Trust in Science: Trends & Insights

Prepared for the NASEM Strategic Council for Research Excellence, Integrity, and Trust

Thank you

- SC: Kathleen, Jenny, and David
- Henry Brady, University of California, Berkeley
- Dominique Brossard, University of Wisconsin
- James Druckman, Northwestern University
- Cary Funk, Pew Research Center
- Courtney Kennedy, Pew Research Center
- Thomas Kent, University of California, Berkeley
- Gary Langer, Langer Research Associates
- Dietram Schufele, University of Wisconsin

Trust (Winterllan et al 2022)

- “is an anticipatory mental state
- in which positive expectations are held
- about the behavior and intentions of another person, institution, or system,
- *allowing one to rely on others despite a certain vulnerability or risk.”*

Trust (Winterllan et al 2022)

- “Because of their bounded understanding of science, citizens inevitably must trust in science (or scientists as representatives of that system)…

- Even though this might be risky.”

Questions

1. Is ”trust in science” high or low?
2. Has “trust in science” changed in recent years?
3. Is low “trust in science” a sign of ignorance?

Answers

1. Trust in science is high.

2. This “trust” has declined…but the decline is not science-specific.

3. Partisanship, rather than ignorance, is the predominant factor.

Data Inclusion Criteria

- For 5-year, 20-year and 40-year time trend data:
  - Multi-year nationally representative surveys of the United States population.
  - AAPOR *Transparency Initiative* standards or equivalent at time of collection (https://www.aapor.org/transparency_initiative.htm).

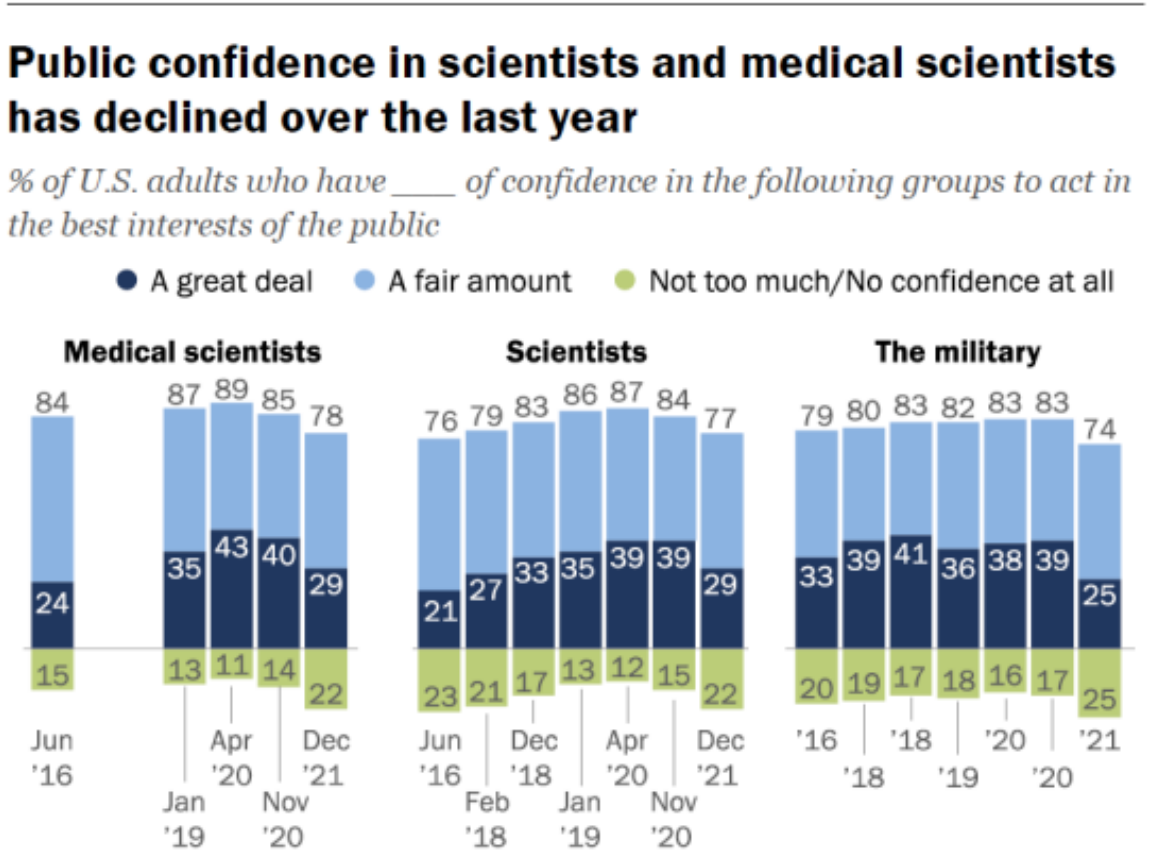
- Other studies must meet comparable standards.

Public Confidence in Scientists to act in the best interests of the public 2016-2021

