Lay standards for reasoning predict people's acceptance of suspect claims

Tomas Ståhl

University of Illinois Chicago

Corey Cusimano

Yale University

In Press: ***Current Opinion in Psychology***

Correspondence concerning this article should be sent to Tomas Ståhl, Department of Psychology, University of Illinois Chicago, m/c 285, 1007 W. Harrison St., Chicago, IL, 60607-7137, USA. E-mail: tstahl@uic.edu.

Abstract

People vary between each other and across contexts with respect to how important it is to them to think in logical, impartial, and evidence-based ways. Recent studies demonstrate that this variation in people's personal standards for thinking predicts the nature and quality of their beliefs. Strong commitments to epistemic virtues motivate careful thinking and protect people from suspicious claims. At the same time, people are more likely to knowingly hold biased or evidentially unsupported beliefs when they think that they are justified to think in biased or evidentially poor ways. People's personal standards for reasoning likely play an important role in shaping how suspect or unreasonable information is received.

Keywords: Misinformation; fake news; epistemic values; ethics of belief; reasoning

1. Introduction

A striking observation from recent research on misinformation is that people sometimes accept news that is not just false, but seemingly obviously so. Infamous examples include claims that Donald Trump's chef quit in protest after Trump ate exclusively fast food for six months, or that Hillary Clinton knowingly accepted a $30,000 donation from a child sex cult [1]. These claims are *epistemically suspect* in the sense that they are inconsistent with the evidence readily available to most people who would encounter them. Whether or not these claims were true, someone thinking about them rationally, considering everything they know, should be suspicious of them. Our approach to understanding people's susceptibility to misinformation focuses on why people sometimes form (and hold on to) epistemically suspect beliefs. Our central argument is that people's standards for reasoning, including the importance they place on being rational, logical, and open-minded, affect their tendency to accept epistemically suspect or irrational beliefs.

Reflecting on and critically appraising claims that diverge wildly from one's background knowledge often reveals why those claims are likely to be false. It is therefore not surprising that people who are more inclined toward these activities, or are forced to reflect or critically appraise claims, are less susceptible to outlandish misinformation, conspiracy theories, and paranormal and superstitious claims [2–4, 4–12]. But what motivates people toward a tendency to question claims or seek out and reflect on evidence? And, when might people feel motivated to question a suspect claim when they aren't being induced by an experimenter to do so? We contend that people variably engage good epistemic practices as a result of their own, internal, and consciously accessible, standards for what constitutes good, responsible belief formation.

2. Lay "ethics of belief"

People's "ethics of belief" reflect their judgments about how they and others ought to reason and form beliefs [13, 14]. A central concern in people's ethics of belief regards how much weight they give *epistemic values*, such as how much they care about *acquiring knowledge* and *avoiding falsehoods*, and which invoke injunctions to be open-minded, impartial, consistent, and logical, and support their beliefs with evidence [13, 15, 16]. We contend that people reason in certain ways, and accept (or not) certain beliefs, based in part on the weight and importance they place on epistemic values. Below we review two sources of variation in the importance that people place on epistemic value, and as a result, their motivation to reason in open-minded, impartial, and evidence-based ways. First, although many people pay lip service to epistemic values, there are substantial individual differences in the importance that people place on these values. And second, people sometimes face dilemmas between believing in ways that prioritize epistemic values versus non-epistemic values. In these situations, people self-consciously feel motivated toward adopting epistemically irrational or biased beliefs.

3. Correlates of individual differences in people's ethics of belief

People differ in the value they place on effortful thinking [17], active open-mindedness [18, 19], and logic and evidence [20, 21]. These individual differences correlate with people's tendency to believe epistemically irrational claims. For instance, people who especially value open-minded thinking are less prone to a host of errors and biases [3, 15, 19, 22–27]. And, people who especially value logical and evidence-based reasoning when forming beliefs tend not to hold paranormal, superstitious, conspiratorial, or religious beliefs [20, 21, 28]. Norms about what counts as evidence are similarly predictive of people's beliefs. Highly religious individuals

are more likely to say that intuition counts as a source of evidence, and to say that beliefs could be justified because they are conducive to morally good behavior [29]. These individuals were also less likely to believe in evolution.

