STUDY 1 SURVEY QUESTIONS

Opposition Questions

GM Food
Genetically modified foods are foods created through the manipulation of a plant's or animal's genetic structure using biotechnology. This is done to create foods with certain attributes such as faster growth, resistance to pathogens, or enhanced nutritional value.

Please indicate your level of opposition to genetically modified foods.
(1-7, anchored by “Not opposed at all = 1” and “Extremely opposed = 7”)

Climate Change
Climate change is a term used to describe significant variation in either the average state of the climate or its variability, lasting for an extended period of time.

Please indicate your level of belief in human-caused climate change.
(1-7, anchored by “Completely do not believe = 1” and “Completely believe = 7”)

Evolution
Evolution is the scientific theory that describes changes in inherited traits of populations through successive generations.

Please indicate your level of belief in Evolution.
(1-7, anchored by “Completely do not believe = 1” and “Completely believe = 7”)

Big Bang
The Big Bang Theory is a scientific theory that a massive blast approximately 13.8 billion years ago caused the universe to expand from its pebble-size origin to astronomical scope.

Please indicate your level of belief in the Big Bang Theory.
(1-7, anchored by “Completely do not believe = 1” and “Completely believe = 7”)

Vaccination
Vaccination is the act of introducing a vaccine into the body to produce immunity to a specific disease.

Please indicate your level of opposition to vaccination.
(1-7, anchored by “Not opposed at all = 1” and “Extremely opposed = 7”)

Homeopathic Medicine
Homeopathic medicine, of “homeopathy,” is a medical system based on the idea that a disease can be cured by a substance that produces similar symptoms in healthy people, and the notion that the lower the dose of medication, the greater its effectiveness.

Please indicate your level of belief in the effectiveness of homeopathic medicine. (1-7, anchored by “Completely do not believe = 1” and “Completely believe = 7”)

Nuclear Power
Nuclear power is the use of sustained nuclear reactions to generate heat and electricity.

Please indicate your level of opposition to nuclear power. (1-7, anchored by “Not opposed at all = 1” and “Extremely opposed = 7”)

Subjective Knowledge

Introduction to Subjective Knowledge Question

Next, we will ask you to rate your understanding of [scientific issue] on a seven-point scale. To ensure you understand the scale, this section explains what three (of the seven) levels of understanding mean, using the example of how a crossbow works. Please read each description to get a sense of how to use the scale. As you will see, a 7 implies detailed and deep knowledge, a 1 implies very little knowledge, and a 4 is in the middle.

Level 7 knowledge: A person with level 7 knowledge of crossbows can tell you all about their parts and how they work together. This person could tell you that a crossbow has a stiff, flexible piece of metal as a bow with a wire or strong line; that the bow is permanently mounted on a block of wood or metal; and that the wire is pulled back by something that gives a mechanical advantage—either a lever, a small block and tackle, or a crank wound around a spool that pulls a wire attached to the bow wire. The bow wire is held back by a pin connected to a trigger, and an arrow is set in front of it. The pin is directly connected to the trigger so that when you pull on the trigger, it causes the pin to pivot around a point such that the end moves downwards and releases the bow wire. When the pin releases the string, the bow very quickly un-flexes, rapidly imparting the energy stored in the flexed bow to the arrow.

Level 4 knowledge: A person with level 4 knowledge might know that the crossbow is a fixed bow and arrow arrangement; that it gets more power than a normal bow and arrow because it allows you to pull the string back extra hard and then trap it there, rather than hold it; and that it is then released by a trigger.

Level 1 knowledge: A person with level 1 knowledge might know what a crossbow looks like and what it does (shoots arrows).

Subjective Knowledge Question
Using the scale you just learned about, how would you rate your understanding of [scientific issue]?
(1-7, anchored by “Vague understanding = 1” and “Thorough understanding = 7”)

**Objective Knowledge Questions**

(7-point Likert scale: Definitely false, Probably false, Maybe false, Not sure, Maybe true, Probably true, Definitely true. Indications of correct answers below were included at the end of the survey during debriefing.)

**Full Set of 34 Items**

1. True or false? The center of the earth is very hot: True
2. True or false? The continents have been moving their location for millions of years and will continue to move: True
3. True or false? The oxygen we breathe comes from plants: True
4. True or false? Antibiotics kills viruses as well as bacteria: False
5. True or false? All insects have eight legs: False
6. True or false? All radioactivity is man made: False
7. True or false? Men and women normally have the same number of chromosomes: True
8. True or false? Lasers work by focusing sound waves: False
9. True or false? Almost all food energy for living organisms comes originally from sunlight: True
10. True or false? Electrons are smaller than atoms: True
11. True or false? All plants and animals have DNA: True
12. True or false? Humans share a majority of their genes with chimpanzees: True
13. True or false? It is the father’s genes that decide whether the baby is a boy or a girl: True
14. True or false? Ordinary tomatoes do not have genes, whereas genetically modified tomatoes do: False
15. True or false? Sound moves faster than light. False
16. True or false? The North Pole is a sheet of ice that floats on the Arctic Ocean. True
17. True or false? The ozone layer absorbs most of the sun’s UVB radiation, but not UVA radiation. True
18. True or false? Nitrogen makes up most of the earth’s atmosphere. True.
19. True or false? Antibodies are proteins produced by the immune system. True
20. True or false? Pathology is the study of the human body. False
21. True or false? The skin is the largest organ of the human body. True
22. True or false? Ligaments connect muscles to bones. False
23. True or false? All mutations to a human’s or animal’s genes are unhealthy. False
24. True or false? Uranium is an element found in nature. True
25. True or false? Radioactive milk can be made safe by boiling it. False
26. True or false? The process of splitting uranium or plutonium atoms to create energy is called nuclear fission. True
27. True or false? Venus is the closest planet to the sun. False
28. True or false? It takes 24 hours for the earth to orbit the sun: False
29. True or false? A “Red Dwarf” is a kind of planet. False
30. True or false? The universe is expanding. True
31. True or false? Earth is the only place in the solar system where helium can be found. False
32. True or false? Gravity is the theory that serves as the foundation for modern biology. False.
33. True or false? The earliest humans lived at the same time as the dinosaurs. False
34. True or false? “Survival of the fittest” is a phrase used to describe how natural selection works. True

Objective Knowledge Issue-specific Subscales

Climate Change
- Almost all food energy for living organisms comes originally from sunlight.
- The oxygen we breathe comes from plants.
- The North Pole is on a sheet of ice that floats on the Arctic Ocean.
- The ozone layer absorbs most of the sun's UVB radiation, but not UVA radiation.
- Nitrogen makes up most of the Earth’s atmosphere.

Vaccination and Homeopathy
- Antibodies are proteins produced by the immune system.
- Pathology is the study of the human body.
- The skin is the largest organ in the human body.
- Ligaments connect human muscles to bones.
- Antibiotics kills viruses as well as bacteria.

GM Foods
- It is the father’s genes that decide whether the baby is a boy or a girl.
- Ordinary tomatoes do not have genes, whereas genetically modified tomatoes do.
- All mutations to a human’s or animal’s genes are unhealthy.
- All plants and animals have DNA.
- Men and women normally have the same number of chromosomes.

Nuclear Power
- All radioactivity is man made.
- Electrons are smaller than atoms.
- Uranium is an element found in nature.
- Radioactive milk can be made safe by boiling it.
- The process of splitting plutonium or uranium atoms to create energy is called nuclear fission.

Big Bang
- Venus is the closest planet to the sun.
- It takes 24 hours for the earth to orbit the sun.
- A “Red Dwarf” is a kind of planet.
- The universe is expanding.
- Earth is the only place in the solar system where helium can be found.
Evolution
· All mutations to a human’s or animal’s genes are unhealthy.
· Humans share a majority of their genes with chimpanzees.
· Gravity is the theory that serves as the foundation for modern biology.
· The earliest human beings lived at the same time as the dinosaurs.
· “Survival of the fittest” is a phrase used to describe how natural selection works.

Demographic Questions

Age: What is your age? Please answer in years, using only numbers.

Gender: What is your gender?
  - Male
  - Female
  - Other / prefer not to answer

Income: What is your individual yearly income level?
  - Less than $10,000
  - $10,000 - $19,999
  - $20,000 - $29,999
  - $30,000 - $39,999
  - $40,000 - $49,999
  - $50,000 - $59,999
  - $60,000 - $69,999
  - $70,000 - $79,999
  - $80,000 - $89,999
  - $90,000 - $99,999
  - $100,000 - $149,999
  - More than $150,000

Political Ideology: What is your political ideology?
  - Very liberal
  - Mostly liberal
  - Somewhat liberal
  - Moderate
  - Somewhat conservative
  - Mostly conservative
  - Very conservative

Religiosity: How important is religion in your life?
  - Not important at all
  - A little important
  - Somewhat important
  - Important
Very important

Education: What is the highest level of education you have completed?
- Less than high school degree
- High school degree
- 2-year college degree
- 4-year college degree
- Post-graduate degree

Sources for Objective Knowledge Subscale Items

Many of the objective knowledge items in Studies 1-3 were taken from Fernbach et al. (25). New items’ sources are below.

