



Public perceptions of federal science advisory boards depend on their composition

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Edited by Susan Hanson, Clark University, Worcester, MA, and approved July 28, 2020 (received for review June 22, 2020)

The United States Environmental Protection Agency (EPA) Science Advisory Board (SAB) provides expert advice to inform agency decision-making. Recent regulations have decreased the representation of academic scientists on the EPA SAB and increased the representation of industry scientists. In an experiment, we asked how the US public views the goals and legitimacy of the board as a function of its composition. Respondents perceived SABs with a majority of industry scientists to be more likely to promote business interests than SABs with a majority of academic scientists. Liberals were less likely than conservatives to perceive industry-majority SABs as promoting human health and the environment, and making unbiased and evidence-based decisions. Our findings underscore the potential for politicization of scientific advice to the government.

EPA | environmental risk governance | decision-making | political ideology

Science advisory boards (SABs) provide expert advice to inform governmental and organizational decision-making on scientific issues. This advice is informed by both scientific and ethical judgments: Evidence surrounding scientific issues is frequently limited and complex, and analyzing decision-relevant risks, costs, and benefits requires SAB members to apply their values in the form of assumptions and judgments (1–5).

A 2017 agency directive disqualified Environmental Protection Agency (EPA) grant recipients from serving on the EPA's SAB, decreasing the share of academic-affiliated and increasing the share of industry-affiliated scientists serving (6–8). Changing the SAB's composition could affect its risk assessments and recommendations: Scientists and engineers affiliated with industry perceive lower need for government action on risks ranging from nuclear energy to genetic engineering, compared to university-affiliated scientists, and give greater priority to economic competitiveness over environmental health (2). Similarly, among occupational health scientists, industry-employed scientists are less likely to support strict regulations to protect employees from health risks (9).

Our research asks how greater industry representation on the EPA's SAB will be viewed by the US public, whom the EPA ultimately serves. Prior research suggests that public perceptions of the legitimacy of an SAB's decision-making will be shaped by whether the public perceives that its values are shared by SAB members (10). A key dimension along which American attitudes toward environmental risks differ is political ideology. Conservative Americans place less trust in scientists who assess the environmental impacts of economic production (11) and display less support for government environmental spending (12) than liberals. This ideological difference applies to scientific experts as well; within the field of environmental risk analysis, industry-affiliated occupational health scientists are more likely than university-affiliated scientists to report being Republicans (9). Politically conservative Americans may thus feel their values are more likely to be shared by industry-affiliated board members,

and ascribe greater legitimacy to SABs with greater industry scientist membership.

We tested this hypothesis in an experiment with a nationally representative sample of US adults. We randomly assigned participants to evaluate the goals and legitimacy of an SAB with either a majority of industry scientists, an even split between industry and academic scientists, or a majority of academic scientists. We predicted that political conservatives would provide more positive evaluations of industry-majority boards and liberals would provide more positive evaluations of academic-majority boards.

Results

Fig. 1, *Top* reports means, by SAB composition and political ideology, for our five dependent measures: the extent to which the SAB was perceived to promote business interests, human health, and the health of the natural environment, and to use the best available science and make unbiased recommendations. Table 1 reports linear regressions predicting perceptions as a function of SAB composition, political ideology, and their interaction. We controlled for value orientations (13), value similarity with industry and academic members (10), and demographics, seeking to estimate the effect of political ideology above and beyond these factors.

We find that SAB composition and ideology independently predict perceived likelihood of promoting business interests: Industry-majority SABs were perceived as more likely than evenly split and academic-majority SABs to promote business interests, and conservative participants were more likely than liberals to perceive SABs as promoting business interests.

We observed significant interactions between composition and ideology when predicting the extent to which the SAB was perceived to promote human health and the health of the natural environment, to make unbiased recommendations, and to use the best available science. Fig. 1, *Bottom* depicts these interactions, with all other factors held constant. Politically liberal participants provided more negative evaluations for industry-majority SABs, while conservative participants provided similar ratings regardless of composition. Evaluations of the evenly split board tended to fall between those of academic- and industry-majority boards, although evenly split boards were considered more likely than industry-majority boards to make unbiased decisions.

Author contributions: C.D., S.G.G., K.T.R., R.W., and J.Á. designed research; S.G.G. performed research; C.D. and S.G.G. analyzed data; and C.D., S.G.G., K.T.R., R.W., and J.Á. wrote the paper.

The authors declare no competing interest.

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First published August 31, 2020.