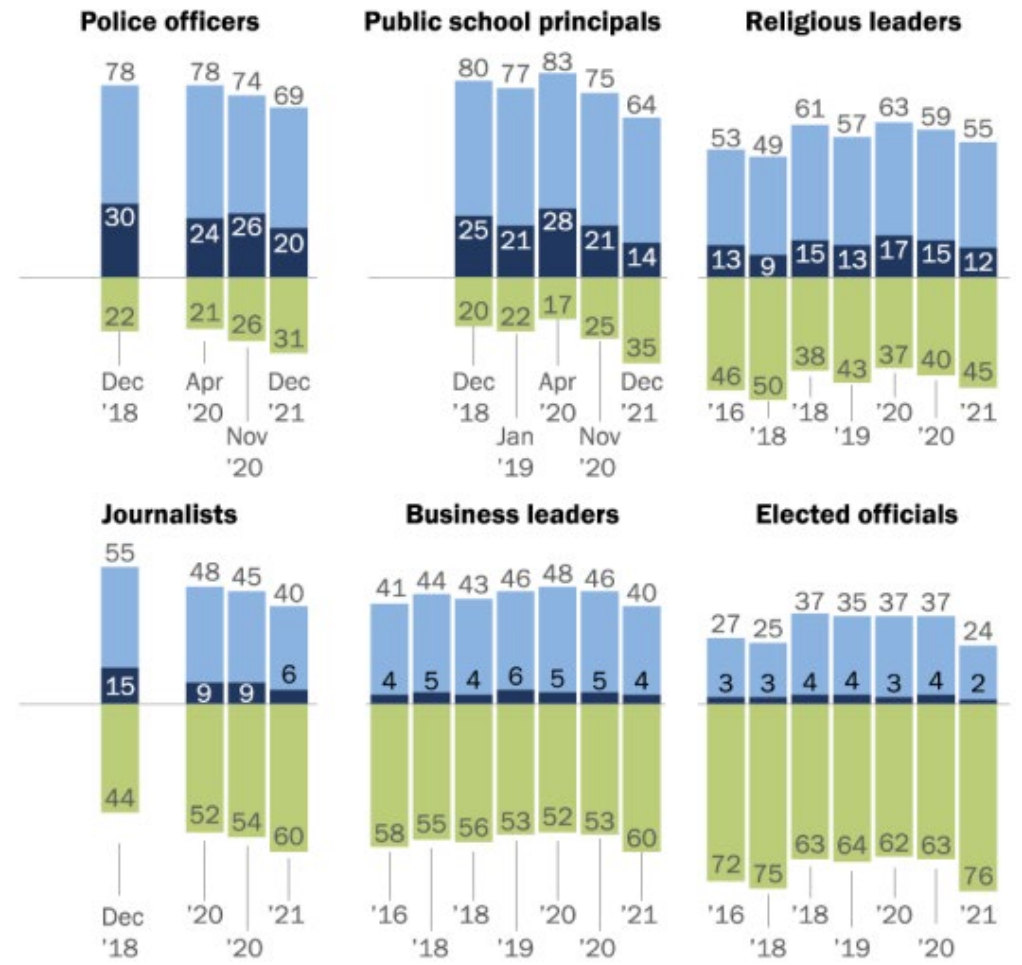
Pew Research Center

2022

High confidence in three groups, with a decline in 2021



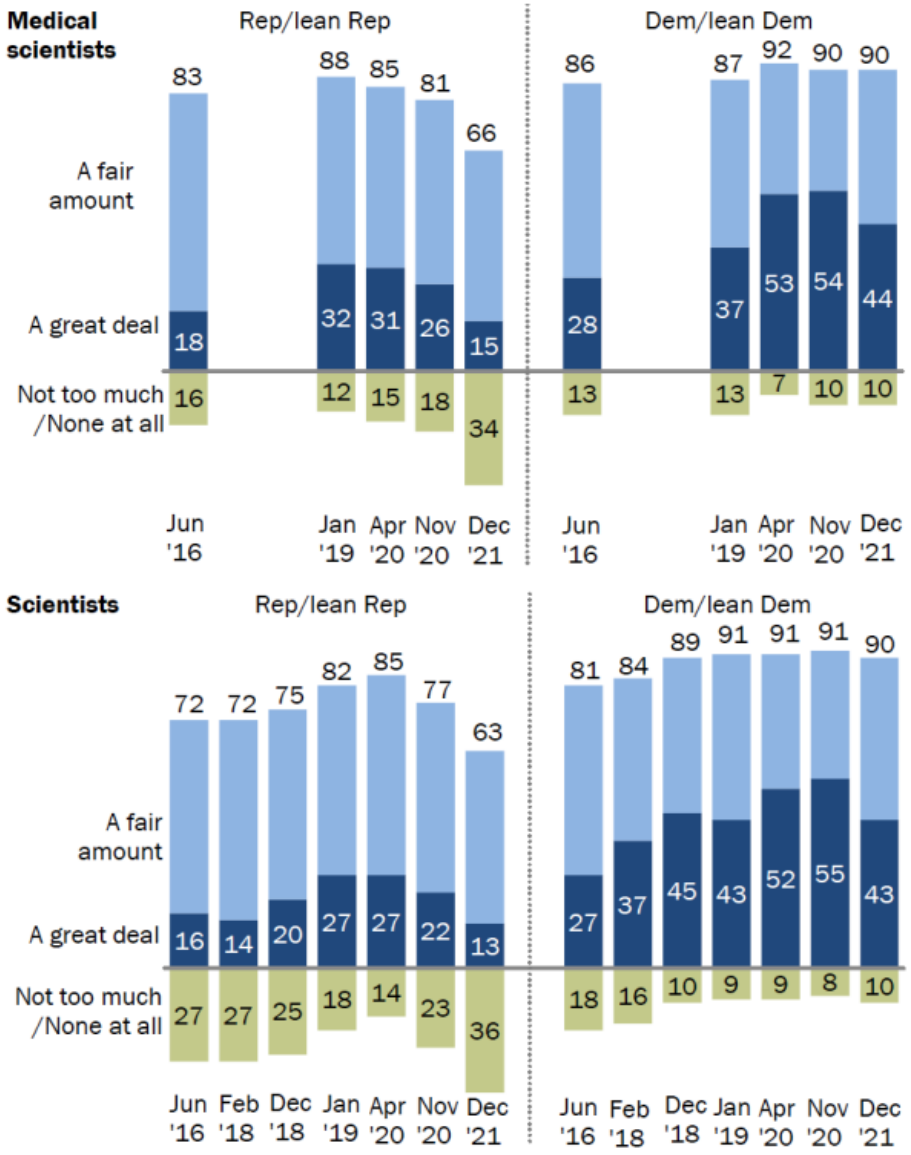
Trust in science is higher than other groups



Note: Respondents who did not give an answer are not shown.
Source: Survey conducted Nov. 30–Dec. 12, 2021.
"Americans' Trust in Scientists, Other Groups Declines"

PEW RESEARCH CENTER

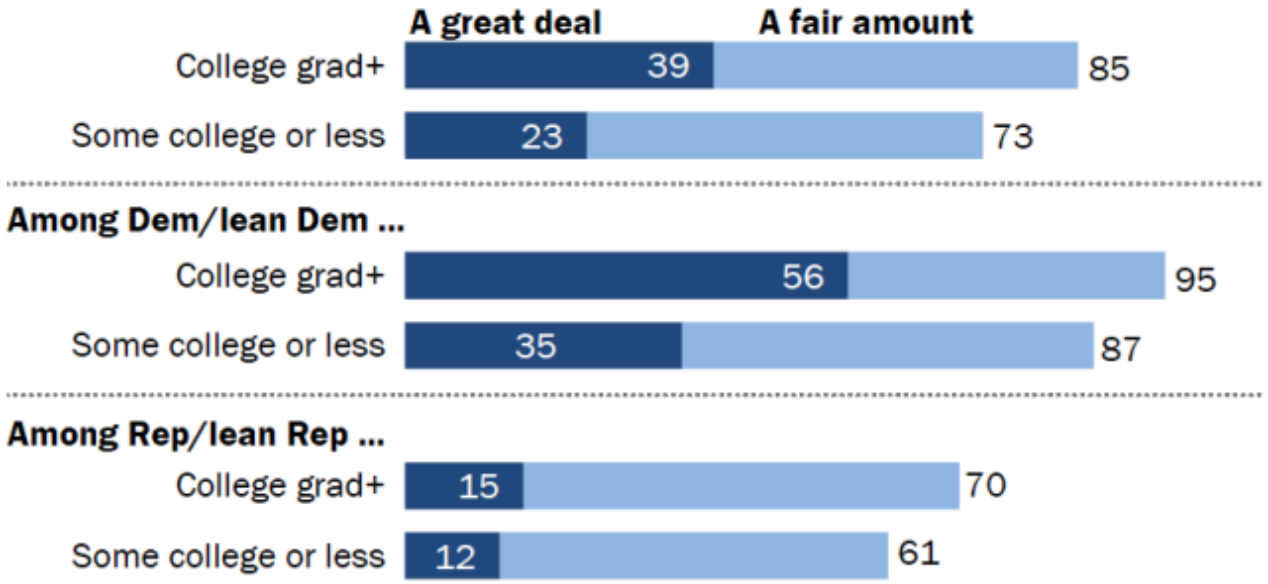
The 2020-2021 drop correlates with partisanship.