- The ozone layer absorbs most of the sun’s UVB radiation, but not UVA radiation.
  - https://www.epa.gov/sites/production/files/documents/uvradiation.pdf
- Antibodies are proteins produced by the immune system.
  - https://www.genome.gov/genetics-glossary/Antibody
- Pathology is the study of the human body.
  - https://www.rcpath.org/discover-pathology/what-is-pathology.html
- The skin is the largest organ in the human body.
  - https://www.ncbi.nlm.nih.gov/books/NBK470464/
- Ligaments connect human muscles to bones.
  - https://medlineplus.gov/ency/imagepages/19089.htm#:~:text=A%20ligament%20is%20a%20fibrous,together%20and%20keep%20them%20stable.
- All mutations to a human’s or animal’s genes are unhealthy.
  - https://www.nationalgeographic.co.uk/history-and-civilisation/2017/11/human-evolution-facts
- Uranium is an element found in nature.
  - https://19january2017snapshot.epa.gov/www3/radtown/docs/tribal-uranium-activities.pdf
- The process of splitting plutonium or uranium atoms to create energy is called nuclear fission.
  - https://www.energy.gov/ne/articles/fission-and-fusion-what-difference
- Venus is the closest planet to the sun.
  - https://spaceplace.nasa.gov/all-about-mercury/en/
- It takes 24 hours for the earth to orbit the sun.
  - https://spaceplace.nasa.gov/years-on-other-planets/en/
- A “Red Dwarf” is a kind of planet.
  - https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=131744
- The universe is expanding.
  - https://www.nasa.gov/feature/goddard/2016/nasa-s-hubble-finds-universe-is-expanding-faster-than-expected
- Earth is the only place in the solar system where helium can be found.
  - https://solarsystem.nasa.gov/planets/jupiter/in-depth/
Gravity is the theory that serves as the foundation for modern biology.
  - [https://www.nsf.gov/news/special_reports/darwin/](https://www.nsf.gov/news/special_reports/darwin/)
  - “Survival of the fittest” is a phrase used to describe how natural selection works.
    - [https://www.genome.gov/25520157/online-education-kit-1859-darwin-published-on-the-origin-of-species-proposing-continual-evolution-of-species](https://www.genome.gov/25520157/online-education-kit-1859-darwin-published-on-the-origin-of-species-proposing-continual-evolution-of-species)

**STUDY 1 ADDITIONAL ANALYSES**

**Main Across-Issue Analyses**

The effect of opposition on the full set of 34 objective knowledge items variable:

|                  | Estimate | Std. Error | df | t value | Pr(>|t|) |
|------------------|----------|------------|----|---------|----------|
| (Intercept)      | 56.6048  | 2.4589     | 15.5052 | 23.020 | 2.08e-13 ** |
| opposition       | -3.5346  | 0.4131     | 1134.0889 | -8.557 | < 2e-16 *** |

The effect of opposition on the issue-specific subscale variable:

|                  | Estimate | Std. Error | df | t value | Pr(>|t|) |
|------------------|----------|------------|----|---------|----------|
| (Intercept)      | 7.76140  | 0.91233    | 8.15327 | 8.507 | 2.49e-05 ** |
| opposition       | -0.60650 | 0.09316    | 1132.51214 | -6.510 | 1.13e-10 *** |

The effect of opposition on subjective knowledge:

|                  | Estimate | Std. Error | df | t value | Pr(>|t|) |
|------------------|----------|------------|----|---------|----------|
| (Intercept)      | 3.13     | 2.760e-01  | 8.10 | 11.343 | 2.98e-06 *** |
| opposition       | .15      | 2.788e-02  | 1132 | 5.392 | 8.47e-08 *** |

The effect of opposition on the knowledge difference score variable using the full set of 34 objective knowledge items:

|                  | Estimate | Std. Error | df | t value | Pr(>|t|) |
|------------------|----------|------------|----|---------|----------|
| (Intercept)      | 0.47709  | 0.10977    | 91.17782 | 4.346 | 3.59e-05 *** |
| opposition       | -0.119630.02545 | 972.13735 | -4.701 | 2.97e-06 *** |

The effect of opposition on the knowledge difference score variable using the issue-specific objective knowledge subscales:

|                  | Estimate | Std. Error | df | t value | Pr(>|t|) |
|------------------|----------|------------|----|---------|----------|
| (Intercept)      | 0.36549  | 0.11095    | 116.44476 | 3.294 | 0.001307 ** |
| opposition       | -0.08958 | 0.02611    | 932.40090 | -3.430 | 0.000629 *** |

**Table S1: Study 1 Issue-by-Issue Analysis Output.**

**GM Foods**

| Operationalization | Beta(opposition) | Std. Error | df | t | p     |
|--------------------|------------------|------------|----|---|-------|
| Objective knowledge full set | -4.37 | .92 | 209 | -4.72 | < .001 |
| Objective knowledge subscale | -.83 | .21 | 209 | -4.02 | < .001 |
|-------------------------------|------|-----|-----|-------|--------|
| Subjective knowledge         | .24  | .06 | 209 | 4.00  | < .001 |
| Diff score (with full set)   | -.18 | .06 | 209 | -2.94 | .004   |
| Diff score (with subscale)   | -.15 | .06 | 209 | -2.53 | .01    |

### Climate Change

| Operationalization                      | Beta(opposition) | Std. Error | df   | t     | p     |
|----------------------------------------|------------------|------------|------|-------|-------|
| Objective knowledge full set           | -1.01            | 1.57       | 123  | -.64  | .52   |
| Objective knowledge subscale           | .03              | .28        | 123  | .12   | .91   |
| Subjective knowledge                   | -.09             | .09        | 123  | -1.00 | .32   |
| Diff score (with full set)             | .00              | .09        | 123  | .01   | .99   |
| Diff score (with subscale)             | .11              | .10        | 123  | 1.04  | .30   |

### Vaccination

| Operationalization                      | Beta(opposition) | Std. Error | df   | t     | p     |
|----------------------------------------|------------------|------------|------|-------|-------|
| Objective knowledge full set           | -5.40            | 1.38       | 76   | 3.91  | < .001|
| Objective knowledge subscale           | -.65             | .33        | 76   | -1.98 | .05   |
| Subjective knowledge                   | .36              | .09        | 76   | 3.90  | < .001|
|                |        |        | df |   t  |   p   |
|----------------|--------|--------|----|------|-------|
| **Diff score (with full set)** | -.24   | .08    | 76 | -2.88| < .001|
| **Diff score (with subscale)**  | -.25   | .08    | 76 | 3.03 | < .001|

**Homeopathic Medicine**

| Operationalization                  | Beta(opposition) | Std. Error | df |   t  |   p   |
|-------------------------------------|------------------|------------|----|------|-------|
| **Objective knowledge full set**    | -4.53            | .99        | 222| -4.60| < .001|
| **Objective knowledge subscale**    | -.28             | .21        | 222| -1.33| .18   |
| **Subjective knowledge**            | .36              | .07        | 222| 5.41 | < .001|
| **Diff score (with full set)**      | -.31             | .06        | 222| -5.16| < .001|
| **Diff score (with subscale)**      | -.30             | .06        | 222| -4.69| < .001|

**Nuclear Power**

| Operationalization                  | Beta(opposition) | Std. Error | df |   t  |   p   |
|-------------------------------------|------------------|------------|----|------|-------|
| **Objective knowledge full set**    | -5.22            | .10        | 194| -5.24| < .001|
| **Objective knowledge subscale**    | -.82             | .22        | 194| -3.78| < .001|
| **Subjective knowledge**            | .15              | .07        | 194| 2.17 | .03   |
| **Diff score (with full set)**      | -.10             | .07        | 194| -1.48| .14   |
| Diff score (with subscale) | -.11 | .07 | 194 | -1.53 | .13 |

## Evolution

| Operationalization | Beta(opposition) | Std. Error | df  | t   | p   |
|--------------------|-----------------|------------|-----|-----|-----|
| Objective knowledge full set | -1.52 | 1.21 | 120 | -1.27 | .21 |
| Objective knowledge subscale | -.88 | .27 | 120 | -3.26 | .001 |
| Subjective knowledge | .04 | .08 | 120 | .48 | .63 |
| Diff score (with full set) | -.05 | .07 | 120 | -.71 | .48 |
| Diff score (with subscale) | .03 | .07 | 120 | .36 | .72 |

