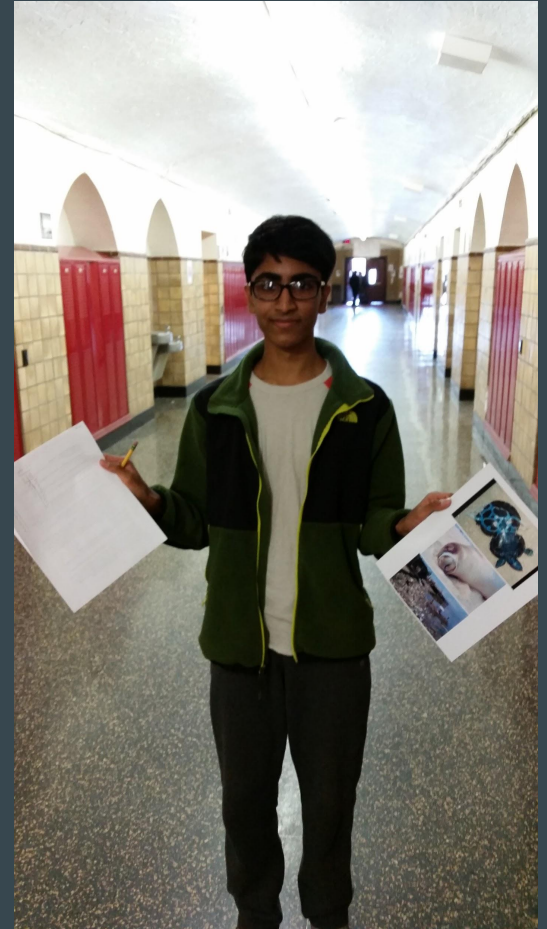# Finding Response Bias

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Main Idea/Introduction

Can showing a picture of something while asking a question create response bias?

Our Question

Do you pay attention to how much your family recycles?

- Half of our subjects were shown this picture.
- Half were not shown this picture (control).

We hypothesized that showing the pictures would create bias and make the subjects feel guilty and sympathetic enough to say that they do pay attention to how much they recycle even if they don't.
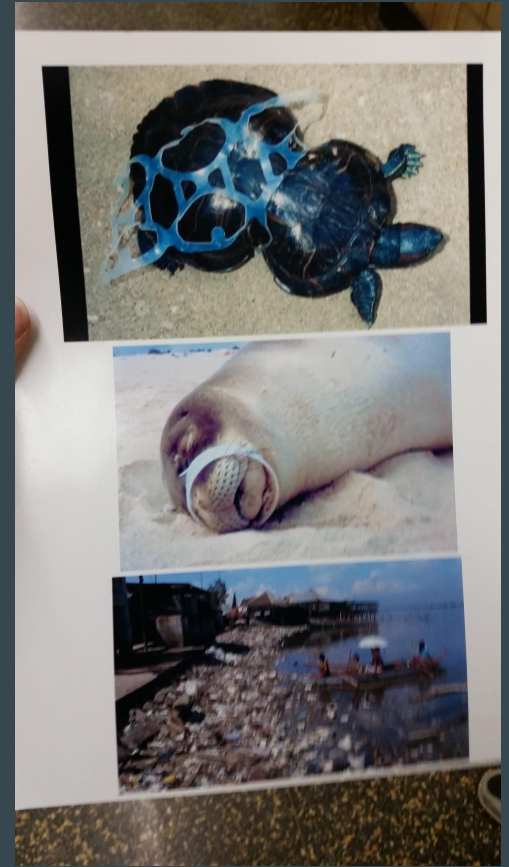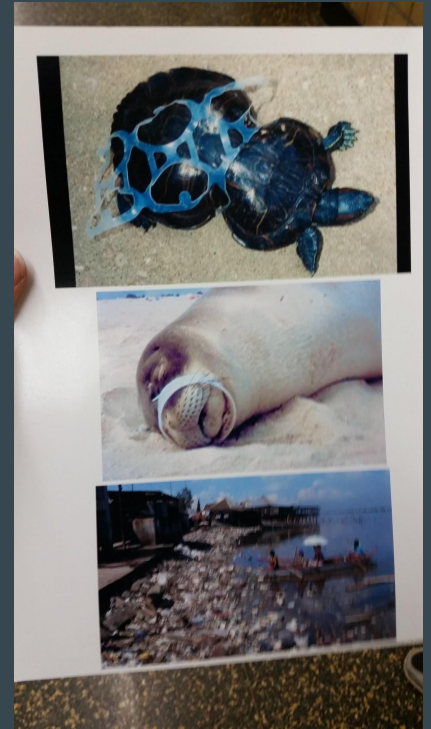
Variables

Explanatory variable: Whether or not we have the pictures visible during the survey.