Today, partisan trust differences are larger than education trust differences

College-educated Democrats especially likely to have a great deal of confidence in scientists

*% of U.S. adults who have ___ of confidence in **scientists** to act in the best interests of the public*



Note: Respondents who gave other responses or did not give an answer are not shown.
Source: Survey conducted Nov. 30–Dec. 12, 2021.
"Americans' Trust in Scientists, Other Groups Declines"

PEW RESEARCH CENTER

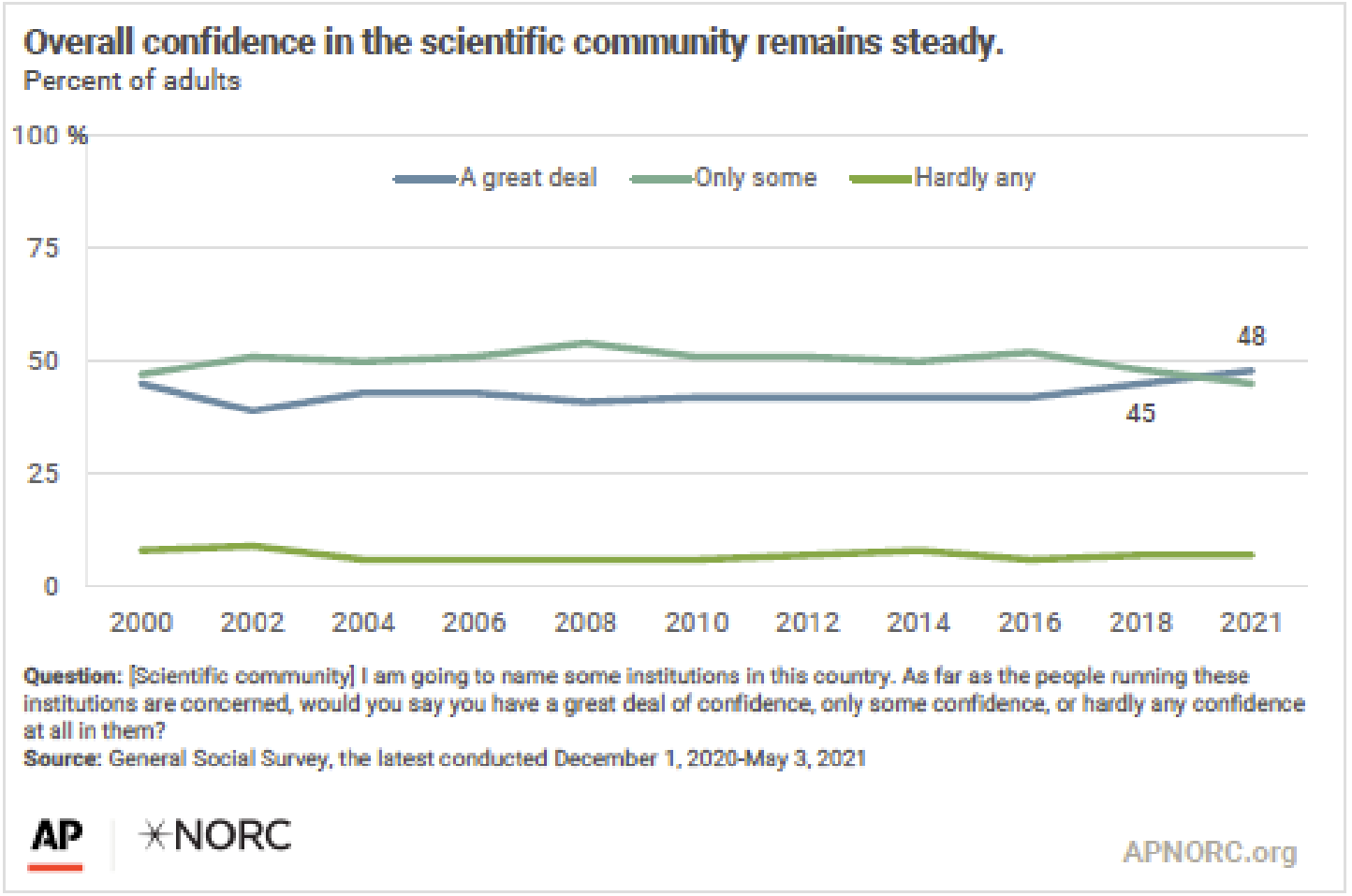
5-year Conclusions

- Trust in science is high.
- Trust has declined
  - *but* the decline is not specifically about science.
- Partisanship is a predominant factor.