## Big Bang

| Operationalization | Beta(opposition) | Std. Error | df  | t   | p   |
|--------------------|-----------------|------------|-----|-----|-----|
| Objective knowledge full set | -1.89 | .98 | 179 | -1.94 | .05 |
| Objective knowledge subscale | -.55 | .27 | 179 | -2.03 | .04 |
| Subjective knowledge | -.08 | .07 | 179 | -1.18 | .24 |
| Diff score (with full set) | .03 | .06 | 179 | .42 | .68 |
| Diff score (with subscale) | .06 | .06 | 179 | .93 | .36 |
STUDY 2 SURVEY QUESTIONS

(Identical to those in Study 1)

STUDY 2 ADDITIONAL ANALYSES

Main Across-Issue Analyses

The effect of opposition on the full set of 34 objective knowledge items variable:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 53.8366 | 2.2628 | 25.1874 | 23.792 | < 2e-16 *** |
| opposition | -2.0816 | 0.4494 | 992.6340 | -4.632 | 4.1e-06 *** |

The effect of opposition on the issue-specific subscale variable:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 7.30427 | 0.85266 | 8.99901 | 8.566 | 1.28e-05 *** |
| opposition | -0.42558 | 0.09827 | 989.37574 | -4.331 | 1.64e-05 *** |

The effect of opposition on subjective knowledge:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 2.93183 | 0.23810 | 9.57506 | 12.313 | 3.47e-07 *** |
| opposition | 0.13698 | 0.02957 | 989.57103 | 4.632 | 4.10e-06 *** |

The effect of opposition on the knowledge difference score variable using the full set of 34 objective knowledge items:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 0.30703 | 0.11004 | 994.00000 | 2.790 | 0.005369 ** |
| opposition | -0.09582 | 0.02688 | 994.00000 | -3.564 | 0.000382 *** |

The effect of opposition on the knowledge difference score variable using the issue-specific objective knowledge subscales:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 0.30459 | 0.11119 | 994.00000 | 2.739 | 0.006267 ** |
| opposition | -0.08967 | 0.02717 | 994.00000 | -3.301 | 0.000998 *** |

Table S2: Study 2 Issue-by-Issue Analysis Output.

| Operationalization | Beta(opposition) | Std. Error | df | t | p |
|---------------------|------------------|------------|----|---|---|
| Objective knowledge full set | -4.56 | 1.01 | 176 | -4.51 | < .001 |

GM Foods

Operationalization: Beta(opposition) Std. Error df t p

Objective knowledge full set: -4.56 1.01 176 -4.51 < .001
| Objective knowledge subscale | -.85 | .22 | 176 | -3.79 | < .001 |
|-----------------------------|------|-----|-----|--------|--------|
| Subjective knowledge        | .18  | .07 | 176 | 2.50   | .01    |
| Diff score (with full set)  | -.04 | .06 | 176 | -.62   | .53    |
| Diff score (with subscale)  | -.07 | .06 | 176 | -1.03  | .30    |

**Climate Change**

| Operationalization | Beta(opposition) | Std. Error | df | t   | p   |
|--------------------|------------------|------------|----|-----|-----|
| Objective knowledge full set | 1.07            | 1.30       | 115 | .82 | .41 |
| Objective knowledge subscale | .14             | .24        | 115 | .59 | .56 |
| Subjective knowledge | .21             | .07        | 115 | 3.05 | .003 |
| Diff score (with full set) | -.16            | .08        | 115 | -2.05 | .04 |
| Diff score (with subscale) | -.19            | .07        | 115 | -2.48 | .01 |

**Vaccination**

| Operationalization | Beta(opposition) | Std. Error | df | t   | p   |
|--------------------|------------------|------------|----|-----|-----|
| Objective knowledge full set | -.25            | 1.92       | 68 | -.13 | .90 |
| Objective knowledge subscale | .43             | .37        | 68 | 1.18 | .24 |
| Subjective knowledge | .003            | .13        | 68 | .02 | .98 |
| Diff score (with full set) | -.19 | .11 | 68  | -1.70 | .09 |
|---------------------------|------|-----|-----|-------|----|
| Diff score (with subscale) | -.12 | .11 | 68  | -1.11 | .27 |

**Homeopathic Medicine**

| Operationalization                     | Beta(opposition) | Std. Error | df  | t    | p      |
|----------------------------------------|------------------|------------|-----|------|--------|
| Objective knowledge full set            | -2.15            | 1.14       | 178 | -1.89| .06    |
| Objective knowledge subscale            | -.46             | .23        | 178 | -2.01| .05    |
| Subjective knowledge                    | .34              | .07        | 178 | 4.70 | < .001 |
| Diff score (with full set)              | -.21             | .07        | 178 | -3.10| .002   |
| Diff score (with subscale)              | -.15             | .07        | 178 | -2.16| .03    |

**Nuclear Power**

| Operationalization                     | Beta(opposition) | Std. Error | df  | t    | p      |
|----------------------------------------|------------------|------------|-----|------|--------|
| Objective knowledge full set            | -1.86            | 1.13       | 175 | -1.65| .10    |
| Objective knowledge subscale            | -.28             | .24        | 175 | -1.18| .24    |
| Subjective knowledge                    | .02              | .07        | 175 | .37  | .71    |
| Diff score (with full set)              | -.03             | .07        | 175 | -.38 | .71    |
| Diff score (with subscale) | -.02 | .07 | 175 | -.24 | .81 |

**Evolution**

| Operationalization | Beta(opposition) | Std. Error | df  | t    | p    |
|--------------------|------------------|------------|-----|------|------|
| Objective knowledge full set | -2.22            | 1.34       | 98  | -1.65| .10  |
| Objective knowledge subscale | -.85             | .30        | 98  | -2.85| .005 |
| Subjective knowledge | .04              | .10        | 98  | .44  | .66  |
| Diff score (with full set) | -.04             | .09        | 98  | -.41 | .68  |
| Diff score (with subscale) | -.04             | .09        | 98  | -.50 | .62  |

**Big Bang**

| Operationalization | Beta(opposition) | Std. Error | df  | t    | p    |
|--------------------|------------------|------------|-----|------|------|
| Objective knowledge full set | -2.92            | .98        | 172 | -2.97| .003 |
| Objective knowledge subscale | -.59             | .26        | 172 | -2.28| .02  |
| Subjective knowledge | .09              | .07        | 172 | 1.19 | .24  |
| Diff score (with full set) | -.09             | .06        | 172 | -1.56| .12  |
| Diff score (with subscale) | -.07             | .06        | 172 | -1.31| .19  |
COMBINED STUDY 1 AND STUDY 2 ADDITIONAL ANALYSES

Figure S1: Distributions of Extremity/Opposition by Issue in Combined Study and Study 2 Data.
Figure S2: Subjective and Objective Knowledge Means (with Standard Errors) by Opposition Level in Combined Study 1 and Study 2 Data.

Figure S3: Correlation Table of Main Constructs in Combined Study 1 and Study 2 Data.
Table S3: Issue-by-Issue Main Analysis Output in Combined Study 1 and Study 2 Data.

### GM Foods

| Operationalization                      | Beta(opposition) | Std. Error | df  | t     | p    |
|----------------------------------------|------------------|------------|-----|-------|------|
| Objective knowledge full set           | -4.46            | .68        | 387 | -6.55 | < .001 |
| Objective knowledge subscale           | -.83             | .15        | 387 | -5.48 | < .001 |
| Subjective knowledge                   | .22              | .05        | 387 | 4.72  | < .001 |
| Diff score (with full set)             | -.12             | .04        | 387 | -2.65 | .008  |
| Diff score (with subscale)             | -.11             | .04        | 387 | -2.57 | .01   |

### Climate Change

| Operationalization                      | Beta(opposition) | Std. Error | df  | t     | p    |
|----------------------------------------|------------------|------------|-----|-------|------|
| Objective knowledge full set           | .66              | .98        | 240 | .67   | .50  |
| Objective knowledge subscale           | .06              | .18        | 240 | .33   | .74  |
| Subjective knowledge                   | .08              | .05        | 240 | 1.53  | .13  |
| Diff score (with full set)             | -.09             | .06        | 240 | -1.62 | .11  |
| Diff score (with subscale)             | -.07             | .06        | 240 | -1.20 | .23  |

### Vaccination
| Operationalization          | Beta(opposition) | Std. Error | df   | t     | p     |
|----------------------------|-----------------|-----------|------|-------|-------|
| Objective knowledge full set | -3.79           | 1.11      | 146  | -3.41 | < .001|
| Objective knowledge subscale| -.34            | .24       | 146  | -1.42 | .16   |
| Subjective knowledge       | .26             | .08       | 146  | 3.47  | < .001|
| Diff score (with full set)  | -.20            | .07       | 146  | -3.11 | .002  |
| Diff score (with subscale)  | -.19            | .06       | 146  | -2.94 | .004  |