Treatment: Pictures of pollution's effects on animals.

Response variable: Yes or No answer of the person taking the survey.

Treatment

Methodology

- We randomly asked 40 students from the hallways and in our stats class during 7th period in Dwight Morrow to answer our question. This is both a convenience sample and a simple random sample because they are the easiest people to contact and we are choosing randomly from the population.
- We alternated asking the question with the image and without.
- We surveyed a total of 20 people in each group.
- Each person was asked independently in order to reduce peer pressure (which we will show later how it can cause confounding).
- Guhan asked the subjects "Can you do this survey with us for our stats class?"
- Asked around the same amount of girls as boys to reduce confounding.
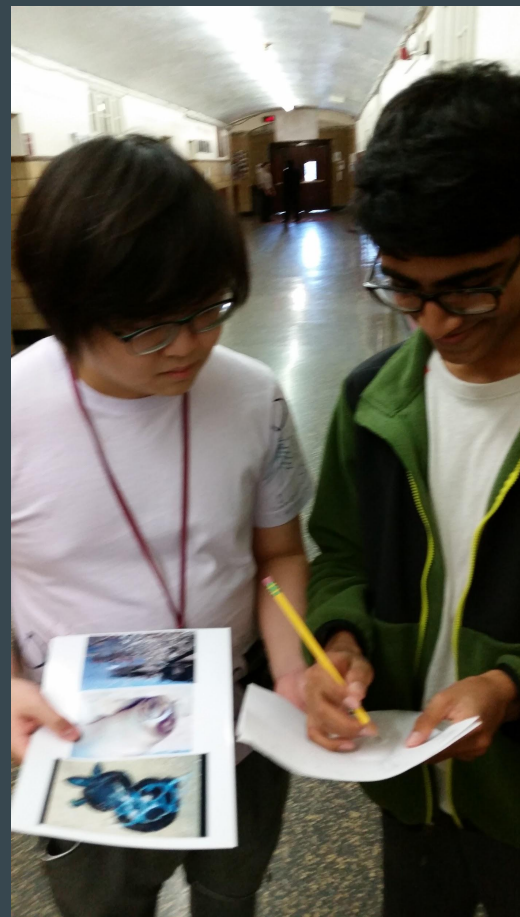
Experimental Design Principles

- **Comparison:** Answers to the question without the picture vs with the picture.
- **Random Assignment:** We approach the students randomly.
- **Control:** Question without the picture.
- **Replication:** We are asking 20 people in our testing group and 20 people in our control group, with allows us to get a wide range of individuals to help determine the effect the picture has on the individual's answer to the question. Alternatively, if we only asked one person for both studies, we couldn't properly determine whether the picture has an effect since we only have 2 data points to compare and many factors can throw the numbers off.
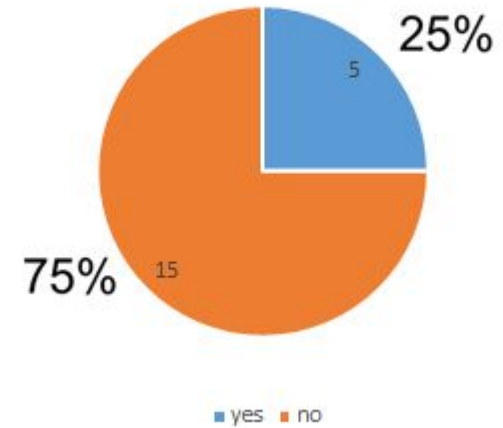- **Blinding** wasn't needed.

Results:

	Yes	No	Total
With Picture	17	3	20
Without Picture	5	15	20
Total	22	18	40

Results
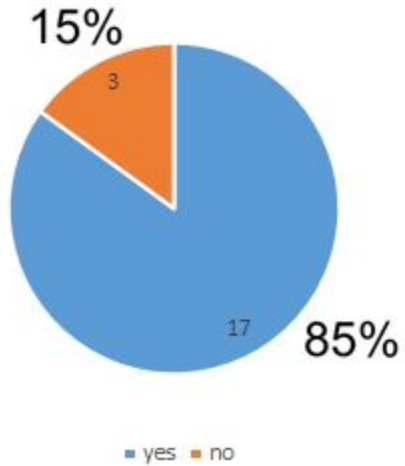
Results

When asking individual people:

- For our results, 85% of the group of 20 that were shown the picture responded "Yes" to the question while the other 15% said "No".
    - People may have lied more due to bias
- 75% of the group of 20 that were not shown the picture responded with "No" to the question while the other 25% said "Yes".
    - People may have been more truthful because they weren't influenced by anything

Results reflection

We were really surprised at how well our treatment worked on the people we were surveying. We thought there would be a slight difference between the two types of questions, we didn't think that it would be so polarized.