The weight that people give to epistemic norms like "follow the evidence" may be a stronger predictor of their acceptance of science compared to other individual differences, such as their tendency to reflect [24]. This may be because measures of reflective thinking primarily assess the *amount* of thinking one is liable to do, whereas measures of epistemic values invoke people's beliefs about *how* they should think (e.g., open-mindedly [19]). Indeed, prompting people to be especially cognizant of the accuracy of a claim may make them think more rationally without necessarily making them think more [30].

Valuing strict and sophisticated epistemic standards seems to improve reasoning by motivating people to marshal their capacity to detect suspect and unreasonable claims [15]. Consistent with this idea, individual differences in cognitive ability (and reflective thinking), more strongly associate with rational skepticism among people who ascribe especially high value to logic and evidence [20, 31]. Likewise, reflective thinking more often leads to epistemically rational belief among people who especially value epistemically good reasoning [32]. Indeed, prompting people to think about the value of being "rational" strengthens the connection between their cognitive ability and their susceptibility to unreasonable claims [33]. Additional evidence comes from studies that interfere with people's opportunity to marshal their cognitive ability. People who tend not to value epistemic rationality also tend to accept bullshit statements whether they read them normally or under cognitive load. By contrast, people who value epistemic rationality are more likely to accept bullshit statements under cognitive load (compared to when they could reason normally) [34].

Epistemic values may also relate to how people evaluate other's credibility. People often have to defer their judgment to others – including news organizations, pundits, and local rumor-mongers. One role for people's ethics of belief is to guide how they receive information from others, and to trust or change others claims accordingly. People who think that it is important to engage in actively open-minded thinking discount sources who think close-mindedly [19]. People who tend to recognize and value good epistemic practices tend to be more trusting of objectively more reliable sources (like scientists). For instance, bullshit statements generally seem more credible when coming from a scientist rather than a spiritual leader [35] and this difference is especially pronounced among non-religious people and people who value science [34, 35]. However, there is still little work investigating the connection between people's ethics of belief and their evaluation of news sources. And recent evidence suggests that, in some cases, people's ethics of belief do not moderate the impact of source credibility on acceptance of suspect claims [34]

4. Moral and instrumental benefits intuitively justify departures from evidence.

Beliefs can vary in their *epistemic* quality, such as how well they are supported by an impartial weighing of evidence, as well as their *non-epistemic* quality, such as how useful, loyal, or risky they are. Recent studies show that people generally attend to both the epistemic and non-epistemic qualities of beliefs and think that they and others are justified to hold beliefs that are epistemically suspect when the non-epistemic benefits of belief seem high [14].

For instance, people believe that over-confidence, one-sided thinking, and positivity illusions, are justified when they are instrumentally and morally beneficial to their believers [29, 36–39]. One study shows that people believe that confidence helps sustain motivation, and so,

overconfidence can help people achieve their goals [38]. And accordingly, people routinely think that, when someone is trying to achieve something, they ought to be overconfident. People also think that overconfidence is especially valuable in close relationships: In one study, participants rated someone's pessimistic-but-clear-eyed view of their marriage as less justified compared to when that person held a rosy, unrealistic belief [36].

People likewise sometimes think that others ought to ignore evidence when doing so would be respectful or would signal the right kinds of commitments [36, 40, 41]. So, for instance, many people (but especially liberals) think that others ought to ignore base rate information about minorities when judging whether that person is dangerous or will act selfishly [36, 42, 43]. Likewise, religious individuals often want their religious peers to avoid questioning or inquiring into their religious beliefs [42, 44]. Observers enforce these belief norms: People by and large think that others can choose what they believe and blame others for holding bad beliefs (even when those beliefs are supported by evidence) [20, 45, 46].

