Online Appendix

Correcting Consumer Misperceptions About CO_2 Emissions

Taisuke Imai Davide D. Pace
Peter Schwardmann Joël J. van der Weele

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A Climate Survey

A.1 Design Details

A.1.1 Consumer Products and Activities

Table A.1: Comments on the calculation of CO_2 emissions.

Product	Comment
Beer	It takes into account all emissions, from production to distribution of the product to the consumer.
Phone call	It takes into account the emissions generated to operate the phone and the communication network.
Microwave	It takes into account only the emissions generated by the power plants that produce the energy used by the microwave.
Milk	It takes into account all emissions, from production to distribution of the product to the consumer.
Egg	It takes into account all emissions, from production to distribution of the product to the consumer.
Poultry meat	It takes into account all emissions, from production to distribution of the product to the consumer.
Shower	It takes into account the emissions generated by warming up the water, as well as all the emissions associated with water delivery and cleaning.
Chocolate	It takes into account all emissions, from production to distribution of the product to the consumer.
Coffee	It takes into account all emissions, from production to distribution of the product to the consumer.
Beef	It takes into account all emissions, from production to distribution of the product to the consumer.
Flight	It takes into account only the emissions generated by burning the plane's fuel.
Gas heating	It is the average of the estimates of 10 different carbon footprint calculators.

A.1.2 Elicitation Interface

We explain the interface and several measures we took to ensure the highest possible data quality in the survey.

Point estimates of the emission sizes. When asking about the CO_2 emissions generated by driving, we allowed the participants to express their guesses either in ounces or grams so they could use the more familiar unit of measure (Figure A.1).

For all the other products, we elicited the point estimates on a single interface that allowed the participants to go back and modify their previous answers easily. The order of the products on the interface was randomized at the individual level.

The 12 questions were graphically displayed (Figure A.2). The product in each question was represented by clip art, below which the name of the product and its size appeared. The participants could see which emissions were taken into account by the scientific estimate by hovering the mouse cursor on an info icon ⓘ shown above each question. The list of products, their amount, and the emissions to be considered were all described in the instructions as well.

The participants' answers were summarized in an interactive box displayed at the bottom of the page. The box appeared as soon as a participant filled in the first question on the screen and it stayed visible until the moment the participant confirmed his/her answers. The "Confirm" button appeared inside the summary box to draw the participant's attention to the box itself.

The summary box showed a participant's guesses graphically on a line. Crucially, we designed the line to avoid any anchoring effects. No number appeared on it if the participant had not entered any guesses. Moreover, the scale of the line adjusted dynamically depending on the highest guess.

Belief distribution. The elicitation interface showed the name and the quantity of the product and reminded the participants of their point estimates. The participants could see which emissions were taken into account by the scientific estimate, by hovering the mouse cursor on an info icon ⓘ.

The interface displayed five bins for each question (Figure A.3). The participant's point estimate for the product, call it m, was taken as the midpoint of the central bin. The central bin covers numbers from $0.95m$ to $1.05m$. The two bins on both sides of the central bin cover numbers from $0.85m$ to $0.95m$ and from $1.05m$ to $1.15m$. Finally, the farthest two bins cover numbers below $0.85m$ and above $1.15m$, respectively.

The interface showed a box containing the 20 balls the participants had to allocate among the bins. The participants could move the balls to a bin by (i) moving a slider below the bin, (ii) directly typing the number of balls they wanted to move in a text field below the bin, or (iii) clicking on the arrows next to the text field. The participants could move all the balls back to the box by pressing the button "Reset".

Willingness to mitigate. The participants indicated their WTMs using sliders (Figure A.4). In each of the eight questions, the current value of the slider was indicated both in £ and in $. The participants could also directly type their WTM in the text fields below the slider.

The interface was designed to (i) not anchor participants' answers and (ii) help participants make consistent choices. To achieve the first objective, the sliders had no default value, and the participants had to click on the slider for a cursor to appear. Moreover, all the sliders were presented on the same page, and they all ranged from £0 to £100. To achieve the second objective, we designed the interface in the following way.

(i) We showed the sliders in increasing order of emission sizes and they were aligned vertically.

(ii) We made sure that more than one slider was visible on the page simultaneously so that participants could see their answers to the other questions.

(iii) We displayed a summary box at the bottom of the page, which showed the participant's answers on a line ranging from £0 to £100. If two or more responses were identical or close to each other, the label position was vertically adjusted to avoid overlapping.

(iv) We placed the "Submit" button inside the summary box to draw the participant's attention to the summary. The button appeared only after the participant entered his/her WTM for all eight emission levels.

Additional measures. At the beginning of the experiment, we explicitly asked the participants not to use external help while taking the survey. We implemented a "Google trap" to check whether the participants complied with this request. The trap consists of three questions about climate-related facts that are hard to know by heart but that are easily googlable. We rewarded each correct answer with an additional £0.20 bonus. This bonus is paid for sure, making the incentives stronger than the incentives to report the point beliefs at the beginning of the survey.[1]

Only 47 participants answered all three questions with values close to the ones that could be found on Google or Wikipedia at the time (call them Google answers for brevity); another 132 and 214 participants reported two or one answer(s) close to the Google answers, respectively. Finally, 629 participants reported responses that were always far from the Google answers. We conclude that Googling was not widespread during the survey. We verified that excluding the 179 subjects who reported two or more answers close to the Google answers does not change our qualitative results.

[1]There is a 1.6% chance that any of the 12 point belief questions is selected for payment. Hence, the expected earning from answering such a question correctly is £0.07.

As a final quality check, at the end of the survey, we asked the participants whether we should use their answers in the analysis or we should discard their data because they were not attentive during the survey, Only 21 participants out of 1,022 indicated we should not use at least some of their answers. Excluding these participants does not change our results.

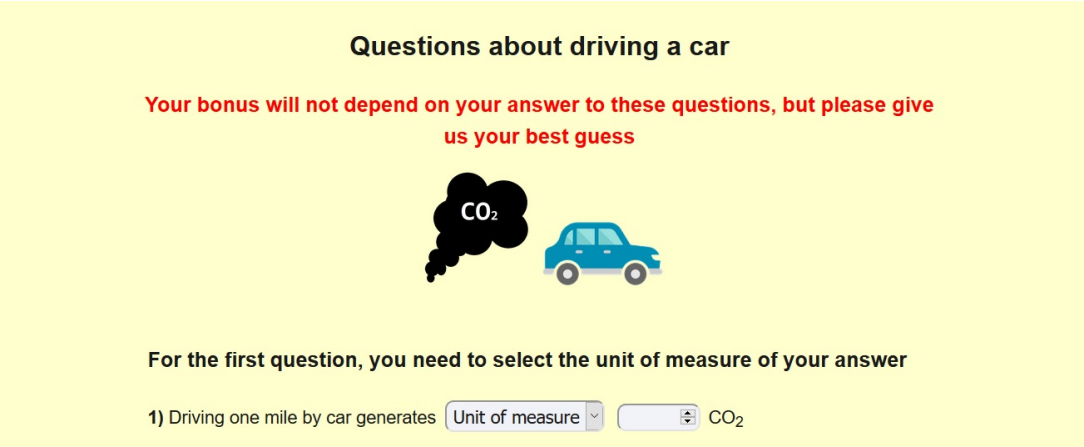


Figure A.1: Beliefs about CO_2 emissions from driving one mile by car.

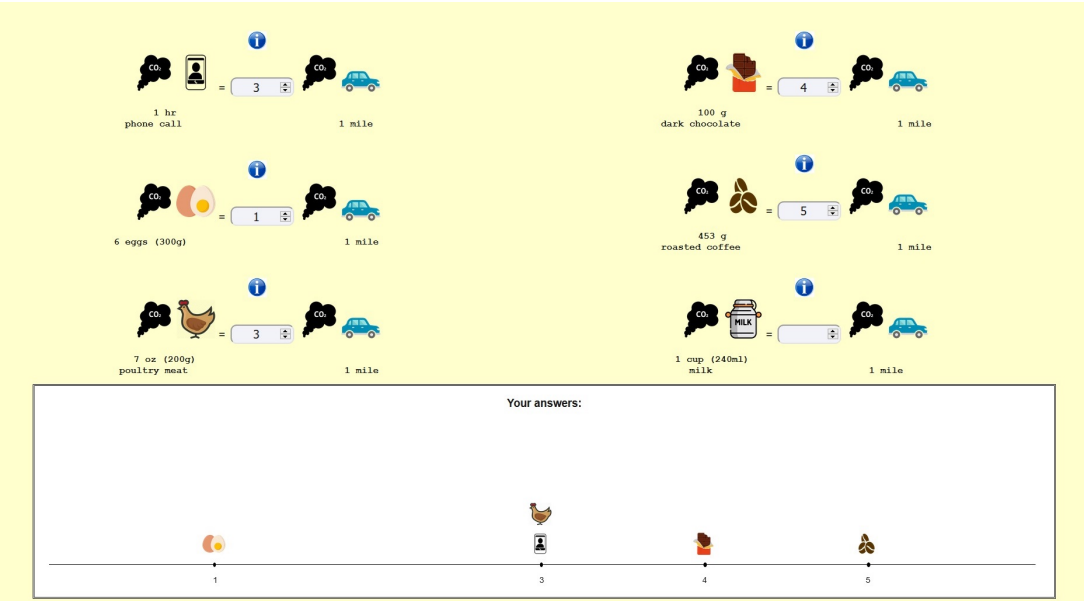


Figure A.2: Beliefs about CO_2 emissions from consumer products and activities.

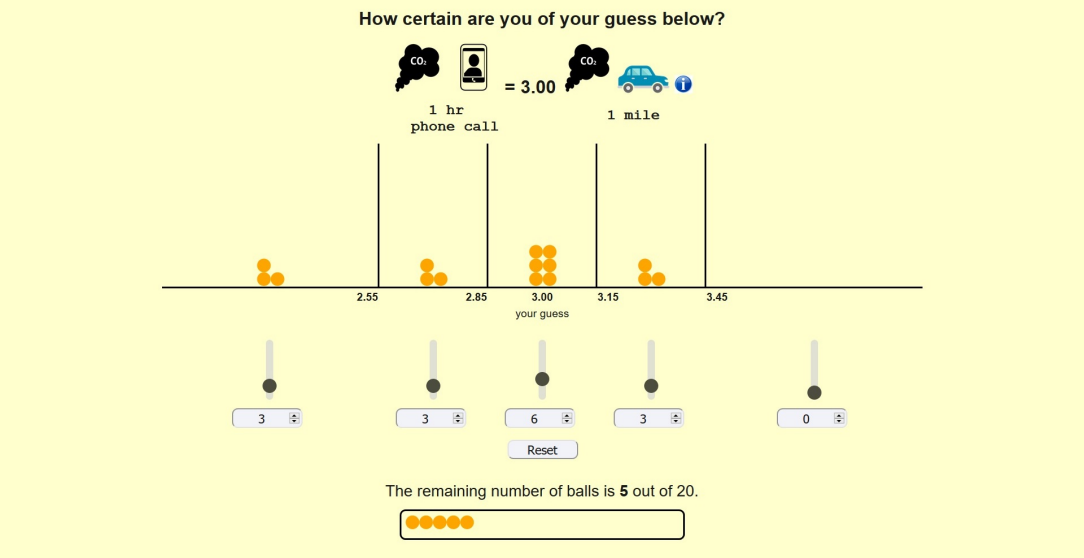


Figure A.3: Belief distribution.

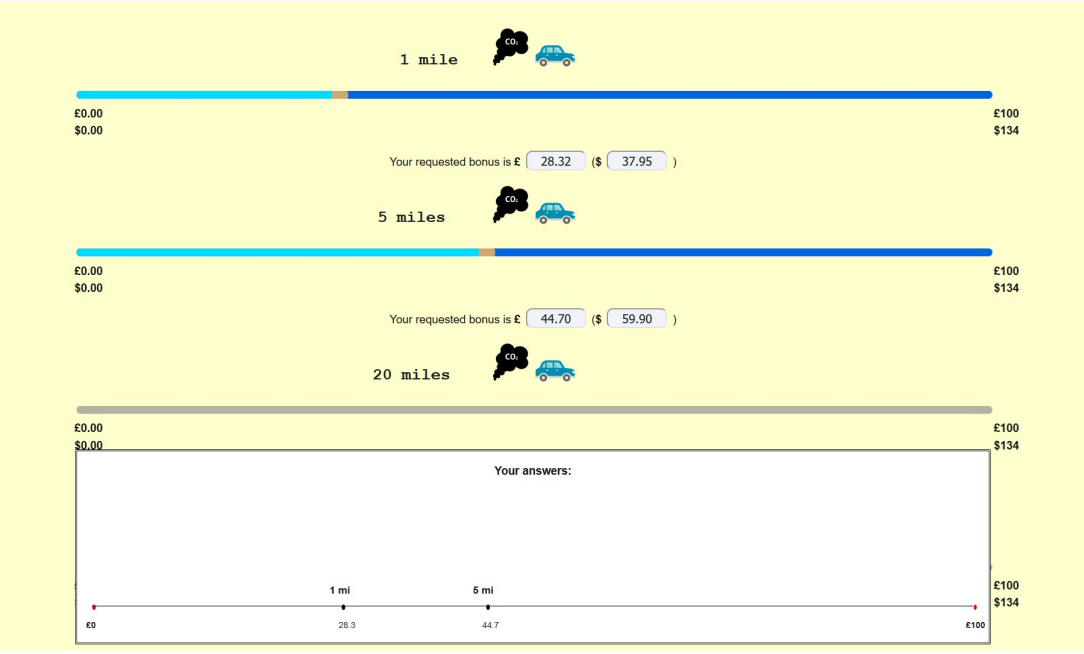


Figure A.4: Willingness to mitigate.

Information about CO_2 emissions

Below you can find the information for some of the products you encountered in this study. In Session 2 you will find the information for the remaining products.

Please copy the name and the CO_2 emissions of each product into the relevant blank spaces.

If you are using a mobile device, this page is better seen keeping the screen horizontally

Product	Actual emissions	Your guess	Copy actual emissions	Source
1 can (360ml) beer = ? 1 mile	1.5	5.00	Product name ▾ ____ miles	Poore, J., & Nemecek, T. (2018) Science
1 hr phone call = ? 1 mile	1.6	1.00	Product name ▾ ____ miles	Smith, A. J. B. et al. (2009) Tobacco Control

Figure A.5: Information provision in Session 1.

Memory Test

Please try to remember the CO_2 emissions of each of the products below.

You will earn an additional bonus of £0.2 for each correct answer.

1 hr phone call = ____ 1 mile

1 can (360ml) beer = ____ 1 mile

1 cup (240ml) milk = ____ 1 mile

Figure A.6: Short-term memory task in Session 1.

Figure A.7: Information provision in Session 2.

A.1.3 Survey Questions

Questions asked in Part 1

Page 1/2: Climate change

1. How much higher was the average global temperature in 2017 compared to the average in the pre-industrial era (1870-1900)? [ ] [°C / °F].
2. Compare the consequence of a 1.5°C and a 2°C increase in global temperature. How many more million people will be exposed to extreme heatwaves at least once every 5 years with an increase of 2°C? [ ] million.
3. Compare the consequence of a 1.5°C and a 2°C increase in global temperature. How many more million people will be exposed to the impacts of sea-level rise globally in 2100 with an increase of 2°C? [ ] million.

Page 2/2: Driving a car

1. Driving one mile by car generates [g / oz] of [ ] CO_2.
2. The social cost of carbon takes into account all future cost to humans of a given amount of CO_2 emissions today. The scientific estimate for the social cost of driving one mile by car is $ [ ].
3. Some people think scientists either over- or underestimate the social cost of carbon. Please give us your best guess of the social cost of driving one mile by car. I think that the social cost is $ [ ].

Survey questions at the end of Session 1

Page 1/5: Demographic information

1. Age
2. Gender
   Male; Female; Other
3. Ethnicity
   White; Black; Asian; Mixed; Other
4. In which state do you live?
5. What are the first 5 digits of your ZIP code?
6. Generally speaking, where do you place yourself on the Liberal-Conservative political spectrum?
   Liberal; Somewhat Liberal; Somewhat Conservative; Conservative

7. Generally speaking, how do you consider yourself?
   A Republican; A Republican-leaning Independent; Independent; A Democrat-leaning Independent; A Democrat

8. What is the highest level of school you have completed or the highest degree you have received?
   Less than high school degree; High school degree; Some University but no degree; Bachelor's degree; Postgraduate degree

9. How much total combined money did all members of your household earn last year?
   Below $5,000; $5,000 to $15,000; $15,000 to $30,000; $30,000 to $45,000; $45,000 to $60,000; $60,000 to $75,000; $75,000 to $90,000; $90,000 to $105,000; $105,000 to $120,000; $120,000 to $135,000; $135,000 to $150,000; $150,000 and up

10. Which device are you using to complete this session?
    Phone; Tablet; Laptop or Desktop

11. Do you trust that the researchers will indeed buy CO_2 offsets as described in the instructions?
    1 - Not at all; 2; 3; 4; 5 - Completely

12. Did you encounter any problem with the way the pages of the experiment were displayed? If so please indicate the model of your device, the browser you are using, and the problem you encountered.

13. Was there anything in the instructions that was unclear or do you have any other feedback?

Page 2/5: Current consumption, intention to reduce future consumption, and difficulty in reducing consumption (for all 12 products)

1. How many hours do you spend making phone calls from a cell phone per week?

2. Do you intend to reduce your call consumption in light of its CO_2 emissions?
   No.; Yes, I am prepared to reduce the time I spend on the phone by about 10%.; Yes, I am prepared to reduce the time I spend on the phone by about 25%.; Yes, I am prepared to reduce the time I spend on the phone by about 50%.; Yes, I am prepared to reduce the time I spend on the phone by more than 50%.

3. How difficult would it be to reduce the time you spend on the phone by half?
   Not applicable, I am not consuming this product.; Very easy.; Easy.; Neither easy nor difficult; Difficult.; Very difficult.

Notes: Similar questions were asked for all 12 products.

Page 3/5: Climate change knowledge

"Climate change, which includes global warming, is widely seen as a significant issue today. We are often asked to make changes in our lives that will lessen climate change. However, there may be reasons leading us to choose not to make changes."

1. How well-informed do you consider yourself on the issue of climate change?
   1 - Not informed; 2; 3; 4; 5 - Completely informed;

2. To what extent do you believe human activity is contributing to climate change?
   1 - Not at all; 2; 3; 4; 5 - A lot

3. How severe do you consider the problem of climate change?
   1 - Not a problem; 2; 3; 4; 5 - A huge problem

4. How soon should climate change be dealt with?
   1 - Never; 2; 3; 4; 5 - Immediately

5. Have you changed your actions, at least partly, due to consideration of climate change?
   No; Yes

6. If you answer Yes to the last question. How much has climate change been a factor in changing your actions?
   1 - A minor factor; 2; 3; 4; 5 - A major factor

7. How influential have the following factors been in shaping your own decisions about actions that might affect climate change?
   1 - Not influential; 2; 3; 4; 5 - Very influential

   (a) The monetary cost of changing my actions.

   (b) The availability of options for change.

   (c) The inconvenience of options for change.

   (d) Fitting changes in with family and others.

   (e) Lack of knowledge about possible changes I can make.

   (f) Uncertainty about the best option to contribute to reducing climate change.

   (g) Uncertainty as to whether climate change is a significant problem.

   (h) Select option 4 in this question. [Attention check]

   (i) The feeling that my actions will not affect the outcome of climate change.

   (j) Feeling that other individuals will not change their actions even if I do.

   (k) Other countries or people not taking equivalent action currently.

(l) Feeling that government policies, like carbon taxes, should be used to fix climate change, not individual action.

Page 4/5: Covid-19

1. Have you or someone in your close family suffered severe physical symptoms due to a Covid-19 infection?
   No; Yes

2. How worried are you that you or someone in you close family will get infected with Covid-19?
   1 - Not worried; 2; 3; 4; 5 - Very worried

3. Have you incurred personal economic losses due to Covid-19?
   No; Yes

4. How worried are you about the future economic impact that Covid-19 will have on your personality?
   1 - Not worried; 2; 3; 4; 5 - Very worried

5. How much do you think unemployment in your country increased due to Covid-19?

6. How long do you think the economic depression/recession in your country induced by Covid-19 will last?

Page 5/5: Self-reported data quality
"For the success of this study, it is essential that we analyze only those responses that have been dully answered. Therefore, we would like to know if you answered the questions attentively and in an honest way. Your answers here will not compromise your approval and bonus. Should we use your answers for the following parts of the experiment?"

1. Questions about the size of CO_2 emissions (Parts 1, 2, and 3)
   Yes, I paid attention to this part of the study and you should use my answers.; No, I didn't pay much attention to this part of the study and you should not use my answers.

2. Questions about getting a bonus vs emitting CO_2 (Part 4)
   Yes, I paid attention to this part of the study and you should use my answers.; No, I didn't pay much attention to this part of the study and you should not use my answers.

3. Final questionnaire
   Yes, I paid attention to this part of the study and you should use my answers.; No, I didn't pay much attention to this part of the study and you should not use my answers.

Survey questions at the end of Session 2

Page 1/3: Trust

1. The information provided about CO_2 emissions in Session 1 reflects the best scientific knowledge on the topic. *1 - Completely disagree; 2, 3; 4; 5 - Completely agree*

2. The scientific estimates in the original survey reflect the actual CO_2 emissions of the different consumption activities. *1 - Completely disagree; 2, 3; 4; 5 - Completely agree*

Page 2/3: Consumption pattern after Session 1 (for all 12 products)

"Have you reduced the time you spend on the phone after filling out our initial survey (Session 1 of this study)?

No.; Yes, I spend on the phone about 90% of the time I otherwise would.; Yes, I spend on the phone about 75% of the time I otherwise would.; Yes, I spend on the phone about 50% of the time I otherwise would.; Yes, I spend on the phone less than 50% of the time I otherwise would.

