Study 5

Survey Flow

Block: Informed Consent (3 Questions)

BlockRandomizer: 1 - Evenly Present Elements

Block: Instructions Warning (10 Questions)

Block: Instructions No Warning (7 Questions)

BlockRandomizer: 1 - Evenly Present Elements

Branch: New Branch

If

If Note. We will close this study on November 7, 2018.    Hi there! The following is a consent form... Is Displayed

EmbeddedData

Group = A

Standard: Group A (3 Questions)

EmbeddedData

theorderValue will be set from Panel or URL.

Branch: New Branch

If

If Note. We will close this study on November 7, 2018.    Hi there! The following is a consent form... Is Displayed

EmbeddedData

Group = B

Standard: Group B (3 Questions)

EmbeddedData

theorderValue will be set from Panel or URL.

Standard: Graph Literacy Scale (8 Questions)

Standard: Debriefing questions (1 Question)

Standard: Demographics (13 Questions)

Standard: Debrief and goodbye (8 Questions)

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Start of Block: Informed Consent

\*   
***Note*. We will close this study on November 7, 2018.**   
  **Hi there!**The following is a consent form for participating in our study. Please read carefully before continuing.

\* **Informed Consent Form**  Protocol title: Visualizations as Evidence    
Principal Investigator: Elizabeth J. Marsh, Ph.D.   
  
  
You are invited to participate in a research study being conducted by Elizabeth Marsh and Brenda Yang from Duke University. The purpose of the research is to study how people reason about facts and evidence.   
  
  
During this study, you will read claims about the world and be asked questions about your stances on topical issues. You may view graphs or photos. There are also no known benefits other than the knowledge gained from participating in the study.   
  
  
The experiment will take about **30 minutes**,and after participating, you will have the option to enter a raffle for an Amazon e-gift card worth**USD $100**. Your participation is voluntary. If you choose to participate in this research study you can decline to answer questions or withdraw from the study at any time.   
  
  
We will do everything we can to protect your privacy. All data will be identified only by a participant number, not your name. Your identity will not be revealed in any publication that may result from this study.   
  
  
If you decide to participate in the raffle, we will collect your name and contact information. These pieces of information will not be associated with your data from the study.   
  
  
If you have any questions, you can contact Brenda Yang at 919-660-5797 or brenda.yang@duke.edu. If you have questions about your rights as a research participant, you may contact the Duke University Chair of the Human Subjects Committee at 919-684-3030.

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consent **I have read this consent form, and I consent to my participation in the research described above.**

* I consent

End of Block: Informed Consent

Start of Block: Instructions Warning

\*welcome **Welcome!**   
    
We are interested in how people interpret graphs about a range of issues. Please read the following instructions carefully.

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\*warning **Instructions (Please read!)**   In this task, you will see a series of graphs. For each graph, you will be asked about the information presented.    
    
Some the graphs were created to be **misleading.**    
    
For example, you might see a graph where the y-axis does not start at 0, as in the graph on the left. We call this technique *axis truncation*. As you can see, this gives the impression that there is a larger difference in interest rates between 2008 and 2012 than might be warranted.   
    
Most experts [recommend](https://guides.library.duke.edu/datavis/topten) that the vertical axis of bar graphs include 0 (or the natural baseline). If it is necessary to truncate the vertical axis to highlight important but small changes, graphs other than bars (e.g. line, dot) should be utilized instead.   
    
   
    
Don't spend too long on any question. It is okay if some of the topics are unfamiliar to you. Look at the graphs as you would if you encountered them in a newspaper or magazine article.

timing\_instructions Timing

First Click

Last Click

Page Submit

Click Count

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manipulation\_check   
 **Quick Check** Click the graph below that was designed to be misleading, by the definition provided on the previous page.

* **Graph #1**
* **Graph #2**

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Display This Question:

If Quick Check Click the graph below that was designed to be misleading, by the definition provided... = <strong>Graph #2</strong>

correct **CORRECT!**   
Nice job! Graph #2 was designed to be misleading because the y-axis does not start at 0.   
    