Even people who normally favor epistemically rigorous thinking may think that the opposite is occasionally justified. Indeed, the same people who endorsed morally desirable motivated reasoning in the studies above thought that run-of-the-mill motivated reasoning (i.e., reasoning motivated by mere hedonic wishful thinking) was unjustified [36]. Furthermore, people who normally value actively open-minded thinking, and who normally derogate others who reason one-sidedly, still thought well of someone who engaged in one-sided thinking about their relationship [19]. Overall, it seems like many people endorse impartial, evidence-based reasoning up until it is morally inconvenient to do so [40].

These judgments about when, and on what grounds, people can permissibly hold biased or motivated beliefs predict what kinds of beliefs people are likely to hold. People can hold

beliefs despite thinking that those beliefs are illogical or thinking that they cannot back them up with evidence [47–49]. These beliefs do not automatically change in the face of reasons to do so but may only change when people feel especially motivated to correct them. Consistent with this line of reasoning, one recent study found that people are most likely to hold beliefs that (they think) they lack evidence for when those beliefs seem morally valuable [37]. In this study, many people reported believing in God or believing that climate change could still be undone. These individuals also thought that they could not back these beliefs up with evidence, but instead, felt justified in holding these beliefs because they thought it motivated them to be better people.

5. Subjective feelings of justified due diligence

Beliefs also vary with respect to how much evidence they require before someone thinks they have sufficient evidence for them. When the stakes are especially high, people think that they should set an especially high threshold for evidence before accepting a claim [36, 50–52].[1] This element of people's everyday ethics of belief reveals a challenge in changing how people confront new information. It has long been recognized that people hold undesirable claims to stricter scrutiny compared to desirable ones [50, 55, 56]. This tendency to shift one's standard of evidence in response to desirable and undesirable new information is often interpreted as a form of biased and motivated reasoning [55, 56].

[1] The style of reasoning described here is distinct from requiring greater evidence to believe evidentially incongruent claims. Accordingly, people may legitimately disregard apparent evidence for wild claims because they have strong prior evidence that those claims are wrong. In such cases, it is much more likely that the evidence is flawed than that it overrides all of one's evidence to the contrary [53, 54]. So, when two people receive the same new information, there are at least *two* reasons why one person might accept the new information while the other does not: First, the new information might be incongruent with one person's prior evidence but not the other person's (the reason discussed here in this footnote). And second, one person might think accepting the new evidence is especially *risky* while the other person does not, even if the new information is equally congruent with both individuals' prior evidence (the reason discussed in the main text).

Subjectively, however, this reaction to new information may often feel to people as though they are simply engaging in proper due diligence. In other words, applying double standards to new information may feel to people like they are doing something legitimate, such as resisting jumping to risky conclusions. Likewise, when people quickly accept new ideas based on flimsy evidence, they may think that it is permissible to do so because the stakes of the issue are low or the risks of non-acceptance are high. Accordingly, people may not scrutinize desirable (or politically congruent) claims because they think that the costs of being wrong are low. And likewise, they may especially scrutinize undesirable (or politically incongruent) claims because they think the costs of being wrong are (now) high. These people are apportioning their capacity to be savvy, critical reasoners in a biased way, all the while knowing that they are doing so, and all the while thinking that they are thinking as they ought to.

Recent evidence suggests that, when people accept or reject new scientific information, they may do so while self-consciously incorporating their impressions about the risks of error. In one investigation [37], participants read about a scientific study showing evidence for a claim that they found risky or offensive (e.g., “Black people tip less than white people” or “Puberty suppressants improve psychological functioning in teens with gender dysphoria”). Participants accepted and rejected these claims while self-consciously knowing that they did so in part because of their judgments about how risky it felt to accept (or reject) them. However, they did not think that it was inappropriate to incorporate their moral judgments into their scientific ones.

6. Future directions

The research reviewed here examines people's tendency to attend to both the epistemic and non-epistemic features of belief when determining what they ought to believe. Research on this topic is still in its infancy, and many questions remain.

Even people who reject illogical, partial, or epistemically irrational reasoning in some domains endorse this kind of reasoning in others. And, as reviewed above, there are substantial individual differences in people's ethics of belief. People who are more open to experience [57], more liberal [58], and less religious [28, 59], tend to endorse virtues related to actively open-minded thinking. These observations raise the question: Why do people endorse epistemically rational reasoning (when they do)? Common scales that measure people's dedication to open-minded thinking or evidence-based reasoning (e.g., [19, 20, 28]) do not tell us. People may value evidence and open-mindedness because they think that knowledge and understanding are intrinsically valuable, because they think that accurate beliefs are instrumentally valuable, or for other reasons (see [13, 14] for discussion).