Notes: Similar questions were asked for all 12 products.

Page 3/3: Self-reported data quality

"For the success of this study, it is essential that we analyze only those responses that have been dully answered. Therefore, we would like to know if you answered the questions attentively and in an honest way. Your answers here will not compromise your approval and bonus. Should we use your answers for the following parts of the experiment?"

1. Questions about the size of CO_2 emissions (Parts 5 and 6)
   Yes, I paid attention to this part of the study and you should use my answers.; No, I didn't pay much attention to this part of the study and you should not use my answers.

2. Questions about the new scientific estimates (Part 7)
   Yes, I paid attention to this part of the study and you should use my answers.; No, I didn't pay much attention to this part of the study and you should not use my answers.

3. Final questionnaire
   Yes, I paid attention to this part of the study and you should use my answers.; No, I didn't pay much attention to this part of the study and you should not use my answers.

A.2 Additional Results

A.2.1 Demographic Characteristics

Table A.2: Demographic characteristics.

Age		
18-27	204	0.200
28-37	235	0.230
38-47	177	0.173
48-57	166	0.162
58+	240	0.235
Gender		
Female	516	0.505
Male	494	0.483
Other	12	0.012
Ethnicity		
Asian	68	0.067
Black	135	0.132
White	765	0.749
Mixed	29	0.028
Other	25	0.024
Party affiliation		
Republican	152	0.149
Republican leaning independent	67	0.066
Independent	205	0.201
Democratic leaning independent	144	0.141
Democratic	452	0.443
Political orientation		
Conservative	101	0.099
Somewhat conservative	225	0.221
Somewhat liberal	318	0.312
Liberal	376	0.369
Education		
Less than high school	8	0.008
High school degree	109	0.107
Some University but no degree	286	0.280
Bachelor Degree	370	0.363
Postgradute degree	247	0.242
Household income		
- $5,000	26	0.025
$5,000 - $15,000	67	0.066
$15,000 - $30,000	129	0.126
$30,000 - $45,000	130	0.127
$45,000 - $60,000	137	0.134
$60,000 - $75,000	114	0.112
$75,000 - $90,000	90	0.088
$90,000 - $105,000	80	0.078
$105,000 - $120,000	88	0.086
$120,000 - $135,000	30	0.029
$135,000 - $150,000	37	0.036
$150,000 -	92	0.090

Notes: 1,022 participants completed Session 1.

Table A.3: Representativeness of the sample.

	Sample	Population	
Age			
18-27	0.200	0.172	
28-37	0.230	0.176	
38-47	0.173	0.160	
48-57	0.162	0.162	$\chi^2(4) = 50.429$
58+	0.235	0.330	$p < 0.001$
Gender			
Female	0.511	0.504	$\chi^2(1) = 0.2049$
Male	0.489	0.496	$p = 0.6508$
Ethnicity			
Asian	0.070	0.064	
Black	0.139	0.142	$\chi^2(2) = 0.6198$
White	0.790	0.794	$p = 0.7335$

Notes: Population-level data is retrieved from US Census Bureau (2022).

A.2.2 Beliefs about CO_2 Emissions

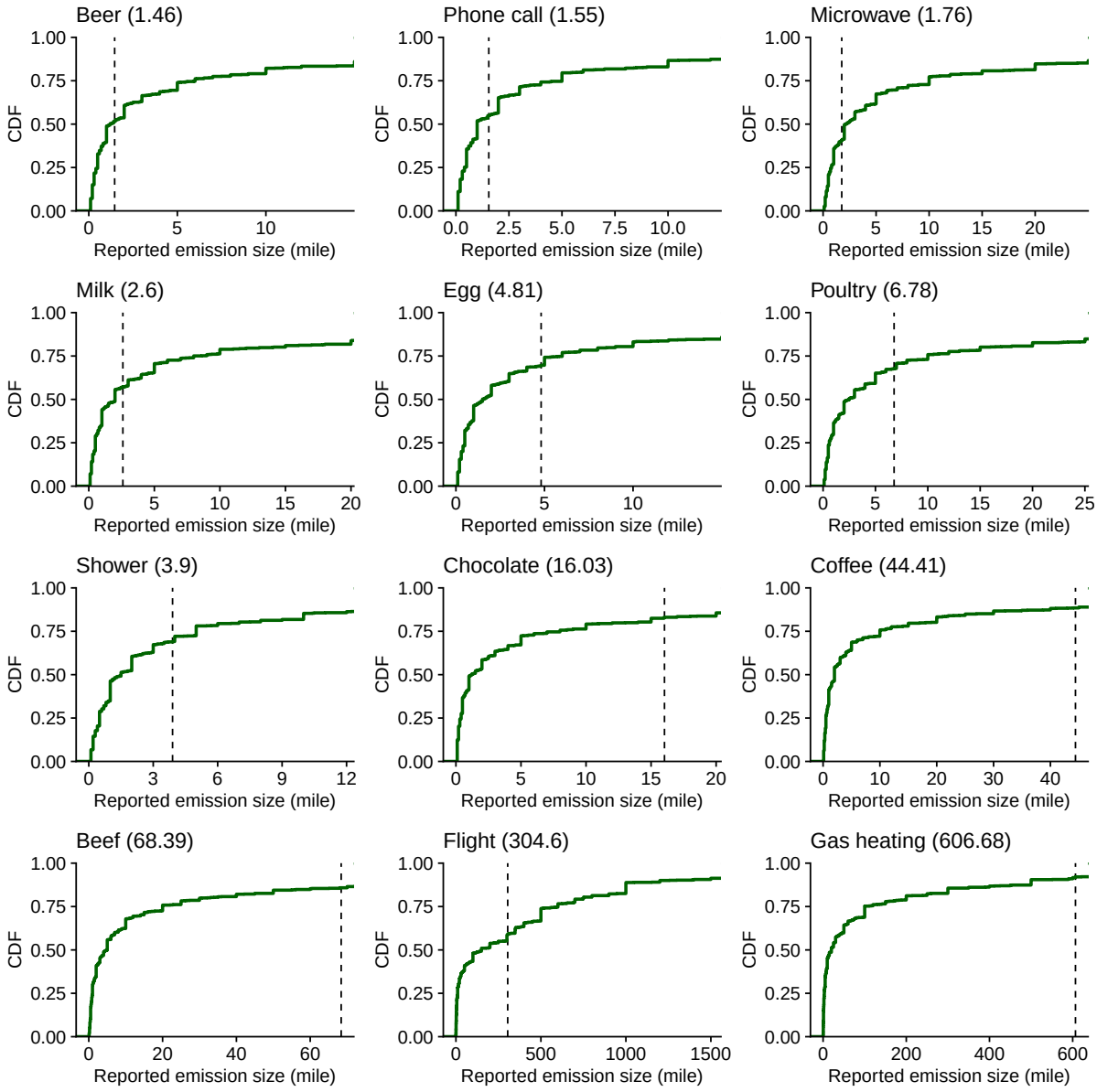


Figure A.8: Empirical CDFs of beliefs about CO_2 emissions. *Notes*: Vertical dashed lines indicate "true" emission sizes (numbers in parentheses). The x-axis is cut at the larger of the true emission size and the bound $\text{Q3} + 1.5 \times \text{IQR}$.

Table A.4: Summary statistics of elicited (point) beliefs about CO_2 emissions (in kilograms) from 12 consumer products and activities. Cf. Table 2.

		Belief			
Product	Emissions	Q1	Median	Q3	Under-est.
Beer	0.425	0.007	0.100	0.851	0.67
Phone call	0.451	0.006	0.082	0.648	0.71
Microwave	0.512	0.011	0.191	1.494	0.62
Milk	0.757	0.009	0.112	1.232	0.69
Shower	1.135	0.007	0.100	0.800	0.79
Egg	1.400	0.007	0.121	1.000	0.78
Poultry	1.973	0.010	0.192	1.814	0.75
Chocolate	4.665	0.007	0.090	1.000	0.85
Coffee	12.923	0.009	0.142	1.417	0.90
Beef	19.901	0.020	0.271	2.835	0.87
Flight	88.639	0.300	5.670	98.129	0.75
Gas heating	176.544	0.060	1.000	15.444	0.93

Notes: The last column "Under-est." shows the fraction of participants who underestimated the size of emissions.

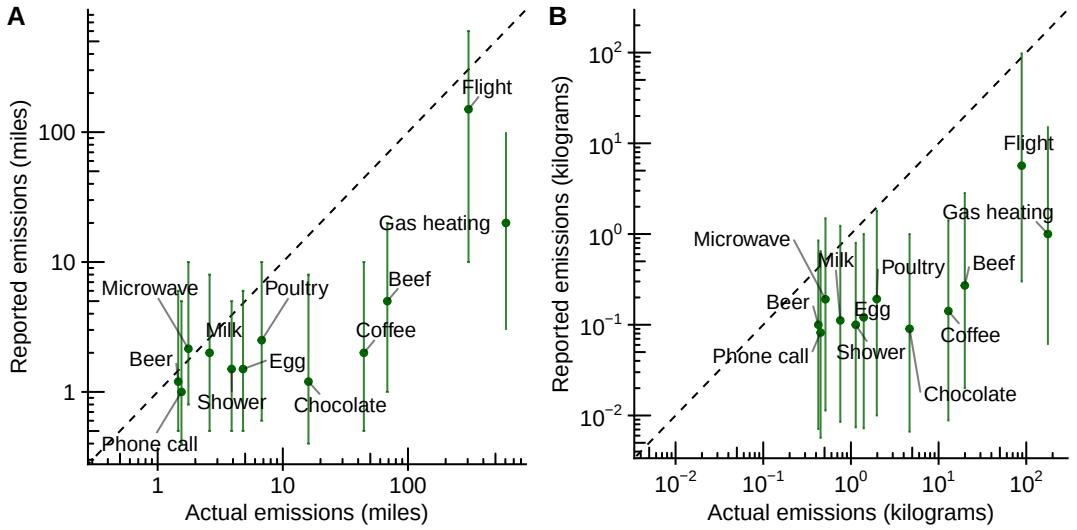


Figure A.9: Summary statistics of reported CO_2 emissions in (A) miles and (B) kilograms. *Notes*: Medians and IQRs are plotted on a logarithmic scale. The actual amount of CO_2 emissions from driving one mile by car is 291 grams. The participants' beliefs about CO_2 emissions from driving one mile by car were elicited in Part 1 of the study.

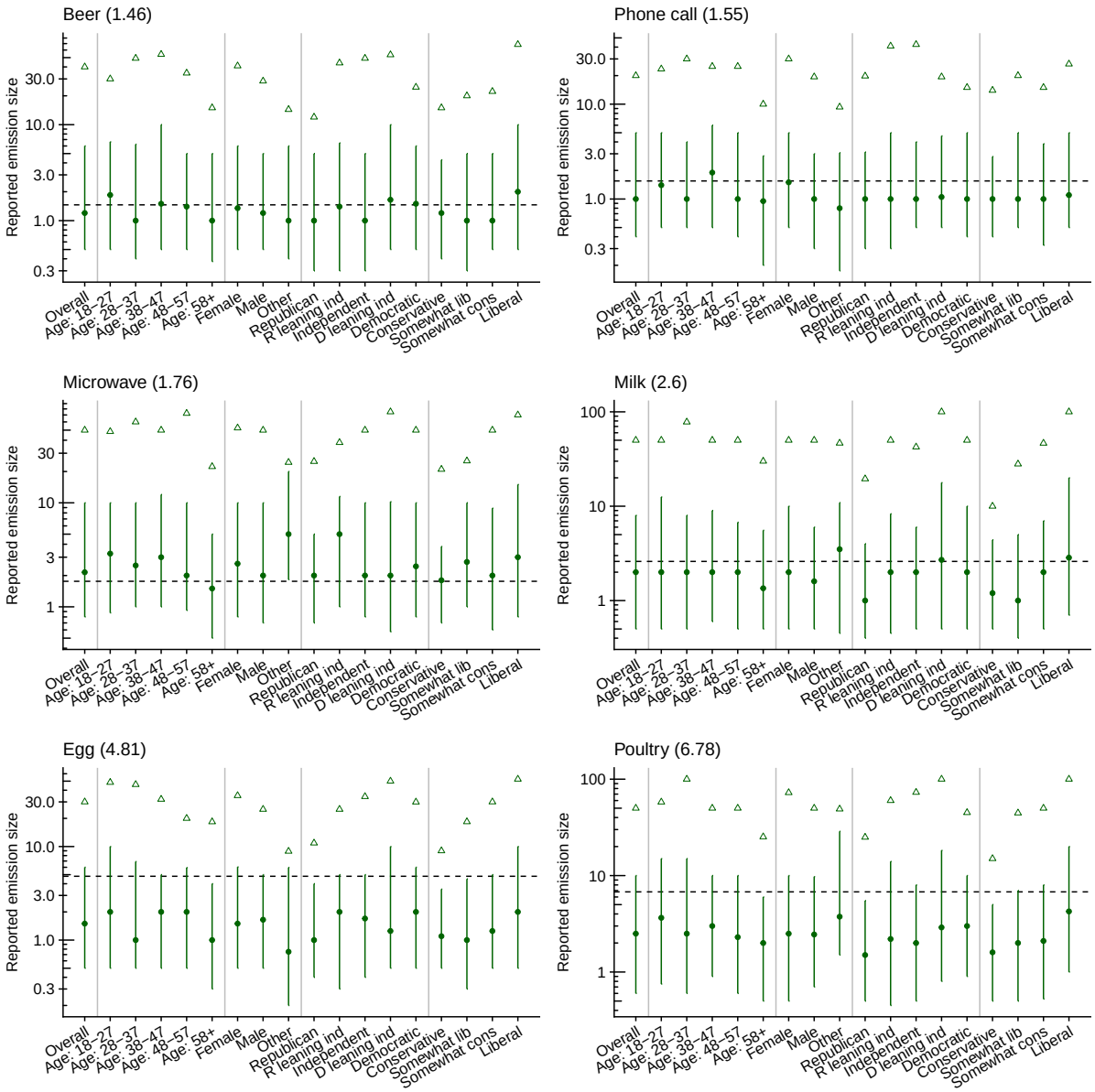


Figure A.10: Heterogeneity of beliefs about CO_2 emissions. *Notes*: Horizontal dashed lines mark the true emission levels (values shown in parentheses). Dots represent medians, horizontal bars indicate the interquartile range (IQR), and triangles denote the 90th percentile.

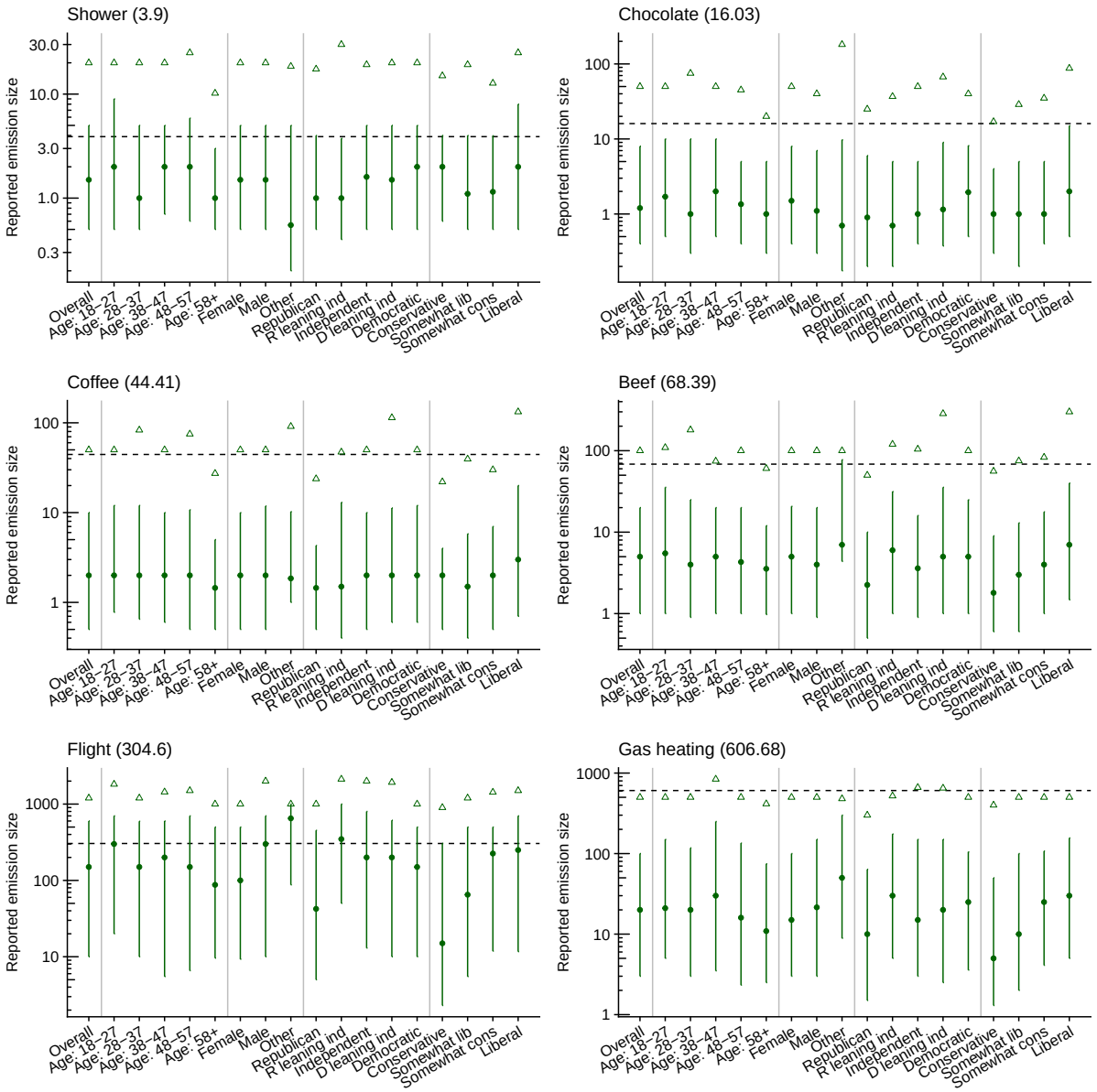


Figure A.10: Heterogeneity of beliefs about CO_2 emissions. *Notes*: Horizontal dashed lines mark the true emission levels (values shown in parentheses). Dots represent medians, horizontal bars indicate the interquartile range (IQR), and triangles denote the 90th percentile.

Table A.5: Quantile regression estimates of demographic effects on reported beliefs.

	(1) Beer	(2) Phone call	(3) Microwave	(4) Milk	(5) Egg	(6) Poultry
Age: 28-37	−0.700	−0.200	−1.000	−0.400	−0.800	−1.000
	(0.459)	(0.311)	(0.759)	(0.661)	(0.484)	(0.773)
Age: 38-47	−0.200	0.300	0.000	−0.200	0.000	−0.500
	(0.468)	(0.387)	(0.833)	(0.687)	(0.509)	(0.812)
Age: 48-57	−0.400	−0.200	−1.000	−0.400	0.000	−0.700
	(0.453)	(0.352)	(0.679)	(0.764)	(0.580)	(0.761)
Age: 58+	−0.800	−0.700	−2.000**	−0.400	−0.800	−1.500
	(0.389)	(0.303)	(0.708)	(0.638)	(0.456)	(0.673)
Gender: Male	−0.100	−0.500**	−0.600	0.000	0.200	0.000
	(0.219)	(0.180)	(0.362)	(0.301)	(0.278)	(0.399)
Gender: Other	−0.800	−0.900	1.400	1.000	−0.200	0.000
	(2.097)	(1.026)	(39.606)	(4.248)	(1.672)	(8.969)
Liberal	0.200	0.000	0.000	1.000***	0.400	1.500***
	(0.257)	(0.130)	(0.331)	(0.287)	(0.284)	(0.442)
Constant	1.800***	1.700***	3.600***	1.400	1.600**	2.500***
	(0.414)	(0.339)	(0.722)	(0.668)	(0.505)	(0.712)
Observations	1,020	1,020	1,020	1,020	1,020	1,020

	(7) Shower	(8) Chocolate	(9) Coffee	(10) Beef	(11) Flight	(12) Gas heating
Age: 28-37	−1.000***	−0.700	−0.500	−2.000	−50.000	0.000
	(0.291)	(0.454)	(0.573)	(1.529)	(66.380)	(7.284)
Age: 38-47	0.000	−0.200	0.000	−0.600	−50.000	7.600
	(0.499)	(0.464)	(0.711)	(1.514)	(59.958)	(9.413)
Age: 48-57	0.000	−0.300	−0.500	−1.600	−50.000	−1.300
	(0.419)	(0.508)	(0.619)	(1.484)	(67.237)	(9.074)
Age: 58+	−1.000***	−0.800	−1.000	−1.600	−95.000	−1.900
	(0.302)	(0.358)	(0.548)	(1.351)	(59.862)	(6.745)
Gender: Male	0.000	−0.200	0.000	0.000	150.000***	−0.600
	(0.166)	(0.279)	(0.371)	(0.758)	(45.148)	(3.828)
Gender: Other	−0.700	−1.300	0.000	0.400	395.000	24.400
	(15.879)	(17.951)	(7.345)	(107.937)	(638.283)	(85.858)
Liberal	0.000	0.700	0.500	3.000***	100.000**	17.600***
	(0.150)	(0.280)	(0.365)	(0.705)	(32.651)	(3.949)
Constant	2.000***	1.500***	2.000***	3.600*	100.000	8.000
	(0.313)	(0.410)	(0.563)	(1.377)	(59.887)	(6.618)
Observations	1,020	1,020	1,020	1,020	1,020	1,020

Notes: This table reports median ($\tau = 0.5$) regression estimates of the dependent variable on demographic covariates. Standard errors are based on 1,000 bootstrap replications. Coefficients represent the estimated change in the median reported belief relative to the reference category for each demographic characteristic (Age: 18-27; Gender: Female; Conservative). Significance stars are based on Bonferroni-adjusted p-values. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

A.2.3 Willingness to Mitigate CO_2 Emissions

Summary statistics

Table A.6: Summary statistics of willingness to mitigate ($N = 1,022$).