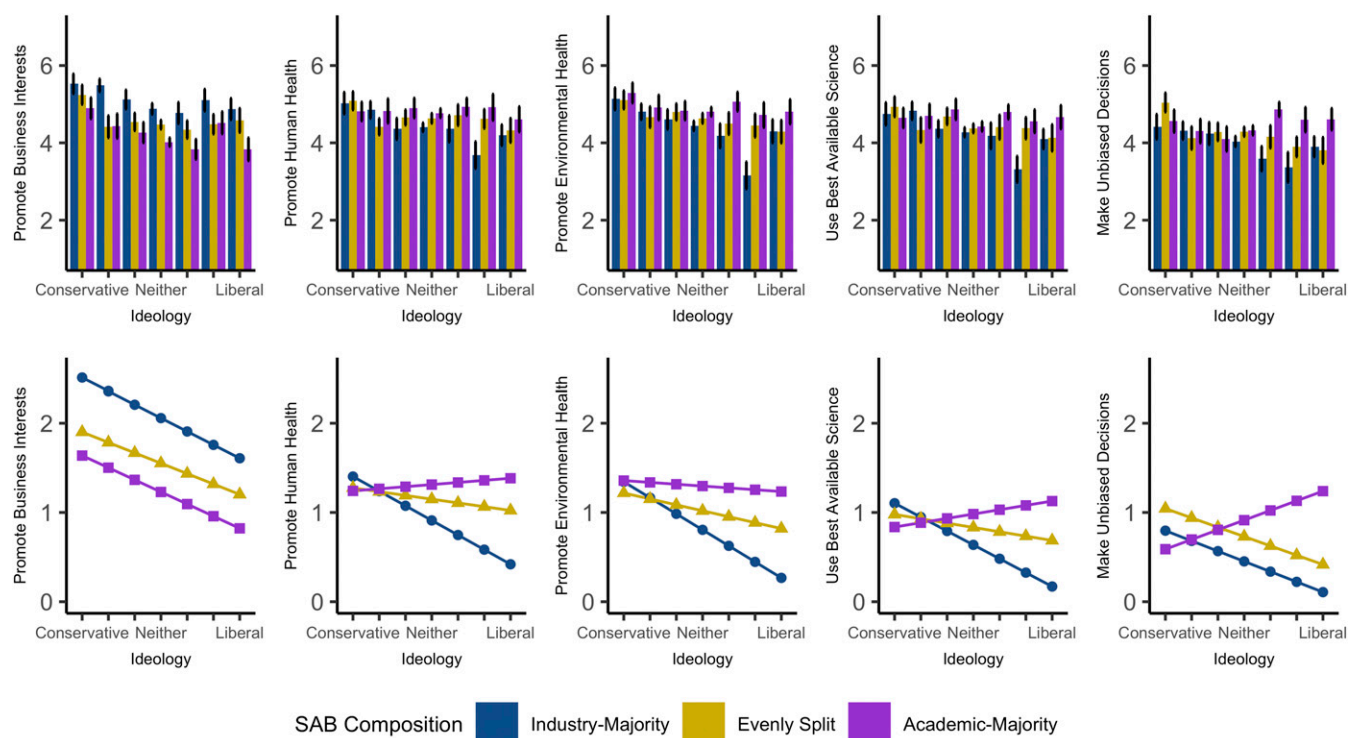


Fig. 1. (Top) The effects of the experimental manipulation in terms of raw mean judgments by SAB composition and ideology, unadjusted by covariates. Error bars represent ± 1 SE. (Bottom) Fitted values from the models reported in Table 1 that include covariates (value measures and demographics), holding all other variables constant to depict the interaction between SAB composition and ideology. Note that $n = 900$.

Discussion

The public rarely has direct access to how government agencies apply values in their decision-making (14). Without being privy to the processes underlying these decisions, public trust in agencies may be instead shaped by a knowledge of who is making them. US attitudes toward environmental risk management diverge along political lines, with conservatives generally less supportive of regulation (12). We find that, when asked to consider an EPA SAB with a majority of industry-affiliated scientists (who are more likely to share conservative attitudes toward environmental risk management) or academic-affiliated scientists (who are not), political conservatives ascribed greater legitimacy to the industry-majority board than did liberals. Both conservatives and liberals viewed industry-majority boards as more likely to promote business interests, consistent with prior research (2), but liberals were less likely to perceive that industry-majority boards would promote human health and the health of the natural environment, make unbiased recommendations, and use the best available science. On these four dimensions, most reflective of the EPA's mandate, academic-majority boards were generally evaluated most positively by all except the most conservative participants, whose judgments were relatively insensitive to SAB composition.

Our findings underscore the potential for politicization of scientific advice to the government, and the need for greater transparency regarding the values used in agency decision-making (15), including the nomination and selection processes for SAB members, and the backgrounds and values of SAB members themselves. This transparency would help interested citizens identify the values and goals of SAB members and interpret their advice to government with those factors in mind.

