

A note on the perverse effects of actively open-minded thinking on climate-change polarization

Research and Politics
October-December 2016: 1–5
© The Author(s) 2016
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/2053168016676705
rap.sagepub.com

Dan M. Kahan¹ and Jonathan C. Corbin²

Abstract

This research note presents evidence that political polarization over the reality of human-caused climate change increases in tandem with individuals' scores on a standard measure of actively open-minded thinking. This finding is at odds with the position that attributes political conflict over facts to a personality trait of closed-mindedness associated with political conservatism.

Keywords

Actively open-minded thinking, climate change, motivated reasoning, political polarization, decision science

Actively open-minded thinking (AOT) refers to a reasoning disposition that is often thought to have political significance. It consists in the motivation to seek out, engage, and appropriately weigh evidence opposed to one's strongly held beliefs (Baron, 2008; Stanovich and West, 1997). Some surmise that a deficit in this disposition associated with ideological conservatism (Price et al., 2015; Jost et al., 2003; Taber and Young, 2013) might be the source of political polarization over facts that admit of empirical proof—for example, that human activity is causing the temperature of the earth to increase (Jost et al., 2013; Nisbet et al., 2013).¹

We will call the position that AOT has this significance for politics the “AOT_p thesis.” The point of this research note is to call attention to some evidence that fails to conform to this position. That evidence shows that partisans who score highest on a standard measure of AOT are in fact the most polarized on the reality of human-caused climate change.

The evidence comes from a nationally representative US sample ($N = 1600$) assembled to aid in construction of the “Ordinary Science Intelligence” assessment, a measure of science comprehension (Kahan, 2016).² For purposes of validating that measure, subjects responded to a standard seven-item AOT battery (Baron et al., 2015; Haran et al., 2013) ($\alpha = 0.61$). The subjects also responded to a five-point liberal-conservative and a seven-point partisan-identification measure, which we combined to form a political-outlook scale (“Left_{right},” $\alpha = 0.78$). The data

set also contained responses to standard survey questions on human-caused climate change.³

Subjects' AOT scores were positively correlated with acceptance of human-caused climate change and negatively correlated with right-leaning political outlooks (Figure 1). These findings are consistent with AOT_p.⁴

The more definitive test, however, involves the impact of subjects' political outlooks *conditional* on their AOT scores. If polarization over the reality of human-caused climate change is a consequence of a deficit in AOT among conservatives, then one would expect the conservatives lowest in AOT to be substantially more skeptical of climate change than those highest in AOT. Likewise, if an ideological asymmetry in AOT drives partisan conflict over climate change, then the gap between partisans ought to narrow as partisans' AOT scores go up (Figure 2).

These results were not observed in the data. As subjects' AOT scores went up, their acceptance of human-caused climate change increased only if they held left-leaning political outlooks. Among right-leaning subjects, higher AOT scores were associated with slightly less acceptance (Table 1).

¹Yale Law School, USA

²University of Richmond, USA

Corresponding author:

Dan M. Kahan, Yale Law School, P.O. Box 208215, New Haven, CT 06520, USA.