Emission size	Mean	SD	SEM	Q1	Median	Q3	Interior	$0	$134
1	40.94	46.22	1.45	3.90	20.08	67.00	835	80	107
5	45.42	45.22	1.41	6.70	27.93	73.47	848	72	102
20	51.73	44.35	1.39	12.15	40.20	80.81	854	68	100
50	57.07	45.33	1.42	14.75	50.00	93.56	845	59	118
100	61.79	46.21	1.45	18.76	59.19	100.50	834	59	129
200	66.22	47.90	1.50	20.01	67.00	110.00	820	57	145
450	70.08	49.57	1.55	20.01	73.15	120.60	801	58	163
700	74.54	51.48	1.61	20.10	80.53	129.99	749	58	215

Notes: The last three columns show the number of interior WTMs and corner WTMs, respectively.

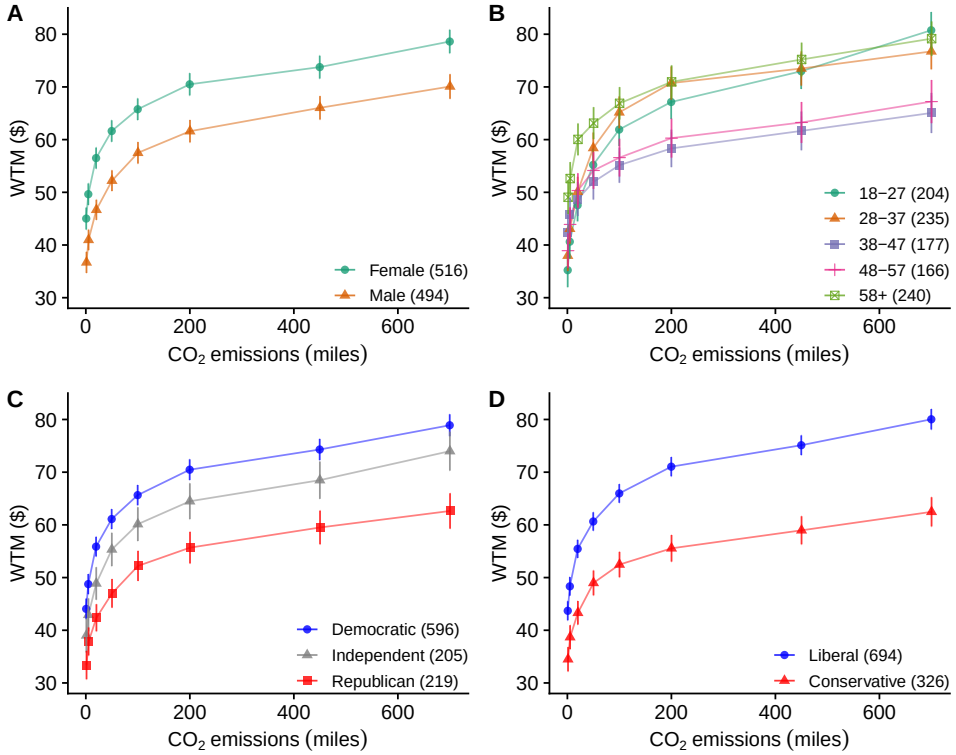


Figure A.11: Willingness to mitigate and demographic characteristics: All participants ($N = 1,022$). *Notes*: Points represent the means and bars represent SEMs. In panel C, "Republican-leaning independent" and "Democratic-leaning independent" are grouped into Republican and Democratic, respectively. In panel D, "somewhat liberal" and "somewhat conservative" are grouped into liberal and conservative, respectively. Panel D is identical to panel D of Figure 3.

Table A.7: Summary statistics of willingness to mitigate. Participants whose WTMs are all strictly between 0 and 100 are included ($N = 686$). Cf. Table A.6.

Emission size	Mean	SD	SEM	Q1	Median	Q3
1	30.83	34.26	1.31	5.00	17.42	46.81
5	34.82	32.94	1.26	6.92	26.71	52.68
20	41.15	33.13	1.26	13.34	33.52	64.96
50	45.70	34.42	1.31	14.81	40.20	69.87
100	50.24	36.11	1.38	18.43	45.03	77.91
200	54.51	38.52	1.47	20.01	51.90	88.88
450	58.89	41.21	1.57	20.01	58.81	93.82
700	64.03	44.59	1.70	20.03	63.77	106.54

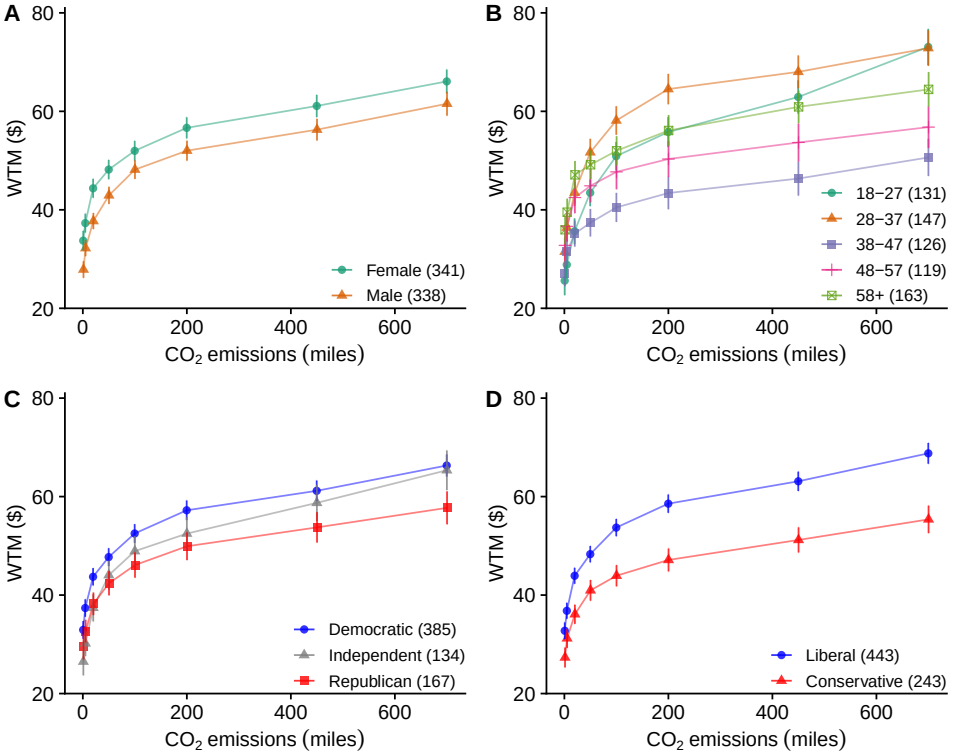


Figure A.12: Willingness to mitigate and demographic characteristics: Participants with all WTMs strictly between 0 and 134 ($N = 686$). *Notes*: Cf. Figure A.11. Points represent the means and bars represent SEMs. In panel C, "Republican-leaning independent" and "Democratic-leaning independent" are grouped into Republican and Democratic, respectively. In panel D, "somewhat liberal" and "somewhat conservative" are grouped into liberal and conservative, respectively.

A.2.4 Shape of the Individual-Level WTM Curve

We elicited WTM for eight levels of CO_2 emissions, that correspond to emissions generated by driving 1, 5, 20, 50, 100, 200, 450, and 700 miles by car. We observe a concave WTM curve at the aggregate level (Figure 3). Here we classify the shape of the individual-level WTM curve. Let (e_i, w_i) denote the pair of emission size e_i and the reported WTM $w_i \in [0, 134]$, for each $i = 1, \ldots, 8$.

Step 1. For each participant, we construct a piecewise linear WTM curve by linear interpolation. The WTM curve has seven line segments. Let s_i be the slope of the ith line segment given by

$$s_i = \frac{w_{i+1} - w_i}{e_{i+1} - e_i}.$$

We apply the following rule sequentially to classify the shape of the WTM curve. We say that a WTM curve is

- *constant* if $s_i = 0$ for all i;
- *almost constant* if $\max w_i - \min w_i \leq 1.34$, i.e., deviation from the constant value are smaller than 1% of the range of possible answers;
- *decreasing* if $s_i \leq 0$ for all i with at least one strict inequality;
- *concave* if $s_{i+1} \leq s_i$ for all i with at least one strict inequality;
- *convex* if $s_{i+1} \geq s_i$ for all i with at least one strict inequality;
- *increasing* if $s_i \geq 0$ for all i with at least one strict inequality;
- *non-monotonic* if it is none of the above.

Since we apply the classification rules sequentially, *concave* and *convex* WTM curves in this classification are non-decreasing, and *increasing* WTM curves are neither concave nor convex.

There are 210 (almost) constant, 34 decreasing, 96 concave, 2 convex, and 304 increasing, WTM curves. The remaining 376 WTM curves are non-monotonic.

Step 2. Let us focus on 304 participants whose WTM curves are increasing but neither concave nor convex. There are 59 participants whose WTMs are top-censored at \$134. Let $\bar{w}$ denote the largest WTM. If $\bar{w} = 134$, let $\bar{e}$ be the smallest emission level e_i at which $w_i = 134$. If $\bar{w} < 134$, let $\bar{e} = e_8$. Now, we draw a chord connecting two points (e_1, w_1) and $(\bar{e}, \bar{w})$. We say that a WTM curve is *concave*† (*convex*†) if the points (e_i, w_i) for which $e_i \leq \bar{e}$ lie above (below) the chord. There are 227 concave† and 6 convex† WTM curves.

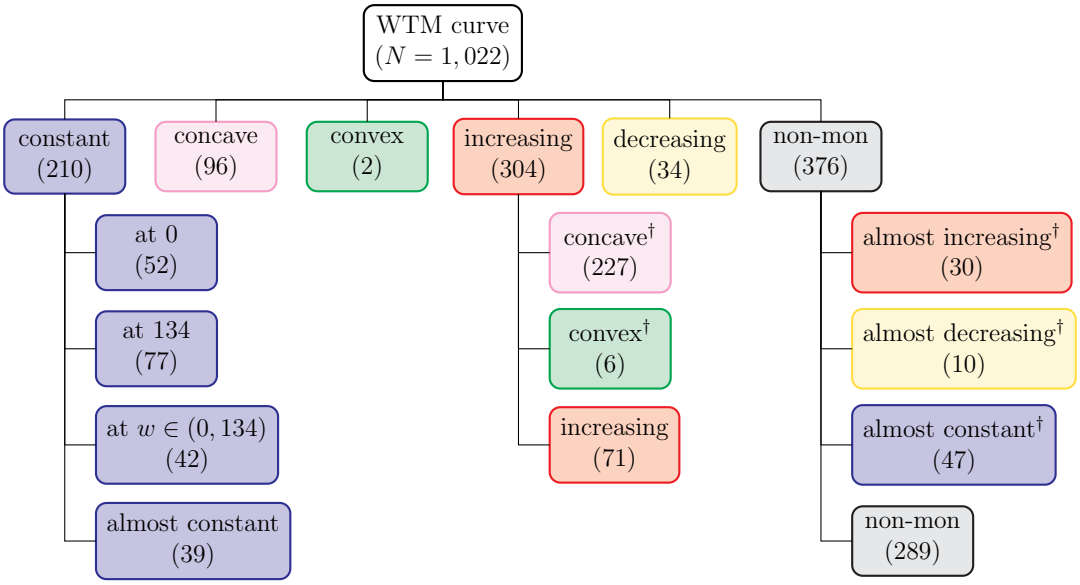


Figure A.13: Classification of individual-level WTM curves.

Step 3. Finally, we turn to the remaining 376 participants whose WTM curves are non-monotonic.

First, we say that a WTM curve is *almost constant*† if the difference between the largest WTM and the smallest WTM is less than \$4.02 (3% of the maximum possible range, \$134). This relaxation captures the shape of additional 47 WTM curves.

Second, we say that a WTM curve is *almost increasing*† (*almost decreasing*†) if the piecewise linear WTM curve has only one line segment with a negative (positive) slope, and the relative change of WTM on that segment is "not too large".[2] This relaxation captures the shape of additional 40 WTM curves.

Classification summary. Allowing some margin of error, we have the following (mutually exclusive) classification of individual-level WTM curves: 257 are constant, 323 are concave, 8 are convex, 101 are increasing, 44 are decreasing, and 289 are non-monotonic.

[2]Suppose the sign of the slopes change on the segment connecting (e_j, w_j) and (e_{j+1}, w_{j+1}). We require the absolute relative change to be less than 10%, i.e., $|(w_{j+1} - w_j)/w_j| \leq 0.1$.

A.3 Quantify the Effect of Information

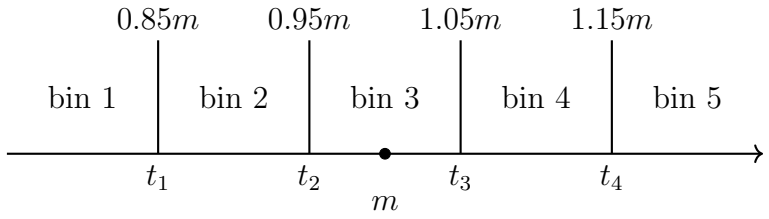
A.3.1 Recover Subjective Belief Distribution

The goal of the belief elicitation task is to elicit the participant's subjective belief distribution F about CO_2 emissions from each of the 12 products.

In the first part of the belief elicitation task, we elicited a point estimate for the modal value of the emissions. Let $m \in \mathbb{R}_+$ denote a participant's belief about how much CO_2 a given product emits relative to driving one mile by car. In the second part of the task, we elicited the subjective probability distribution about the size of the CO_2 emissions. We first constructed five bins around the reported modal belief m,

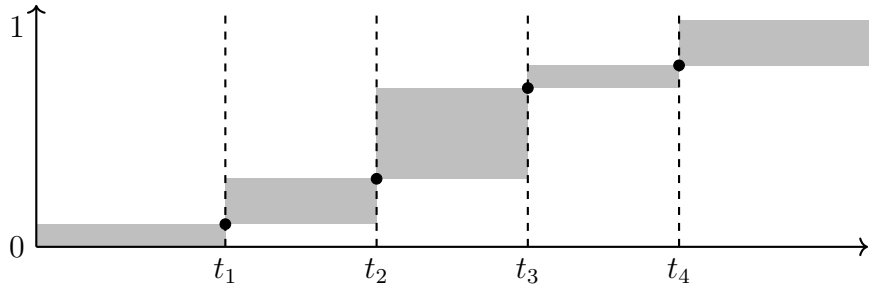
$$[0, t_1), [t_1, t_2), [t_2, t_3), [t_3, t_4), [t_4, \infty),$$

where each t_i is the threshold separating bins, given by $t_1 = 0.85m$, $t_2 = 0.95m$, $t_3 = 1.05m$, and $t_4 = 1.15m$, as illustrated below.



The participant then allocated 20 balls into these five bins. Let $p_i \in [0, 1]$ denote the probability assigned to the ith bin (i.e., 1/20 times the number of balls in the bin). The collection $(m, (p_1, \ldots, p_5))$ represents the response from the participant, from which we recover the subjective belief distribution F.

Let $q_i = \sum_{j=1}^{i} p_j$ be the cumulative probability for the emission size being below threshold t_i. Assuming that there is no measurement error, we have $F(y \leq t_i) = q_i$ for each $i = 1, \ldots, 4$. Given the observation $\{(t_1, q_1), \ldots, (t_4, q_4)\}$, we can bound the cumulative distribution function (CDF) of the subjective belief F by the gray shaded rectangles as illustrated below.



We fit a *cubic interpolating spline* following Breunig et al. (2021), which took the idea from Bellemare, Bissonnette and Kröger (2012). The details will not be shown here, but this method interpolates observed quantile points using a smooth and monotonic

curve. To apply this procedure, we need some assumptions about the boundaries of the support of F. We take $t_0 = 0.75m$ and $t_5 = 1.25m$, where t_0, t_5 are such that $t_0 = \sup_t\{t \leq t_1 : F(y \leq t) = 0\}$ and $t_5 = \inf_t\{t \geq t_4 : F(y \leq t) = 1\}$.

A.3.2 Expected WTM

We elicited the participants' willingness to mitigate (WTM) for eight levels of CO_2 emissions, corresponding to the emissions generated by driving 1, 5, 20, 50, 100, 200, 450, and 700 miles by car. We recover the participant's WTM function w by linear interpolation.

Given a WTM function w and a subjective belief distribution F about CO_2 emissions associated with a given product, we can calculate the *expected WTM*,

$$\overline{W}(w, F) = E_F[w(c)] = \int w(c)\mathrm{d}F(c),$$

by numerically evaluating the integral with the Adaptive Gauss-Kronrod Quadrature.

A.3.3 Predicted Effect of Information

We model an *information policy* as a device that shifts consumer i's belief about CO_2 emissions associated with good k from F_{ik} to F_k^*, a degenerate distribution at the "true" size of CO_2 emissions. The effect of information on the consumption of good k, Δ_k, is defined as the sample average of Δ_{ik} with respect to a reference group of agents G:

$$\Delta_k = \frac{1}{|G|} \sum_{i \in G} \left(\overline{W}(w_i, F_k^*) - \overline{W}(w_i, F_{ik}) \right).$$

We calculate our measure of the effect of information using the data from the survey. Taking the entire sample of 1,022 participants as the reference group G, we obtain Δ_k for each product k, which is shown in Figure 4.

We observe a substantial variation in the predicted effect of information across products, including a positive effect for five products (gas heating, beef, coffee, flight, chocolate), no effect for three products (shower, poultry, egg), and a negative effect for four products (phone call, milk, beer, microwave).

While the model incorporates several inputs, such as individual-level WTM curves and belief distributions, the product-level variation can be heuristically interpreted using two simple measures. As shown in Figure A.14, the predicted effect is positively correlated with the baseline emission level (panel A) and with the share of individuals who underestimate the size of emissions (panel B).

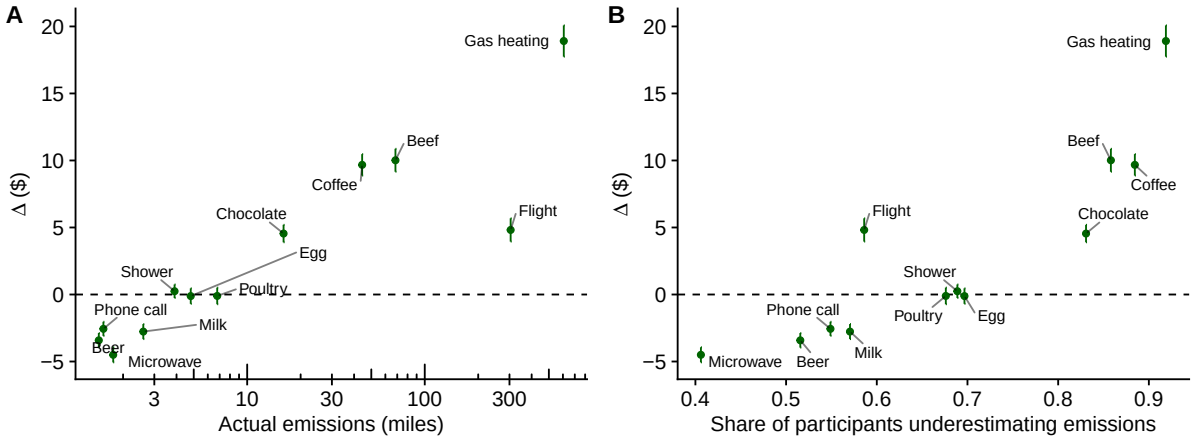


Figure A.14: Variation in predicted effect of information provision Δ_k for each product. (A) Relationship with the baseline emission level. (B) Relationship with the share of individuals who underestimate the size of emissions. *Notes*: Bars indicate SEM.