A closely related question concerns how people develop their internal standards for good reasoning [15]. Children endorse norms of actively open-minded thinking more strongly as they age [27, 60]. By the time they are adolescents, they tend to strongly endorse explicit epistemic virtues like openness to disagreement and intellectual humility [61]. But why do children and adolescents endorse these virtues, and what role does education play in nurturing these virtues? Overall, we know little about the process through which epistemic virtues develop, or about their level of malleability once formed. Understanding why people believe that open-minded and evidence-based thinking is valuable may help predict when people will devalue epistemically desirable thinking, and potentially as a result, become more susceptible to suspect claims. Likewise, learning why people value epistemic virtues (when they do) is important for

understanding how to increase the value that they place on these virtues when they are prone to devalue them [14].

Finally, although we have argued that it is important to learn more about the origin and malleability of people's ethics of belief, it will not always be practical or useful to change people's ethics of belief. We have reviewed evidence that people's standards for reasoning often predict good judgment. However, much of this data is correlational – there is no work to date showing that interventions that increase people's valuation of epistemic virtues result in better judgment. Likewise, in everyday contexts, it is unclear how often people are aware that their beliefs are epistemically irrational [62, 63]. Many biases operate unconsciously, and some people may generally be worse at monitoring and understanding their thinking relative to others. If most of the cases in which people accept epistemically suspect misinformation are cases in which they thought that they were being perfectly rational, then interventions to change people's ethics of belief may have limited impact. Likewise, doubts remain about how effectively people regulate their beliefs to align with their standards (see discussion in [64]). People may adopt beliefs that fail to satisfy their personal standards of belief but maintain them anyway [47, 49]. In these scenarios, modifying people's standards for belief will also have limited impact.

A full account of people's susceptibility to misinformation needs to consider a large catalog of variables, including but not limited to the nature and supply of misinformation, people's cognitive capacities, people's metacognitive awareness of their reasoning, and people's ability to adopt the beliefs they want to adopt. However this complete account turns out, we suspect that there will be an important place for people's lay ethics of belief.