Email: dan.kahan@yale.edu



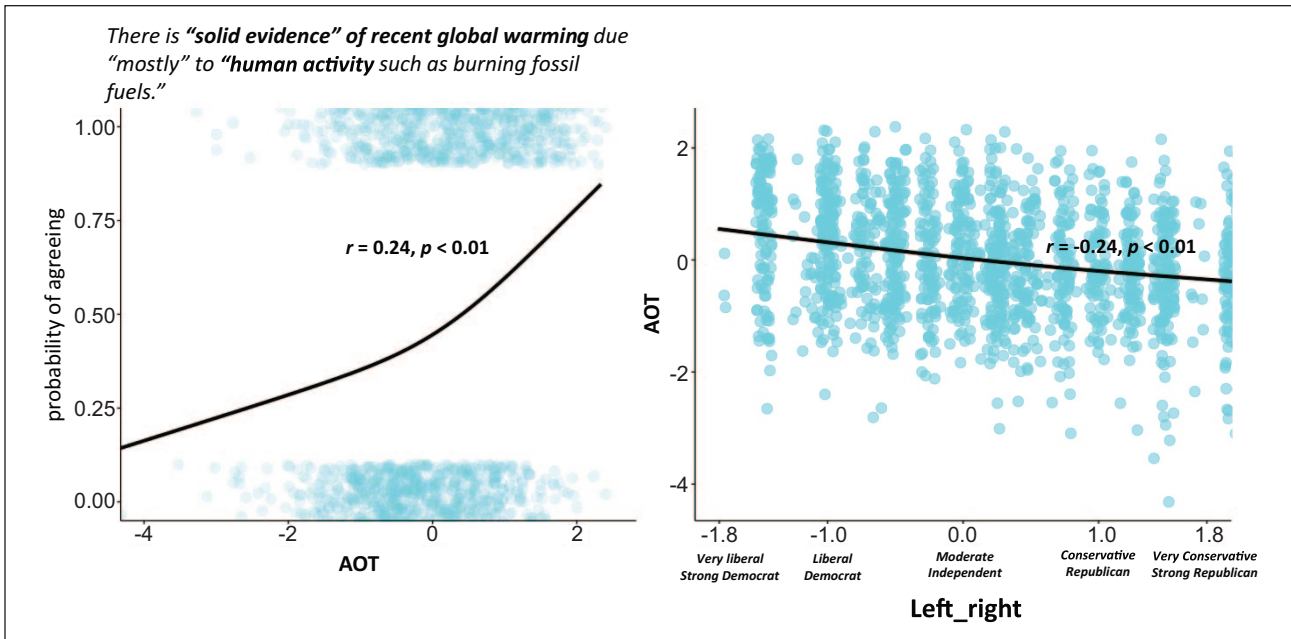


Figure 1. Relationships of AOT to political outlooks and acceptance of climate change.

AOT: actively open-minded thinking.

N = 1591 (left panel), 1547 (right). Locally weighted regressions superimposed on scatter plots. Left_right and AOT are both standardized.

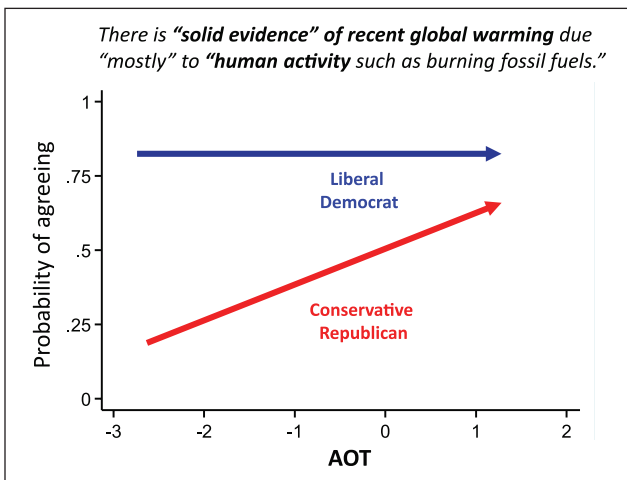


Figure 2. AOTp prediction. The AOTp thesis posits that a deficit in AOT among ideologically conservative individuals accounts for their resistance to counter-attitudinal evidence on climate change and thus drives political conflict on this issue. If this is true, then one would predict that those conservative individuals who are nevertheless relatively high in AOT would be more inclined to credit evidence of human-caused climate change, narrowing the partisan gap on the reality of this phenomenon.

As a result, political polarization grew as subjects' AOT scores increased (Figure 3). For subjects with a low AOT score (-1 SD), the predicted probability that a liberal Democrat would accept that human activity is causing global warming ($58\%, \pm 6\%$)⁵ was 39 percentage points (± 7) higher

Table 1. Regression analysis.

	b	
LR	-1.40	(-17.49)
AOT	0.42	(6.26)
LR x AOT	-0.49	(-6.58)
constant	-0.07	(1.17)
N	1547	
LR χ^2	575.3(3)	
pseudo R^2	0.33	

AOT: actively open-minded thinking; LR: left_right
N = 1547. Outcome variable is agreement that there is "solid evidence" of recent global warming due "mostly" to "human activity such as burning fossil fuels." Logit coefficients with z-statistic denoted parenthetically. Left_right and AOT are centered at zero through standardization to promote interpretation (Friedrich, 1982). Pseudo R^2 calculated by squaring the Pearson correlation between predicted and observed values. **Bold** denotes that the predictor, the Likelihood Ratio χ^2 , or the pseudo R^2 is significant at $p < 0.05$.

than the predicted probability that a conservative Republican would ($19\%, \pm 3\%$). For partisans with a high AOT score ($+1$ SD), there was a 73 percentage point ($\pm 6\%$) difference ($87\%, \pm 3\%$ vs. $14\%, \pm 4\%$).

These are not the patterns one would expect to see under AOTp. We can think of three explanations.