A.3.4 Predicted Effect of Information for Beef and Poultry

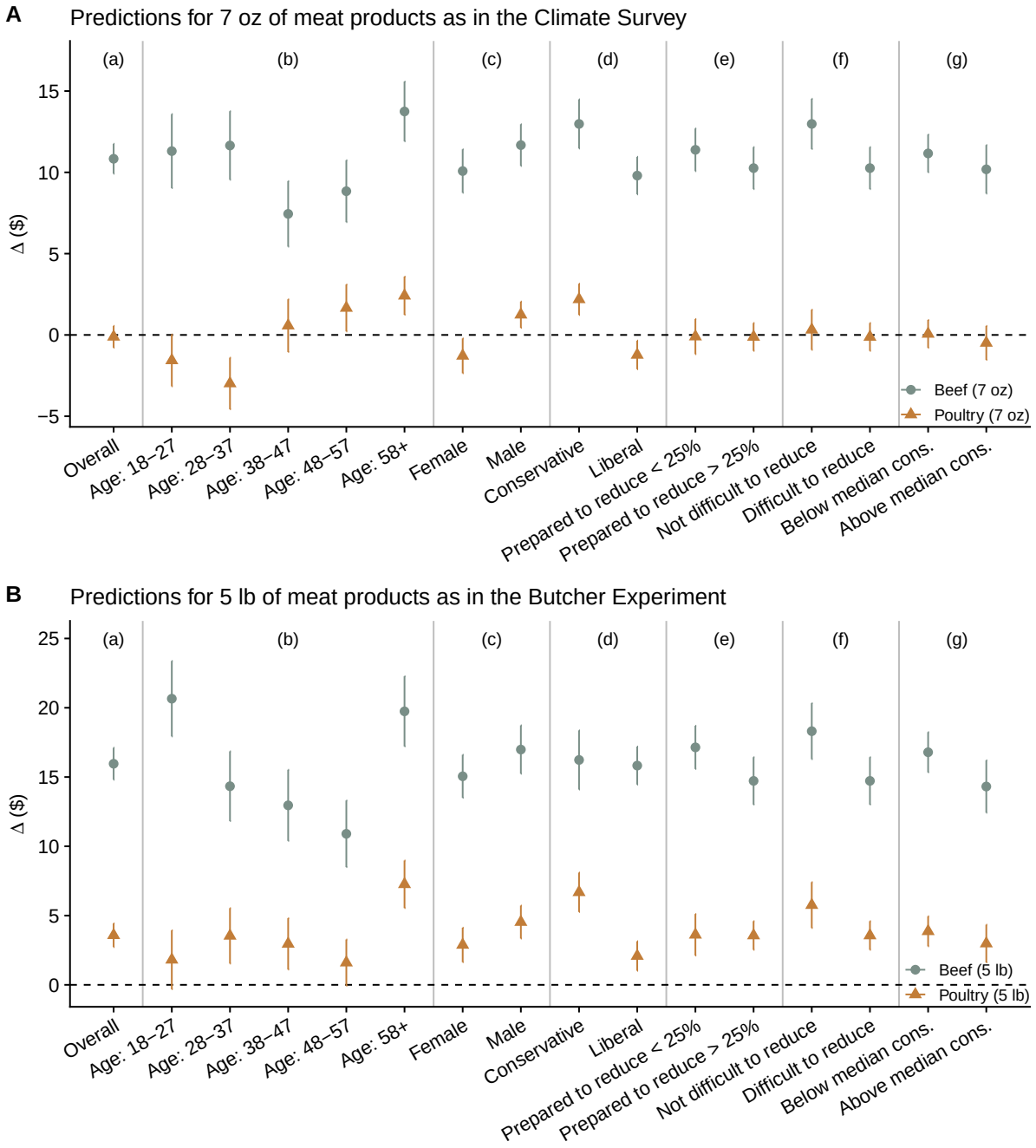


Figure A.15: Predicted effects of information provision across demographic groups. (A) Predictions for 7 oz of meat products, as in the Climate Survey. (B) Predictions for 5 lb (80 oz) of meat products, as in the Butcher Experiment. *Notes*: Subpanels display effects for the following demographic groups: (a) Overall effect, including all respondents. (b) Subgroups by age. (c) Subgroups by gender. (d) Subgroups by political orientation ("somewhat liberal" and "somewhat conservative" are grouped into liberal and conservative, respectively). (e) Subgroups based on responses to the question: "Are you prepared to reduce your future consumption of beef/poultry in light of its CO_2 emission footprint?" (f) Subgroups based on responses to the question: "How difficult would it be to reduce your current consumption of beef/poultry by half?" (g) Subgroups based on responses to the question: "How many times do you eat beef/poultry per week?" Bars indicate SEM.

A.4 Information Treatment

A.4.1 Assignment

Table A.8: Number of participants in each treatment.

Product	Info	NoInfo
Beer	246	776
Phone call	245	777
Microwave	256	766
Milk	254	768
Shower	255	767
Egg	248	774
Poultry	211	811
Chocolate	258	764
Coffee	232	790
Beef	251	771
Flight	245	777
Gas heating	266	756

Notes: Treatments are on the subject-product pair level. If a subject is informed about a particular product's emissions, the pair is in the Info treatment; if not, it is in the NoInfo treatment.

A.4.2 Belief Updating

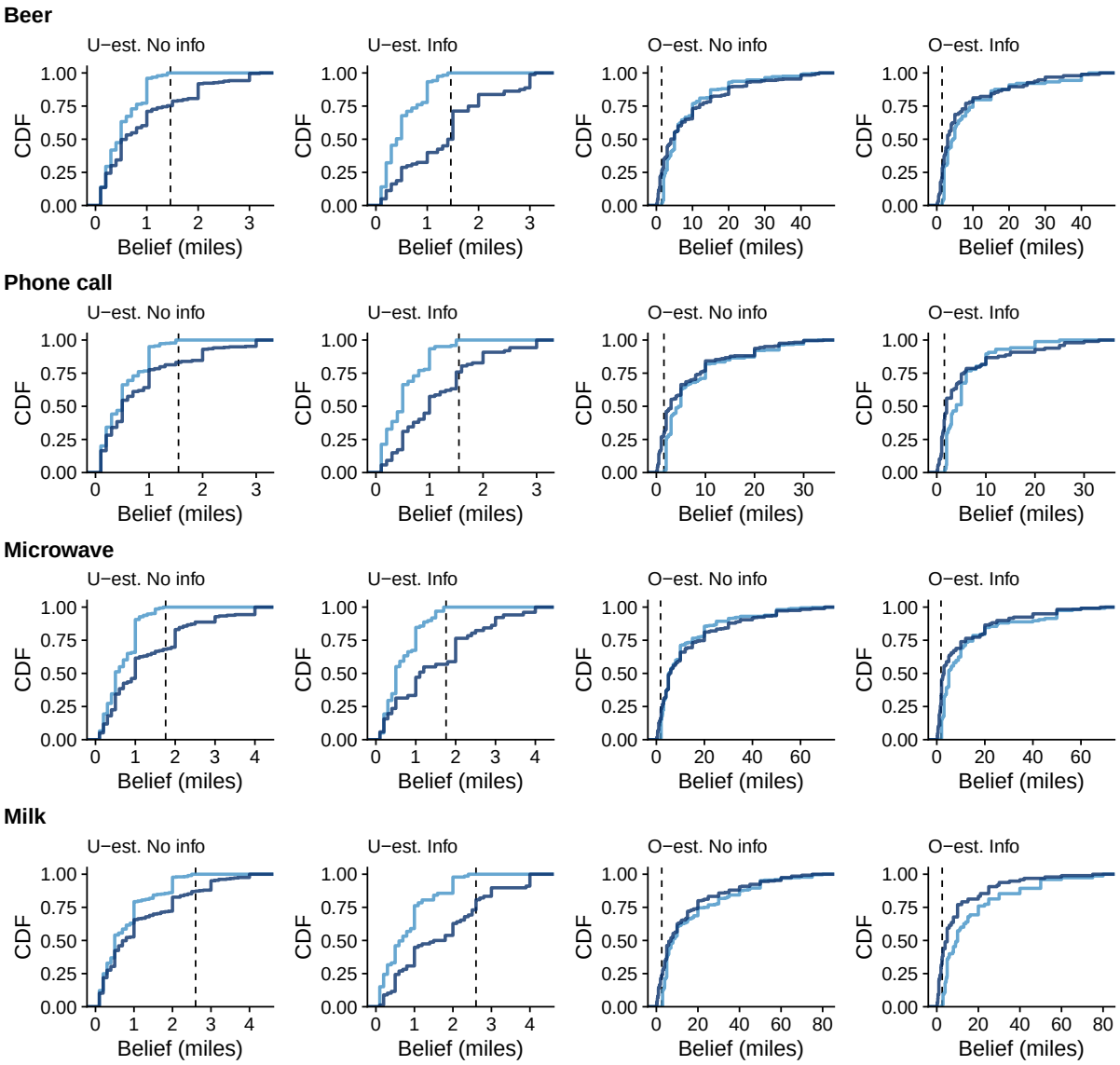


Figure A.16: Impact of information on beliefs. *Notes*: Each panel shows beliefs from the original survey in Session 1 (light blue) and those elicited two weeks later in Session 2 (dark blue). For each product, participants are grouped into four categories (2×2): those who underestimated the emission size in Session 1 ("U-est") and those who overestimated it ("O-est"), and whether they received information about the product's impact or not ("Info" and "No info"). Vertical lines correspond to the "true" size of CO_2 emissions.

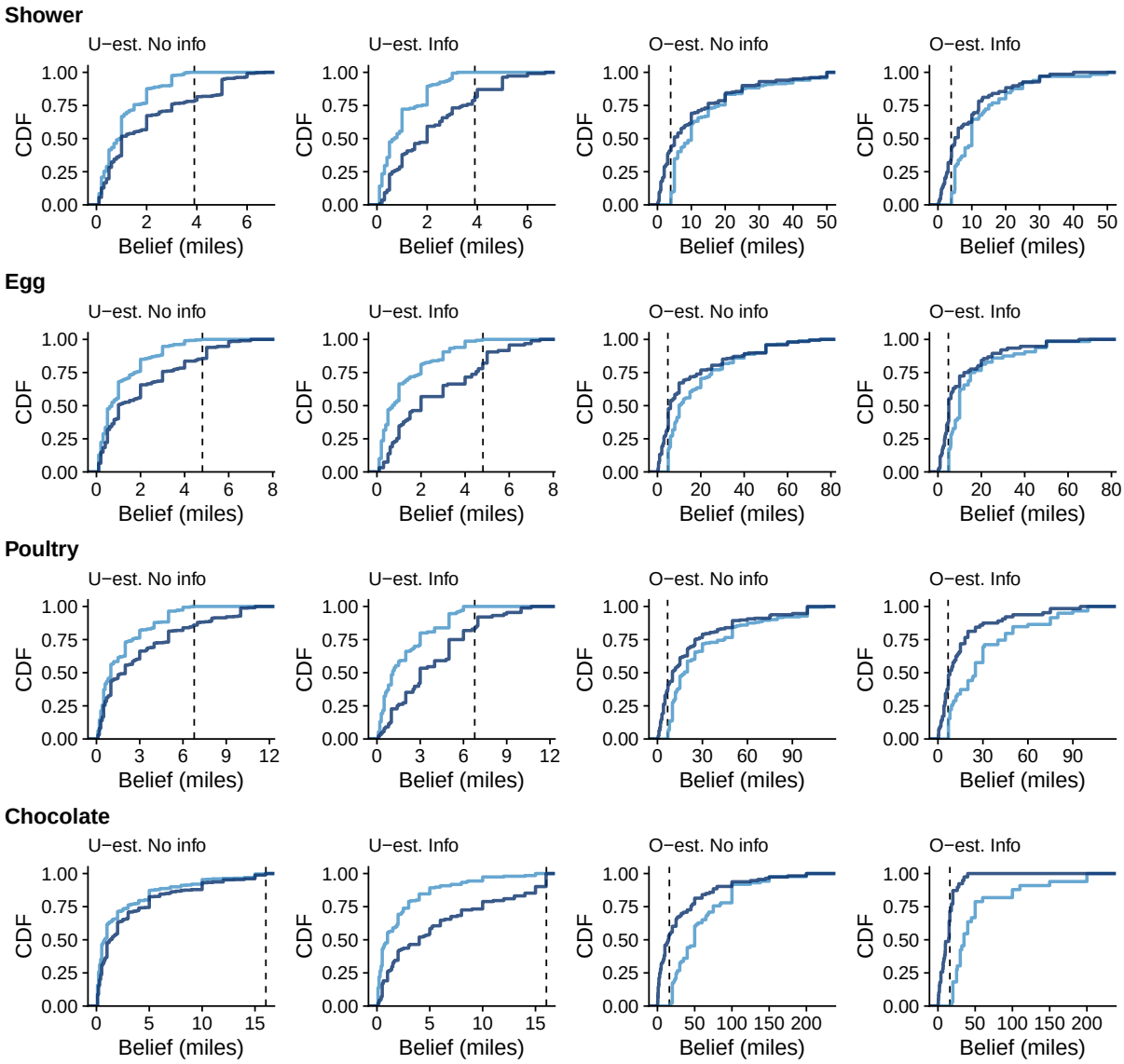


Figure A.16: Impact of information on beliefs (ctd.). *Notes*: Each panel shows beliefs from the original survey in Session 1 (light blue) and those elicited two weeks later in Session 2 (dark blue). For each product, participants are grouped into four categories (2×2): those who underestimated the emission size in Session 1 ("U-est") and those who overestimated it ("O-est"), and whether they received information about the product's impact or not ("Info" and "No info"). Vertical lines correspond to the "true" size of CO_2 emissions.

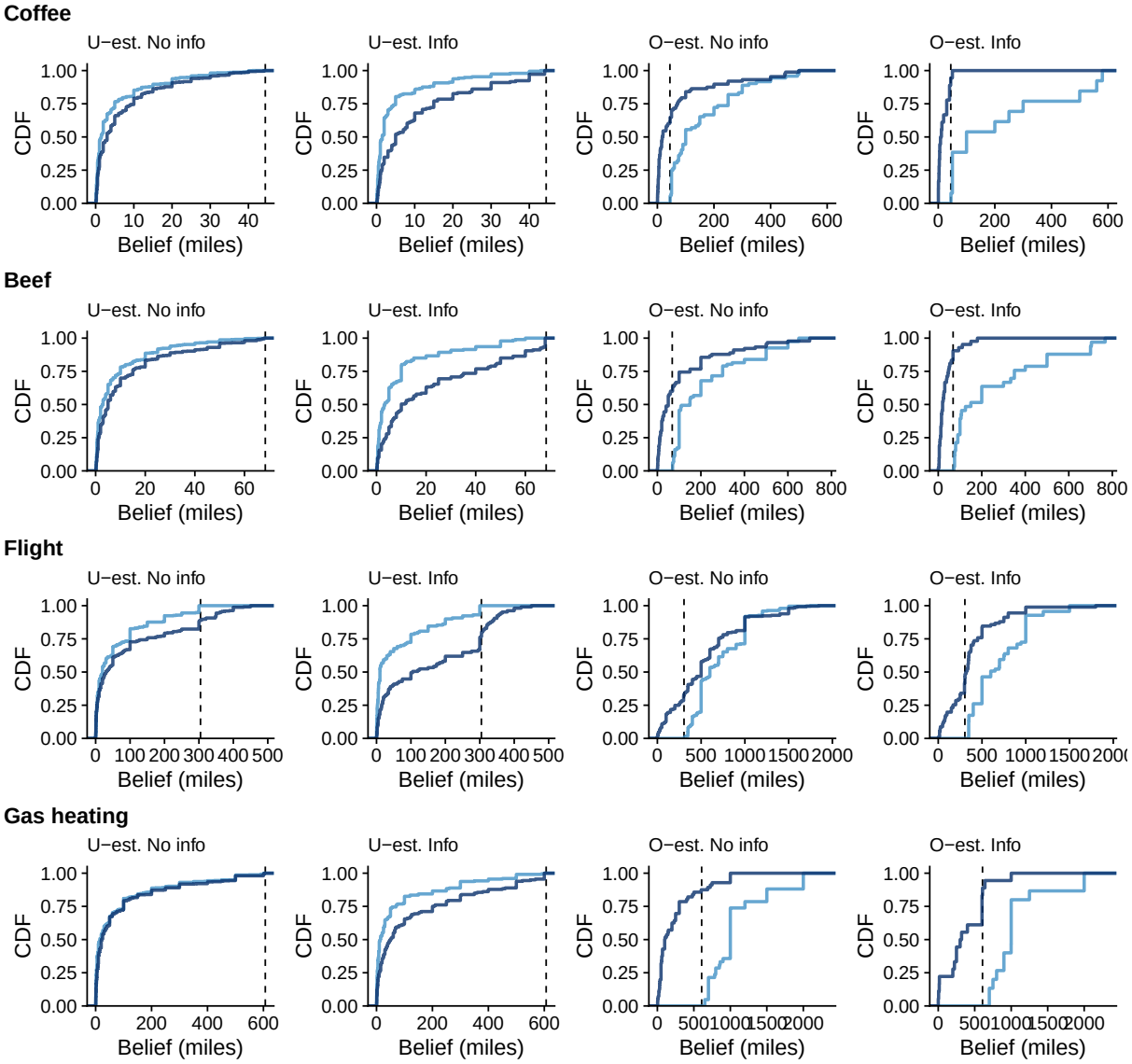


Figure A.16: Impact of information on beliefs (ctd.). *Notes*: Each panel shows beliefs from the original survey in Session 1 (light blue) and those elicited two weeks later in Session 2 (dark blue). For each product, participants are grouped into four categories (2×2): those who underestimated the emission size in Session 1 ("U-est") and those who overestimated it ("O-est"), and whether they received information about the product's impact or not ("Info" and "No info"). Vertical lines correspond to the "true" size of CO_2 emissions.

A.5 The Effect of Information on Intentions and Actual Consumption

Table A.9 mirrors Table 4, substituting Session 1 intentions for Session 2 reported changes in consumption. This variable switch does not alter the results: Columns (1) and (2) replicate the null effect of information *content*, while column (3) replicates the overall positive effect of information *per se*.

Figure A.17 presents the point estimate for the effect of information *content* on each product in the survey (excluding flights, as the COVID-19 pandemic significantly limited opportunities for air travel at the time of the survey). The regression specifications used are the same as those in column (1) of Table 4 (actual reduction) and Table A.9 (intentions).

Finally, we investigate whether the shock in participants' beliefs due to information changes their consumption patterns. To this end, Table A.10 focuses on the product-participant pairs that received information about the impact and regresses the reported changes in consumption on three proxies for belief change. In column (1), we compare the consumption of participants who underestimated the CO_2 emissions in Session 1 with the consumption of those who overestimated them. We do not find a statistically significant difference between these two groups. Column (2) performs a similar analysis, using the magnitude of the participants' underestimation as an independent variable. This analysis also shows that the variable does not have significant predictive power. Finally, column (3) tests whether the reported reduction in consumption correlates with our model predictions for changes in willingness to pay (as described in Section 3). The result indicates that our model poorly predicts participants' choices, as the estimated coefficient for the model predictions is small and not significant. Table A.11 replicates these results, using intentions to reduce consumption as the dependent variable. Overall, these correlational results are consistent with the lack of a causal link between belief correction and behavioral change.

Relative emission hypothesis. To investigate the relative emission hypothesis using data from the survey experiment, we use a similar approach as in Section 4.2. Specifically, for each participant, we calculate the change in subjective pollution rankings for each of the 12 products between Session 1 and Session 2. We then test whether, among the participants who received any information, individuals are more likely to report reductions in consumption for products for which their perceived ranking became relatively more pessimistic. Column (4) of Table A.10 provides significant evidence of this effect. While this analysis is correlational, the results are consistent with the relative emission hypothesis. We conclude that a promising direction for future research is to design experiments that more directly test this hypothesis.

Table A.9: Effect of information on intention to reduce consumption.

	(1) Intentions Beef	(2) Intentions All products	(3) Intentions All products
Information	−0.031	0.005	0.037*
	(0.035)	(0.009)	(0.019)
Observations	666	7,326	6,637
R^2	0.427	0.332	0.314

Notes: The dependent variable is the intention to reduce consumption of beef (column (1)) and of each of the 12 products in the survey (columns (2) and (3)). `Information` is a dummy variable equal to 1 if we provided information about emissions for a participant-product observation and 0 otherwise. The sample in columns (1) and (2) includes all participants who received at least *some* information. The sample in column (3) consists of participants who received *no* information and those participant-product observations for which we provided information. Robust standard errors in (1) and standard errors clustered at the individual level in (2) and (3) are reported in parentheses. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

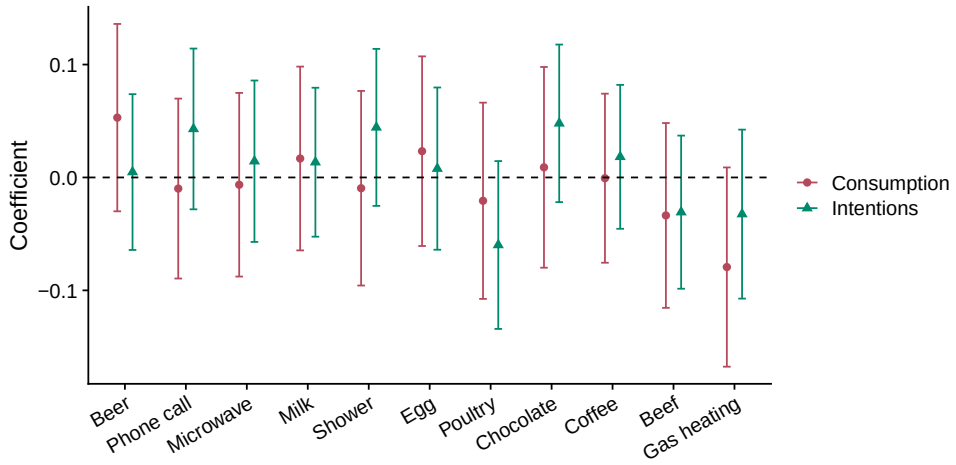


Figure A.17: The effect of information on the intended and actual reduction of consumption. *Notes*: Participants who received at least *some* information are included. A linear regression was run on each product separately. The dependent variable is a binary indicator `intend to reduce/actually reduced consumption of [product]` and the independent variable is the indicator `received information about` CO_2 `emissions from [product]`. Bars indicate 95% CI.

Table A.10: Predictive effect of beliefs on consumption.

	(1) Consumption	(2) Consumption	(3) Consumption	(4) Consumption
Underestimation	0.007			
	(0.023)			
Misperception		0.00001		
		(0.00002)		
Predicted change in WTM			−0.00002	
			(0.0004)	
Rank differences				0.008***
				(0.003)
Observations	2,500	2,500	2,495	2,500
R^2	0.144	0.144	0.155	0.149

Notes: Linear probability model. The dependent variable is a dummy indicating the reduction of consumption by at least 10% since the completion of Session 1. Observations featuring the product category flight are excluded, as there was little opportunity to fly during the COVID-19 pandemic. Participant-product pairs that received information about the impact are included. Three independent variables are considered. `Underestimation` is a dummy indicating that the participant underestimated the size of CO_2 emissions. `Misperception` is the difference between the stated modal beliefs and the true size of the emissions (it is winsorized at 99%). `Predicted change in WTM` is calculated by Δ_{ik} defined in Section 3. `Rank differences` refers to the change in the product's CO_2 emission ranking based on participants' reported beliefs between Session 1 and Session 2. Positive values indicate that, in Session 2, participants placed the product in a higher (worse) emission rank—that is, they became more pessimistic about its emissions. List of control variables: age, gender, ethnicity, education, income, political orientation, state the participants live in, baseline consumption frequency, stated difficulty in reducing consumption, and perceived severity of climate change. Product dummies are included in column (3). Standard errors are clustered at the individual level. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

Table A.11: Predictive effect of beliefs on intention to reduce consumption.