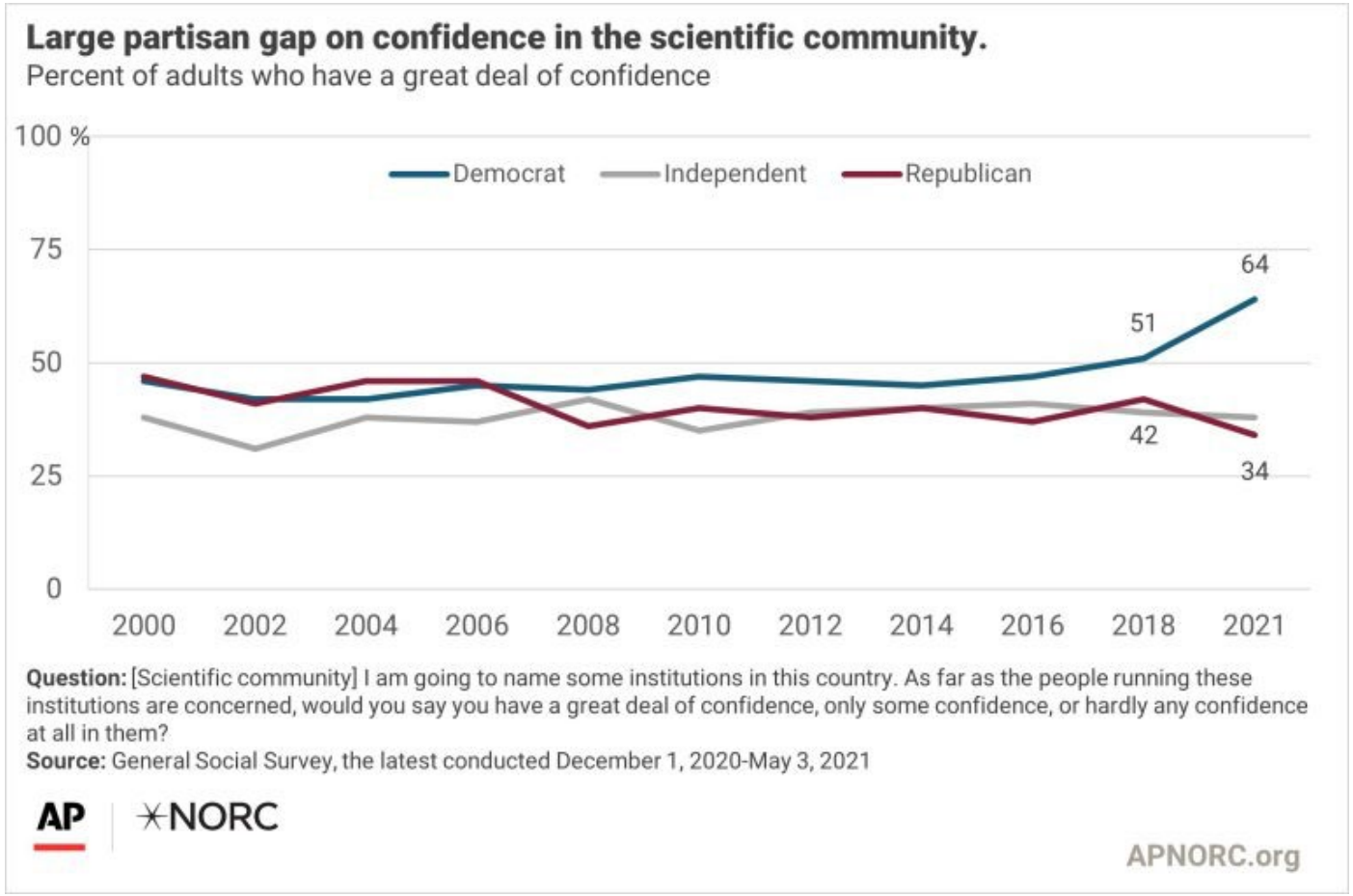
Partisan trust gap changes in leaders of institutions 2000-2021

National Opinion Research Center/AP
2022

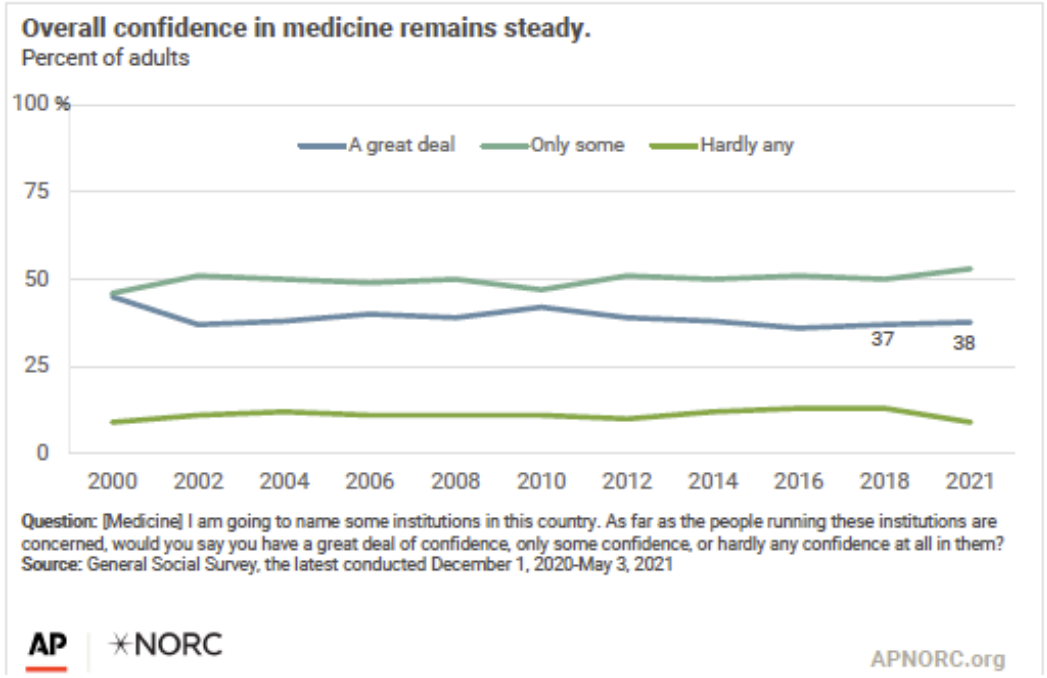
>90% Americans have some or a great deal of confidence in the scientific community