One is that AOTp is simply false. AOTp is one variant of a more general claim that an asymmetry in critical reasoning explains political conflict over contested policy-relevant facts (Jost et al., 2013). While proponents of this asymmetry thesis have long pointed to correlations between

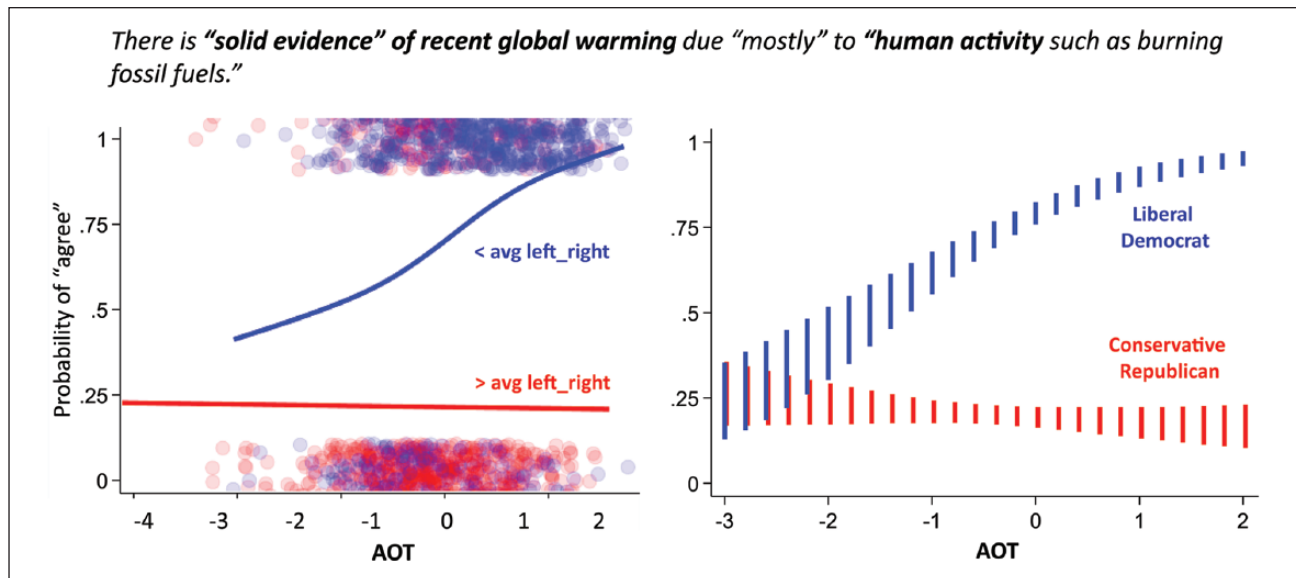


Figure 3. Impact of AOT on acceptance of climate change conditional on right-left political outlooks.

AOT: actively open-minded thinking

$N = 1547$. Locally weighted regressions superimposed on scatter plot in left panel; “< avg” and “> avg Left_right” based on scores in relation to mean on “Left_right” political outlook scale.” Right panel based on Monte Carlo simulation derived from logistic regression (Table 1) (King et al., 2000); predictors for Left_right set at values corresponding to responses “liberal” and “Democrat” and “conservative” and “Republican,” respectively, on the study’s five-point liberal-conservative and seven-point party-identification items. Colored bars denote 0.95 confidence intervals.

ideology and self-report measures of reasoning style (e.g. Jost et al., 2003), they have not produced evidence that such correlations explain partisan divisions over such facts, much less observable differences in information processing relating to formation of factual beliefs, in representative samples of the general public. On the contrary, experimental studies have found that there is a basic symmetry in manifestations of politically biased information processing (Nisbet et al., 2015; Kahan, in press)—one that is not mitigated but instead magnified by objective measures of cognitive proficiency (Lewandowsky and Oberauer, 2016). The evidence we have presented, while based on a self-report measure of reasoning style, adds further weight to the case against the asymmetry thesis.

Another, related explanation is that AOT in fact enhances the proficiency of reasoning aimed at forming identity-congruent beliefs. Individuals’ personal beliefs have no meaningful impact on their exposure to societal risks like climate change. Those beliefs, however, do activate affective stances that convey individuals’ membership in and loyalty to important affinity groups—information that will be used by other group members to judge their social competence.

Under these conditions, it is *expressively rational* for individuals to attend to evidence in a manner that conduces to formation of and persistence in beliefs characteristic of their cultural groups (Stanovich, 2013; Kahan, in press, a). Studies suggest that individuals *use* their critical reasoning dispositions for that purpose. These individuals display greater directional bias in their information processing *not*

because they are more partisan or are more vulnerable to heuristic substitutes for conscious, effortful information processing (Lodge and Taber, 2013; Taber and Young, 2013) but because they are simply *better* at screening information for identity-congruent inferences (Kahan, in press, b).