References

1. Rathje, S, Roozenbeek, J, Van Bavel, JJ, van der Linden, S: **Accuracy and social motivations shape judgements of (mis)information.** *Nat Hum Behav* 2023, **7**892-903.
2. Bago, B, Rand, DG, Pennycook, G: **Does deliberation decrease belief in conspiracies**. *Journal of Experimental Social Psychology* 2022, **103**104395.
3. Bronstein, MV, Pennycook, G, Bear, A, Rand, DG, Cannon, TD: **Belief in Fake News is Associated with Delusionality, Dogmatism, Religious Fundamentalism, and Reduced Analytic Thinking**. *Journal of Applied Research in Memory and Cognition* 2019, **8**108-117.
4. Pennycook, G, Cheyne, JA, Seli, P, Koehler, DJ, Fugelsang, JA: **Analytic cognitive style predicts religious and paranormal belief.** *Cognition* 2012, **123**335-346.
5. Georgiou, N, Delfabbro, P, Balzan, R: **Conspiracy theory beliefs, scientific reasoning and the analytical thinking paradox**. *Applied Cognitive Psychology* 2021, **35**1523-1534.
6. Erceg, N, Galić, Z, Bubić, A: **"Dysrationalia" Among University Students: The Role of Cognitive Abilities, Different Aspects of Rational Thought and Self-Control in Explaining Epistemically Suspect Beliefs.** *Eur J Psychol* 2019, **15**159-175.
7. Gervais, WM, Norenzayan, A: **Analytic thinking promotes religious disbelief.** *Science* 2012, **336**493-496.
8. Shenhav, A, Rand, DG, Greene, JD: **Divine intuition: cognitive style influences belief in God.** *J Exp Psychol Gen* 2012, **141**423-428.
9. Pennycook, G, Epstein, Z, Mosleh, M, Arechar, AA, Eckles, D, Rand, DG: **Shifting attention to accuracy can reduce misinformation online.** *Nature* 2021, **592**590-595.
10. Lerner, JS, Tetlock, PE: **Accounting for the effects of accountability.** *Psychol Bull* 1999, **125**255-275.
11. Swami, V, Voracek, M, Stieger, S, Tran, US, Furnham, A: **Analytic thinking reduces belief in conspiracy theories.** *Cognition* 2014, **133**572-585.
12. Pennycook, G, Rand, DG: **Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning.** *Cognition* 2019, **188**39-50.
13. Chignell: **The Ethics of Belief The Stanford Encyclopedia of Philosophy.** Edited by NZ Edward. Metaphysics Research Lab, Stanford University; 2018
14. ** Cusimano, C, Lombrozo, T: **Reconciling scientific and commonsense values to improve reasoning.** *Trends Cogn Sci* 2021, **25**937-949.
    - Provides a review and framework for triangulating between people's everyday ethics of belief, cognitive models of belief formation, and normative theories of good reasoning.
15. Baron, J: **Why Teach Thinking?-An Essay**. *Applied Psychology* 1993, **42**191-214.
16. Zagzebski, LT (Ed): *Virtues of the Mind: An Inquiry Into the Nature of Virtue and the Ethical Foundations of Knowledge*. Cambridge University Press; 1996.
17. Cacioppo, JT, Petty, RE: **The need for cognition.** *Journal of Personality and Social Psychology* 1982, **42**116-131.
18. Stanovich, KE, West, RF: **Individual differences in rational thought.** *Journal of Experimental Psychology: General* 1998, **127**161-188.
19. Baron, J: **Actively open-minded thinking in politics.** *Cognition* 2019, **188**8-18.

20. Ståhl, T, Zaal, MP, Skitka, LJ: **Moralized Rationality: Relying on Logic and Evidence in the Formation and Evaluation of Belief Can Be Seen as a Moral Issue.** *PLoS One* 2016, **11**e0166332.
21. Ståhl, T, van Prooijen, J-W: **Analytic atheism: Valuing epistemic rationality strengthens the association between analytic thinking and religious disbelief**. *Personality and Individual Differences* 2021, **179**110914.
22. Carpenter, J, Preotiuc-Pietro, D, Clark, J, Flekova, L, Smith, L, Kern, ML, Buffone, A, Ungar, L, Seligman, M: **The impact of actively open-minded thinking on social media communication**. *Judgment and Decision Making* 2018, **13**562-574.
23. Haran, U, Ritov, I, Mellers, BA: **The role of actively open-minded thinking in information acquisition, accuracy, and calibration**. *Judgment and Decision Making* 2013, **8**188-201.
24. Newton, C, Feeney, J, Pennycook, G: **On the Disposition to Think Analytically: Four Distinct Intuitive-Analytic Thinking Styles.** *Pers Soc Psychol Bull* 2023, 1461672231154886.
25. Stenhouse, N, Myers, TA, Vraga, EK, Kotcher, JE, Beall, L, Maibach, EW: **The potential role of actively open-minded thinking in preventing motivated reasoning about controversial science**. *Journal of Environmental Psychology* 2018, **57**17-24.
26. West, RF, Toplak, ME, Stanovich, KE: **Heuristics and biases as measures of critical thinking: Associations with cognitive ability and thinking dispositions.** *Journal of Educational Psychology* 2008, **100**930-941.
27. Toplak, ME, West, RF, Stanovich, KE: **Rational thinking and cognitive sophistication: development, cognitive abilities, and thinking dispositions.** *Dev Psychol* 2014, **50**1037-1048.
28. * Pennycook, G, Cheyne, JA, Koehler, DJ, Fugelsang, JA: **On the belief that beliefs should change according to evidence: Implications for conspiratorial, moral, paranormal, political, religious, and science beliefs**. *Judgment and Decision Making* 2020, **15**476-498.
    - The authors provide evidence that actively open-minded thinking about evidence is a stronger predictor of science beliefs and epistemically suspect beliefs than measures of reflective thinking. This is especially the case among liberals.