	(1) Intentions	(2) Intentions	(3) Intentions
Underestimation	−0.0004		
	(0.021)		
Misperception		0.00002	
		(0.00002)	
Predicted change in WTM			−0.0001
			(0.0004)
Observations	2,721	2,721	2,716
R^2	0.364	0.364	0.371

Notes: Linear probability model. The dependent variable is a dummy indicating the intention to reduce consumption by at least 10%. Observations featuring the product category flight are excluded, as there was little opportunity to fly during the COVID-19 pandemic. Participant-product pairs that received information about the impact are included. Three independent variables are considered. `Underestimation` is a dummy indicating that the participant underestimated the size of CO_2 emissions. `Misperception` is the difference between the stated modal beliefs and the true size of the emissions (it is winsorized at 99%). `Predicted change in WTM` is calculated by Δ_{ik} defined in Section 3. List of control variables: age, gender, ethnicity, education, income, political orientation, state the participants live in, baseline consumption frequency, stated difficulty in reducing consumption, and perceived severity of climate change. Product dummies are included in column (3). Standard errors are clustered at the individual level. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

B Butcher Experiment

B.1 Design Details

B.1.1 Information Screen

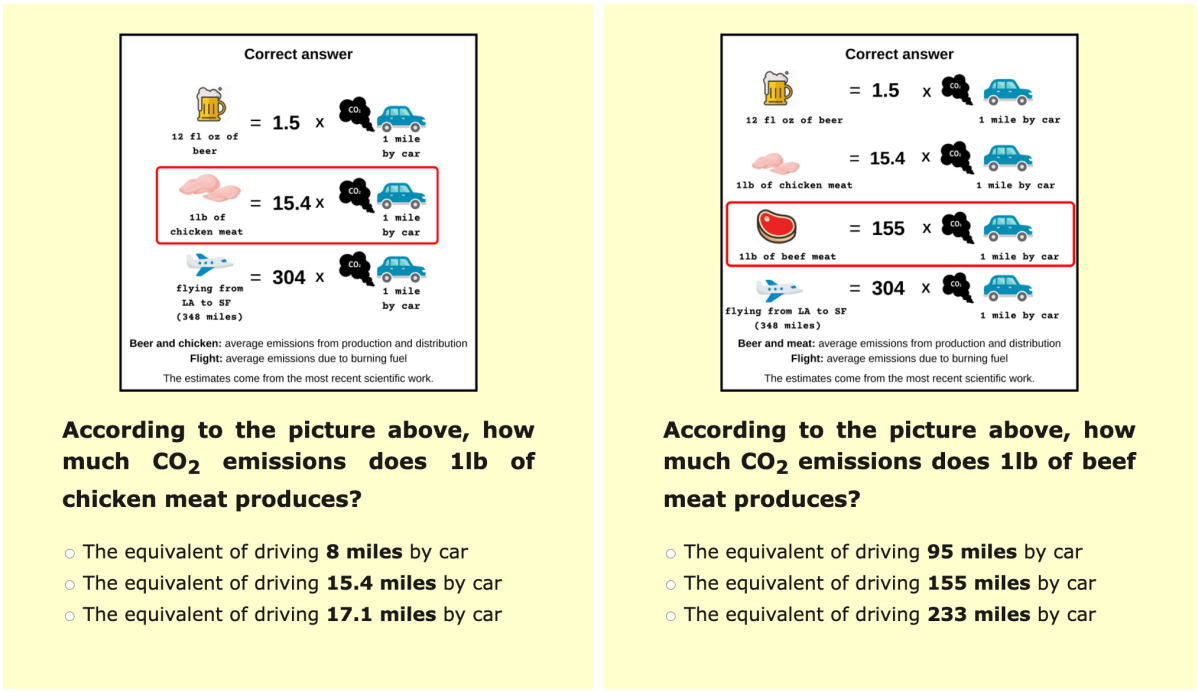


Figure B.1: Information screens in the Info treatment. (Left) The first product (poultry in this case). (Right) The second product (beef in this case).

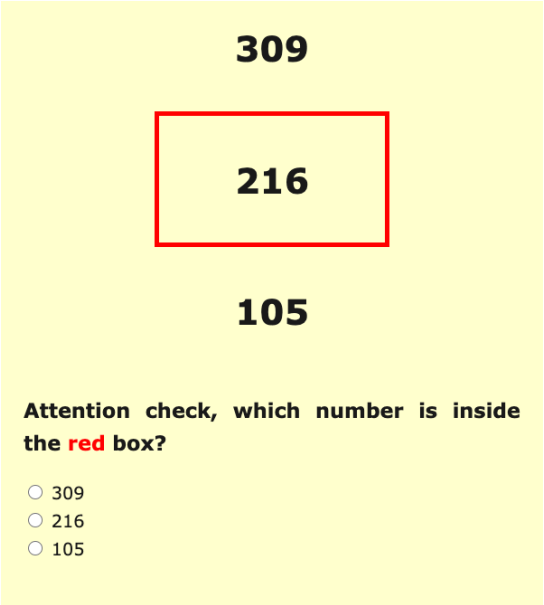


Figure B.2: Screen for the NoInfo treatments.

B.1.2 WTP Elicitation Interface

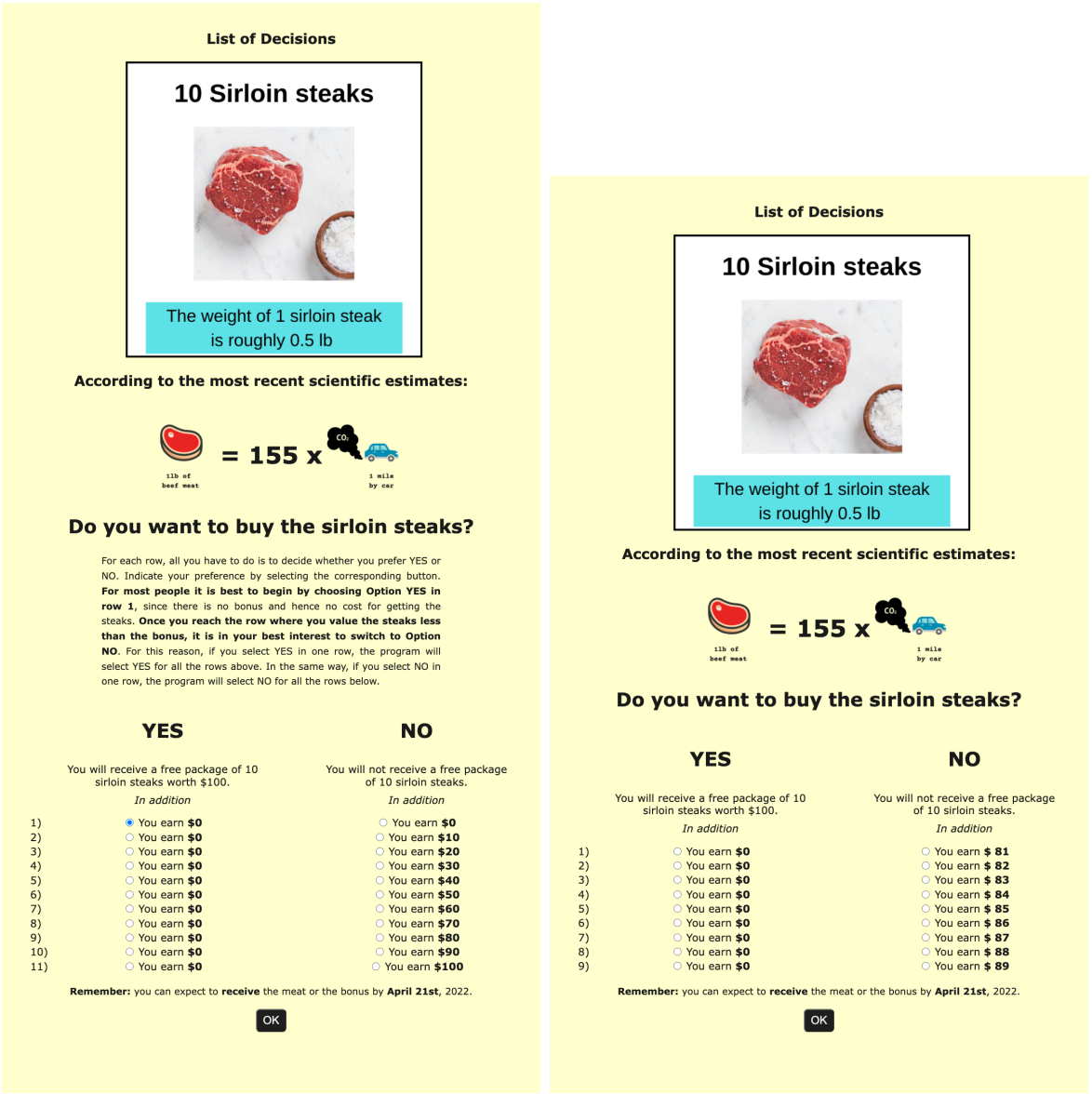


Figure B.3: Willingness to pay elicitation screen for the beef product in the Info treatments. (Left) On the first list, the monetary bonus in the right option ranged from \$0 to \$100 in \$10 increment. (Right) The second list "zoomed in" around the switching point and asked another nine questions. *Notes*: In the NoInfo treatments, information about the true emission size is shown as **?**.

B.1.3 Survey Questions

Initial screening questions

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1. What is your age?
2. What sex were you assigned at birth, such as on an original birth certificate?
   Male; Female
3. What is your ethnicity?
   White; Black; Asian; Mixed; Other
4. In which state do you live?
5. What are the first 5 digits of your ZIP code?

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1. Generally speaking, where do you place yourself on the Liberal-Conservative political spectrum?
   Liberal; Somewhat liberal; Somewhat conservative; Conservative
2. Generally speaking, how do you consider yourself?
   A Republican; A Republican-leaning Independent; A Democrat-leaning Independent; A Democrat
3. What is the highest level of school you have completed or the highest degree you have received?
   Less than high school degree; High school degree; Some University but no degree; Bachelor's degree; Postgraduate degree

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1. How many people live in your household (including yourself)?
2. What was the combined income of all the members of your household last year?
   Below $5,000; $5,000 to $15,000; $15,000 to $30,000; $30,000 to $45,000; $45,000 to $60,000; $60,000 to $75,000; $75,000 to $90,000; $90,000 to $105,000; $105,000 to $120,000; $120,000 to $135,000; $135,000 to $150,000; $150,000 and up
3. Do you eat meat?
   Yes; No

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1. Do you live with a partner?
   Yes; No

2. What is the gender of your partner?
   I don't have a partner; Male; Female; Other

3. What is the education level of your partner?
   I don't have a partner; Less than high school degree; High school degree; Some University but no degree; Bachelor's degree; Postgraduate degree

4. This is an attention check, please answer that you strongly agree.
   Strongly disagree; Disagree; Neither agree nor disagree; Strongly agree

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1. Which device are you using to complete this study?
   Phone; Tablet; Laptop or Desktop

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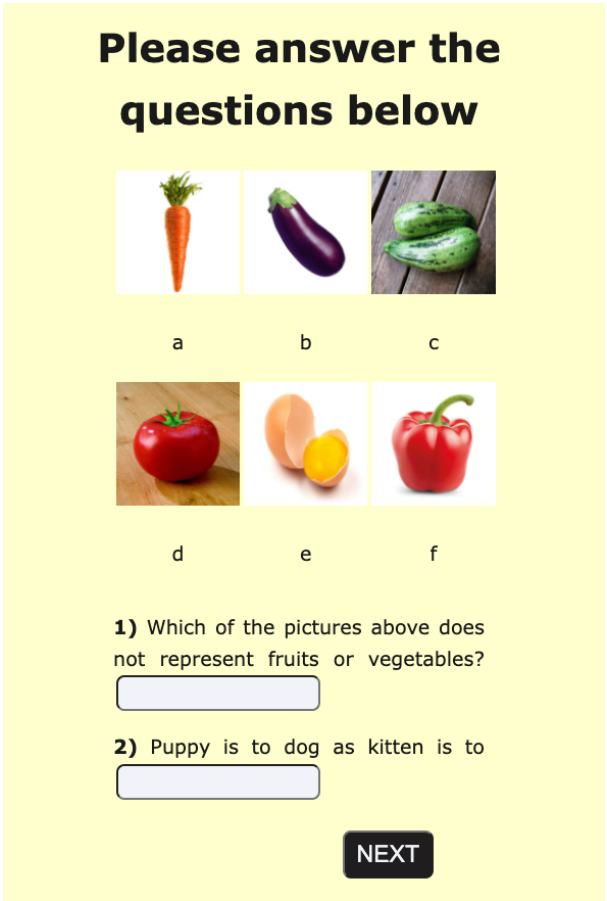

Post-experiment questionnaire

Notes: MEAT1 below is either beef or poultry, depending on the first product the participant saw, and MEAT2 is the other meat product.

1. How many times do you eat MEAT1 per week?

2. Do you intend to reduce your MEAT1 consumption in light of its CO_2 emissions?
   No.; Yes, I am prepared to reduce my current consumption by about 10%.; Yes, I am prepared to reduce my current consumption by about 25%.; Yes, I am prepared to reduce my current consumption by about 50%.; Yes, I am prepared to reduce my current consumption by more than 50%.

3. How difficult would it be to reduce your current MEAT1 consumption by half?
   Not applicable. I don't consume this product.; Very easy.; Easy.; Neither easy nor difficult.; Difficult.; Very difficult.

4. If you wanted to avoid the CO_2 impact of MEAT1, how would you change your consumption patterns? Choose the answer that most applies.
   I would eat more lamb and pork.; I would eat more MEAT2.; I would eat more vegetarian dishes.; I would not reduce my consumption of MEAT1.; I would eat less MEAT1 without necessarily eating more of anything else.

5. Do you trust that the researchers will indeed ship meat products as promised in the instructions?
   1 - Not at all; 2; 3; 4; 5 - Completely

6. How severe do you consider the problem of climate change?
   1 - Not a problem; 2; 3; 4; 5 - A huge problem

B.2 Preregistration

ASPREDICTED

Wharton CREDIBILITY LAB
University of Pennsylvania

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Information provision about CO2 emissions and meat consumption. (#92070)

Created: 03/25/2022 03:41 AM (PT)

This is an anonymized copy (without author names) of the pre-registration. It was created by the author(s) to use during peer-review.
A non-anonymized version (containing author names) should be made available by the authors when the work it supports is made public.

---

1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
Correcting perceptions about CO2 emissions associated with meat products will affect demand for these products.
In particular, in previous work we have used data on a) misperceptions about CO2 emissions and b) willingness to pay to avoid CO2 emissions to predict the effect of providing information about the emissions. Following these predictions, we expect that providing information about CO2 emissions will have a larger negative effect on the demand for beef than on the demand for chicken.

3) Describe the key dependent variable(s) specifying how they will be measured.
The key dependent variable is the willingness to pay (WTP) for a package of meat products. Willingness to pay is measured by an incentive compatible multiple price list mechanism.

4) How many and which conditions will participants be assigned to?
The experiment has two parts. The first part contains our main design, which is a 2x2:
·The meat package consists of either beef products (sirloin steaks) or chicken products (chicken breasts).
·Participants either obtain a scientific estimate of the emissions associated with the package ("info" treatment) or not ("no info" treatment).
These four conditions are between-subjects.

In the second part of the experiment (again a 2x2), we will ask each subject for their WTP for the alternative meat product. In the information treatment, this implies that subjects now have knowledge about both beef and chicken products ("double info" treatment).

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
We will regress the WTP for both meat products in Part 1 of the experiment on a treatment dummy for information provision and meat type, and we will test the interaction of meat type and information provision. Our regression analysis will control for covariates like political orientation and household income.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
We will not exclude observations. However, we will conduct robustness checks where we exclude people who were not able to reproduce the information we gave them in the info treatments or that did not give us their address for sending the meat products.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We aim at collecting 2000 observations, 500 in each treatment cell. We consider an observation collected if a participant completed the first part of the experiment.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
We conduct a questionnaire where we ask several personal characteristics. We will correlate these characteristics with WTP. We will study how people update beliefs about CO2 emissions in response to the information and will study whether prior and posterior beliefs affect purchases.
We will also conduct heterogeneity analyses by subgroups that have been shown to have a higher elasticity of meat consumption, or, per our previous survey, have shown particularly large predicted effects of information.
As robustness checks for the model specification, we will conduct Tobit regressions with censoring above. We will also look quantile regressions for 10 WTP quantiles, and focus on the interaction effects among the middle quantiles that are away from the extremes of the WTP distribution.
Finally, to understand the impact of information about substitutes, we will compare the results of the first part of the experiment (info vs. no info), with the results of the second part (double info vs. no info).

B.3 Additional Results

B.3.1 Willingness to Pay for the First Product

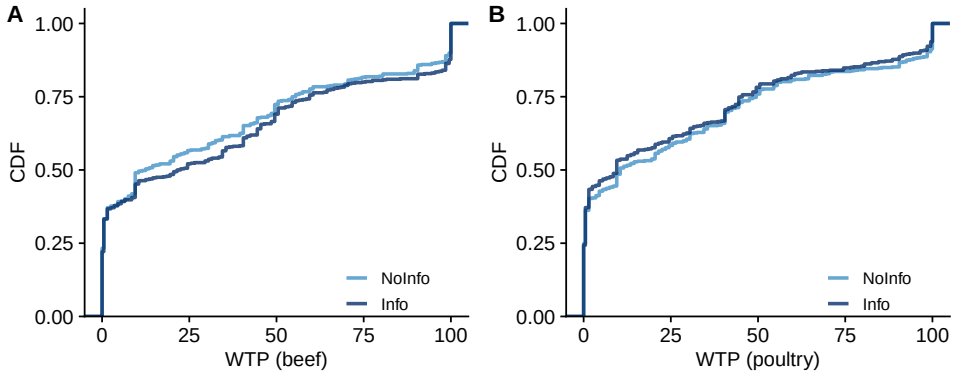


Figure B.4: Distribution of the willingness to pay for the first meat product.

B.3.2 Beliefs about the Second Product

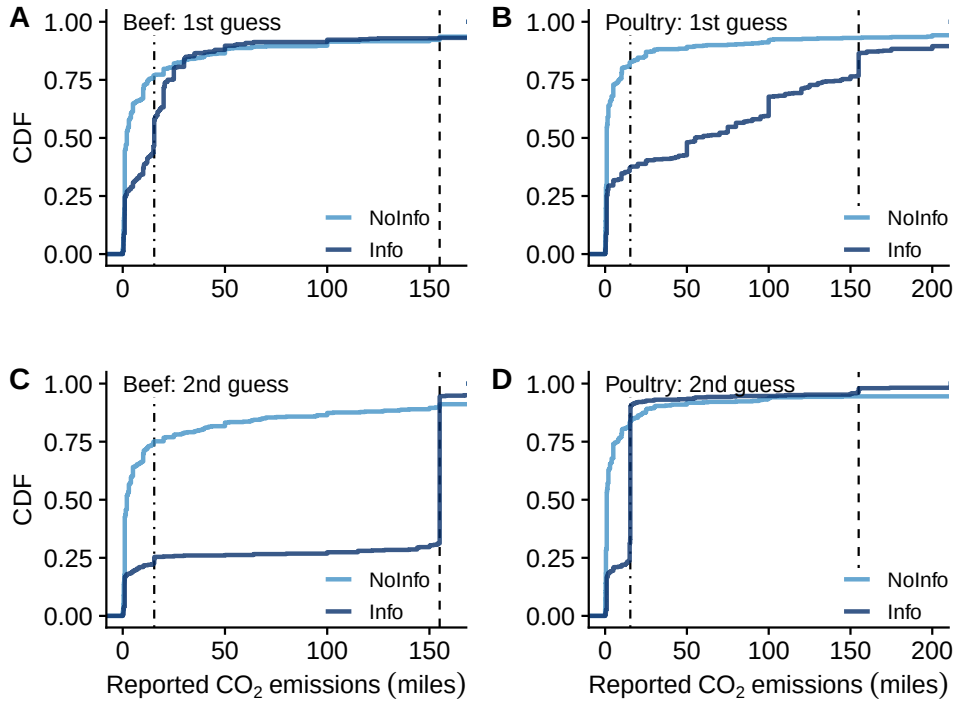


Figure B.5: Beliefs about CO_2 emissions from two meat products. *Notes*: We focus on the data from the second part of the experiment (panels AC: "poultry first" treatments; panels BD: "beef first" treatments). Vertical lines correspond to the "true" size of CO_2 emissions (dash-dotted: poultry, 15.4 miles; dashed: beef, 155 miles). Cf. Figure 7.

B.3.3 Demographic Characteristics

Table B.1: Demographic characteristics.