**Graph #1**   
  
   
     
    
**Graph #2**

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Display This Question:

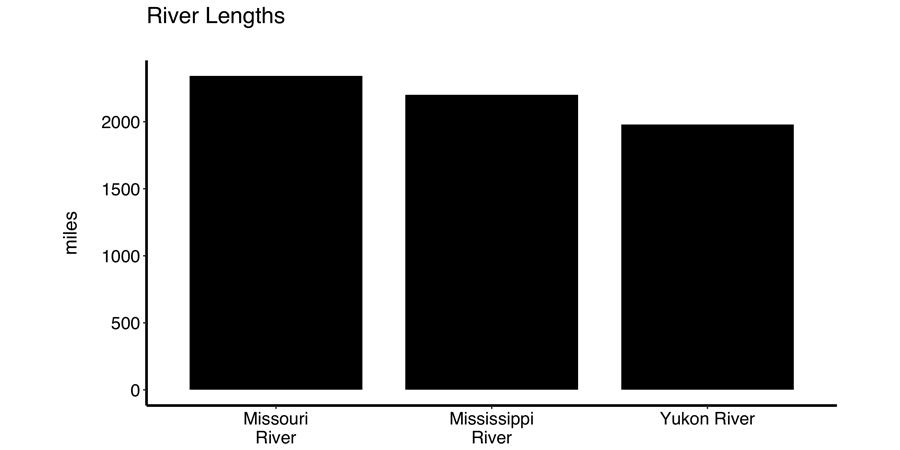
If Quick Check Click the graph below that was designed to be misleading, by the definition provided... = <strong>Graph #1</strong>

incorrect **X INCORRECT.**  
 Actually, the second graph is more misleading because the vertical axis of **graph #2 does not start at 0**.   
   
   
  
 **Graph #1**   
  
   
     
    
**Graph #2**​​   
*​*

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\*trial **Sample Trial**  
  
This an example of what you'll see in our study. Make a choice based on the graph.

\*trial



trial\_rating Compare the lengths of the Yukon River and the Missouri River. How different are they?

* 1 not at all different
* 2
* 3
* 4 moderately different
* 5
* 6
* 7 extremely different

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\*good\_job **Great job!**   
   
 Now you will complete the remainder of the study, where you will examine 40 more graphs.  
  
  
We ask that you stay within the survey window for the duration of the study for the integrity of our research.

End of Block: Instructions Warning

Start of Block: Instructions No Warning

\*welcome **Welcome!**   
    
We are interested in how people interpret graphs about a range of issues. Please read the following instructions carefully.

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\*instructions **Instructions** In this task, you will see a series of graphs. For each graph, you will be asked about the information presented.   
  
  
Don't spend too long on any question. It is okay if some of the topics are unfamiliar to you. Look at the graphs as you would if you encountered them in a newspaper or magazine article.

timing\_instructions Timing

First Click

Last Click

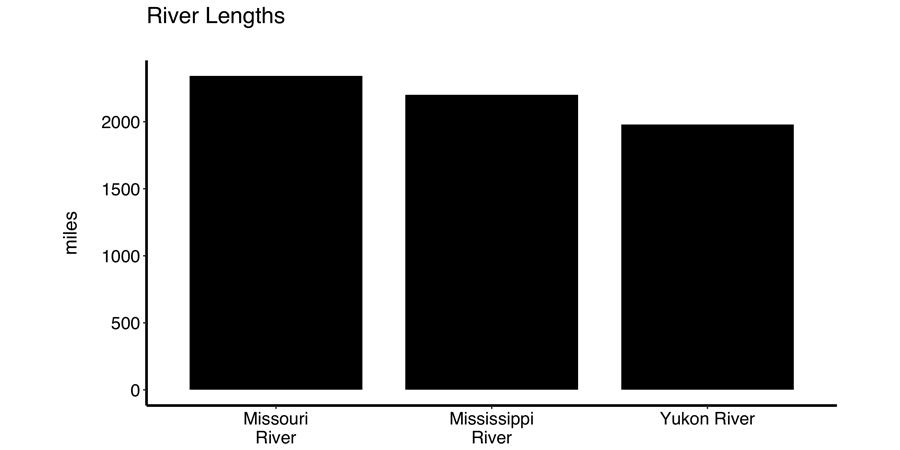
Page Submit

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| Page Break |  |

trial **Sample Trial**  
  
This an example of what you'll see in our study. Make a choice based on the graph.

trial



trial\_rating Compare the lengths of the Yukon River and the Missouri River. How different are they?

* 1 not at all different
* 2
* 3
* 4 moderately different
* 5
* 6
* 7 extremely different

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| Page Break |  |

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good\_job **Great job!** Now you will complete the remainder of the study.  
  
  
We ask that you stay within the survey window for the duration of the study for the integrity of our research.