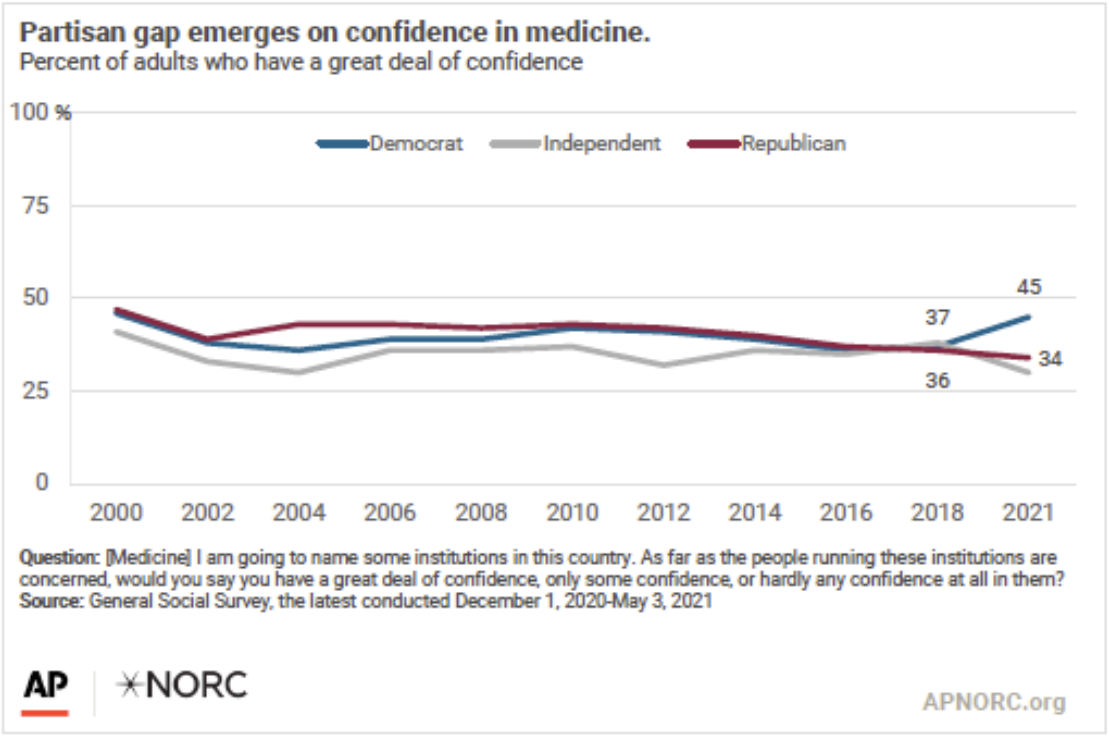


Growing Partisan Gap

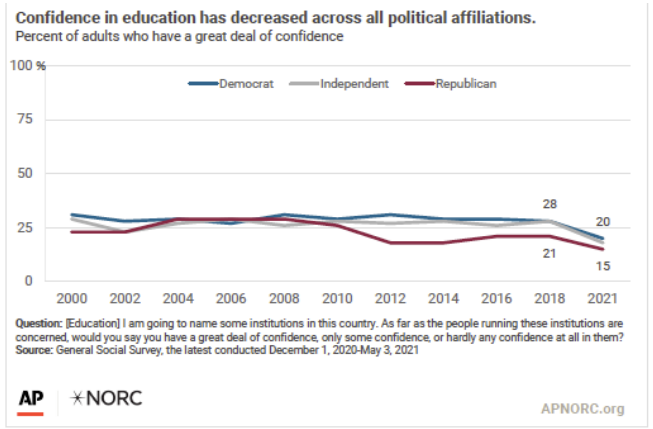


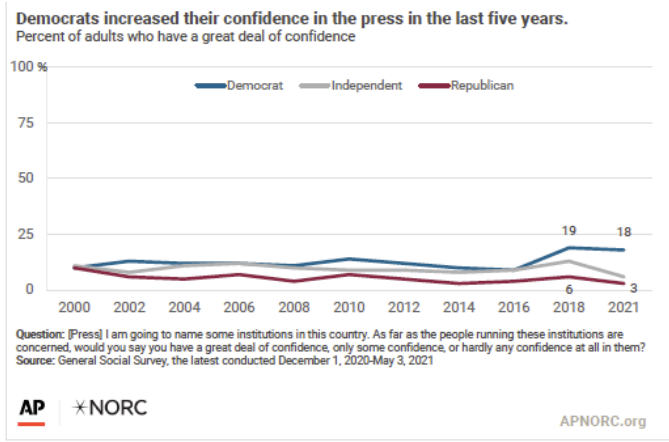
Trust in medicine follows a similar pattern.

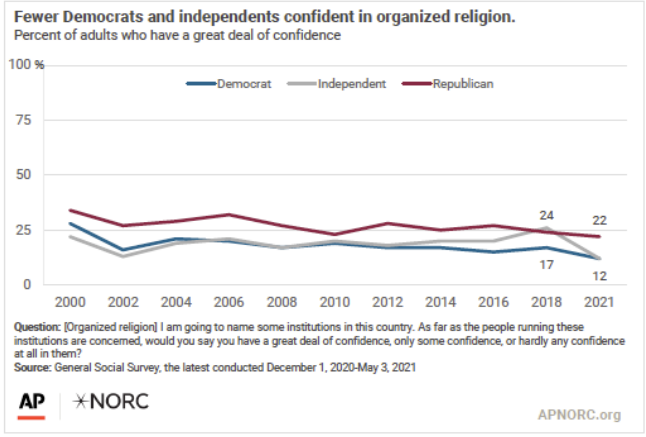


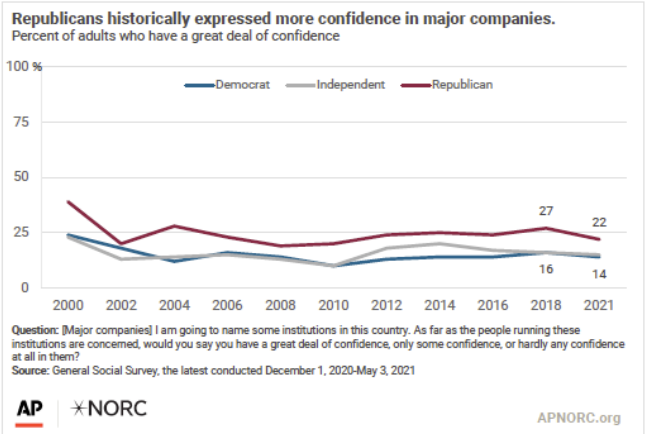


Trust in other measured institutions is lower…and often declining









20-year Conclusions

- Trust in science is high.
- Trust has declined for some
  - *but* the decline is not specifically about science.
- There is a partisan “trust” gap…