	All		BeefFirst		PoultryFirst	
			NoInfo	Info	NoInfo	Info
Age						
18-27	367	0.176	0.174	0.177	0.189	0.165
28-37	364	0.175	0.161	0.185	0.156	0.198
38-47	332	0.160	0.153	0.162	0.166	0.158
48-57	356	0.171	0.191	0.181	0.158	0.154
58+	662	0.318	0.320	0.296	0.331	0.325
Gender						
Female	1073	0.516	0.511	0.517	0.516	0.518
Male	1008	0.484	0.489	0.483	0.484	0.482
Ethnicity						
Asian	68	0.033	0.036	0.029	0.029	0.037
Black	265	0.127	0.146	0.117	0.106	0.140
White	1605	0.771	0.769	0.785	0.778	0.753
Mixed	79	0.038	0.027	0.035	0.050	0.041
Other	64	0.031	0.023	0.035	0.037	0.029
Party affiliation						
Republican	595	0.286	0.288	0.312	0.270	0.274
Republican leaning independent	169	0.081	0.072	0.073	0.094	0.086
Independent	404	0.194	0.188	0.165	0.202	0.222
Democratic leaning independent	160	0.077	0.078	0.096	0.073	0.060
Democratic	753	0.362	0.375	0.354	0.360	0.358
Political orientation						
Conservative	434	0.209	0.195	0.213	0.216	0.210
Somewhat conservative	662	0.318	0.320	0.338	0.289	0.325
Somewhat liberal	579	0.278	0.278	0.277	0.291	0.267
Liberal	406	0.195	0.206	0.171	0.204	0.198
Education						
Less than high school	48	0.023	0.023	0.029	0.019	0.021
High school degree	527	0.253	0.259	0.248	0.252	0.253
Some University but no degree	661	0.318	0.324	0.319	0.337	0.290
Bachelor Degree	546	0.262	0.267	0.275	0.225	0.282
Postgradute degree	299	0.144	0.127	0.129	0.166	0.154
Household income						
- $5,000	68	0.033	0.025	0.025	0.042	0.039
$5,000 - $15,000	130	0.062	0.062	0.044	0.067	0.076
$15,000 - $30,000	339	0.163	0.186	0.156	0.150	0.160
$30,000 - $45,000	313	0.150	0.129	0.163	0.158	0.152
$45,000 - $60,000	322	0.155	0.136	0.165	0.160	0.158
$60,000 - $75,000	220	0.106	0.098	0.112	0.106	0.107
$75,000 - $90,000	188	0.090	0.102	0.081	0.092	0.086
$90,000 - $105,000	109	0.052	0.055	0.050	0.054	0.051
$105,000 - $120,000	93	0.045	0.051	0.037	0.052	0.039
$120,000 - $135,000	67	0.032	0.049	0.033	0.025	0.021
$135,000 - $150,000	89	0.043	0.030	0.065	0.037	0.039
$150,000 -	143	0.069	0.076	0.069	0.056	0.074

Notes: 2,081 participants completed Part 1 of the study. The last four columns present the proportion of subjects in each treatment.

Table B.2: Representativeness of the sample.

		Sample	Population
Age			
18-27	0.176	0.172	
28-37	0.175	0.176	
38-47	0.160	0.160	
48-57	0.171	0.162	$\chi^2(4) = 2.029$
58+	0.318	0.330	$p = 0.7305$
Gender			
Female	0.516	0.504	$\chi^2(1) = 1.1684$
Male	0.484	0.496	$p = 0.2797$

Notes: Population-level data is retrieved from US Census Bureau (2022).

Table B.3: Sample Comparison: Prolific and Lucid.

	Climate Survey Prolific		Butcher Experiment Lucid		
Age					
18-27	204	0.200	367	0.176	
28-37	235	0.230	364	0.175	
38-47	177	0.173	332	0.160	
48-57	166	0.162	356	0.171	$\chi^2(4) = 30.20$
58+	240	0.235	662	0.318	$p < 0.001$
Gender					
Female	516	0.505	1073	0.516	$\chi^2(1) = 0.06$
Male	494	0.483	1008	0.484	$p = 0.805$
Other	12	0.012			
Ethnicity					
Asian	68	0.067	68	0.033	
Black	135	0.132	265	0.127	
White	765	0.749	1605	0.771	
Mixed	29	0.028	79	0.038	$\chi^2(4) = 21.27$
Other	25	0.024	64	0.031	$p < 0.001$
Party affiliation					
Republican	152	0.149	595	0.286	
Republican leaning independent	67	0.066	169	0.081	
Independent	205	0.201	404	0.194	
Democratic leaning independent	144	0.141	160	0.077	$\chi^2(4) = 96.09$
Democratic	452	0.443	753	0.362	$p < 0.001$
Political orientation					
Conservative	101	0.099	434	0.209	
Somewhat conservative	225	0.221	662	0.318	
Somewhat liberal	318	0.312	579	0.278	$\chi^2(3) = 154.76$
Liberal	376	0.369	406	0.195	$p < 0.001$
Education					
Less than high school	8	0.008	48	0.023	
High school degree	109	0.107	527	0.253	
Some University but no degree	286	0.280	661	0.318	
Bachelor Degree	370	0.363	546	0.262	$\chi^2(4) = 144.45$
Postgradute degree	247	0.242	299	0.144	$p < 0.001$
Household income					
- $5,000	26	0.025	68	0.033	
$5,000 - $15,000	67	0.066	130	0.062	
$15,000 - $30,000	129	0.126	339	0.163	
$30,000 - $45,000	130	0.127	313	0.150	
$45,000 - $60,000	137	0.134	322	0.155	
$60,000 - $75,000	114	0.112	220	0.106	
$75,000 - $90,000	90	0.088	188	0.090	
$90,000 - $105,000	80	0.078	109	0.052	
$105,000 - $120,000	88	0.086	93	0.045	
$120,000 - $135,000	30	0.029	67	0.032	
$135,000 - $150,000	37	0.036	89	0.043	$\chi^2(11) = 44.97$
$150,000 -	92	0.090	143	0.069	$p < 0.001$

Notes: In the demographic survey of the Butcher Experiment, participants were asked: "What sex were you assigned at birth, such as on an original birth certificate?" with response options limited to "Male" and "Female." For the chi-squared test, 12 participants from the Prolific sample who selected "Other" were excluded from the analysis.

B.3.4 Treatment Effect

We estimate the following linear model,

$$WTP_i = \beta_0 + \beta_1 T_i + \gamma X_i + \varepsilon_i,$$

where $T_i = 1$ if participant i is assigned to the Info treatment, X_i is a vector of dummy variables capturing demographic characteristics of participant i, and ε_i is an error term.

Table B.4: Effect of information on the willingness to pay for meat products.

	WTP (beef)			WTP (poultry)		
	(1)	(2)	(3)	(4)	(5)	(6)
Info	2.743	2.907	2.622	−2.028	−1.944	−2.395
	(2.285)	(2.281)	(2.305)	(2.162)	(2.151)	(2.178)
Age		0.170**	0.216***		0.189***	0.229***
		(0.067)	(0.068)		(0.061)	(0.066)
Female		−5.400**	−5.287**		−3.712*	−3.892*
		(2.276)	(2.312)		(2.159)	(2.201)
Liberal		−0.753	−0.297		1.064	0.025
		(2.296)	(2.366)		(2.158)	(2.223)
Belief (beef)		−0.010	−0.007			
		(0.012)	(0.013)			
Above-median consumption (beef)			6.493***			
			(2.410)			
Intention to reduce (beef)			−0.412			
			(0.979)			
Difficult to reduce (beef)			2.140**			
			(1.038)			
Belief (poultry)					0.009	0.008
					(0.007)	(0.008)
Above-median consumption (poultry)						3.433
						(2.345)
Intention to reduce (poultry)						1.330
						(1.000)
Difficult to reduce (poultry)						−0.452
						(0.993)
Constant	32.225***	27.697***	16.869***	29.517***	21.795***	18.737***
	(1.590)	(4.007)	(5.263)	(1.544)	(3.586)	(5.310)
First product	Beef	Beef	Beef	Poultry	Poultry	Poultry
Observations	1,048	1,048	1,011	1,033	1,033	1,005
R^2	0.001	0.014	0.032	0.001	0.013	0.018

Notes: Robust standard errors are reported in parentheses. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

Subgroup analysis. We estimate the following linear model for each demographic group,

$$WTP_i = \beta_0 + \beta_1 T_i + \varepsilon_i,$$

where $T_i = 1$ if participant i is assigned to the Info treatment and ε_i is an error term. Estimated coefficients and their 95% confidence intervals are plotted in Figure B.6 below.

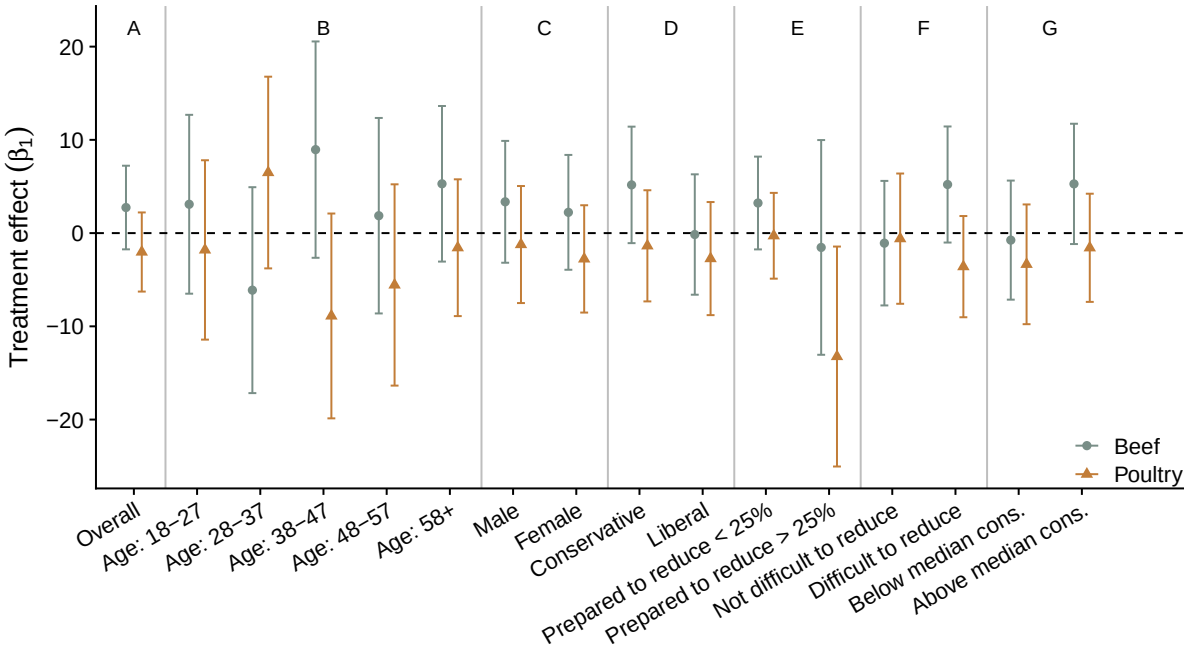


Figure B.6: Effect of information on WTP for meat products. *Notes*: Estimated coefficients and 95% confidence intervals are plotted. (D) "Somewhat liberal" and "somewhat conservative" are grouped into liberal and conservative, respectively. (E) "Do you intend to reduce your consumption of beef/poultry in light of its CO_2 emissions?" (F) "How difficult would it be to reduce your current consumption of beef/poultry by half?" (G) "How many times do you eat beef/poultry per week?"

B.3.5 Stated Intentions about Future Consumption

Table B.5: The effect of information about emissions on stated intention to reduce meat consumption.

	(1) Beef	(2) Poultry
Information	0.017	−0.071
	(0.095)	(0.098)
	[−0.170, 0.203]	[−0.264, 0.121]
Butcher experiment	0.257***	0.271***
	(0.092)	(0.094)
	[0.077, 0.438]	[0.087, 0.454]
Constant	−0.196***	−0.269***
	(0.067)	(0.066)
	[−0.328, −0.065]	[−0.399, −0.139]
Observations	2,035	2,029
Log-likelihood	−1405.23	−1395.81

Notes: Logistic regression was run on each product separately. The dependent variable is a binary indicator `intend to reduce consumption of [product]`. The independent variables are the indicator `received information about CO2 emissions from [product]` and the indicator for the `Butcher experiment`. Robust standard errors are reported in parentheses. 95% confidence intervals are reported in square brackets. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

B.3.6 Substitution Across Meat Products

To test whether information causes people to substitute from one meat product to another, we compare the valuations for the meat shipments depending on whether they are offered as product 1 or product 2 in the information treatment. In fact, when learning the emissions associated with product 2, subjects already know about the emissions of the potential substitute. Compared to the effect of information when the meat is offered as product 1, the information about product 2 should cause an (additional) negative effect of information on beef demand (as a cleaner alternative is known to be available), and a positive effect of information on poultry demand (as the alternative is more polluting).

To evaluate these hypotheses, we regress the WTP for both meat products separately on a dummy for Info, timing ("Second product"), and the interaction between these variables. Following our reasoning above, the coefficient for the interaction between *Second product* and *Info* should be positive for poultry and negative for beef. Table B.6 shows the results of these regressions. The estimated coefficients are in the hypothesized direction, but not (close to) statistically significant. Thus, we cannot rule out that knowledge about substitute products induces a shift in valuation, but the effect, if it exists, is too small for us to detect despite our large sample. The role of substitution in information provision is an important question for future research.

Table B.6: The effect of knowledge about the emissions of substitute products.

	(1) WTP (poultry)	(2) WTP (beef)
Info	−2.028	2.743
	(2.162)	(2.285)
Second product	−0.202	0.855
	(2.189)	(2.267)
Info × Second product	3.755	−3.603
	(3.100)	(3.237)
Constant	29.517***	32.225***
	(1.544)	(1.590)
Observations	2,054	2,061
R^2	0.001	0.001

Notes: The dependent variable is `WTP for poultry` (1) or `WTP for beef` (2). The `Second product` dummy takes 1 if the WTP for poultry (beef) is measured in the BeefFirst (PoultryFirst) treatment. Robust standard errors are reported in parentheses. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

B.3.7 Further Results on the Relative Emissions Hypothesis

A complementary test of the relative emission hypothesis examines misperceptions about the pollution ranking of beer and meat. Perhaps surprisingly, 48.4% of participants believe that a can of beer is linked to more emissions than a pound of beef. Among participants who initially held the wrong ranking and received the information, 63.2% corrected the mistakes in the posteriors, indicating that the information effectively shifted perceived rankings. However, the null effect of information persists even within the subsample of participants who initially held incorrect rankings (Table B.7), a result that contrasts with the relative emission hypothesis.

Table B.7: Interpretation of the null effect of information on WTP for beef (cont.).

	WTP (beef)
Info	4.165
	(3.374)
Constant	32.711***
	(2.364)
Observations	519
R^2	0.003

Notes: The dependent variable is `WTP for beef`. Participants in the BeefFirst treatments, who believe that a can of beer is linked to more emissions than a pound of beef, are included. Robust standard errors are reported in parentheses. *: $p < 0.1$; **: $p < 0.05$; ***: $p < 0.01$.

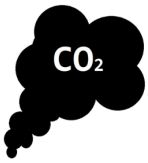
C Instructions for the Climate Survey

C.1 Session 1: Introduction

Welcome!

UNIVERSITY OF AMSTERDAM

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN



In the study, we will mainly ask you questions related to climate change and CO_2 emissions.

For this study, it is important that for every question you give us your best guess without asking anyone else or using any other form of help.

This study runs over two days:

- **Today**: Session 1 - **65 minutes** survey
- **16th December**: Session 2 - **25 minutes** survey

The total reward for this study is **£10.00 (~$13.10)**

In addition, you can win a **bonus** worth several pounds

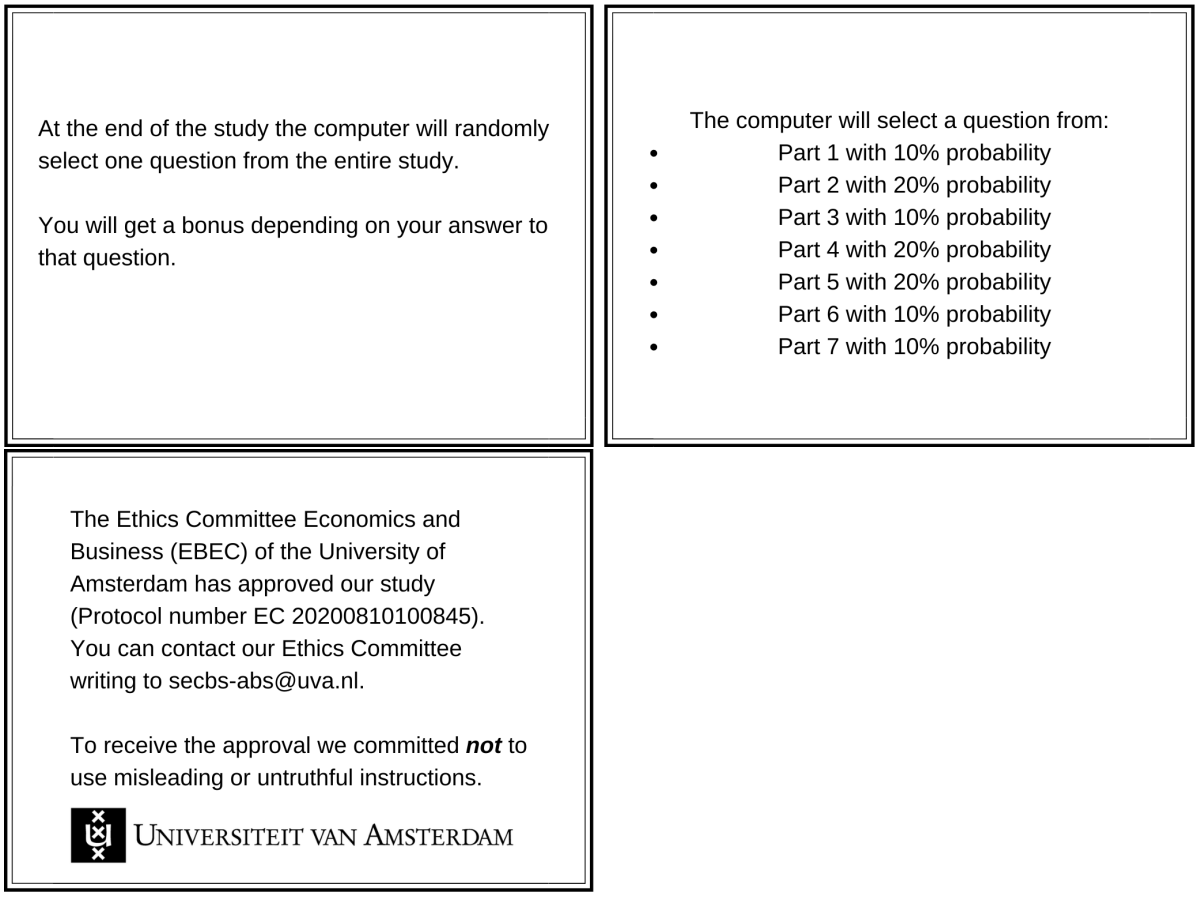
We will **approve** your submission only if you complete the surveys on both days.

You **must** complete Session 2 **between Wednesday 16th December** at 12 noon ET (11.00 am CT, 10.00 am MT, 9.00 am PT) and Thursday **17th December** 3.00 pm ET (2.00 pm MT, 1.00 pm MT, 12 noon PT).

We will send you a reminder on Prolific when Session 2 is open.

Today you will complete parts 1, 2, 3, 4 of the study and a questionnaire.
In Session 2, you will complete parts 5, 6, and 7.

In each part, you will make some decisions or answer questions.



Comprehension questions

1. You will be paid only if you conclude all the parts of this study. The study has two sessions.
   True; False

2. At the end of the study, the computer will randomly select one question. You will receive a bonus depending on your answer to this question.
   True; False

3. For this study, it does not matter if you ask for help to answer the questions.
   True; False

4. According to the ethical protocol under which we run this study, all the instructions you read must be truthful and not misleading.
   True; False

C.2 Part 1

Part 1

Scientific studies have investigated the causes and the effects of climate change. In particular they estimated:

- The global warming from pre-industrial era.
- The consequences of a 2°C global warming for humans.
- The CO_2 generated by several human activities.

The most important measure of the future consequences of emitting a given amount of CO_2 today is called the **social cost of carbon**.

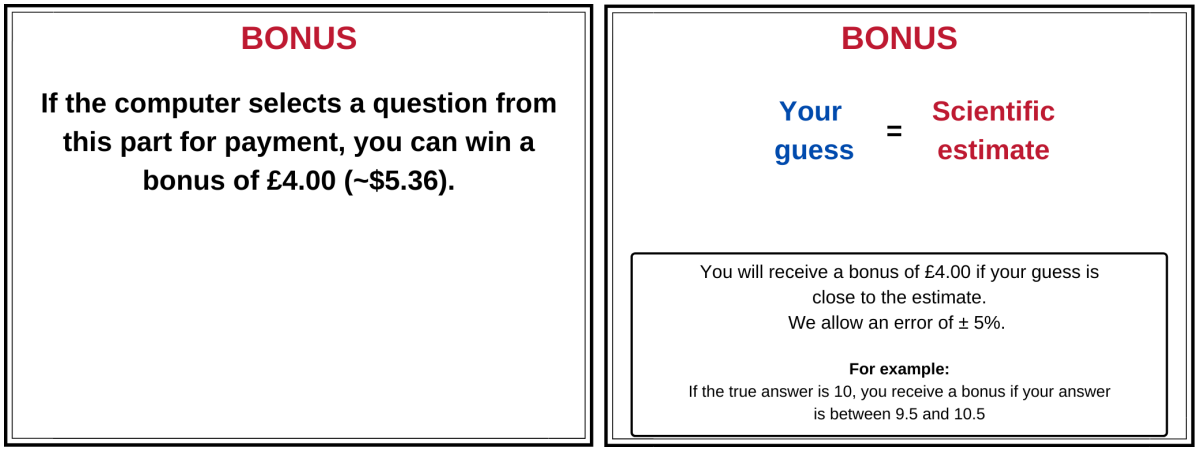
The social cost of carbon puts a dollar value on the fact that:

- CO_2 emissions have an impact on the earth's climate and they lead to rises in sea levels, changes in rainfall patterns, a higher frequency of extreme weather events etc. All these events affect human health and productivity.
- CO_2 emissions imply a hidden cost: emitting CO_2 today requires reducing consumption tomorrow to avoid a global warming of more than 2°C.

In Part 1, we will ask you to guess the value of several scientific estimates.

Your guess ⟷ **Scientific estimate**

We will compare your guess to the scientific estimate.



