & Napier, 2017; Jones, 2019; Kahan & Stanovich, 2016; Kraft et al., 2015; Lupia et al., 2007; Sarathchandra et al., 2018; Yudkin et al., 2019).

These survey responses are not direct measures of myside bias, and they involve a host of other complexities. Political polarization is far from a pure measure of the myside processing tendency as it is measured in experiment evaluation studies (e.g., Drummond & Fischhoff, 2019; Kahan et al., 2017; MacPherson & Stanovich, 2007). I have mentioned this literature, however, because of the interesting convergence between political survey research and the laboratory findings. The convergence I wish to draw attention to concerns what we might call the weak conclusion that intelligence and other related measures of cognitive sophistication do not inoculate the reasoner against myside bias. We cannot hope that looking to more education or to the cognitive elites of our society will save us from the deleterious social and political effects of myside bias.

In summary, well controlled laboratory studies of myside bias converge with survey research and polling data in showing that intelligence and education do not inoculate at all against myside tendencies. As Ditto

[2] The *strong* conclusion, drawn by Kahan (2013; Kahan et al., 2017) and many political science researchers (e.g., Drummond & Fischhoff, 2017; Henry & Napier, 2017; Kraft et al., 2015; Yudkin et al., 2019), is that cognitive elites may actually show a larger myside bias. This is a fascinating conclusion, but its strong form is not necessary for my arguments going forward. Some research contradicting the strong conclusion (e.g., Fischer et al., 2022; Stagnaro et al., 2023) actually supports the weaker conclusion I draw here—that cognitive sophistication of many types does not attenuate myside bias.

et al. (2019) note, "What if bias is not the sole province of the simple-minded? … A growing body of research suggests that greater cognitive sophistication and expertise often predicts greater levels of political bias, not less….Cognitive sophistication may allow people to more skillfully argue for their preferred conclusions, thus improving their ability to convince others—and themselves—that their beliefs are correct" (p. 312).

Tests of Myside Bias and Thinking Dispositions

From an individual differences point of view, myside bias displays other curious tendencies. Most of the other biases in the heuristics and biases literature display correlations with, not only intelligence, but also thinking dispositions that are related to rational thinking such actively open-minded thinking and need for cognition (Bruine de Bruin et al., 2007; Finucane & Gullion, 2010; Parker & Fischhoff, 2005; Stanovich & West, 1997, 1998a; Stanovich et al., 2016; Toplak & Stanovich, 2002; Toplak et al., 2011, 2014a, 2014b; Viator et al., 2020; Weller et al., 2018).

Despite these consistent findings involving almost every other cognitive bias, myside bias has failed to correlate with relevant thinking dispositions in the same manner that it has failed to correlate with intelligence (e.g., Kahan & Corbin, 2016; Stanovich & West, 2007; Stenhouse et al., 2018). For example, in our study using Perkins' (1985) argument generation paradigm (Toplak & Stanovich, 2003), we found substantial myside biases on several issues (people tended to give more arguments in favor of their position than against), but the degree of myside bias was not correlated with several thinking dispositions, including actively open-minded thinking, dogmatism, and need for cognition.

In the Macpherson and Stanovich (2007) study, we examined myside bias in both argument generation and evidence evaluation and also measured three different thinking dispositions: actively open-minded thinking, need for cognition, and the avoidance of superstitious thinking. None of the six resulting correlations indicated that more sophisticated thinking was significantly associated with avoiding myside bias.

In our studies of naturalistic myside bias (Stanovich & West, 2007) and argument evaluation (Stanovich & West, 2008), relationships

between myside bias and rational thinking dispositions were also negligible. Guay and Johnston (2021) examined myside bias in political reasoning and found that need for certainty and openness did not predict the magnitude of the myside effect.

AOT and Myside Thinking: A Paradox

These results are most surprising in the case of actively open-minded thinking. Actively open-minded thinking (AOT) is measured by scale items that tap the willingness to consider alternative opinions, the sensitivity to evidence contradictory to current beliefs, the willingness to postpone closure, and reflective thought (Baron et al., 2023; Stanovich & Toplak, 2023; Stanovich & West, 1997). This would seem to be the quintessence of the thinking style that should capture variation in the susceptibility to myside bias. Yet research has not shown that those higher in AOT are less prone to myside bias.