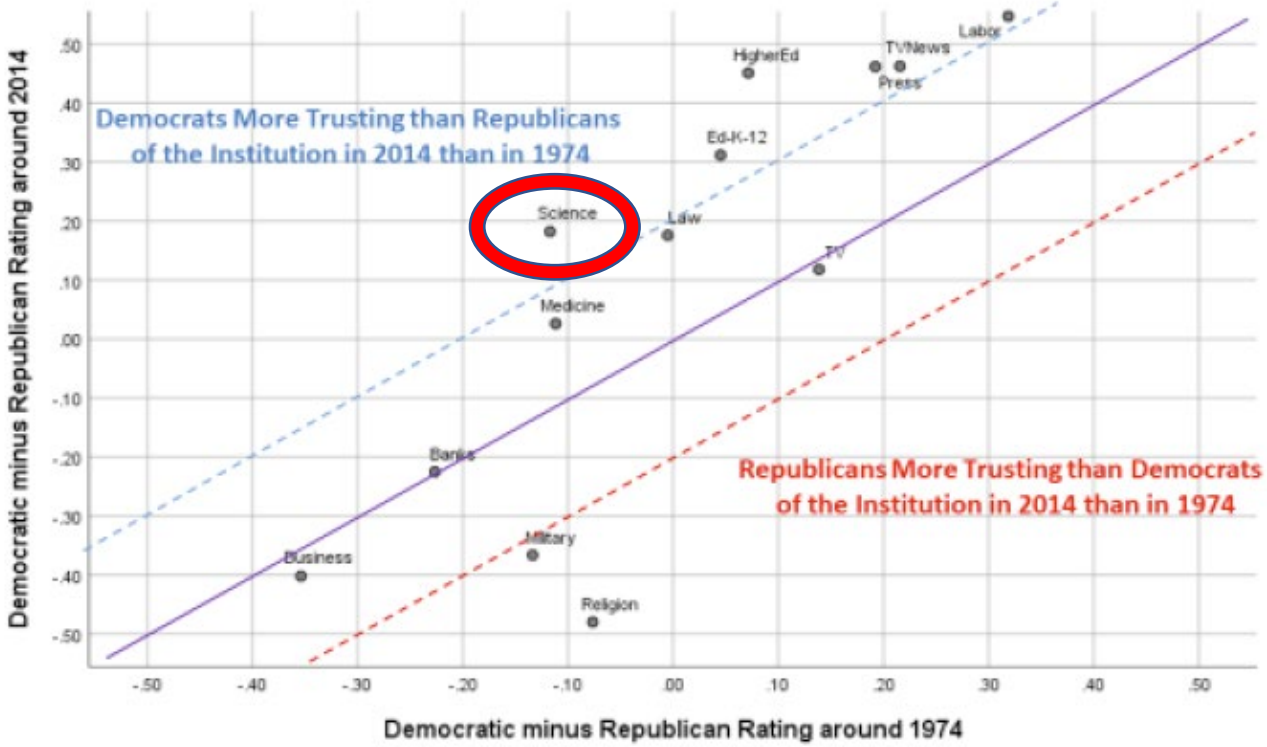
Trust Trends in leaders of institutions 1970-2014

Henry E Brady and Thomas Kent (UC Berkeley). 2020.

"Increasing Polarization Since 1970 in Trust for American Non-Political Institutions"

Relative Trust in “Knowledge” Institutions are Heading Towards Seattle

Figure 4: Change in Democratic Minus Republican Trust Ratings from 1974 to 2014



40-year Conclusions

- Trust in science is high.
- There is a growing partisan “trust” gap
  - But the gap is not science-specific.

The Role of Knowledge

Dan Kahan. 2015. “Climate Science Communication and the Measurement Problem.”

Aaron M. McCright, Katherine Dentzman, Meghan Charters, and Thomas Dietz. 2013. “The Influence of Political Ideology on Trust in Science.”

Design

- Respondents asked questions about 18 science facts.
- Answers aggregated to form an “Ordinary Science Intelligence” Scale (OSI).
- About politically controversial science topics, he then asks..
  - what respondents believe.
  - what respondents *think scientists* believe.

Questions Used to Form OSI

Ordinary Science Intelligence (OSI) Assessment

For more information on the background and psychometric properties of the OSI scale, see Kahan (2014a).

Item label	Wording	% correct (sample)	Derivation
DIE	Imagine that we roll a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up as an even number?	57%	Weller et al. (2013)
BUCKS	In the BIG BUCKS LOTTERY, the chances of winning a $10.00 prize are 1%. What is your best guess about how many people would win a $10.00 prize if 1,000 people each buy a single ticket from BIG BUCKS?	56%	Weller et al. (2013)
SWEEP	In the ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets of ACME PUBLISHING SWEEPSTAKES win a car?	31%	Weller et al. (2013)
DISEASE1	If the chance of getting a disease is 20 out of 100, this would be the same as having a _____% chance of getting the disease.	75%	Weller et al. (2013)
DISEASE2	If the chance of getting a disease is 10%, how many people would be expected to get the disease out of 1000?	78%	Weller et al. (2013)
COND_PROB	Suppose you have a close friend who has a lump in her breast and must have a mammogram. Of 100 women like her, 10 of them actually have a malignant tumor and 90 of them do not. Of the 10 women who actually have a tumor, the mammogram indicates correctly that 9 of them have a tumor and indicates incorrectly that 1 of them does not have a tumor. Of the 90 women who do not have a tumor, the mammogram indicates correctly that 81 of them do not have a tumor and indicates incorrectly that 9 of them do have a tumor. The table below summarizes all of this information. Imagine that your friend tests positive (as if she had a tumor), what is the likelihood that she actually has a tumor?	8%	Weller et al. (2013)
WIDGET	If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?	27%	Frederick (2005)
BATBALL	A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?	13%	Frederick (2005)

Appendix (Continued)

Item label	Wording	% correct (sample)	Derivation
LILLYPAD	In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?	23%	Frederick (2005)
RADIOACTIVE	All radioactivity is man-made. [True or False]	83%	NSF Indicators (2014)
LASERS	Lasers work by focusing sound waves. [True or False]	68%	NSF Indicators (2014)
ELECTRONS	Electrons are smaller than atoms. [True or False] Which gas	69%	NSF Indicators (2014)
PEWGAS2	makes up most of the Earth's atmosphere? [Hydrogen, Nitrogen, Carbon Dioxide, Oxygen]	25%	NSF Indicators (2014)
COPERNICUS1	Does the Earth go around the Sun, or does the Sun go around the Earth? (Earth around Sun/Sun around the earth) [only if "earth/around sun" for Copernicus1]: How long does it take for the Earth to go around the Sun? (1 day, 1 month, 1 year)	60% (both)	NSF Indicators (2014)
ANTIBIOTICS	Antibiotics kill viruses as well as bacteria. [True or False]	65%	NSF Indicators (2014)
EVOLUTIONa (1/2 sample)	Human beings, as we know them today, developed from earlier species of animals. [True or False]	55%	NSF Indicators (2014)
EVOLUTIONb (1/2 sample)	According to the theory of evolution, human beings, as we know them today, developed from earlier species of animals. [True or False]	81%	NSF Indicators (2006)
VALID	Two scientists want to know if a certain drug is effective against high blood pressure. The first scientist wants to give the drug to 1,000 people with high blood pressure and see how many of them experience lower blood pressure levels. The second scientist wants to give the drug to 500 people with high blood pressure and not give the drug to another 500 people with high blood pressure, and see how many in both groups experience lower blood pressure levels. Which is the better way to test this drug? [The first way/The second way]	72%	NSF Indicators (2014)
PROB1	A doctor tells a couple that their genetic makeup means that they've got one in four chances of having a child with an inherited illness. Does this mean that if their first child has the illness, the next three will not? (Yes/No)	85%	NSF Indicators (2014)
PROB2	Does this mean that each of the couple's children will have the same risk of suffering from the illness? (Yes/No)	73%	NSF Indicators (2014)