Comprehension questions

1. The social cost of CO_2 emissions is due both to the consequences of climate change and to the cost of reducing consumption in the future to avoid global warming of more than 2°C.
   True; False

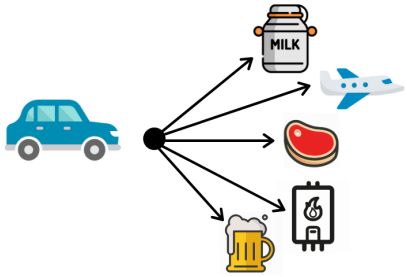
2. If one of the questions from Part 1 is selected for payment, you can win a bonus of £ ☐.

3. If one of the questions from Part 1 is selected for payment, you will win the bonus:
   Only if your answer is below the scientific estimate.; Only if your answer is above the scientific estimate.; Only if your answer is equal to the scientific estimate with an error of no more than ±5%.; Only if your answer is exactly equal to the scientific estimate.

C.3 Part 2

Part 2

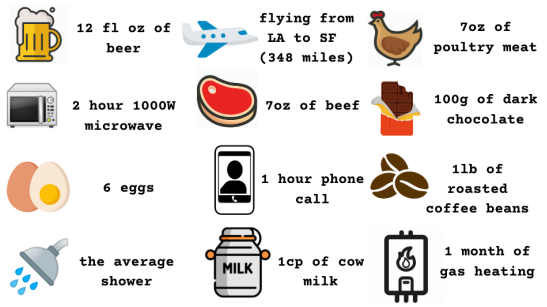
Scientists and governments estimated the CO_2 emissions of other products and actions as well



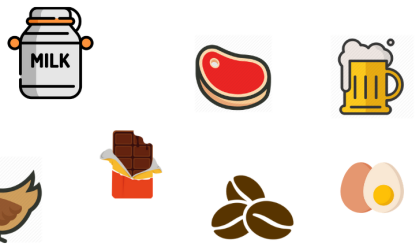
We will now ask you to compare the CO_2 emissions generated by other products with the emissions generated by driving a car.

Example question:

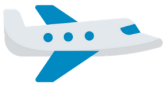
For example, you are asked to fill the blank space with the number of miles you need to drive to produce as much CO_2 as the average shower.



Here is the complete list of the 12 products we will use in this study.



For the products above the scientific estimates take into account all the emissions starting with the production and ending with the distribution of the products to the consumer.



For the flight the scientific estimate takes into account only the emissions generated by burning the plane fuel.

For the gas heating the scientific estimate is the average of the estimates of 10 different carbon footprint calculators.

For the microwave the scientific estimate takes into account only the emissions generated by the power plants that produce the energy used by the microwave.

For the shower the scientific estimate takes into account the emissions generated by warming up the water and all the emissions connected to the water delivery and cleaning.

For the phone call the scientific estimate takes into account the CO_2 emissions generated to operate the phone and the communication network.

BONUS

If the computer selects a question from this part for payment:

You can win a bonus of £4 (~$5.36)

Your guess ⟷ **Scientific estimate**

As in Part 1:
We will compare your guess to a scientific estimate.

Your guess = **Scientific estimate**

As in Part 1:
You will receive a bonus of £4.00 if your guess is close to the estimate.
We allow an error of ± 5%.

Comprehension questions

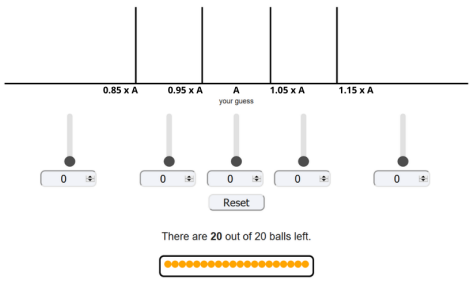
1. In this part, you need to compare the emissions produced by several actions with the emissions produced by driving 1 mile by car.
   True; False

2. You will need to compare the emissions of a flight from New York to Chicago with the emissions of driving a car.
   True; False

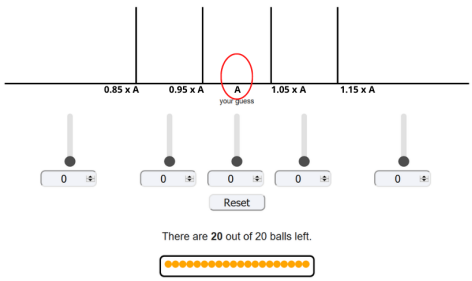
C.4 Part 3

Part 3

We will now ask you how certain you are about your guesses in Part 1 and Part 2

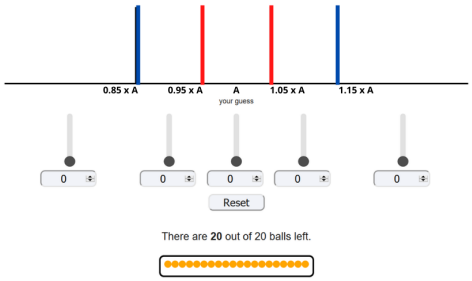


For each of your guesses in Parts 1 and 2, you will see an interface like the one above.

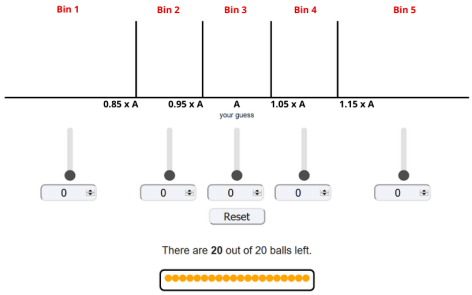


The point in the middle corresponds to your guess in Part 1 or Part 2.

Here we indicate your guess with "A". In the actual question you will see the number you stated as your guess instead of "A".



The two **red lines** represent your guess ± 5%
The two **blue lines** represent your guess ± 15%



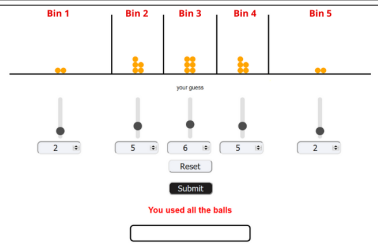
Hence, the interface is divided into 5 bins.
You have to distribute 20 balls between these 5 bins.

The number of balls you place in a bin expresses the chances with which you think the scientific estimate falls into that bin.

So, the more likely you think it is that the scientific estimate falls into a particular bin, the more balls you should place into that bin.

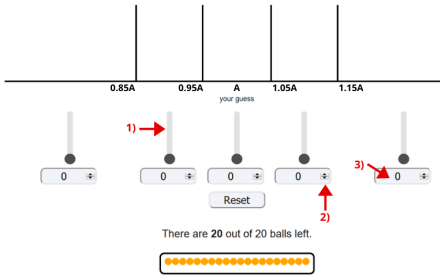
If you are really certain of your original guess, then you should put many balls into the central bin.

If you are rather uncertain and think that the true estimate could take any number of values, then you should distribute the balls between bins more evenly.



In the example above a participant indicated that the chance that the estimate falls into

- Bin 1 is 2 out of 20
- Bin 2 is 5 out of 20
- Bin 3 is 6 out of 20
- Bin 4 is 5 out of 20
- Bin 5 is 2 out of 20



To distribute the balls you can 1) move the sliders, 2) use the arrows, and 3) type numbers in the boxes.

BONUS

You can win a bonus of £6 (~$8.04) if the computer selects a question from this part for payment

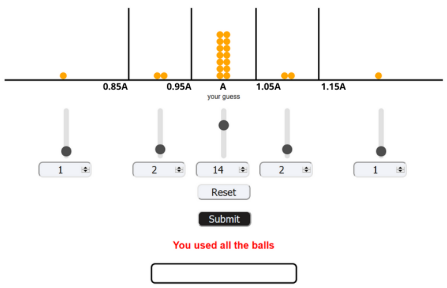
BONUS

The payment mechanism is such that you have the highest chance to win the bonus if the distribution of balls reflects **your level of certainty**.

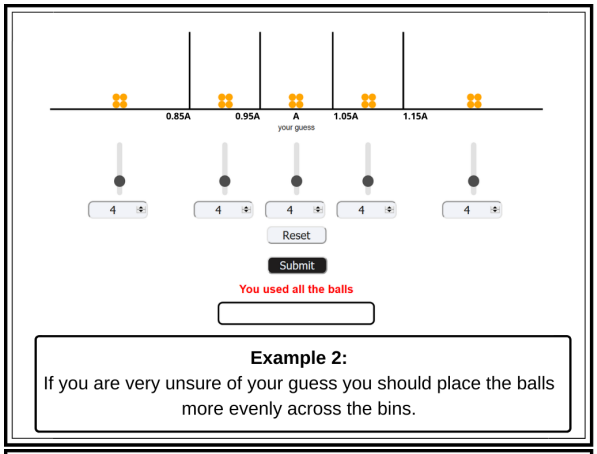
That means that the number of balls in each bin should reflect the likelihood that the bin contains the scientific estimate.

If you want more information about the payment mechanism, click on the link below this slide

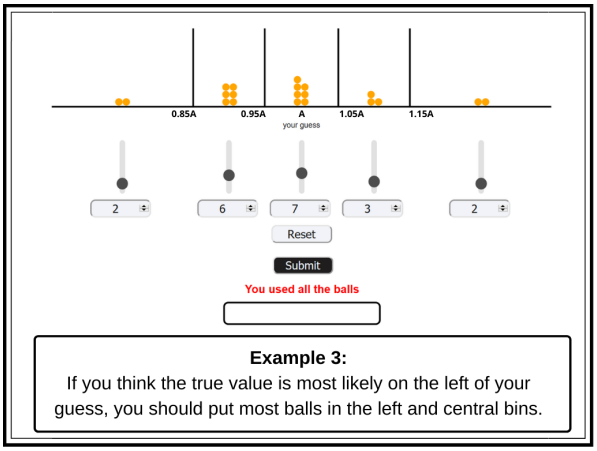
We now illustrate how you can express your level of certainty with a number of examples.



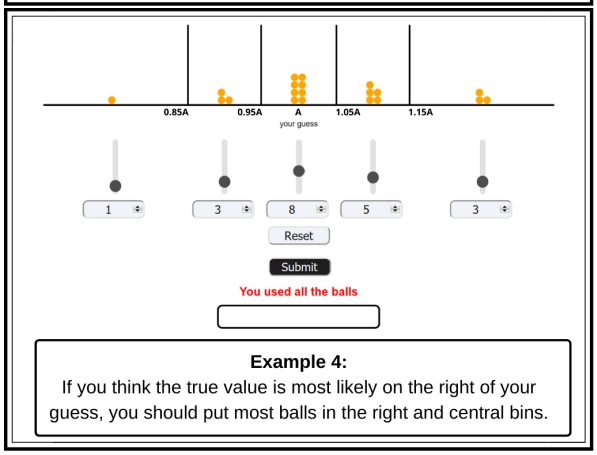
Example 1:
If you are very sure of your guess, then you should place many balls in the central bin.



Example 2:
If you are very unsure of your guess you should place the balls more evenly across the bins.



Example 3:
If you think the true value is most likely on the left of your guess, you should put most balls in the left and central bins.



Example 4:
If you think the true value is most likely on the right of your guess, you should put most balls in the right and central bins.

Optional instructions about the incentives

Additional information about the the payment mechanism

If a question from this part is selected for payment, then the computer will randomly select one of the bins from this question

Your probability of winning the bonus is determined by:

- The bin that contains the scientific estimate
- How you distribute the 20 balls

If:

- You put *B* out of 20 balls in the selected bin
- The scientific estimate is in the selected bin

You win the bonus with probability:

$100 - 100*(1 - B/20)^2$

For example:

- If you put 20 balls in that bin you win the bonus with 100% probability.
- If you put 4 balls in the bin you win the bonus with 36% probability.
- If you put 0 balls in the bin you win the bonus with 0% probability.

If:

- You put *B* out of 20 balls in the selected bin
- The scientific estimate is *not* in the selected bin

You win the bonus with probability:

$100 - 100*(B/20)^2$

For example:

- If you put 20 balls in that bin you win the bonus with 0% probability.
- If you put 4 balls in the bin you win the bonus with 96% probability.
- If you put 0 balls in the bin you win the bonus with 100% probability.

Comprehension questions

1. Your task in this part is to distribute [ ] balls across [ ] bins.

2. The number of balls that you place in each bin represents your level of certainty about the chance that the scientific estimate is in that bin.
   True; False

3. You maximize the chances of winning the bonus if you distribute the balls according to your level of certainty.
   True; False

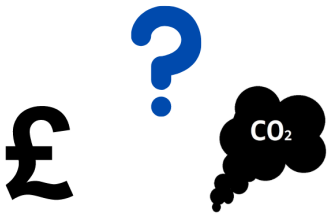
4. It is best for you to put many balls into a bin only if:
   You think there are high chances that the scientific estimate is in that bin.; You think there are low chances that the scientific estimate is in that bin.

5. If you are not very certain in your answer, then:
   You should put all of your balls in one bin.; You should put balls in several of the bins.

C.5 Part 4

Part 4

In **Part 4,** you will have to **choose between** earning money for yourself and implementing CO_2 emissions.

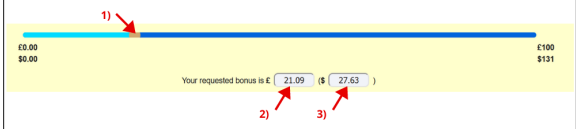


We will show you an amount of CO_2 emissions that is equivalent to driving a number of miles by car. For instance, 5 miles as in the picture below.

Your task is to indicate (on a scale between £0.00 and £100 ($134), your **requested bonus.**

For each CO_2 emission, the **requested bonus** is the smallest bonus you would need to be fine with causing these emissions.

You can indicate your requested bonus **1)** moving the cursor on the scale, **2)** typing the amount in £, and **3)** typing the amount in $.



If this part is selected for payment, then your choices affect both your bonus and the emissions in the atmosphere!

We describe on the next slides how this works.

First note that the emissions are real: the University of Amsterdam has arranged a fund to be donated to Carbonfund.org Foundation to eliminate CO_2 from the atmosphere. Carbonfund.org Foundation is a nonprofit organization that offsets CO_2 emissions. If you choose to receive money for yourself, then you will reduce the size of the fund, resulting in an increase of CO_2 in the atmosphere.

This is the invoice of the donation from a previous study

You can check our donation!

After the study is over, we will send you a link with the proof of the donation to Carbonfund.org.

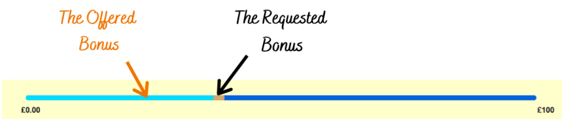
How do we determine your bonus and emissions?

After you picked your Requested Bonus, the computer will generate an ***Offered Bonus,*** which is a random amount between £0 and £100 ($134).

We then compare the **Requested Bonus** with the **Offered Bonus** as follows:

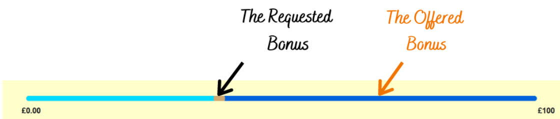
If the Offered Bonus is **smaller** than your Requested Bonus (i.e. it falls in the light-blue area), then:

- There will be **no emissions**.
- You will **not** obtain a **bonus**



If the Offered Bonus is **bigger** than the Requested Bonus (i.e. it falls in the **dark-blue** area), then:

- You will obtain the **Offered Bonus**
- You **emit** the **CO_2** specified on top of the scale



Thus, it is in your best interest to state the Requested Bonus that reflects the smallest bonus you would need to be fine with causing these emissions:

- *If you feel strongly you don't want to implement emissions, then you should choose a high Requested Bonus.*
  - This guarantees that if emissions will not occur, unless you receive a high compensation.
- *If you don't feel strongly about implementing emissions, then you should choose a low Requested Bonus.*
  - This guarantees that you will not reject an Offered Bonus that is sufficient to compensate you.
- N.B.: choosing a Requested Bonus of £100 guarantees that emissions will not be implemented. Choosing a Requested Bonus of £0 guarantees that emissions will be implemented.

For more explanations about the payment scheme, click on the link below.

Optional instructions about the incentives

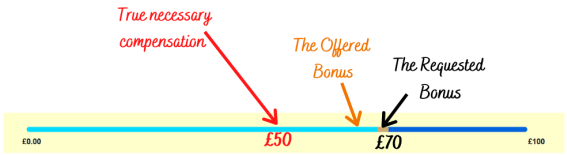
These slides give more details on the payment mechanism of Part 4

In the slides below, we explain why it is in your best interest to state a Requested Bonus that reflects the true minimum compensation that you need to accept the emissions.

Suppose for the sake of this explanation that your true necessary compensation is £50. We show you what goes wrong if you specify a Requested Bonus that is *different* from £50.

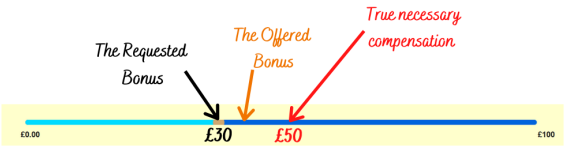
Suppose first that you specify a Requested Bonus *higher than £50*, for instance £70 in the picture below.

Then, if the Offered Bonus falls somewhere between £50 and £70, you will *not* receive the Offered Bonus, *even though* it is higher than the necessary compensation for the emissions.



Suppose now that you specify a Requested Bonus lower *than £50*, for instance £30 in the picture below.

Then, if the Offered Bonus falls somewhere between £30 and £50, you will implement the emissions and receive the Offered Bonus, *even though* it is not enough to compensate you for the emissions.



Whenever your Requested Bonus differs from the true compensation you feel you need to receive, you can construct examples like the ones above.

Thus, the only way to make sure you receive an adequate compensation for the implemented emissions, is to specify a Requested Bonus that reflects your true compensation needs.

Comprehension questions

1. The offered bonus is randomly selected.
   True; False

2. Suppose a decision from Part 4 is selected for payment. Which is true?
   I will receive the requested bonus for that decision.; I will receive the offered bonus.; I will receive the offered bonus only if the offered bonus is higher *than my requested bonus for that decision.; I will receive the offered bonus only if the offered bonus is* lower *than my requested bonus for that decision.*

3. Suppose a decision from Part 4 is selected for payment. Which is true about the emissions specified in that decision?
   The emissions will be implemented.; The emissions will never be implemented.; The emissions will be implemented only if the offered bonus is higher *than the requested bonus for that decision.; The emissions will be implemented only if the offered bonus is* lower *than the requested bonus for that decision.*

4. The amount of CO_2 in the atmosphere might change due to your decisions in this study.
   True; False

5. When the study is over we will send you the link with the proof of our donation to Carbonfund.org.
   True; False

6. If you strongly feel you don't want to implement emissions then it is best for you to:
   To choose a high requested bonus.; To choose a low requested bonus.

7. If you *don't* feel strongly about implementing emissions then it is best for you to:
   To choose a high requested bonus.; To choose a low requested bonus.

C.6 Session 2: Introduction

Welcome to the second day of the study!

Today you will complete parts 5, 6, and 7.

After you complete the study, the computer will randomly select a question for payment.

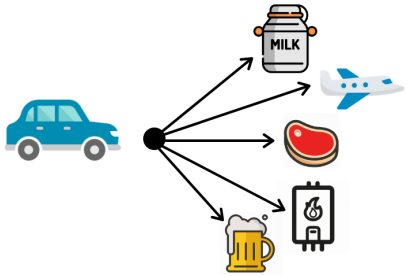
You will receive a total reward of **£10.00** for completing both sessions of the study.
In addition, you can win a **bonus** of several dollars.

C.7 Part 5

Part 5

In Part 5, your task is to guess the value of some scientific estimates of the CO_2 emissions of several products.

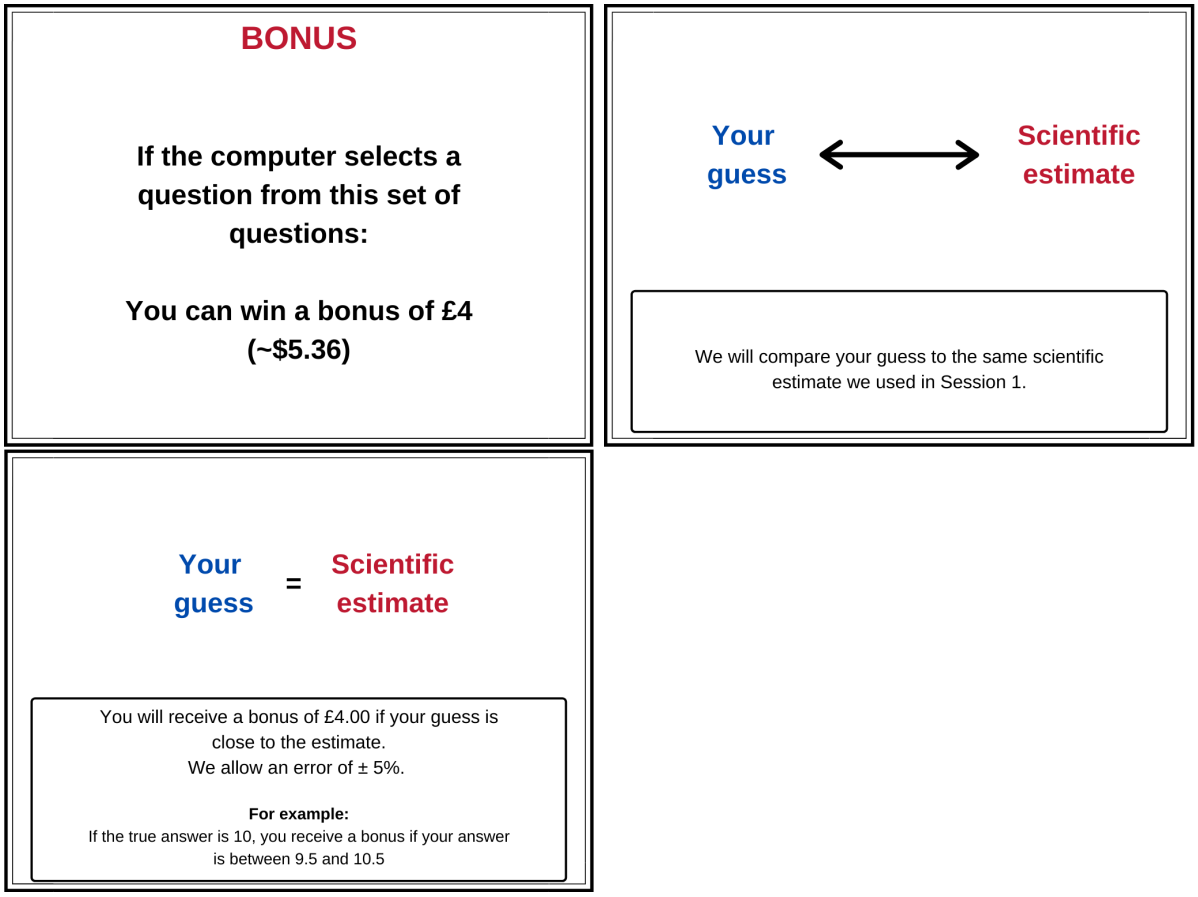
Those scientific estimates are the same we asked you about in Session 1



As in Session 1, you will be comparing the CO_2 emissions generated by these products with the CO_2 emissions generated by driving for one mile by car.