It was also really surprising to see that people would lie just because of this, and conversely that so many people don't really pay attention to how much they recycle if we go by the data without the picture.

Conclusions

- Our hypothesis was correct.

- There is a correlation between the presence of the picture and more people paying attention to recycling.

- We can conclude that by having a picture of animals suffering from the effects of pollution, people will respond differently to the question so they don't look like bad people.

Possible Bias

- The interpretation of "paying attention to recycling" could vary person to person.
- We found that females generally replied yes more often than males did.
- It wasn't anonymous, so people could have been pressured by the interviewer to say yes even if they didn't recycle.
- Undercoverage: we only asked students, if we asked adults we probably would have more people saying yes.
- Non response bias: some people said they didn't want to interview with us, so we might have missed some data points.

Improvements

- Make the question a bit more specific and clear
- We could have taken factors into consideration such as gender. We noticed girls said yes more often than boys, we should have asked exactly the same amount of girls as boys.
- Make it anonymous.
- Ask a more diverse age group.

Results of group testing (extra credit)
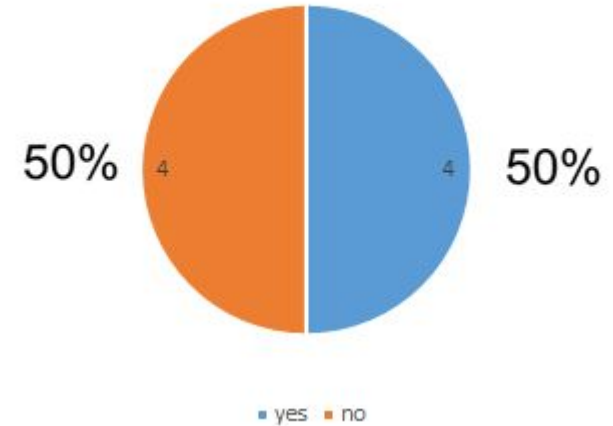
	Yes	No	Total
With Picture	5	3	8
Without Picture	4	4	8
Total	9	7	16

Groups (extra credit)

Groups: With the picture
38% 3
5 62%
yes no
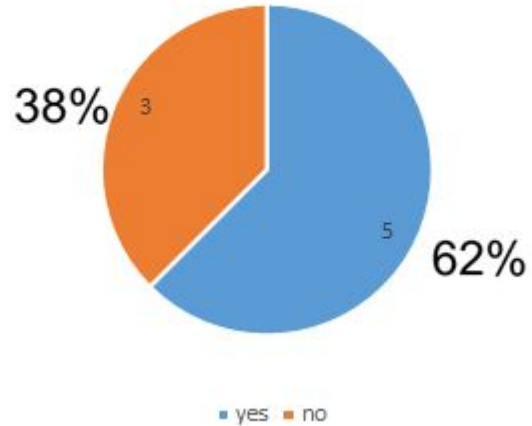
Groups: Without the picture
50% 4
4 50%
yes no

Group results

When asking a group:

- For our results, 62% of the group of 8 that were shown the picture responded "Yes" to the question while the other 38% said "No".

- 50% of the group of 8 that were not shown the picture responded "Yes" to the question while the other 50% said "No".

- When we surveyed groups of people, their responses tended to be more evenly split since certain group members persuaded the rest of the group, so if we didn't ask people independently our data would have been skewed

AP Statistics First Semester Project: Response Bias

The Project: You will design and conduct an experiment to investigate the effects of response bias in surveys. You may choose the topic for your surveys, but you must design your experiment so that it can answer at least one of the following questions:

- Can the wording of a question create response bias?
- Do the characteristics of the interviewer create response bias?
- Does anonymity change the responses to sensitive questions?
- Does manipulating the answer choices change the response?

Proposal: The proposal will be worth a quiz grade (10 points), so don't treat it casually. If the proposal isn't approved the first time, you will need to resubmit it for a reduced grade. **You must attach the original proposal to any resubmissions.**

In your proposal, you should:

- Describe your topic and state which type of bias you are investigating
- Describe how you will obtain your subjects in detail including which type of random sampling you will. The minimum sample size is 50. This must be practical!! Note: your population does not need to be from DMAE.
- Describe what your questions will be and how they will be asked, including how you will incorporate direct control, blocking, and randomization. Convince me that this is a good experiment!