29. Metz, SE, Weisberg, DS, Weisberg, M: **Non-Scientific Criteria for Belief Sustain Counter-Scientific Beliefs.** *Cogn Sci* 2018,
30. Lin, H, Pennycook, G, Rand, DG: **Thinking more or thinking differently? Using drift-diffusion modeling to illuminate why accuracy prompts decrease misinformation sharing.** *Cognition* 2023, **230**105312.
31. ** Ståhl, T, van Prooijen, J-W: **Epistemic rationality: Skepticism toward unfounded beliefs requires sufficient cognitive ability and motivation to be rational**. *Personality and Individual Differences* 2018, **122**155-163.
    - The authors show that individual differences in cognitive ability are more strongly negatively associated with paranormal beliefs, and conspiracy beliefs, among people who ascribe high value to epistemic rationality.

32. Yilmaz S, T, S: **Science beliefs: The role of analytic thinking and epistemic values.** *Unpublished manuscript* 2023,

33. Adam-Troian, J, Caroti, D, Arciszewski, T, Ståhl, T: **Unfounded beliefs among teachers: The interactive role of rationality priming and cognitive ability**. *Applied Cognitive Psychology* 2019,
34. ** Ståhl, T, Yilmaz, S, Digby, N, Stasko, P: **Valuing epistemic rationality bolsters the effect of analytic thinking on skepticism toward pseudo-profound bullshit**. *Personality and Individual Differences* 2024, **217**112452.
    - Demonstrates that people who strongly value epistemic rationality become more inclined to accept bullshit when under cognitive load (vs. control), whereas acceptance of bullshit is equally high across conditions among people who value epistemic rationality less.

35. * Hoogeveen, S, Haaf, JM, Bulbulia, JA, Ross, RM, McKay, R, Altay, S, Bendixen, T, Berniūnas, R, Cheshin, A, Gentili, C *et al.*: **The Einstein effect provides global evidence for scientific source credibility effects and the influence of religiosity.** *Nat Hum Behav* 2022, **6**523-535.
    - A large cross-cultural experiment shows that people generally view bullshit statements as more credible when coming from a scientist (vs. spiritual leader). This effect is more pronounced among the less religious.

36. Cusimano, C, Lombrozo, T: **Morality justifies motivated reasoning in the folk ethics of belief.** *Cognition* 2021, **209**104513.
37. ** Cusimano, C, Lombrozo, T: **People recognize and condone their own morally motivated reasoning.** *Cognition* 2023, **234**105379.
    - Demonstrates that people recognize and condone (at least) two forms of their motivated reasoning. First, people sometimes believe they lack evidence for their (morally desirable) beliefs (but feel justified in their beliefs anyway). Second, people sometimes believe that they are (justifiably) withholding belief because of the perceived risk of error.

38. * Tenney, ER, Logg, JM, Moore, DA: **(Too) optimistic about optimism: the belief that optimism improves performance.** *J Pers Soc Psychol* 2015, **108**377-399.
    - These authors show two things. First, people believe that beliefs affect motivation. Second, because of this, people think that others should be overconfident when they think it is important for them to be motivated.

39. Armor, DA, Massey, C, Sackett, AM: **Prescribed optimism: is it right to be wrong about the future**. *Psychol Sci* 2008, **19**329-331.
40. Tetlock, PE: **Social functionalist frameworks for judgment and choice: intuitive politicians, theologians, and prosecutors.** *Psychol Rev* 2002, **109**451-471.
41. Tetlock, PE: **Thinking the unthinkable: sacred values and taboo cognitions.** *Trends Cogn Sci* 2003, **7**320-324.
42. Tetlock, PE, Kristel, OV, Elson, SB, Green, MC, Lerner, JS: **The psychology of the unthinkable: taboo trade-offs, forbidden base rates, and heretical counterfactuals.** *J Pers Soc Psychol* 2000, **78**853-870.
43. Cao, J, Kleiman-Weiner, M, Banaji, MR: **People Make the Same Bayesian Judgment They Criticize in Others.** *Psychol Sci* 2019, **30**20-31.