**Homeopathic Medicine**

| Operationalization          | Beta(opposition) | Std. Error | df   | t     | p     |
|----------------------------|-----------------|-----------|------|-------|-------|
| Objective knowledge full set | -3.51           | .74       | 402  | -4.75 | < .001|
| Objective knowledge subscale| -.37            | .15       | 402  | -2.45 | < .001|
| Subjective knowledge       | .36             | .5        | 402  | 7.37  | < .001|
| Diff score (with full set)  | -.25            | .04       | 402  | -5.66 | < .001|
| Diff score (with subscale)  | -.22            | .05       | 402  | -4.74 | < .001|

**Nuclear Power**

| Operationalization          | Beta(opposition) | Std. Error | df   | t     | p     |
|----------------------------|-----------------|-----------|------|-------|-------|
| Objective knowledge full set | -3.59           | .75       | 371  | -4.76 | < .001|
|                      | Objective knowledge subscale | Subjective knowledge | Diff score (with full set) | Diff score (with subscale) |
|----------------------|-----------------------------|----------------------|---------------------------|---------------------------|
|                      | -.56                        | .16                  | 371                       | -3.44                     | < .001                   |
|                      | .09                         | .05                  | 371                       | 1.83                      | .07                       |
|                      | -.06                        | .05                  | 371                       | -1.31                     | .19                       |
|                      | -.06                        | .05                  | 371                       | -1.24                     | .21                       |

**Evolution**

| Operationalization      | Beta(opposition) | Std. Error | df  | t     | p      |
|-------------------------|------------------|------------|-----|-------|--------|
| Objective knowledge full set | -1.81            | .89        | 220 | -2.03 | .04    |
| Objective knowledge subscale | -.87             | .20        | 220 | -4.37 | < .001 |
| Subjective knowledge    | .04              | .06        | 220 | .59   | .55    |
| Diff score (with full set) | -.04             | .06        | 220 | -.79  | .43    |
| Diff score (with subscale) | -.002            | .06        | 220 | -.04  | .97    |

**Big Bang**

| Operationalization        | Beta(opposition) | Std. Error | df  | t     | p      |
|----------------------------|------------------|------------|-----|-------|--------|
| Objective knowledge full set | -2.39            | .69        | 353 | -3.45 | < .001 |
| Objective knowledge subscale | -.57             | .19        | 353 | -3.05 | .002   |
Analyses with Binarized Versions of Objective Knowledge

As reported in the main text, we ran robustness analyses for all models using versions of the objective knowledge variable in which we binarize each objective knowledge question score (1 for correct, 0 for incorrect). Model output using binarized versions of objective knowledge are below.

### Across-Issue Binarized Objective Knowledge Analyses (each with random intercepts for issue)

The effect of opposition on the binarized full set of 34 objective knowledge items variable:

| Estimate   | Std. Error | df | t value | Pr(>|t|) |
|------------|------------|----|---------|----------|
| (Intercept)| 25.9059    | 0.4345 | 13.1133 | <2e-16 ***|
| opposition | -0.6647    | 0.0684 | 2130.9089 | <2e-16 ***|

The effect of opposition on the binarized issue-specific subscale variable:

| Estimate   | Std. Error | df | t value | Pr(>|t|) |
|------------|------------|----|---------|----------|
| (Intercept)| 0.3598     | 0.0785 | 136.2654 | 4.584 1.02e-05 ***|
| opposition | -0.0937    | 0.0185 | 1989.6008 | 5.059 4.60e-07 ***|

The effect of opposition on the knowledge difference score variable using the binarized version of the full set of 34 objective knowledge items:

| Estimate   | Std. Error | df | t value | Pr(>|t|) |
|------------|------------|----|---------|----------|
| (Intercept)| 0.3969     | 0.0760 | 163.3542 | 5.218 5.43e-07 ***|
| opposition | -0.1041    | 0.0183 | 1878.3942 | 5.694 1.44e-08 ***|

The effect of opposition on the knowledge difference score variable using the binarized version of the issue-specific objective knowledge subscales:

| Estimate   | Std. Error | df | t value | Pr(>|t|) |
|------------|------------|----|---------|----------|
| (Intercept)| 0.3598     | 0.0785 | 136.2654 | 4.584 1.02e-05 ***|
| opposition | -0.0937    | 0.0185 | 1989.6008 | 5.059 4.60e-07 ***|

Table S4: Issue-by-Issue Binarized Objective Knowledge Analyses in Combined Study 1 and Study 2 Data.

GM Foods
| Operationalization | Beta(o/p) | Std. Error | df | t   | p     |
|-------------------|-----------|------------|----|-----|-------|
| Binarized full set | -1.01     | .15        | 387| -6.56| < .001|
| Binarized subscale| -.18      | .04        | 387| -5.12| < .001|
| Binarized full set diff score | -.11 | .04 | 387 | -2.62 | .009 |
| Binarized subscale diff score | -.11 | .04 | 387 | -2.65 | .008 |

### Climate Change

| Operationalization | Beta(o/p) | Std. Error | df | t    | p     |
|-------------------|-----------|------------|----|-----|-------|
| Binarized full set | -.06      | .22        | 240| -.26| .80   |
| Binarized subscale| -.03      | .05        | 240| -.73| .47   |
| Binarized full set diff score | -.08 | .05 | 240 | -1.58 | .12  |
| Binarized subscale diff score | -.08 | .06 | 240 | -1.40 | .16  |

### Vaccination

| Operationalization | Beta(o/p) | Std. Error | df | t    | p     |
|-------------------|-----------|------------|----|-----|-------|
| Binarized full set | -.89      | 1.05       | 146| -3.40| <.001 |
| Binarized subscale| -.06      | .06        | 146| -1.02| .31   |
| Binarized full set diff score | -.19 | .07 | 146 | -2.76 | .007 |
| Binarized subscale diff score | -.16 | .06 | 146 | -2.51 | .01  |

### Homeopathic Medicine
| Operationalization | Beta(opposition) | Std. Error | df  | t     | p     |
|--------------------|-----------------|------------|-----|-------|-------|
| Binarized full set | -.74            | .72        | 402 | -4.45 | <.001 |
| Binarized subscale | -.08            | .03        | 402 | -2.26 | .02   |
| Binarized full set | -.25            | .04        | 402 | -5.61 | <.001 |
| diff score         | -.21            | .05        | 402 | -4.60 | <.001 |

**Nuclear Power**

| Operationalization | Beta(opposition) | Std. Error | df  | t     | p     |
|--------------------|-----------------|------------|-----|-------|-------|
| Binarized full set | -.71            | .17        | 371 | -4.14 | <.001 |
| Binarized subscale | -.11            | .04        | 371 | -2.65 | .008  |
| Binarized full set | -.05            | .05        | 371 | -1.10 | .27   |
| diff score         | -.06            | .05        | 371 | -1.33 | .19   |

**Evolution**

| Operationalization | Beta(opposition) | Std. Error | df  | t     | p     |
|--------------------|-----------------|------------|-----|-------|-------|
| Binarized full set | -.46            | .21        | 220 | -2.24 | .03   |
| Binarized subscale | -.19            | .05        | 220 | -4.01 | <.001 |
| Binarized full set | -.05            | .06        | 220 | -.81  | .42   |
| diff score         | -.02            | .06        | 220 | -.27  | .79   |

**Big Bang**
### Overall Analyses with Political Ideology and Religiosity as Covariates

The following analyses show the main construct relationships, controlling for individual-level political ideology and religiosity. Although more conservatism and higher religiosity are negatively associated with objective knowledge and positively associated with subjective knowledge, including them as covariates in these overall models does not change the pattern of results from those reported in the main text.