Method

The University of Michigan Institutional Review Board approved this study as exempt and informed consent was not required. Data and materials are available at <https://osf.io/me25t/> (16).

Design and Measures. Participants were shown a short description of the EPA's SAB and then were randomly assigned to consider an SAB that was composed of 80% industry scientists and 20% academic scientists (industry-majority condition); 50% and 50% (evenly split condition); or 20% and 80% (academic-majority condition). Participants next used seven-item Likert scales to respond to whether they thought that, "This board will support policies that promote business interests [human health] [the health of the natural environment]" and used seven-item scales from 1 = very low trust to 7 = very high trust to respond to, "How much do you trust this Science Advisory Board to make recommendations and decisions that are based on the best available science?" and "How much do you trust this Science Advisory Board to make unbiased recommendations and decisions?" They completed measures of value similarity with the academic and industry scientists (10), and of value orientations (13) before providing demographic information including political ideology, using a seven-item scale from "conservative" to "liberal."

Participants. We recruited a nationally representative sample of US adults aged 18 y and older from Dynata; 1,382 participants started and 900 finished our survey. Based on self-reports, 45% of the final sample were male, mean age was 44 y ($SD = 15$), 43% had a Bachelor's degree or higher, and 29% reported being liberal, 36% moderate, and 35% conservative.

Analyses. The demographic and psychological measures used as covariates were determined a priori based on theory. We also conducted all analyses without these covariates. We found similar results for promoting business interests; the main effects and interactions for the other four dependent measures were generally smaller but still significant for the academic-majority condition, and not significant for the evenly split condition.

Data Availability. Data have been deposited in Open Science Framework (<https://osf.io/me25t/>) (16).

Table 1. Science advisory board perceptions

	Promote business interests		Promote human health		Promote the health of the natural environment		Make recommendations based on the best available science		Make unbiased recommendations	
	B (95% CI)	η^2_p	B (95% CI)	η^2_p	B (95% CI)	η^2_p	B (95% CI)	η^2_p	B (95% CI)	η^2_p
Composition (categorical; reference = industry majority)		0.065		0.016		0.023		0.012		0.021
Evenly split	−0.510*** (−0.721, −0.300)		0.223* (0.024, 0.422)		0.200 (−0.004, 0.403)		0.182 (−0.011, 0.376)		0.277** (0.079, 0.475)	
Academic majority	−0.829*** (−1.039, −0.620)		0.379*** (0.181, 0.576)		0.471*** (0.269, 0.673)		0.320** (0.128, 0.513)		0.435*** (0.237, 0.632)	
Political ideology (centered)	−0.150*** (−0.234, −0.066)	0.028	−0.164*** (−0.243, −0.084)	0.007	−0.179*** (−0.261, −0.098)	0.014	−0.156*** (−0.233, −0.078)	0.005	−0.115** (−0.194, −0.035)	0.002
Composition* political ideology interaction		0.0004		0.013		0.009		0.016		0.023
Evenly split* political ideology	0.033 (−0.083, 0.150)		0.122* (0.011, 0.232)		0.113* (0.0003, 0.226)		0.107 (−0.0003, 0.214)		0.010 (−0.100, 0.120)	
Academic majority* political ideology	0.014 (−0.102, 0.130)		0.188*** (0.078, 0.297)		0.159** (0.047, 0.271)		0.204*** (0.098, 0.310)		0.223*** (0.114, 0.332)	
Constant	2.076*** (1.536, 2.616)		0.931*** (0.421, 1.441)		0.827** (0.306, 1.349)		0.656** (0.161, 1.151)		0.466 (−0.043, 0.975)	
R ²	0.272		0.316		0.328		0.377		0.394	
Adjusted R ²	0.259		0.303		0.316		0.365		0.383	
Residual SE (df = 883)	1.304		1.232		1.26		1.197		1.229	
Maximum generalized variance inflation factor	3.25		3.25		3.25		3.25		3.25	
F(16; 883)	20.651***		25.452***		26.946***		33.366***		35.924***	

Note that $N = 900$. Self-reported political ideology measured from 1 = conservative to 7 = liberal. Regressions control for age, gender (male vs. nonmale), race (white vs. nonwhite), education, income, religiosity, perceived value similarity with industry and academic members (10), and value orientations (egoism, altruism, and biospherism; ref. 13). Effect sizes for main effects and interactions reported with partial eta squared; 95% CI is given in parentheses; df, degrees of freedom. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

ACKNOWLEDGMENTS. This research was supported by the US NSF under Award SES 1728807 to Decision Research and the University of Michigan. We

are grateful to Christopher Zarba for his assistance during the design of this research.

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