Kahan and Corbin (2016) found an interaction between myside thinking and AOT scores, but the interaction was in the opposite direction than expected. Conservatives and liberals who were high in AOT had more diverging opinions on climate change than did conservatives and liberals who were low in AOT. Stenhouse et al. (2018) found no significant interaction between AOT and ideological difference in climate-change attitudes. Although not replicating the interaction observed by Kahan and Corbin (2016), the Stenhouse et al. (2018) results (as well as those of Clements & Munro, 2021) converged with their results and those of Macpherson and Stanovich (2007) and Stanovich and West (2007) in finding no evidence that higher AOT scores attenuate tendencies toward myside thinking.

In a follow-up study, Eichmeier and Stenhouse (2019) found a significant correlation between party identification and AOT scores. However, using an argument evaluation paradigm, they found no indication that AOT scores were related to the myside bias observed in the argument strength ratings (see also, Beatty & Thompson, 2012; Clements & Munro, 2021; Marin et al., 2024). Thus, the findings from the Stenhouse lab (Eichmeier & Stenhouse, 2019; Stenhouse et al., 2018) are exactly

parallel to those from the Stanovich lab (Macpherson & Stanovich, 2007; Stanovich & Toplak, 2019; Stanovich & West, 2007).

This convergence of findings is disconcerting because of all the biases one would expect to be correlated with AOT, it would be myside bias (Baron, 1993, 2019; Baron et al., 2023; Stanovich & West, 1997, 2007, 2008). Baron et al. (2015) argued that "AOT is a set of dispositions aimed at avoiding 'myside bias', the tendency to think in ways that strengthen whatever possible conclusions are already strong" (p. 267). In a later treatment of the concept, Baron et al. (2023) argued that the core of AOT encompasses avoiding myside bias and avoiding overconfidence in favored conclusions. The findings indicating that AOT does not correlate with direct measures of myside bias is an embarrassment to this view.

Stanovich and Toplak (2023; see also, Stanovich, 2021) argued that strength of belief is an issue that might make the findings a little more understandable. The argument starts with the fact that a related bias—belief bias—*does* correlate with AOT as we would expect, but myside bias does not. Belief bias occurs when people have difficulty evaluating conclusions that conflict with what they know about the world. For example: All living things need water; Roses need water; Therefore, roses are living things; is an invalid syllogism. Belief bias has been most extensively studied in the syllogistic reasoning and conditional reasoning literatures (Evans, 2017), but it is observed in other paradigms as well (Levin et al., 1993; Stanovich & West, 1997, 1998b; Thompson & Evans, 2012).

Belief bias is not the same as myside bias. Belief bias occurs when real-world knowledge interferes with reasoning performance. Myside bias is a bias toward searching and interpreting evidence in a manner that tends to favor the hypothesis we want to be true (Mercier, 2017; Stanovich, 2021). What turns a belief bias into a myside bias? Myside bias refers to processing in favor of existing opinions that are currently highly-valued. To use a distinction discussed years ago by Abelson (1988), myside bias concerns the beliefs that individuals hold with high conviction. Convictions—unlike more typical beliefs—are accompanied by emotional commitment and ego preoccupation. Convictions also tend to have undergone more cognitive elaboration (see Abelson, 1988; and see also Fazio, 2007, and Howe & Krosnick, 2017, for more contemporary discussions). Skitka et al. (2005) found that attitudes rooted in moral mandates tended to

become convictions. Convictions that were rooted in such moral judgments were especially potent predictors of outcome variables (social distance, good will, etc.).

Convictions often derive from worldviews that spawn so-called protected values—those that resist trade-offs with other values (Baron & Spranca, 1997). Protected values (sometimes termed sacred values, see Ditto et al., 2012; Tetlock, 2003) are viewed as moral obligations that arise from deontological rules concerning action, and the thought of violating them often provokes anger. Experiments have shown that subjects are reluctant to trade or engage in monetary tradeoffs when protected values are at stake (Baron & Leshner, 2000; Bartels & Medin, 2007). In further writings on the idea that some beliefs can become convictions, Abelson (1986; Abelson & Prentice, 1989) made the distinction between what he called testable beliefs and distal beliefs. Testable beliefs are closely tied to the real world and the words we use to describe that world (e.g., roses are red). They can be verified by observations—sometimes easily-made personal observations, but other times requiring reliance on the expertise of others and the more sophisticated methods of science. In contrast, distal beliefs cannot be directly verified by experience, nor can they be easily confirmed by turning to experts or scientific consensus.

For example, you may think that pharmaceutical companies make excessive profits, or that your state should spend more on mental health and less on green initiatives. Certainly, economic statistics and public policy facts might condition distal beliefs such as these (either strengthening or weakening our attachment to them) but they cannot *verify* our distal beliefs in the same manner that they can verify testable ones. Many distal beliefs embody our values. When they do, they are apt to become convictions, because they will lead to emotional commitment and ego preoccupation, as argued by Abelson (1988). Distal beliefs often derive from a person's general worldview or, in politics, from their ideology.