Opposition on the full set of objective knowledge items, controlling for political ideology (higher numbers = more conservatism), with random intercepts by issue:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 60.3368 | 2.1027 | 19.3967 | 28.695 | <2e-16 *** |
| opposition | -2.4676 | 0.3078 | 2129.0642 | -8.016 | 1.78e-15 *** |
| polideo | -1.7492 | 0.3014 | 2126.0381 | -5.803 | 7.47e-09 *** |

Opposition on the objective knowledge subscales, controlling for political ideology (higher numbers = more conservatism), with random intercepts by issue:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 8.04254 | 0.86126 | 8.04904 | 9.338 | 1.36e-05 *** |
| opposition | -0.496640 | 0.06871 | 2126.63227 | -7.229 | 6.77e-13 *** |
| polideo | -0.159250 | 0.06730 | 2127.28938 | -2.366 | 0.0181 * |

Opposition on subjective knowledge, controlling for political ideology (higher numbers = more conservatism), with random intercepts by issue:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 2.783 | 2.444e-01 | 8.323e+00 | 11.387 | 2.32e-06 *** |
| opposition | 0.128 | 2.058e-02 | 2.126.63227 | 6.240 | 5.27e-10 *** |
| polideo | 0.085 | 2.016e-02 | 2.126.63227 | 4.194 | 2.86e-05 *** |

Opposition on the full set of objective knowledge items, controlling for religiosity (higher numbers = more religiosity), with random intercepts by issue:

| Estimate | Std. Error | df | t value | Pr(>|t|) |
|----------|------------|----|---------|----------|
| (Intercept) | 61.2011 | 1.9383 | 17.4964 | 31.575 | <2e-16 *** |
| opposition | -2.1860 | 0.3056 | 2129.0810 | -7.153 | 1.16e-12 *** |
| religion | -3.0511 | 0.3276 | 2128.1750 | -9.313 | <2e-16 *** |
Opposition on the objective knowledge subscales, controlling for religiosity (higher numbers = more religiosity), with random intercepts by issue:

| Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|------------|-----|---------|----------|
| (Intercept) | 8.14035 | 0.84758 | 7.66406 | 9.604 | 1.53e-05 *** |
| opposition | -0.46907 | 0.06888 | 2126.42201 | -6.810 | 1.26e-11 *** |
| religion | -0.28751 | 0.07385 | 2126.71203 | -3.893 | 0.000102 *** |

Opposition on subjective knowledge, controlling for religiosity (higher numbers = more religiosity), with random intercepts by issue:

| Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|------------|-----|---------|----------|
| (Intercept) | 2.841e+00 | 2.416e-01 | 7.868e+00 | 11.759 | 2.87e-06 *** |
| opposition | 1.256e-02 | 2.067e-02 | 2.127e+03 | 6.077 | 1.44e-09 *** |
| religion | 9.735e-02 | 2.216e-02 | 2.127e+03 | 4.392 | 1.18e-05 *** |

Overall Analyses with both Objective and Subjective Knowledge Simultaneously Predicting Opposition

The full set of objective knowledge items variable and subjective knowledge on opposition

| Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|------------|-----|---------|----------|
| (Intercept) | 3.754e+00 | 1.747e-01 | 1.326e+01 | 21.488 | 1.09e-11 *** |
| subjective | 1.705e-01 | 2.126e-02 | 2.113e+03 | 7.998 | 2.11e-14 *** |
| scilit | -1.436e-02 | 1.466e-03 | 2.129e+03 | -9.793 | < 2e-16 *** |

Objective knowledge subscale variable and subjective knowledge on opposition

| Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|------------|-----|---------|----------|
| (Intercept) | 3.417e+00 | 1.708e-01 | 1.056e+01 | 20.014 | 9.78e-10 *** |
| subjective | 1.741e-02 | 2.231e-02 | 2.115e+03 | 7.804 | 9.34e-15 *** |
| subscale | -5.625e-02 | 6.685e-03 | 2.110e+03 | -8.413 | < 2e-16 *** |

Overall Analyses with Demographic Control Variables

Note that the effect of opposition on the dependent variables remains significant and in the same direction as the models reported in the main text.

Predicting Objective Knowledge

| Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|------------|-----|---------|----------|
| (Intercept) | 44.47030 | 2.65139 | 45.15641 | 16.772 | < 2e-16 *** |
| opposition | -2.58042 | 0.30201 | 2111.89617 | -8.544 | < 2e-16 *** |
| age | 0.03612 | 0.03400 | 2107.44415 | 1.062 | 0.288 |
| gender.binary | 7.53316 | 0.98531 | 2109.47660 | 7.645 | 3.14e-14 *** |
| edu | 2.62116 | 0.44912 | 2106.87258 | 5.836 | 6.17e-09 *** |

Predicting Subjective Knowledge

| Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|------------|-----|---------|----------|
| (Intercept) | 2.608e+00 | 2.721e-01 | 1.143e+01 | 9.586 | 8.35e-07 *** |
| opposition | 1.621e-01 | 2.108e+03 | 7.976 | 2.46e-15 *** |
| age | 9.734e-04 | 2.286e-03 | 2.106e+03 | 0.426 | 0.670265 |
| gender.binary | 4.394e-01 | 6.626e-02 | 2.107e+03 | 6.631 | 4.21e-11 *** |
| edu | 1.070e-01 | 3.019e-02 | 2.106e+03 | 3.544 | 0.000403 *** |
STUDY 3 SURVEY QUESTIONS

Betting Question and Scenario

In the next part of the survey we will ask you to answer 30+ true-false scientific questions. Mixed in among them are 5 questions on the science surrounding [issue] specifically. These questions were developed using factual information from top scientists at organizations such as:

- NASA
- The Organisation for Economic Co-operation and Development (OECD)
- The National Science Foundation (NSF)
- The National Institutes of Health (NIH)
- The Environmental Protection Agency (EPA)

We would like to give you the opportunity to bet on your understanding of [issue], as defined by the agreed-upon knowledge of these scientists.

If you decide to bet, you will receive a $.50 bonus if you score better than the average on these five questions. If you do not choose to take the bet, we will give you a one-time bonus of $.25.

Would you like to bet?
- No, I would not like to bet
- Yes, I would like to bet

STUDY 3 ADDITIONAL ANALYSES

Figure S4: Distribution of Opposition/Extremity in Study 3.
Figure S5: Subjective and Objective Knowledge Means (with Standard Errors) by Opposition/Extremity Level in Study 3.
Figure S6: Correlation Table of Main Constructs in Study 3.

Overall Analyses with Both Objective and Subjective Knowledge Simultaneously Predicting Opposition

The full set of objective knowledge items variable and subjective knowledge on opposition

|          | Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|----------|------------|-----|---------|----------|
| (Intercept) | 5.799e+00 | 4.654e-01 | 5.324e+00 | 12.459 | 3.85e-05 *** |
| subjective | 1.734e-01 | 2.966e-02 | 1.169e+03 | 5.846 | 6.52e-09 *** |
| scilit.all | -1.294e-01 | 8.229e-03 | 1.167e+03 | -15.728 | < 2e-16 *** |

Objective knowledge subscale variable and subjective knowledge on opposition

|          | Estimate | Std. Error | df  | t value | Pr(>|t|) |
|----------|----------|------------|-----|---------|----------|
| (Intercept) | 4.0939 | 0.4916 | 4.1695 | 8.327 | 0.000947 *** |
| subjective | 0.2063 | 0.0312 | 1169.1032 | 6.613 | 5.72e-11 *** |
| subscale | -0.4316 | 0.0432 | 1168.7180 | -9.990 | < 2e-16 *** |

Main Analyses Excluding Participants Fully in Line with The Scientific Consensus
All of the following models take the same basic form: a dependent variable predicted by opposition, with a random intercept variable for issue.
Opposition on the full set of objective knowledge items variable

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 28.684   | 0.6796     | 42.21 | 4.01e-12 | ***      |
| opposition     | -1.413   | 0.1157     | -12.22| < 2e-16  | ***      |

Opposition on the objective knowledge subscale variable

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 4.03849  | 0.22151    | 18.23 | 1.61e-05 | ***      |
| opposition     | -0.17005 | 0.02452    | -6.94 | 7.94e-12 | ***      |

Opposition on subjective knowledge

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 2.0767   | 0.38141    | 3.45  | 5.445   | 0.00629  |
| opposition     | 0.33509  | 0.03277    | 10.22 | 3.24e-15| ***      |

Opposition on the knowledge difference score variable

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 0.81529  | 0.14879    | 37.66 | 1.86e-08| ***      |
| opposition     | -0.24064 | 0.02998    | -8.03 | 3.22e-15| ***      |

Opposition on the participant payout variable

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 1.20589  | 0.03202    | 37.66 | 6.79e-08| ***      |
| opposition     | -0.02453 | 0.00410    | -5.98 | 3.22e-09| ***      |

Overall Analyses with Demographic Control Variables

Note that the effect of opposition on the dependent variables remains significant and in the same direction as the models reported in the main text.