The results of this study are consistent with the inference that individuals will use the reasoning dispositions measured by a standard AOT scale in the same way. As relatively liberal individuals make gains in the form of cognitive proficiency measured by the scale, their opinions become progressively more aligned with the view that predominates in the group. The same is so for more conservative ones, although the effect is admittedly less dramatic, possibly due to the relative obviousness of the position that corresponds to their group identity or relatedly to a floor effect in the measure of conservative skepticism about human-caused climate change. The net result is that subjects highest in AOT are in fact the most polarized, just as individuals highest in numeracy, cognitive reflection, and science comprehension are (Kahan et al., 2012; Kahan, 2016).

Third and finally, the results of the study could be understood to suggest that the standard measure of AOT included in the data we analyzed is not valid. AOT is supposed to evince a motivation to resist “my side” bias in information processing (Stanovich et al., 2013). Thus, one might naturally expect the individuals highest in AOT to converge, not polarize all the more forcefully, on contested issues like climate change. Because our evidence contravenes this expectation, it could

be that the AOT scale on which our results are based is not faithfully measuring any genuine AOT disposition.

We do not ourselves find this last possibility convincing. Again, the results we report here are consistent with those reported in many studies that show political polarization to be associated with higher scores on externally validated, objective measures of cognitive proficiency such as the Cognitive Reflection Test, numeracy, and science literacy (Lewandowsky and Oberauer, 2016; National Research Council, 2016; Kahan, in press, 2016; Kahan et al., 2012). Because such results do nothing to call these measures into doubt, we do not see why our results would cast any doubt on the validity of the AOT scale we used, which in fact has also been validated in other studies (e.g., Haran et al., 2013; Baron et al., 2015; Mellers et al., 2015).

Instead we think the most convincing conclusion is that the disposition measured by the standard AOT scale, like the dispositions measured by these other cognitive-proficiency measures, is one that has become tragically entangled in the social dynamics that give rise to pointed, persistent forms of political conflict (Kahan, in press, b). As do other studies, ours “suggest[s] it might not be people who are characterized by more or less myside bias, but beliefs that differ in the degree of myside bias they engender” (Stanovich and West, 2008: 159). “Beliefs” about human-caused climate change and a few select other highly divisive empirical issues are ones that people *use* to express who they are, an end that has little to do with the truth of what people, “liberal” or “conservative,” know (National Research Council, 2016; Kahan, 2015).⁶

Obviously, our findings, themselves open to more than one reasonable interpretation, make only an incremental contribution to the larger body of knowledge in this area. We report them so that researchers can give them the weight they believe they are due and, more importantly, take them into account in designing still further studies that can help to expand understanding of the role of critical reasoning dispositions in biased political information processing.

Author note

Dan M. Kahan, Elizabeth K. Dollard Professor of Law and Professor of Psychology, Yale Law School; Jonathan C. Corbin, Department of Psychology, University of Richmond.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Supplementary material

The supplementary files are available at <http://rap.sagepub.com/content/3/4>

Carnegie Corporation of New York Grant

The open access article processing charge (APC) for this article was waived due to a grant awarded to *Research & Politics* from Carnegie Corporation of New York under its ‘Bridging the Gap’ initiative. The statements made and views expressed are solely the responsibility of the author.

Notes

1. Parallel claims are made for other “open-mindedness” dispositions such as “need for cognition” and “openness to experience,” which in fact have been shown to correlate positively with AOT (Haran et al., 2013).
2. The sample was recruited by the public opinion firm YouGov. The study was approved by the Human Subjects Committee at Yale University.
3. The data set and codebook are available at http://www.culturalcognition.net/osi_2/. The wording of all the relevant measures used in this study is reproduced in the online appendix.
4. These correlations are modest, however, in practical terms. Whereas 53% of the sample indicated acceptance of human-caused climate change overall, the proportion increased to only 57% among subjects who scored at or above +1 SD on the AOT scale. Likewise, the proportion of subjects above +1 SD on the AOT scale who had scores to the “left” of the mean on the Left_right scale was only 59%.
5. As used in the text, “±” refers to the 0.95 level of confidence.
6. *Science curiosity* might be an individual difference in cognition that evades this entanglement and promotes genuine receptivity to counter-attitudinal evidence among persons of opposing political outlooks (Kahan et al., in press).