44. Gill, M, Lombrozo, T: **Seeking evidence and explanation signals religious and scientific commitments.** *Cognition* 2023, **238**105496.
45. Cusimano, C, Goodwin, GP: **Lay beliefs about the controllability of everyday mental states.** *J Exp Psychol Gen* 2019, **148**1701-1732.
46. Cusimano, C, Goodwin, GP: **Mental states and control-based theories of responsibility.** In *Advances in experimental philosophy of free will and responsibility*. Edited by T Nadelhoffer, A Monroe. Bloomsbury Publishing; 2022
47. Risen, JL: **Believing what we do not believe: Acquiescence to superstitious beliefs and other powerful intuitions.** *Psychol Rev* 2016, **123**182-207.
48. Walco, DK, Risen, JL: **The Empirical Case for Acquiescing to Intuition.** *Psychol Sci* 2017, **28**1807-1820.
49. Cusimano, C: **The case for heterogeneity, and insight, in people's evaluation of their biased beliefs.** *Unpublished Manuscript*. 2023,
50. Trope, Y, Liberman, A: **Social hypothesis testing: Cognitive and motivational mechanisms.** The Guilford Press; 1996:239-270.
51. Kruglanski, AW, Freund, T: **The freezing and unfreezing of lay-inferences: Effects on impressional primacy, ethnic stereotyping, and numerical anchoring**. *Journal of Experimental Social Psychology* 1983, **19**448-468.
52. Mayseless, O, Kruglanski, AW: **What makes you so sure? Effects of epistemic motivations on judgmental confidence**. *Organizational Behavior and Human Decision Processes* 1987, **39**162-183.
53. Koehler, JJ: **The Influence of Prior Beliefs on Scientific Judgments of Evidence Quality**. *Organizational Behavior and Human Decision Processes* 1993, **56**28-55.
54. Jern, A, Chang, KM, Kemp, C: **Belief polarization is not always irrational.** *Psychol Rev* 2014, **121**206-224.
55. Ditto, PH, Lopez, DF: **Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions.** *Journal of Personality and Social Psychology* 1992, **63**568-584.
56. Taber, CS, Lodge, M: **Motivated Skepticism in the Evaluation of Political Beliefs**. *American Journal of Political Science* 2006, **50**755-769.
57. Ståhl, T, Turner, J: **Epistemic values and the Big Five: Personality characteristics of those who ascribe personal and moral value to epistemic rationality.** *PLoS One* 2021, **16**e0258228.
58. Kahan, DM, Corbin, JC: **A note on the perverse effects of actively open-minded thinking on climate-change polarization**. *Research & Politics* 2016, **3**205316801667670.
59. Piazza, J, Landy, JF: **"Lean not on your own understanding": Belief that morality is founded on divine authority and non-utilitarian moral judgments**. *Judgment and Decision Making* 2013, **8**639-661.
60. Kokis, JV, Macpherson, R, Toplak, ME, West, RF, Stanovich, KE: **Heuristic and analytic processing: age trends and associations with cognitive ability and cognitive styles.** *J Exp Child Psychol* 2002, **83**26-52.
61. * Metz, S.E., Baelen, RN, Yu, A: **Actively open-minded thinking in American adolescents**. *Review of Education* 2020, **8**768-799.
    - Through self-report, teacher report, reasoning tasks and in-depth interviews, these authors demonstrate strong endorsement of actively open-minded thinking in

adolescents. Methods from this paper should inspire future measurement of actively open-minded thinking.
62. Pronin, E, Gilovich, T, Ross, L: **Objectivity in the eye of the beholder: divergent perceptions of bias in self versus others.** *Psychol Rev* 2004, **111**781-799.
63. West, RF, Meserve, RJ, Stanovich, KE: **Cognitive sophistication does not attenuate the bias blind spot.** *J Pers Soc Psychol* 2012, **103**506-519.
64. Cusimano, C, Goodwin, GP: **People judge others to have more voluntary control over beliefs than they themselves do.** *J Pers Soc Psychol* 2020, **119**999-1029.