Myside bias centers on distal beliefs, not testable ones. Belief bias, in contrast, concerns testable beliefs. This is why belief bias is more remediable by education and more correlated with cognitive ability than is myside bias (Stanovich, 2021). The proposition that health care spending is the second largest item in the US federal budget is a testable belief. The proposition that Americans spend too much on health care is a distal

belief. Certainly, economic facts might alter our attitude toward the latter proposition, but they cannot verify this distal belief in the same manner that they can verify testable beliefs.

It is possible that these distinctions (testable versus distal; ego involvement versus noninvolvement; sacred values versus non-sacred) help to explain the curious paradox regarding AOT as a bias predictor—namely, that it predicts a plethora of biases (Stanovich et al., 2016) except the one closest to its definition. Building on our view (see Stanovich & Toplak, 2019, 2023) of AOT as a measure of the tendency to detach and decontextualize, one hypothesis might be that with myside bias paradigms, we are seeing the limits of individual detachment.

Heuristics and biases tasks often involve a conflict between a nonnormative and a normative response (Stanovich, 2018). De Neys (2014, 2023) has shown that in many cases the conflict between the two responses is detected at some cognitive level. The detected conflict might broach awareness to a sufficient degree that tendencies toward detachment can be helpful. A classic bias such as belief bias would be a clear case of response conflict of this type. However, many myside bias paradigms (particularly the more naturalistic ones, see Stanovich & West, 2007) may not provide opportunities for any conflict to be detected, thus neutering the possibility of high AOT subjects using their skills. Alternatively, the involvement of convictions may be overwhelming even in cases where awareness of alternative reactions has taken place.

Detaching from a prepotent response in a heuristics and biases task such as syllogisms with conclusion validity and believability in conflict may be vastly easier than using AOT tendencies toward detachment and decoupling to overturn a conviction and/or weaken a commitment to a sacred value. The levels of detachment and decontextualization required for the latter are orders of magnitude higher than the parallel cognitive requirements in a typical heuristics and biases task. This would be consistent with the argument previously made by Stanovich (2021) that myside bias is an outlier bias in the rational thinking literature.

Actively Open-Minded Thinking and Myside Bias in the Critical Thinking Literature

Finally, we reviewed previously the extensive literature showing that it is not easy to demonstrate that myside bias is non-normative. In addition to those arguments, many utility-based theories that model beliefs in terms of cost and benefits (Loewenstein & Molnar, 2018; Sharot et al., 2023) show that the early dismissal of myside bias as an irrational tendency was premature because belief restructuring is cognitively expensive. Cognitive models stressing computational expense emphasize the rationality of biasing information assimilation in the direction of previously acquired knowledge. The detachment and decoupling tendencies of AOT may not work against such epistemic mechanisms that are rationally acting as governors and minimizing knowledge restructuring. However, AOT does predict normative responding in many other tasks that do not have as many inertial components as myside bias (Stanovich et al., 2016).

From the standpoint of these constructs in the critical thinking literature, we are left with one secure conclusion but also some puzzling loose ends. The secure conclusion surrounds actively open-minded thinking as a construct in the critical thinking literature. It remains an essential correlate of dozens of heuristics and biases tasks (see Stanovich et al., 2016) many of which are constructs that are central in the critical thinking literature. The latter field seems justified in emphasizing AOT as a foundational thinking style (Baron et al., 2023).

The "loose ends" referred to above concern how the critical thinking literature should treat phenomena of myside bias. For the first several decades of work in the heuristics and biases tradition (Kahneman & Tversky, 1973; Tversky & Kahneman, 1974), from the 1970s to the 1990s, myside bias was treated as simply another bias on a growing list of biases (anchoring bias, hindsight bias, availability bias, etc.) and its occurrence in the laboratory paradigms that were designed to study it was deemed non-normative, without much discussion in most papers. That initial stance now seems oversimplified. We have seen that from a philosophical standpoint, it is difficult to show that myside bias is irrational.

Furthermore, I have reviewed evidence here showing that, in contrast to most other thinking biases, it does not correlate with intelligence. Finally, the most perplexing finding was that it does not correlate with actively open-minded thinking, a cognitive style conceptualized as relating directly to mysided thinking. The research I have covered demonstrates that the field needs to do much more conceptual work on this construct and how it fits in with the critical thinking literature.

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