References

- Baron J (2008) *Thinking and Deciding*. New York: Cambridge University Press.
- Baron J, Scott S, Fincher K, et al. (2015) Why does the cognitive reflection test (sometimes) predict utilitarian moral judgment (and other things)? *Journal of Applied Research in Memory and Cognition* 4(3): 265–284.
- Friedrich RJ (1982) Defense of multiplicative terms in multiple regression equations. *American Journal of Political Science* 26(4): 797–833.
- Haran U, Ritov I and Mellers BA (2013) The role of actively open-minded thinking in information acquisition, accuracy, and calibration. *Judgment and Decision Making* 8(3): 188–201.
- Jost JT, Glaser J, Kruglanski AW, et al. (2003) Political conservatism as motivated social cognition. *Psychological Bulletin* 129(3): 339–375.
- Jost JT, Hennes EP and Lavine H (2013) “Hot” political cognition: Its self-, group-, and system-serving purposes. In: Carlson DE (ed.) *Oxford Handbook of Social Cognition*. New York: Oxford University Press, pp.851–875.
- Kahan DM (2013) Ideology, motivated reasoning, and cognitive reflection. *Judgment and Decision Making* 8(4): 407–424.
- Kahan DM (2015). Climate-science communication and the measurement problem. *Advances in Political Psychology* 36(S1): 1–43.

- Kahan DM (2016) "Ordinary science intelligence": a science-comprehension measure for study of risk and science communication, with notes on evolution and climate change. *Journal of Risk Research*. Epub ahead of print 31 March. DOI: 1080/13669877.2016.1148067.
- Kahan DM (in press, a) The expressive rationality of inaccurate perceptions of fact. *Brain and Behavioral Science*. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2670981.
- Kahan DM (in press, b) The politically motivated reasoning paradigm. *Emerging Trends in Social and Behavioral Sciences*, Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2703011.
- Kahan DM, Landrum AR, Carpenter K, et al. (in press) Science curiosity and political information processing. *Advances in Political Psychology*. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2816803.
- Kahan DM, Peters E, Dawson E, et al. (in press) Motivated numeracy and enlightened self-government. *Behavioural Public Policy*.
- Kahan DM, Peters E, Wittlin M, et al. (2012) The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change* 2(10): 732–735.
- King G, Tomz M and Wittenberg J (2000) Making the most of statistical analyses: Improving interpretation and presentation. *American Journal of Political Science* 44(2): 347–361.
- Lodge M and Taber CS (2013) *The Rationalizing Voter*. Cambridge; New York: Cambridge University Press.
- Lewandowsky S and Oberauer K (2016) Motivated rejection of science. *Current Directions in Psychological Science* 25(4): 217–222.
- Mellers B, Stone E, Atanasov P, et al. (2015) The psychology of intelligence analysis: Drivers of prediction accuracy in world politics. *Journal of Experimental Psychology: Applied* 21(1): 1–14.
- National Research Council (2016) *Science Literacy: Concepts, Contexts and Consequences. A Report of the National Academies of Science, Engineering and Medicine*. Washington DC: National Academies Press.
- Nisbet EC, Cooper KE and Garrett RK (2015) The partisan brain: How dissonant science messages lead conservatives and liberals to (dis)trust science. *The Annals of the American Academy of Political and Social Science* 658(1): 36–66.
- Nisbet EC, Hart PS, Myers T, et al. (2013) Attitude change in competitive framing environments? Open-/closed-mindedness, framing effects, and climate change. *Journal of Communication* 63(4): 766–785.
- Price E, Ottati V, Wilson C, et al. (2015) Open-minded cognition. *Personality and Social Psychology Bulletin* 41(11): 1488–1504.
- Smith ER (2000) Research Designs. In: Reis HT and Judd CM (eds) *Handbook of Research Methods in Social and Personality Psychology*. Cambridge: Cambridge University Press, pp.17–39.
- Stanovich KE. (2013) Why humans are (sometimes) less rational than other animals: Cognitive complexity and the axioms of rational choice. *Thinking & Reasoning* 19: 1–26.
- Stanovich KE and West RF (1997) Reasoning independently of prior belief and individual differences in actively open-minded thinking. *Journal of Educational Psychology* 2(2): 342–357.
- Stanovich KE and West RF (2008) On the failure of intelligence to predict myside bias and one-sided bias. *Thinking & Reasoning* 14: 129–167.
- Stanovich KE, West RF and Toplak ME (2013) Myside bias, rational thinking, and intelligence. *Current Directions in Psychological Science* 22(4): 259–264.
- Taber CS and Young E (2013) Political information processing. In: Huddy L, Sears DO and Levy JS (eds) *The Oxford Handbook of Political Psychology*. 2nd ed. Oxford: Oxford University Press, pp.525–558.