OSI tracks science fact knowledge

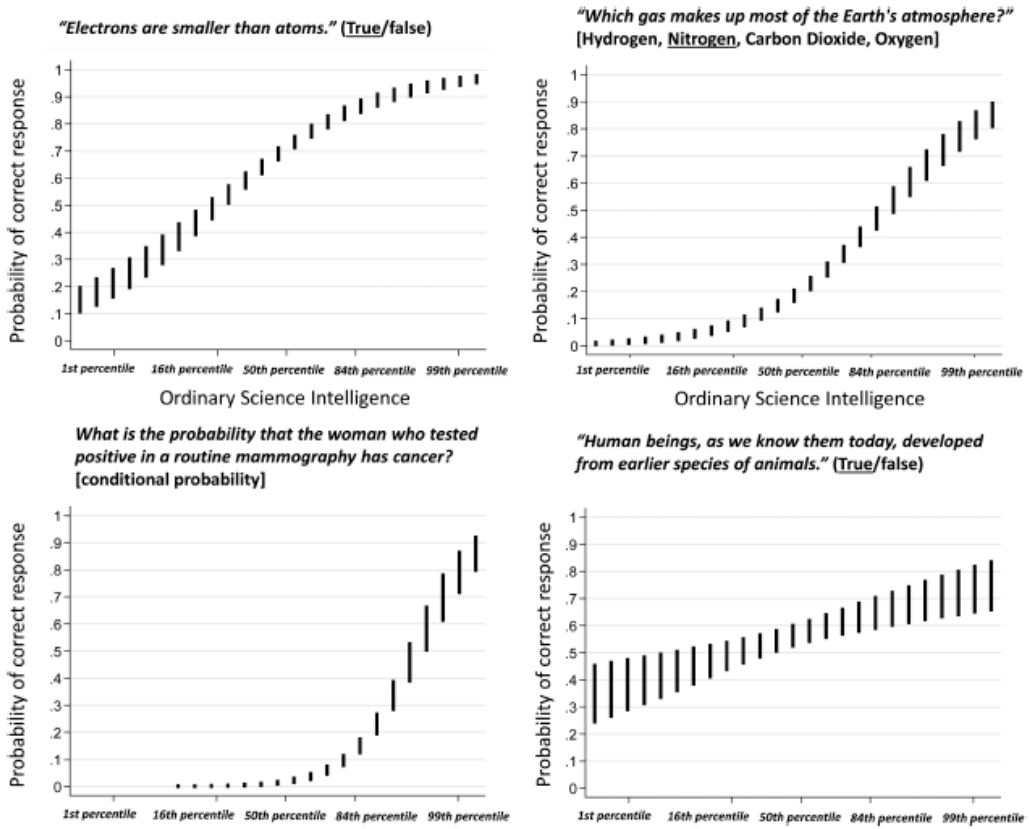


Figure 1. Select OSI item-response curves. Using item-response theory 2PL model, figures plot the predicted probability of correctly responding to the item conditional on score on OSI scale. Black bars reflect 0.95 confidence intervals.

A positive slope is the baseline expectation.

For many issues, religion does not affect response.

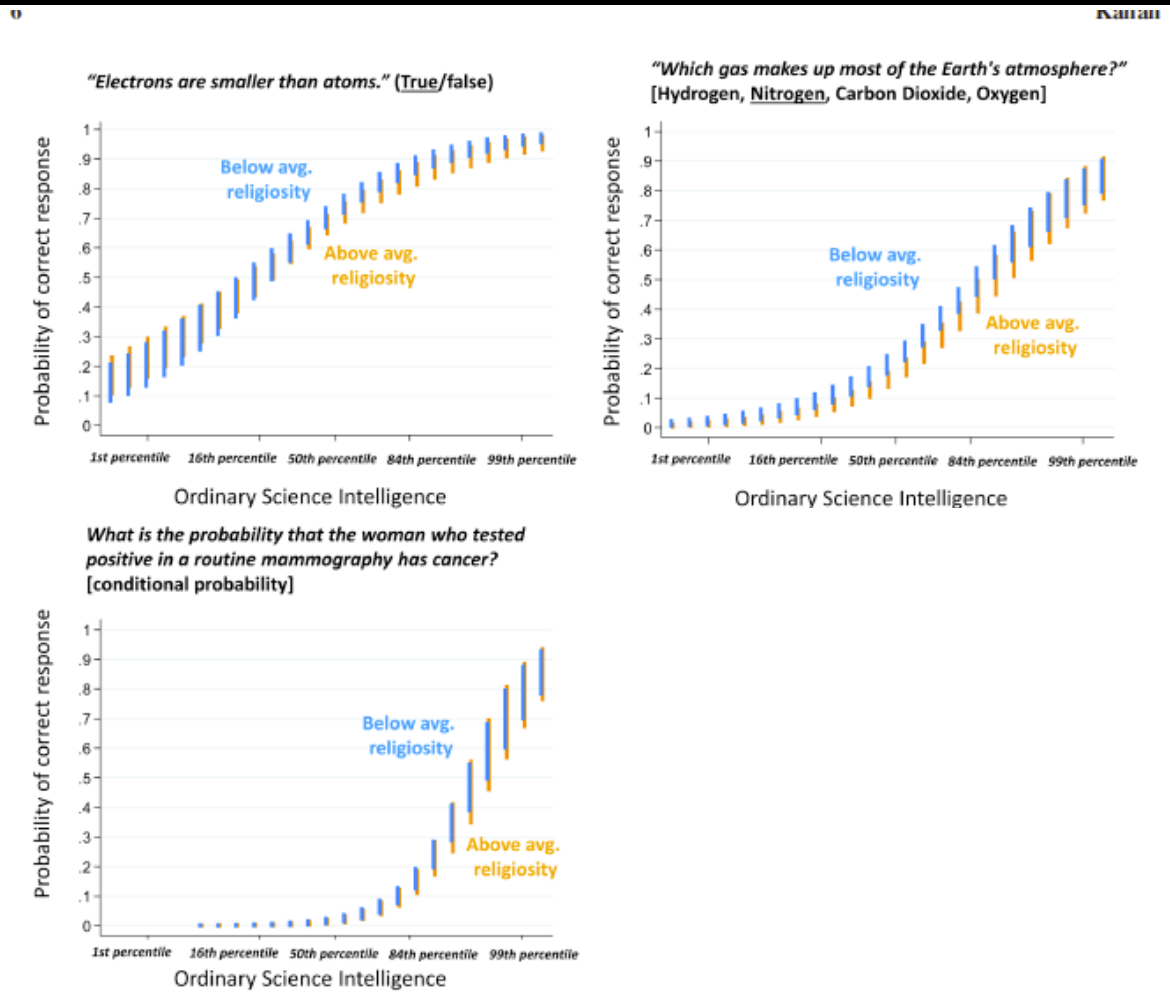
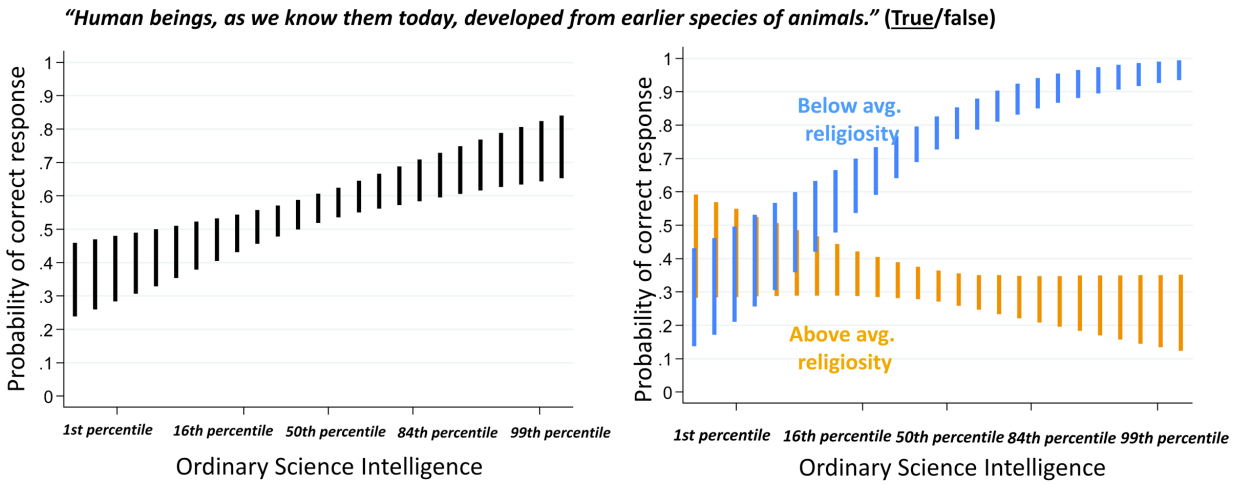