Example question:

For example, you are asked to fill the blank space with the number of miles you need to drive to produce as much CO_2 as the average shower.



Comprehension questions

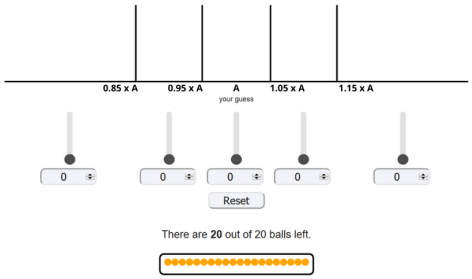
1. In Part 5, you need to guess the value of:
   TThe same scientific estimates you were asked about in Session 1.; A new scientific estimate of the CO_2 emissions of some products.

2. You will need to compare the emissions of a flight from New York to Chicago with the emissions of driving a car.
   True; False

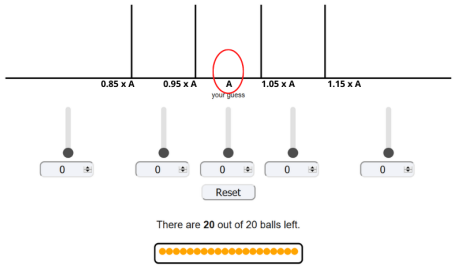
C.8 Part 6

Part 6

We will now ask you how certain you are about your guesses in Part 5



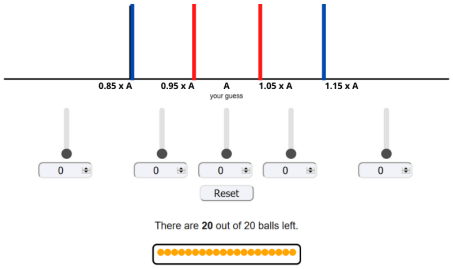
You will see an interface like the one above.
You should be familiar with this interface from Session 1



The point in the middle corresponds to your guess of Session 1.

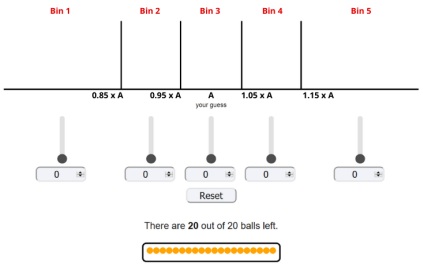
Here we indicate your guess with "A". In the actual question you will see the number you stated as your guess instead of "A".

As in Session 1



The two **red lines** represent your guess ± 5%
The two **blue lines** represent your guess ± 15%

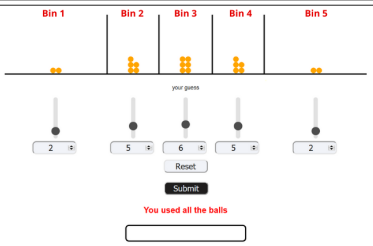
As in Session 1



The interface is divided into 5 bins.
You have to distribute 20 balls between these 5 bins.

The number of balls you place in a bin expresses the chances with which you think the scientific estimate falls into that bin.

So, the more likely you think it is that the scientific estimate falls into a particular bin, the more balls you should place into that bin.



In the example above a participant indicated that the chance that the estimate falls into

- Bin 1 is 2 out of 20
- Bin 2 is 5 out of 20
- Bin 3 is 6 out of 20
- Bin 4 is 5 out of 20
- Bin 5 is 2 out of 20

BONUS

If the computer selects a question from this set:

You can win a bonus of £6 (~$8.04)

BONUS

The payment mechanism is such that you have the highest chance to win the bonus if the distribution of balls reflects **your level of certainty**.

That means that the number of balls in each bin should reflect the likelihood that the bin contains the scientific estimate.

If you want more information about the payment mechanism, then click on the link below this slide

Comprehension questions

1. Your task in this part is to distribute [ ] balls across [ ] bins.

2. The number of balls that you place in each bin represents your level of certainty about the chance that the scientific estimate is in that bin.
   True; False

3. You maximize the chances of winning the bonus if you distribute the balls according to your level of certainty.
   True; False

4. It is best for you to put many balls into a bin only if:
   You think there are high chances that the scientific estimate is in that bin.; You think there are low chances that the scientific estimate is in that bin.

5. If you are not very certain in your answer, then:
   You should put all of your balls in one bin.; You should put balls in several of the bins.

D Instructions for the Butcher Experiment

We present the instructions for the BeefFirst treatments in which sirloin steaks are offered in Part 1 and chicken breasts are offered in Part 2. The content of the instructions for the PoultryFirst treatments is identical except for the order of the products.

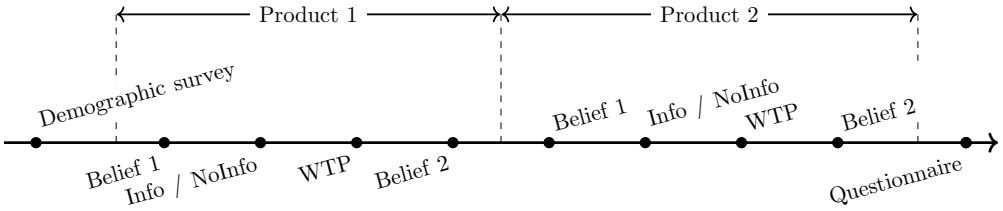


Figure D.1: Timeline of the butcher experiment.

D.1 Introduction

Welcome!

This is a study conducted by researchers at the University of Amsterdam and the Ludwig Maximilians Universität München.

This study lasts about **15 minutes**.

Your submission will be approved within two weeks.

If you finish the experiment you have the chance of winning an Amazon voucher worth $500.

One participant among those that finish the experiment will be randomly selected to receive the voucher. You will know if you won the voucher on the last screen of the experiment.

Moreover, depending on your decisions and luck, you may receive an additional Amazon voucher worth several dollars or a free delivery of food.

If you are selected for either the voucher or the food, you can expect to receive them by April 21st, 2022.

The experiment has two parts: Part 1 and Part 2.

One of your decisions in one of the two parts will be randomly selected, and will determine your bonus or food earnings.

The Economics and Business Ethics Committee (EBEC) of the University of Amsterdam has approved our study (Protocol number 20210810100815). You can contact our Ethics Committee by writing to secbs-abs@uva.nl.

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To receive ethical approval we committed ***not*** to use misleading or untruthful instructions.

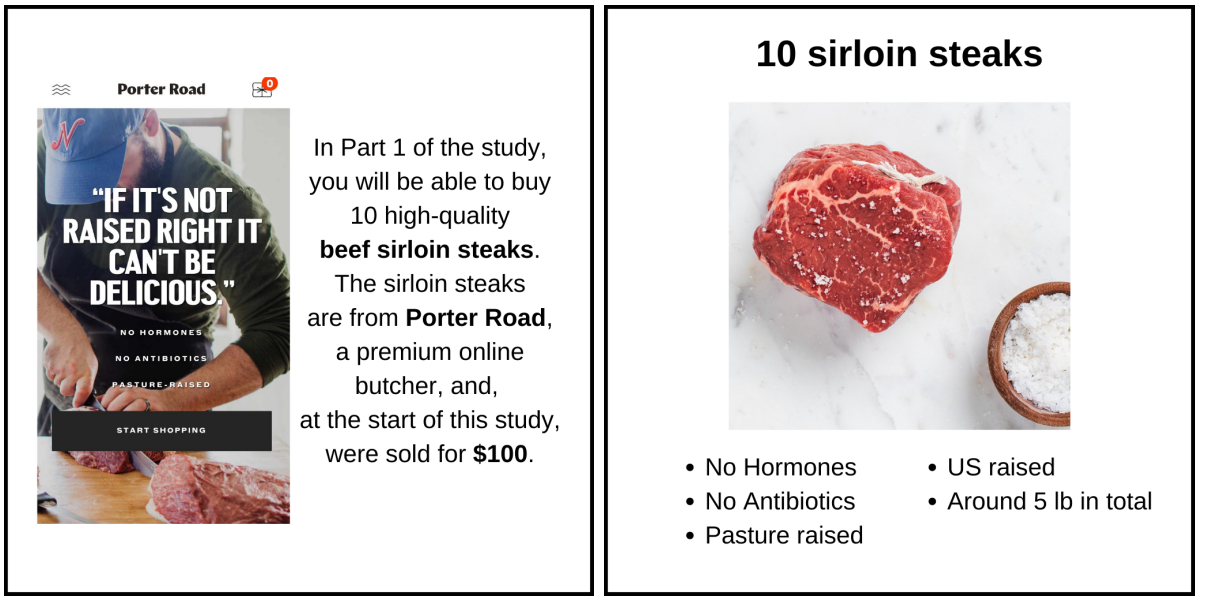
Everything you read in the instructions is true.

Comprehension questions

1. If you complete this study, you can win an Amazon voucher worth $500.
   True; False

2. According to the ethical protocol under which we run this study, all the instructions you read must be truthful and not misleading.
   True; False

D.2 Part 1



Comprehension question

"When we started this study, what was the price of the meat that you can buy in this study?"

$65; $80; $100

Like many products, beef meat is associated with **CO_2 emissions** that are linked to climate change.

In this study, we will tell you about the emissions associated with several products. The information we give you comes from the most recent **scientific work**.

You will find the link to the scientific work at the end of the study.

For example, **on average, driving one mile** by car emits the equivalent of **10.3 oz** (291 g) **of CO_2** in the atmosphere.

1 mile by car

= 10.3 oz CO_2

Car: emissions generated by an average car

The estimates come from the most recent scientific work.

Here are two other products and their average emissions relative to driving 1 mile by car.

12 fl oz of beer

= **1.5** x

1 mile by car

flight from LA to SF (348 miles)

= **304** x

1 mile by car

Beer: average emissions from production and distribution
Flight: average emissions due to burning fuel

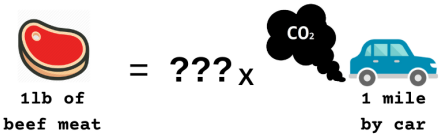
The estimates come from the most recent scientific work.

Prior belief

Your estimate:

Next, you will be asked how much CO_2 is emitted in the production and distribution of 1lb of beef meat. Please state your answer relative to driving 1 mile by car.

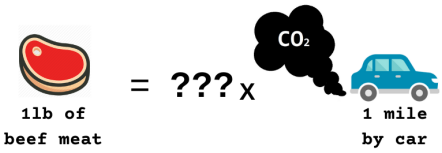
For example, you may guess that 1lb of beef meat emits 0.4 times or 301 times as much as driving 1 mile by car. (Note that these are random numbers used for illustrative purposes.)



Your estimate:

What do you think, relative to driving 1 mile by car, how much CO_2 is generated by 1lb of beef meat?

(You receive 50 cents if your answer is within 5 percent of the correct answer.)



"I think 1 lb of beef meat emits as much CO_2 as driving ☐ miles by car."

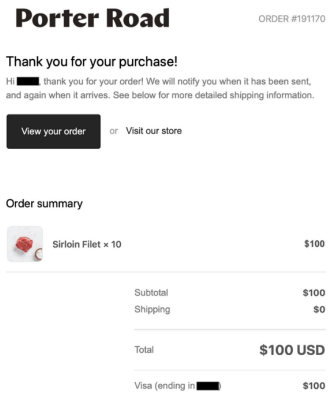
Willingness to pay

How much are you willing to pay for 10 sirloin steaks?

You are now able to buy 10 premium sirloin steaks worth $100. To this end, you will make a series of decisions between an amount of money and receiving a free shipment of 10 sirloin steaks from Porter Road.

Your decisions may have real consequences: The computer will randomly select one in every 20 participants in this survey (100 people in total) and implement their decisions in one part of the experiment, as we will explain below. If your decisions from this part are selected, then you will receive either money or the shipment of sirloin steaks.

In line with our commitment to truthful instructions, payments and shipments will take place as promised: Here is an invoice for a shipment for a previous participant.



Do you want to buy the sirloin steaks?

YES	**NO**
You will receive a free package of 10 sirloin steaks worth $100.	You will not receive a free package of sirloin steaks.
In addition	*In addition*
○ You earn an extra **$0** for this study.	○ You earn an extra **$50** for this study.

This is an example of the decisions you will have to make. You obtain **either** the steaks, **or** the bonus of $50. In other words, you can obtain the steaks at a cost of $50. Imagine for a moment which option you would prefer in this example.

Do you want to buy the sirloin steaks?

YES	**NO**
You will receive a free package of 10 sirloin steaks worth $100.	You will not receive a free package of sirloin steaks.
In addition	*In addition*
● You earn an extra **$0** for this study.	○ You earn an extra **$50** for this study.

If you choose **YES**, then you mark your choice as above.

Do you want to buy the sirloin steaks?

YES	NO
You will receive a free package of 10 sirloin steaks worth $100.	You will not receive a free package of sirloin steaks.
In addition	*In addition*
○ You earn an extra **$0** for this study.	● You earn an extra **$50** for this study.

If you choose **NO**, then you mark your choice as above.

Do you want to buy the sirloin steaks?

	YES	NO
	You will receive a free package of 10 sirloin steaks worth $100.	You will **not** receive a free package of sirloin steaks.
	in addition	*in addition*
1)	● you earn **$ 0**	○ you earn **$ 0**
2)	○ you earn **$ 0**	○ you earn **$ 10**
3)	○ you earn **$ 0**	○ you earn **$ 20**
4)	○ you earn **$ 0**	○ you earn **$ 30**
5)	○ you earn **$ 0**	○ you earn **$ 40**
6)	○ you earn **$ 0**	○ you earn **$ 50**
7)	○ you earn **$ 0**	○ you earn **$ 60**
8)	○ you earn **$ 0**	○ you earn **$ 70**
9)	○ you earn **$ 0**	○ you earn **$ 80**
10)	○ you earn **$ 0**	○ you earn **$ 90**
11)	○ you earn **$ 0**	○ you earn **$ 100**

We will ask you to make several decisions, arranged in a list like above. In each row, you have to choose between **YES** and **NO**.

- Option **YES** is always the same.
- Option **NO** differs in the bonus you obtain.

Do you want to buy the sirloin steaks?

	YES	NO
	You will receive a free package of 10 sirloin steaks worth $100.	You will **not** receive a free package of sirloin steaks.
	in addition	*in addition*
1)	● you earn **$ 0**	○ you earn **$ 0**
2)	○ you earn **$ 0**	○ you earn **$ 10**
3)	○ you earn **$ 0**	○ you earn **$ 20**
4)	○ you earn **$ 0**	○ you earn **$ 30**
5)	○ you earn **$ 0**	○ you earn **$ 40**
6)	○ you earn **$ 0**	○ you earn **$ 50**
7)	○ you earn **$ 0**	○ you earn **$ 60**
8)	○ you earn **$ 0**	○ you earn **$ 70**
9)	○ you earn **$ 0**	○ you earn **$ 80**
10)	○ you earn **$ 0**	○ you earn **$ 90**
11)	○ you earn **$ 0**	○ you earn **$ 100**

In each row, the bonus increases by $10. Thus, choosing the steaks becomes more costly as you go down the rows, as you give up a larger bonus.

Do you want to buy the sirloin steaks?

	YES	NO
	You will receive a free package of 10 sirloin steaks worth $100.	You will **not** receive a free package of sirloin steaks.
	in addition	*in addition*
1)	● you earn **$ 0**	○ you earn **$ 0**
2)	○ you earn **$ 0**	○ you earn **$ 10**
3)	○ you earn **$ 0**	○ you earn **$ 20**
4)	○ you earn **$ 0**	○ you earn **$ 30**
5)	○ you earn **$ 0**	○ you earn **$ 40**
6)	○ you earn **$ 0**	○ you earn **$ 50**
7)	○ you earn **$ 0**	○ you earn **$ 60**
8)	○ you earn **$ 0**	○ you earn **$ 70**
9)	○ you earn **$ 0**	○ you earn **$ 80**
10)	○ you earn **$ 0**	○ you earn **$ 90**
11)	○ you earn **$ 0**	○ you earn **$ 100**

For most people, it is best to choose **YES** in row 1: there is no bonus, and hence no cost of choosing the steaks. Once you reach the row where you value the steaks less than the bonus, it is in your best interest to switch from **YES** to **NO**.

N.B. there are no wrong or right answers. Each decision should simply reflect whether you prefer the additional bonus payment or the free package of sirloin steaks.

Once you made your choices, we may ask you to choose between Option YES and Option NO for the second list of possible bonuses.

Payment

At the end of the experiment, the computer randomly selects one out of every 20 participants in either Part 1 or Part 2 of the study. In addition, the computer randomly selects a bonus amount between $0 and $100.

In case your decisions in Part 1 are selected, payment proceeds as follows: if for the selected bonus amount you chose

- Option YES, then a free package of sirloin steaks will be shipped to your home address.
- Option NO, then you will receive an email with an Amazon voucher equal to the bonus amount.

N.B.: In case the computer selects a bonus amount you did not see in that round, we will infer your preferred option using your decision for the closest bonus amount you actually saw.

Comprehension questions

1. If you are selected to receive either the meat or the bonus AND you chose **YES** for the randomly selected bonus amount, then you will receive 10 sirloin steaks at your home address.
   True; False

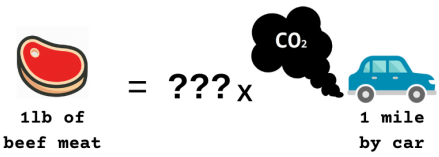
2. If you are selected to receive either the meat or the bonus AND you chose **NO** for the randomly selected bonus amount, then you will receive an email with an Amazon voucher equivalent to the randomly selected bonus amount.
   True; False

Posterior belief

Question:

Let us ask you again.

Relative to driving 1 mile by car,
how much CO_2 is generated, on average,
in the production and distribution of
1lb of beef meat?



"I think 1 lb of beef meat emits as much CO_2 as driving ☐ miles by car."

D.3 Part 2

This concludes Part 1 of the experiment.
You are now starting Part 2,
which will be **shorter than Part 1**.

In **Part 2**, we ask for your valuation of
a package of chicken breasts,
using the same interface as in Part 1.

Afterward, we will ask you a few
closing questions.

In Part 2 of the study,
you will be able to buy
10 high-quality
chicken breasts.
The chicken breasts
are from **Porter Road**,
a premium online
butcher, and,
at the start of this study,
were sold for **$100**.

10 chicken breasts (skinless)

- No Hormones
- No Antibiotics
- Pasture raised
- US raised
- Around 5 lb in total

Remember that your decisions from **either Part 1 or Part 2** may be implemented. This means you will at most obtain one meat product or voucher.

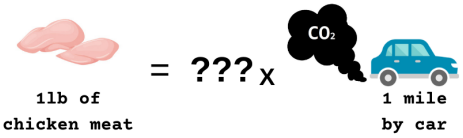
Thus, focus on the next decisions as if these are the ones that will be implemented, as they may well be.

Prior belief

Your estimate:

Next, you will be asked how much CO_2 is emitted in the production and distribution of 1lb of chicken meat. Please state your answer relative to driving 1 mile by car.

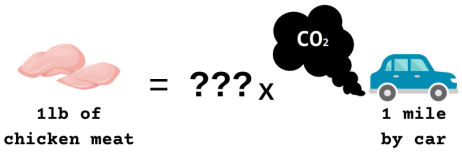
For example, you may guess that 1lb of chicken meat emits 0.4 times or 301 times as much as driving 1 mile by car. (Note that these are random numbers used for illustrative purposes.)



Your estimate:

What do you think, relative to driving 1 mile by car, how much CO_2 is generated by 1lb of chicken meat?

(You receive 50 cents if your answer is within 5 percent of the correct answer.)



"I think 1 lb of chicken meat emits as much CO_2 as driving [ ] miles by car."

Willingness to pay

How much are you willing to pay for 10 chicken breasts?

You are now able to buy 10 premium chicken breasts worth $100. Similar to Part 1, you will make a series of decisions between an amount of money and receiving a free shipment of 10 chicken breasts from Porter Road.

Your decisions may have real consequences: as before, if your decisions in this part are selected, then you will receive either money or the shipment of chicken breasts.

Decision interface

The decision interface for Part 2 is the same as for Part 1.

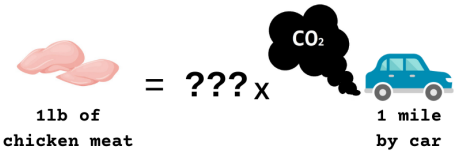
On the next screen, please indicate in each row whether you would prefer the chicken breasts (left column) or the bonus (right column).

Posterior belief

Question:

Let us ask you again.

Relative to driving 1 mile by car,
how much CO_2 is generated, on average,
in the production and distribution of
1lb of chicken meat?



"I think 1 lb of chicken meat emits as much CO_2 as driving ☐ miles by car."

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