End of Block: Instructions No Warning

Start of Block: Group A

A Look at the following graph:

|  |
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|  |

rating\_A Compare the ${lm://Field/2} **${lm://Field/3}** and **${lm://Field/4}**. How different are they?

* ${trial\_rating/ChoiceDescription/1}
* ${trial\_rating/ChoiceDescription/2}
* ${trial\_rating/ChoiceDescription/3}
* ${trial\_rating/ChoiceDescription/4}
* ${trial\_rating/ChoiceDescription/5}
* ${trial\_rating/ChoiceDescription/6}
* ${trial\_rating/ChoiceDescription/7}

timing\_A Timing

First Click

Last Click

Page Submit

Click Count

End of Block: Group A

Start of Block: Group B

B Look at the following graph:

|  |
| --- |
|  |

rating\_B Compare the ${lm://Field/2} **${lm://Field/3}** and **${lm://Field/4}**. How different are they?

* ${trial\_rating/ChoiceDescription/1}
* ${trial\_rating/ChoiceDescription/2}
* ${trial\_rating/ChoiceDescription/3}
* ${trial\_rating/ChoiceDescription/4}
* ${trial\_rating/ChoiceDescription/5}
* ${trial\_rating/ChoiceDescription/6}
* ${trial\_rating/ChoiceDescription/7}

timing\_B Timing

First Click

Last Click

Page Submit

Click Count

End of Block: Group B

Start of Block: Graph Literacy Scale

\* **Nice job!**   
    
The study is almost complete. Now, you will answer a few questions about your experience with graphs.

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graphicacy\_1   
  
Read and answer the questions below. If you are unfamiliar with a particular graph, select **1**= not at all good.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| How good are you at working with bar charts? |  |  |  |  |  |  |
| How good are you at working with line plots? |  |  |  |  |  |  |
| How good are you at working with pies? |  |  |  |  |  |  |
| How good are you at inferring the size of a bar in a bar chart? |  |  |  |  |  |  |
| How good are you at determining the difference between 2 bars in a bar chart? |  |  |  |  |  |  |
| How good are you at projecting a future trend from a line chart? |  |  |  |  |  |  |

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graphicacy\_7 Read and answer the questions below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| Are graphs easier to understand than numbers? |  |  |  |  |  |  |

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graphicacy\_8 Read and answer the questions below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| How often do you find graphical information to be useful? |  |  |  |  |  |  |

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| Page Break |  |

graphicacy\_9 Read and answer the questions below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| To what extent do you believe in the saying ‘‘a picture is worth one thousand words"? |  |  |  |  |  |  |
| When reading books or newspapers, how helpful do you find graphs that are part of a story? |  |  |  |  |  |  |

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db\_approach Which of the following best describes your approach to answering questions about the graphs? You may select one, more than one, or none at all.  
  
  
**Note**: There is no "wrong answer," and  you may not have used any of these approaches.

* Comparing the values of the bars based on vertical axis (y-axis)
* Comparing the areas of the bars visually
* Using hands, fingers, or other physical objects to measure the heights of bars
* Judging intuitively how different the bars look i.e. how different they "feel"
* Using what I already knew about the topics to answer some of the questions (e.g. I already knew about the weights of brown bears versus cows)
* Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Display This Question:

If Instructions (Please read!)   In this task, you will see a series of graphs. For each graph, you... Is Displayed

db\_strategy\_w   
We are interested in how people might be approaching graphs that are misleading differently or not differently than accurate graphs.  
  
  
How would you describe your approach to graphs that were misleading?    
  
  
If you have any other comments on your experience with these graphs, you may write them here.

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Display This Question:

If Instructions (Please read!)   In this task, you will see a series of graphs. For each graph, you... Is Displayed

db\_approach\_nw Did you notice anything interesting about the graphs?  
  
  
If you have any other comments on your experience looking at the graphs, you may write them here.

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End of Block: Graph Literacy Scale

Start of Block: Debriefing questions

\* Finally, you will answer a few questions about the survey experience and yourself.  
  
  
Your responses to these questions will help us interpret our data set. Remember that all information you provide is confidential and your name will not appear on this document. Answering these question is voluntary and you can choose to skip any or all of them.