General Guidelines

- Make sure that the questions are simple and unambiguous. Having questions that take quantitative answers will simplify things.
- Be careful about asking sensitive questions. Think about who might read the questions in your survey.
- When you finish writing your questions, do a pilot test, that is, try out your questions on a small group of individuals. This will help spot poor wording and ambiguous questions.
- Try to get as high a response rate as possible. A response rate of 15% to 20% may not yield very convincing results.

Poster or PowerPoint (or other electronic presentation):

The presentation should completely summarize your project, yet be simple enough to be understood by a freshman. Be sure to include some pictures of your data collection in progress. Do not make it heavy--I want to hang them up! Make it nice to look at. Use color. Use a full sheet of poster paper.

Things it should include:

- Introduction: What form of response bias were you investigating? Why did you choose the topic you chose for the survey?

- Methodology: Describe how you conducted you experiment and why you think your design was effective. Note: This section should be very similar to your proposal and include the type of random sampling used.
- Results: Present the data in both tables and graphs in such a way that conclusions can be easily make. Make sure to label the graphs/tables clearly and consistently and make sure they are on the same scale.
- Conclusions: What conclusions can be drawn from your experiment? Be specific. Did you encounter any problems during your project? Would you do anything different if you were to repeat your experiment? What did you learn from this project?

Oral Presentation: Each group will be required to give a 5 minute oral presentation to the class. All members need to participate equally and should be prepared to answer questions. To receive full credit for your presentation your group must speak clearly, with confidence and must do something to ENGAGE THE AUDIENCE. I leave it open-ended as to exactly what you tell us about what you did, but I absolutely insist that your presentation be clear, interesting and well-spoken (if you want full credit!).

Miscellaneous:

- The project may be done in pairs but absolutely no groups of more than 2 or 3. You will turn in one project per group.
- The project will be worth a test grade (100 points)

Examples of Successful Projects:

Wording of the question bias :
"Cartoons"
1. "Do you watch cartoons?"
2. "Do you *still* watch cartoons?"

"Milk vs. Orange Juice"
1. "Which do you prefer, milk or orange juice, as a breakfast drink?"
2. "Milk contains high levels of vitamin D and calcium. Do you prefer milk or orange juice as a breakfast drink?"

Anonymity
"Cheating"
1. "Do you cheat in class?" (anonymous)
2. "Do you cheat in class?" (not anonymous)

Interviewer Characteristics
"Make-Up"
    (all questions asked to males)
1. "Do you find females who wear makeup attractive?" (wearing makeup)

Response Bias Project	4 = Complete	3 = Subs
Introduction	• Describes the context of the research • Has a clearly stated question of interest • Provides a hypothesis about the answer to the question of interest • Question of interest is of appropriate difficulty	• Introduces t the research specific que • Suggests hy has appropr
Data Collection	• Method of data collection is clearly described • Includes appropriate randomization • Describes efforts to reduce bias, variability, confounding • Quantity of data collected is appropriate	• Method of d is clearly de • Some effort incorporate good data co • Quantity of is appropriat
Graphs and Summary Statistics	• Raw data is included in a two-way table (categorical) or in lists (quantitative) • Appropriate graphs are included • Graphs are neat, easy to compare, and clearly labeled, including clear identification of treatments • Appropriate summary statistics are included in discussion (e.g., percentages for categorical data, means for quantitative data)	• Appropriate included • Graphs are n labeled, and compare • Appropriate statistics or included
Conclusions	• Uses the results of the study to correctly answer question of interest • Discusses what inferences are appropriate based on study design • Shows good evidence of critical reflection (discusses possible errors, limitations, etc.)	• Makes a cor • Discusses w are appropri good eviden reflection
Poster, Presentation, & Communication	• Has a clear, holistic understanding of the project • Poster is well organized, neat, and easy to read • Poster included pictures of data collection in progress and is visually appealing • Oral presentation is well organized	• Has a clear, understandin project, but unorganized appeal, or o is not organ

Note: It is possible to receive a score of 0 in any of the categories.

2. "Do you find females who wear mak

Manipulating Answer Choices
"Time Online"
1. "On average, how many hours do yo 25, 26- 35, or more?"
2. "On average, how many hours do yo more?"

For question 2, the students antici