Figure 2. Differential item function curves. Using item-response theory 2PL model, figures plot the predicted probability of correctly responding to the item conditional on score on OSI scale. Predicted probabilities for "Below" and "Above avg. religiosity" determined by setting predictor on religiosity scale at −1 and +1 SD, respectively. Colored bars reflect 0.95 confidence intervals.

But for evolution, more knowledgeable "believe" less.

Most people who say that they “don’t believe” in evolution *know what scientists believe*



Nisbett, Cooper and Garrett 2015

- “Demonizing [conservatives] by claiming they have an insurmountable psychological deficit… is not empirically justified.”

- and is…“ironically—contributing to the very political polarization of science…”

Trust…

- “Because of their bounded understanding of science, citizens inevitably must trust in science (or scientists as representatives of that system)…
- Even though this might be risky.”
- **COMMON FINDING: Many people who report not trusting in science, know what we believe.**

Trust in Science Survey 2022

Annenberg Public Policy Center

Public high on “competence”, less certain about values (Percent agree)

	2022 (A)	2020 (B)
Scientists in general are competent	78	79
Scientists in general are trustworthy	66	69
Scientists in general share my values	46	49
Scientists in general feel superior to others	42	41

Trust
(Winterllan et al 2022)

- “is an anticipatory mental state
- in which positive expectations are held
- about the behavior and intentions of another person, institution, or system,
- *allowing one to rely on others despite a certain vulnerability or risk.”*

Citations

- Annenberg Public Policy Center. 2022. Trust in Science Survey. Working Draft.
- Associated Press & National Opinion Research Center. 2022. “Amidst the Pandemic, Confidence in the Scientific Community Becomes Increasingly Polarized.” https://apnorc.org/projects/amidst-the-pandemic-confidence-in-the-scientific-community-becomes-increasingly-polarized/
- Brady, Henry E., & Thomas Kent. 2020. “Increasing Polarization since 1970 in Trust for American Non-political Institutions. American Political Science Association Annual Meeting.
- Covid States Project, The. 2022. “A 50-state COVID-19 Survey Report #82: COVID-19 Vaccine Misinformation Trends. Report Available at:https://www.covidstates.org/reports/covid-19-vaccine-misinformation-trends
- Kahan, Dan. 2015. “Climate-Science Communication and the Measurement Problem.” *Advances in Political Psychology* 36: 1-43.
- Krause, Nicole M., Dietram A. Schuefele, Isabelle Freiling, and Dominique Brossard. 2021. “The Trust Fallacy: Scientists’ Search for Pathologies is Unhealthy, Unhelpful, and Ultimately Unscientific.” *American Scientist* July-August: 226-233
- McCright, Aaron. M., Katherine Dentzman, Meghan Charters, and Thomas Dietz. 2013. The Influence of Political Ideology on Trust in Science.” *Environmental Research Letters* 8:044029.
- Nisbet, Erik C., Kathryn E. Cooper & R. Kelly Garrett. 2015. “The Partisan Brain: How Dissonant Science Messages Lead Conservatives and Liberals to (Dis)trust Science.” *Annals of the American Academy of Political and Social Science, 658*(1), 36-66
- Pew Research Center. 2022. “Americans’ Trust in Science, Other Groups Declines.” https://www.pewresearch.org/science/2022/02/15/americans-trust-in-scientists-other-groups-declines/
- Wintterlin, Florian, Friederike Hendriks, Niels G. Mede, Rainer Bromme, Julia Metag, & Mike S. Schäfer, 2022. “Predicting Public Trust in Science: The Role of Basic Orientations Toward Science, Perceived Trustworthiness of Scientists, and Experiences With Science .” *Frontiers in Communication* 6. *DOI=10.3389/fcomm.2021.822757*

Trust in Science
Trends and Insights

Thank you.