End of Block: Debriefing questions

Start of Block: Demographics

\* Questions About You

dem\_browser Browser Meta Info

Browser

Version

Operating System

Screen Resolution

Flash Version

Java Support

User Agent

|  |
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dem\_age My current age is:

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dem\_gender I identify my gender as:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dem\_language First Language:

* English
* Other (please write): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dem\_language\_string (optional) If other than English, number of years you have spoken English:

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dem\_ed Please indicate the highest level of education you have attained

* Some high school
* Graduated high school (or G.E.D.)
* Some college
* Currently in college (please indicate year) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Associate's degree
* Bachelor's degree
* Completion of some graduate school courses
* Graduate degree (indicate degree below) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dem\_program Briefly describe your program of study e.g. *2nd year PhD student in Psychology*

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dem\_statsTraining Which of the following you've engaged in within the past 5 years? (select all that apply)

* Formal coursework in statistics or data visualization
* Informal coursework in statistics or data visualization (e.g. parts of a Coursera module)
* Workshops on statistics or data visualization
* Other training in statistics or data visualization
* None of the above

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Display This Question:

If Which of the following you've engaged in within the past 5 years? (select all that apply) = Formal coursework in statistics or data visualization

training\_formal Please briefly describe your formal coursework in statistics or data visualization   
  
  
e.g. *3 semesters of statistics in graduate school + one summer course on regression*

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Display This Question:

If Which of the following you've engaged in within the past 5 years? (select all that apply) = Informal coursework in statistics or data visualization (e.g. parts of a Coursera module)

training\_informal Please briefly describe your informal coursework in statistics or data visualization   
  
  
e.g. *worked through most of R for Data Science online exercises (~ 5 hours)*

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Display This Question:

If Which of the following you've engaged in within the past 5 years? (select all that apply) = Workshops on statistics or data visualization

training\_workshop Please briefly describe your experience with workshop(s) relating to statistics or data visualization   
  
  
e.g. *I took a 2 hour workshop run by the library on data visualization in Stata*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Display This Question:

If Which of the following you've engaged in within the past 5 years? (select all that apply) = Other training in statistics or data visualization

training\_other Please briefly describe your training with statistics/data visualization that falls outside of formal or informal coursework and workshops

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End of Block: Demographics

Start of Block: Debrief and goodbye

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\*   
**Experimental Debrief**   
    
 What was happening during the experiment? During this study, you saw different types of graphs. Some of the graphs represented information in a way that was designed to be misleading. We used tactics that are seen in the media regularly. For example, one technique is to change the vertical axis (y-axis) to make a small difference seem larger:  ​​      In this study, some of the graphs were manipulated in this way.  
Our past research shows that people reliably judge differences between quantities as larger when the y-axis is truncated, even when they have been warned about this technique, or attention to drawn to the axis. We are curious whether this effect holds in a population with more expertise in statistics and data visualization.  
   **What are we trying to learn in this research?** We are interested in how people are persuaded and how people change their beliefs. We would like to go how graphs play a role in these processes, how misleading these deceptive graphs really are, and whether they are ways to combat deceptive graphs.   **Why is this research important?** You may have heard the terms “post-truth” or “fake news” being used more frequently in the media. Knowing more about what contributes to persuasion and belief change is important to understanding how false beliefs and misinformation propagate and stick around. It is also relevant to efforts to change people’s minds about issues that have concrete consequences, such as rates of vaccination in children and environmental issues.   **What if I have questions later?** If you have questions, you can contact Brenda Yang at 919-660-5797 or brenda.yang@duke.edu.

|  |  |
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| Page Break |  |

db\_misleading\_percen Give an estimate the percentage of graphs that were misleading, as described in the experimental debrief.    
    
Give your best guess. We expect that it is difficult to know this exactly.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

|  |  |
| --- | --- |
| % of misleading graphs you saw |  |

|  |  |
| --- | --- |
| Page Break |  |

\*   
**Great. Thank you for participating in our study!**   
  
  
 Are you interested in keeping your name in the rafflefor an **Amazon e-gift card** worth **$100?**   
   
    
Your participation is voluntary. If you decide to participate in the raffle, we will collect your name and contact information.

* Yes
* No

Skip To: End of Block If Great. Thank you for participating in our study!  Are you interested in keeping your name in the ... = No

|  |  |
| --- | --- |
| Page Break |  |

Explanation   
**Contact Information**  
  
 Please provide the best way to reach you in case you win the raffle. We will announce the raffle winner(s) no later than December 7th.

name Name and last name \*

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email Email address \*

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phone Phone number

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End   
Thank you for participating in our study!  Have a nice day!   
 If you have additional comments on your experience or if you have questions about what we are studying in this experiment, you can write them in the box below or contact brenda.yang@duke.edu.

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End of Block: Debrief and goodbye