Predicting Objective Knowledge

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 27.31223 | 0.90855    | 30.61 | < 2e-16 | ***      |
| opposition     | -1.28914 | 0.09309    | -13.84| < 2e-16 | ***      |
| edu            | 0.51053  | 0.15675    | 3.257 | 0.00117 | **       |
| age            | -0.02281 | 0.01525    | -1.496| 0.13497 |          |
| gender.binary  | 0.88625  | 0.33801    | 5.22  | 0.00888 | **       |

Predicting Subjective Knowledge

|                | Estimate | Std. Error | df    | t value | Pr(>|t|) |
|----------------|----------|------------|-------|---------|----------|
| (Intercept)    | 2.075e+00| 4.204e-01  | 4.935 | 0.00280 | **       |
| opposition     | 1.843e-01| 2.771e-02  | 6.650 | 4.92e-11| ***      |
| edu            | 1.599e-01| 4.639e-02  | 3.448 | 0.00059 | ***      |
| age            | 4.895e-03| 4.513e-03  | 1.085 | 0.27835 |          |
| gender.binary  | 5.248e-01| 1.000e-01  | 5.247 | 1.91e-07| ***      |

STUDY 4 SURVEY QUESTIONS

COVID-19 Vaccination Opposition Question

COVID-19 is an illness caused by a coronavirus called SARS-CoV-2 that can spread from person to person.
If a COVID-19 vaccine were available to you today, would you get the vaccine? Please indicate your answer on the 7-point scale below. (7-point scale, “Definitely get the vaccine,” “Probably get it,” “Lean slightly toward getting it,” “Neutral,” “Lean slightly against getting it,” “Probably not get it,” “Definitely get the vaccine”)

Subjective Knowledge

Introduction to Subjective Knowledge Question

(Identical to Studies 1 and 2)

Subjective Knowledge Question

Using the scale you just learned about, how would you rate your understanding of how a COVID-19 vaccine would work? (1-7, anchored by “Vague understanding = 1” and “Thorough understanding = 7”)

Objective Knowledge Questions

(7-point Likert scale: Definitely false, Probably false, Maybe false, Not sure, Maybe true, Probably true, Definitely true. Indications of correct answers below were included at the end of the survey during debriefing.)

Full Set of 23 Items

1. True or false? The center of the earth is very hot: True
2. True or false? The continents have been moving their location for millions of years and will continue to move: True
3. True or false? The oxygen we breathe comes from plants: True
4. True or false? Antibiotics kills viruses as well as bacteria: False
5. True or false? All insects have eight legs: False
6. True or false? All radioactivity is man made: False
7. True or false? Men and women normally have the same number of chromosomes: True
8. True or false? Lasers work by focusing sound waves: False
9. True or false? Almost all food energy for living organisms comes originally from sunlight: True
10. True or false? Electrons are smaller than atoms: True
11. True or false? All plants and animals have DNA: True
12. True or false? Humans share a majority of their genes with chimpanzees: True
13. True or false? It is the father’s genes that decide whether the baby is a boy or a girl: True
14. True or false? Ordinary tomatoes do not have genes, whereas genetically modified tomatoes do: False
15. True or false? The earth orbits the sun: True
16. True or false? Antibodies are proteins produced by the immune system: True
17. True or false? COVID-19 is a kind of bacteria. False
18. True or false? People younger than 65 cannot contract COVID-19. False
19. True or false? There is no publicly available COVID-19 vaccine. True
20. True or false? There are many different types of Coronavirus. True
21. True or false? COVID-19 can be transmitted through houseflies. False
22. True or false? COVID-19 is a variant of the flu. False
23. True or false? COVID-19 is transmitted mainly via small respiratory droplets through sneezing, coughing, or when people interact in close proximity. True

Objective Knowledge COVID-specific Subscale Items

- COVID-19 is a kind of bacteria.
- People younger than 65 cannot contract COVID-19.
- There is no publicly available COVID-19 vaccine.
- There are many different types of Coronavirus.
- COVID-19 can be transmitted through houseflies.
- COVID-19 is a variant of the flu.
- COVID-19 is transmitted mainly via small respiratory droplets through sneezing, coughing, or when people interact in close proximity.

Sources for COVID-specific Subscale Items

COVID-19 subscale items were drawn from facts on the following informational websites:
- https://www.cdc.gov/coronavirus/2019-ncov/downloads/2019-ncov-factsheet.pdf
- https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/2019-novel-coronavirus-myth-versus-fact
- https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters
- https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters?gclid=CjwKCAiA8ov_BRAoEiwAOZogwVROv5ZPdF-7tPRUm61EGjmlDvF6oTSjFmB_yfkdPWdJzN6P-DzxBBcCn2IQAvD_BwE#houseflies
- https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19-similarities-and-differences-with-influenza
Figure S7: Distribution of Participants’ Reported Willingness to Receive a COVID-19 Vaccine in Study 4.

Willingness to get COVID-19 vaccine
1 = Definitely, 4 = Neutral, 7 = Definitely not
Figure S8: Subjective and Objective Knowledge Means (with Standard Errors) by Opposition/Extremity Level in Study 4.

Figure S9: Correlation Table of Main Constructs in Study 4.
Binarized Objective Knowledge Analyses

The effect of opposition on the binarized full set of objective knowledge items variable:

|              | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------|----------|------------|---------|----------|
| (Intercept)  | 19.77251 | 0.39047    | 50.64   | <2e-16 *** |
| opposition   | -0.22907 | 0.08845    | -2.59   | 0.01 *   |

The effect of opposition on the binarized COVID-specific subscale variable:

|              | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------|----------|------------|---------|----------|
| (Intercept)  | 6.29784  | 0.13658    | 46.112  | <2e-16 *** |
| opposition   | -0.06495 | 0.03094    | -2.099  | 0.0366 * |

The effect of opposition on the knowledge difference score variable using the binarized version of the full set of objective knowledge items:

|              | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------|----------|------------|---------|----------|
| (Intercept)  | 0.61411  | 0.17211    | 3.568   | 0.000416 *** |
| opposition   | -0.15537 | 0.03898    | -3.985  | 8.38e-05 *** |

The effect of opposition on the knowledge difference score variable using the binarized version of the issue-specific objective knowledge subscales:

|              | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------|----------|------------|---------|----------|
| (Intercept)  | 0.55998  | 0.17724    | 3.159   | 0.00173 ** |
| opposition   | -0.14168 | 0.04015    | -3.529  | 0.00048 *** |

Overall Analyses with Political Ideology and Religiosity as Covariates

The following analyses show the main construct relationships, controlling for individual-level political ideology and religiosity. Although more conservatism and higher religiosity are again negatively associated with objective knowledge and positively associated with subjective knowledge, including them as covariates in these overall models does not meaningfully change the pattern of results from those reported in the main text.

Opposition on the full set of objective knowledge items, controlling for political ideology (higher numbers = more conservatism):

|              | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------|----------|------------|---------|----------|
| (Intercept)  | 52.4492  | 2.2043     | 23.794  | < 2e-16 *** |
| opposition   | -0.5820  | 0.4285     | -1.358  | 0.17534   |
| polideo     | -1.4897  | 0.4948     | -3.011  | 0.00282 ** |

Opposition on the COVID-specific subscale, controlling for political ideology (higher numbers = more conservatism):

|              | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------|----------|------------|---------|----------|
| (Intercept)  | 17.5824  | 0.7466     | 23.549  | <2e-16 *** |
| opposition   | -0.2323  | 0.1451     | -1.600  | 0.1105    |
| polideo     | -0.4887  | 0.1676     | -2.916  | 0.0038 ** |

Opposition on subjective knowledge, controlling for political ideology (higher numbers = more conservatism):

|              | Estimate | Std. Error | t value | Pr(>|t|) |
|--------------|----------|------------|---------|----------|
| (Intercept)  | 2.74545  | 0.23618    | 11.624  | <2e-16 *** |
| opposition   | 0.10581  | 0.04591    | 2.305   | 0.0218 *  |
Opposition on the full set of objective knowledge items, controlling for religiosity (higher numbers = more religiosity):

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 53.3661  | 2.0656     | 25.836  | < 2e-16  *** |
| opposition       | -0.6984  | 0.4073     | -1.715  | 0.0873   . |
| religion         | -2.3394  | 0.5213     | -4.488  | 1.01e-05 *** |

Opposition on the objective knowledge subscales, controlling for religiosity (higher numbers = more religiosity):

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 17.3470  | 0.7124     | 24.350  | < 2e-16  *** |
| opposition       | -0.2998  | 0.1405     | -2.135  | 0.03356  * |
| religion         | -0.5009  | 0.1798     | -2.786  | 0.00566  ** |

Opposition on subjective knowledge, controlling for religiosity (higher numbers = more religiosity):

|                  | Estimate | Std. Error | t value | Pr(>|t|) |
|------------------|----------|------------|---------|----------|
| (Intercept)      | 2.77073  | 0.2250     | 12.315  | <2e-16   *** |
| opposition       | 0.11694  | 0.04436    | 2.636   | 0.0088   ** |
| religion         | 0.09753  | 0.05678    | 1.718   | 0.0868   . |

Analyses with both Objective and Subjective Knowledge Simultaneously Predicting Opposition

The full set of objective knowledge items variable and subjective knowledge on opposition

|                  | Estimate | Std. Error | df  | t value | Pr(>|t|) |
|------------------|----------|------------|-----|---------|----------|
| (Intercept)      | 3.795864 | 0.385981   | 9.834| < 2e-16 *** |
| scilit           | -0.018976| 0.009598   | -1.977| 0.04891 * |
| subjective       | 0.208825 | 0.070126   | 2.978| 0.00313 ** |

Objective knowledge COVID subscale variable and subjective knowledge on opposition

|                  | Estimate | Std. Error | df  | t value | Pr(>|t|) |
|------------------|----------|------------|-----|---------|----------|
| (Intercept)      | 4.08239  | 0.42166    | 9.682| < 2e-16 *** |
| COVlit           | -0.05617 | 0.02195    | -2.559| 0.01096 * |
| subjective       | 0.20426  | 0.06980    | 2.927| 0.00368 ** |

Overall Analyses with Demographic Control Variables
Note that the effect of opposition on the dependent variables remains significant and in the same direction as the models reported in the main text.

Predicting Objective Knowledge

|                  | Estimate | Std. Error | df  | t value | Pr(>|t|) |
|------------------|----------|------------|-----|---------|----------|
| (Intercept)      | 11.17166 | 1.32075    | 8.459| 1.09e-15 *** |
| opposition       | -0.26829 | 0.14090    | -1.904| 0.057827 . |
| edu              | 0.90502  | 0.24992    | 3.621| 0.000343 *** |
| gender.binary    | 0.30269  | 0.54817    | 0.552| 0.581221 |
| age              | 0.04008  | 0.01796    | 2.231| 0.026373 * |
Predicting Subjective Knowledge

| Estimate | Std. Error | t value | Pr(>|t|) |
|----------|------------|---------|---------|
| (Intercept) | 2.819912 | 0.425410 | 6.629 1.51e-10 *** |
| opposition | 0.138616 | 0.045385 | 3.054 0.00245 ** |
| edu | -0.020850 | 0.080499 | -0.259 0.79580 |
| gender.binary | 0.248369 | 0.176565 | 1.407 0.16053 |
| age | 0.004155 | 0.005785 | 0.718 0.47320 |

STUDY 5 SURVEY QUESTIONS

Subjective knowledge

Perceptions of people’s own knowledge were measured with one question, “How would you rate your knowledge about COVID-19?” Responses were recorded on a sliding scale from 1 = Very poor knowledge to 10 = Very good knowledge, with the midpoint labeled Average knowledge.

Subjective knowledge of scientists

Perceptions of scientists’ knowledge were measured with one question, “How would you rate (in general) scientists' knowledge about COVID-19?” using the same scale as above.

Objective knowledge

The objective knowledge items consisted of twenty questions adapted from Rothmund et al. (64) that tapped into general knowledge of COVID-19 and seven questions generated from the scientific literature by M.V.G. that tapped into knowledge specifically of COVID-19 transmission. One knowledge question (“The numbers of people that have died from COVID-19 are artificially inflated”) was excluded from the analysis because the true answer is unknown. Responses were scored correct if participants selected “Yes, probably right” or “Yes, definitely right” for items that are true, and “No, definitely wrong” or “No, probably wrong” for items that are false.

Table S5: Objective Knowledge Questions in Study 5.

| Question                                                                 | True |
|--------------------------------------------------------------------------|------|
| Many claims have been made about COVID-19, some maybe true, others maybe false. In your opinion: 1 = No, definitely wrong, 2 = No, probably wrong, 3 = I am not sure, 4 = Yes, probably right, 5 = Yes, definitely right |      |
| Keeping distant to other people helps to slow the spread of COVID-19 (1) | True |
| It usually takes a few days from the moment of infection to the onset of disease (2) | True |
| Statement                                                                 | Correctity |
|--------------------------------------------------------------------------|------------|
| Washing one's hands thoroughly kills the novel coronavirus (3)           | True       |
| An infection with COVID-19 is only possible once, then the body is immune (4) | False      |
| Taking Ibuprofen or Aspirin can exacerbate COVID-19 (5)                  | False      |
| The novel coronavirus was unleashed in a laboratory in Wuhan and spread from there (6) | False      |
| With the proper diet, I can protect myself from being infected with COVID-19 (7) | False      |
| The spread of COVID-19 is affected by 5G wireless technology (8)         | False      |
| As long as I can hold my breath for 10 seconds without any difficulties, I am not infected with COVID-19 (9) | False      |
| To kill the coronavirus in its initial stage of infection, one should inhale hot air, for example from a hair dryer (10) | False      |
| The drug hydroxychloroquine has been proven to cure COVID-19 (11)        | False      |
| To prevent infection, one should gargle with a diluted solution of disinfectant, such as Clorox (12) | False      |
| 99 percent of the people infected with COVID-19 do not show any symptoms (13) | False      |
| If a person has no sign of infection, they are not contagious (14)       | False      |
| The numbers of people that have died from COVID-19 are artificially inflated (15) | Excluded from the analysis* |
| Overall, COVID-19 is not deadlier than seasonal flu (16)                 | False      |
| Young people with no pre-existing conditions can also die from COVID-19 (17) | True       |
| COVID-19 is more dangerous than seasonal flu (18)                       | True       |
The United States has the lowest death rate of COVID-19 in the world (19)  |  False  
Black and Hispanic communities have the highest rates of COVID-19 infections (20)  |  True  

What is your opinion about the following statements regarding COVID-19 transmission?
1 = No, definitely wrong, 2 = No, probably wrong, 3 = I am not sure, 4 = Yes, probably right, 5 = Yes, definitely right

| Statement                                                                 | Opinion  |
|---------------------------------------------------------------------------|----------|
| COVID-19 is transmissible via droplets through coughing, sneezing or intimate contact. (1) | True     |
| COVID-19 is transmissible via feces from an infected person, like when someone flushes the toilet (2) | True     |
| COVID-19 is transmissible via feces from an infected pet. (3) | False    |
| COVID-19 is transmissible via objects that have been contaminated by an infected person. (4) | True     |
| COVID-19 is transmissible through AC tubing from room to room, even with filters in place. (5) | False    |
| COVID-19 lingers in the air six or more hours after an infected person has been in a room (6) | False    |
| Wearing a mask only protects others if I am sick, it does not protect me from being infected (7) | False    |

* Although this item was in Rothmund et al.’s (64) battery and appeared in our survey, it does not have a known answer and so was omitted from the aggregate measure of objective knowledge.

**Opposition to COVID-19 mitigation policies**

Opposition to public health policies was measured by reverse coding thirteen items and calculating participant means across items:

**Table S6: Opposition to COVID-mitigating policies in Study 5.**
**Retrospective**: What was your agreement towards some of the major policy decisions that have been taken during this pandemic?

1 = *Strongly against*, 2 = *Against*, 3 = *Neither against or support*, 4 = *Support*, 5 = *Strongly support*

| Decision                                      | 1 | 2 | 3 | 4 | 5 |
|-----------------------------------------------|---|---|---|---|---|
| Closing all K-12 schools and universities    |   |   |   |   |   |
| Closing all bars and restaurants             |   |   |   |   |   |
| Closing all non-essential businesses         |   |   |   |   |   |
| Closing all parks                            |   |   |   |   |   |
| Forbidding all public gatherings (sports and culture) |   |   |   |   |   |
| Forbidding all non-necessary travel          |   |   |   |   |   |
| Imposing severe restrictions to people coming to the US from overseas |   |   |   |   |   |

**Prospective**: What would be your support towards the following policy measures, if implemented?

1 = *Strongly against*, 2 = *Against*, 3 = *Neither against or support*, 4 = *Support*, 5 = *Strongly support*

| Measure                                                                 | 1 | 2 | 3 | 4 | 5 |
|------------------------------------------------------------------------|---|---|---|---|---|
| State-wide mandate requiring people to wear masks all the time when in public? |   |   |   |   |   |
| State-wide mandate requiring people to get a coronavirus vaccine once one is available? |   |   |   |   |   |
| State-wide mandate requiring businesses to check the temperature of all people upon entering the premises? |   |   |   |   |   |
| State-wide mandate requiring self-reporting of all personal contacts for the last five days if diagnosed with COVID-19? |   |   |   |   |   |
| State-wide mandate requiring people entering from other states with higher infection rates to quarantine for 10 days? |   |   |   |   |   |
| State-wide mandate that makes a special exception allowing houses of worship to remain open? |   |   |   |   |   |

**Noncompliance with recommended preventive behaviors**

Noncompliance was measured by calculating participant means across six items:

**Table S7: COVID Noncompliance Measures from Study 5.**
How often have you taken the following measures to prevent infection with COVID-19?

1 = *Almost all the time*, 2 = *Fairly often*, 3 = *Sometimes*, 4 = *Not very often*, 5 = *Almost never*

| Measure                                                                 | Rating |
|------------------------------------------------------------------------|--------|
| Hand washing with soap for 20 seconds                                  |        |
| Avoiding touching your eyes, nose, and mouth with unwashed hands        |        |
| Use of disinfectants to clean hands when soap and water is not available for washing hands |        |
| Social distancing at 6ft or more from other people                     |        |
| Wiping mail and packages with disinfectant                              |        |
| Using a face mask when going out in public                              |        |
| Wiping groceries and other purchased items with disinfectant           |        |

Because Study 4 data was part of a larger investigation (before being integrated into the current manuscript), participants also answered questions about information source trust and use, risk perception, and various demographics.

**STUDY 5 ADDITIONAL ANALYSES**
Table S8: Objective and Subjective Knowledge Means (with Standard Errors) by Level of Opposition in Study 5.

| Opposition Bin | Objective Knowledge Mean | SE   |
|----------------|--------------------------|------|
| 1              | 0.55                     | 0.055|
| 2              | 0.75                     | 0.008|
| 3              | 0.68                     | 0.01 |
| 4              | 0.60                     | 0.011|
| 5              | 0.52                     | 0.011|

| Opposition Bin | Subjective Knowledge Mean | SE   |
|----------------|---------------------------|------|
| 1              | 7.25                      | 1.03 |
| 2              | 7.38                      | 0.12 |
| 3              | 6.82                      | 0.12 |
| 4              | 6.76                      | 0.15 |
| 5              | 8.05                      | 0.15 |
Political ideology

Countless experiments and surveys have found strong effects of political ideology on COVID-19 related behaviors (see Geana, Rabb, & Sloman, under revision). To ensure that the main effects reported here cannot be explained away by partisanship, we ran regressions similar to those reported in the main paper but with individuals’ reported ideology (1 = Very conservative, 2 = Moderately conservative, 3 = Somewhat conservative, 4 = Neither conservative nor liberal, 5 = Somewhat liberal, 6 = Moderately liberal, 7 = Very liberal) and the relevant interaction included. As the results of these analyses show, political ideology does account for substantial variance in judgments, as we would expect (with the exception of subjective knowledge with noncompliance as a predictor), but the patterns of main effects and directions remain for both independent variables and all three dependent variables.

Table S9: Regression Output for Models Controlling for Political Ideology in Study 5.

| DV: Objective knowledge | B    | SEM  | Standardized β | t      | Sig.  |
|-------------------------|------|------|----------------|--------|-------|
| Policy opposition       | -0.056 | 0.011 | -0.385        | -4.993 | <.001 |
| Political ideology      | 0.018 | 0.008 | 0.232         | 2.148  | .032  |
| Policy opposition x political ideology | 0.001 | 0.003 | 0.044         | 0.555  | .579  |

| DV: Subjective knowledge | B    | SEM  | Standardized β | t      | Sig.  |
|--------------------------|------|------|----------------|--------|-------|
| Policy opposition        | 0.817 | 0.161 | 0.479         | 5.071  | <.001 |
| Political ideology       | 0.461 | 0.118 | 0.516         | 3.913  | <.001 |
| Policy opposition x political ideology | -0.186 | 0.038 | -0.468       | -4.896 | <.001 |

| DV: Knowledge difference score | B    | SEM  | Standardized β | t      | Sig.  |
|--------------------------------|------|------|----------------|--------|-------|
| Policy opposition             | -0.819 | 0.100 | -0.655        | -8.197 | <.001 |
A different way that political ideology could explain away the results is if the items used to measure objective knowledge were written to lure liberals to agree and conservatives to disagree. Although we excluded one especially charged item (“The numbers of people that have died from COVID-19 are artificially inflated”) because it has no determinate answer, it is possible that others could have created a demand characteristic that would unfairly suggest differential knowledge. This cannot fully explain the results since they hold when controlling for political ideology, but it could account for some of the variance in judgments. To examine this possibility, we first calculated correlations between objective knowledge items (correct) and political ideology. Coefficients ranged from -.002 (“Taking Ibuprofen or Aspirin can exacerbate COVID-
19") to .58 ("The drug hydroxychloroquine has been proven to cure COVID-19"). We then created a non-politicized objective knowledge measure collapsing across only the items for which the correlation with ideology was small to nonexistent using Cohen’s rule of thumb ($r < .2$). Non-politicized objective knowledge showed the same relationships reported in the main paper: as opposition to policies consistent with the scientific consensus increased, this measure decreased ($\beta_{\text{opposition}} = -22, t(692) = -5.9, p < .001$), and noncompliance with preventive behaviors had the same effect ($\beta_{\text{opposition}} = -.23, t(692) = -6.18, p < .001$).

**Excluding participants showing the strongest agreement**

Studies 1–4 measured opposition to the scientific consensus with single questions and excluded participants who were in complete agreement with the consensus. Study 5 operationalized opposition using composite measures of multiple scales, so the number of participants showing complete agreement by this criterion (selecting the highest scale point for every question) was small. Still, we may ask whether the results of Study 5 hold up when excluding those who were in near-complete agreement. The analyses below are identical to those reported in the main paper but with all participants whose mean opposition or noncompliance scores were less than 2, i.e. those who responded 1 or 2 on every question. Again, the main effects and directions are the same.

**Table S10: Regression Output for Robustness Check Models Excluding Participants with the Strongest Agreement with Scientific Consensus Positions.**

| DV: Objective knowledge | B     | SEM  | Standardized $\beta$ | $t$     | Sig.  |
|-------------------------|-------|------|-----------------------|---------|-------|
| Policy opposition       | -0.083| 0.007| -0.477                | -12.264 | <.001 |

| DV: Subjective knowledge | B     | SEM  | Standardized $\beta$ | $t$     | Sig.  |
|--------------------------|-------|------|-----------------------|---------|-------|
| Policy opposition        | 0.616 | 0.092| 0.285                 | 6.694   | <.001 |

| DV: Knowledge difference score | B     | SEM  | Standardized $\beta$ | $t$     | Sig.  |
|-------------------------------|-------|------|-----------------------|---------|-------|
| Policy opposition             | -0.870| 0.060| -0.545                | -14.610 | <.001 |

| DV: Objective knowledge      | B     | SEM  | Standardized $\beta$ | $t$     | Sig.  |
|------------------------------|-------|------|-----------------------|---------|-------|
| Noncompliance with preventive measures | -0.101| 0.008| -0.483                | -11.982 | <.001 |
Table S11: Overall Analyses with both Objective and Subjective Knowledge Simultaneously Predicting Opposition (Policy Opposition and Noncompliance with Preventive Measures in Separate Models) in Study 5.

| DV: Subjective knowledge | B      | SEM   | Standardized β | t      | Sig.  |
|--------------------------|--------|-------|----------------|--------|-------|
| Noncompliance with preventive measures | 0.564  | 0.114 | 0.222          | 4.926  | <.001 |

| DV: Knowledge difference score | B      | SEM   | Standardized β | t      | Sig.  |
|-------------------------------|--------|-------|----------------|--------|-------|
| Noncompliance with preventive measures | -0.952 | 0.076 | -0.502         | -12.568| <.001 |

Table S12: Overall Study 5 Regression Output with Demographic Control Variables.

Predicting Objective Knowledge
### Predicting Subjective Knowledge

| Model | Unstandardized Coefficients | Standardized Coefficients |
|-------|-----------------------------|---------------------------|
|       | B | Std. Error | Beta | t | Sig. |
| 1     | (Constant) | .725 | .027 | 26.913 | .000 |
|       | mean_policy_opposition | -.081 | .005 | -.564 | -15.811 | .000 |
|       | How old are you? | .001 | .000 | .077 | 2.117 | .035 |
|       | gender_dummy_coded_female | -8.363E-5 | .010 | .000 | -.008 | .994 |
|       | How many years of education have you completed? | .025 | .004 | .207 | 5.964 | .000 |

a. Dependent Variable: objective_knowledge

### Predicting Subjective Knowledge

| Model | Unstandardized Coefficients | Standardized Coefficients |
|-------|-----------------------------|---------------------------|
|       | B | Std. Error | Beta | t | Sig. |
| 1     | (Constant) | 4.984 | .370 | 13.459 | .000 |
|       | mean_policy_opposition | .101 | .066 | .059 | 1.528 | .127 |
|       | How old are you? | .025 | .003 | .322 | 7.517 | .000 |
|       | gender_dummy_coded_female | .014 | .141 | .004 | .098 | .922 |
|       | How many years of education have you completed? | .144 | .059 | .099 | 2.465 | .014 |

a. Dependent Variable: How would you rate your knowledge about COVID-19? - Knowledge about COVID-19