THE PERSUASIVE POWER OF DATA VISUALIZATION

Anshul Vikram Pandey, Anjali Manivannan, Oded Nov,
Margaret Satterthwaite, and Enrico Bertini

Lauren Fratamico
Info Vis – Nov. 25, 2014

Persuasion

Research Question

Does graphical depiction of data have a more persuasive effect than textual or tabular information?

- *What is the role of visualization in persuasion?*
- *What do we mean when we say that visualization is more persuasive? More persuasive than what?*
- *How do we measure persuasion?*

Hypothesis: Graphical depiction of statistical information leads to increased persuasion when contrasted with non-graphical representations of the *same* data.

Pre-experiments

- Topic Selection Protocol – 7 topics selected
  - Easily Understandable – not too technical or only of limited interest
  - Able to present compelling evidence in the form of data

- Conducted Amazon Mechanical Turk study to narrow down topics
  - 150 participants
  - Shown a topic and asked how much they agreed to it on Likert scale

-3	-2	-1	0	1	2	3
Negatively Polarized (NP)		Neutral/Weakly Polarized (NWP)			Positively Polarized (PP)	
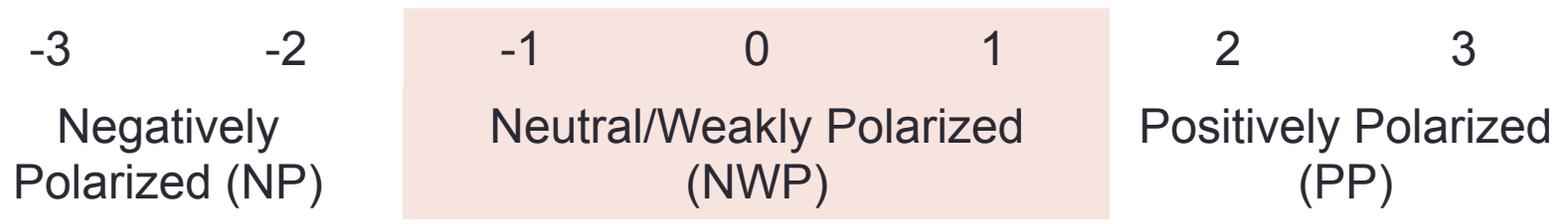
The Experiment

- Run on Amazon Mechanical Turk

- 720 participants

- Basic Steps:
  - Topic description
  - Pre-treatment attitude
  - Persuasive message
  - Post-treatment attitude

The Experiment

STEP 1: Demographic Information

- Participants had to be US residents

The Experiment

STEP 2: Cover Story

Topic	Cover Story
Video Games	A video game is an electronic game that involves human interaction with a user interface to generate visual feedback on a video device. Controversies over video games center on debates around video game content and the potential for it to negatively impact player attitude and behavior. Since the early 1980s, video games have become part of the political discourse with advocates emphasizing their nature as an expressive medium (protected under the freedom of speech laws of many countries), and detractors promoting various theories that video games are harmful for society and thus subject to legislative oversight and restrictions. **Sources**: Wikipedia
Corporate Income Tax	The creation of the federal corporate income tax occurred in 1909, when the uniform rate was 1% for all business income above $5,000. Since then the rate has increased to as high as 52.8% in 1969, and the single rate has become eight different rates for different income levels. Proponents of lowering the corporate tax rate to create jobs argue that it incentivizes job creation in the United States instead of overseas, encourages increased investment in research and infrastructure, and passes savings on to consumers through lower prices. Opponents of lowering the corporate tax rate to create jobs argue that it results in more profits for corporations without affecting job creation, and that unemployment rates were the lowest in recorded US history during the time when corporate income tax rates were highest. **Sources**: ProCons Website
Incarceration	Policy-makers in the United States have argued for decades about whether stricter use of imprisonment leads to a decrease in crime. Proponents of stricter incarceration argue that people respond to punishment, and that the threat of incarceration helps prevent crime. Opponents argue that higher imprisonment rates have not led to lower crime rates, and that prison is not an effective deterrent. **Sources**: Stuart Henry, "On the Effectiveness of Prison as Punishment"

The Experiment

STEP 3: Topic Involvement Questions

- Degree of interest in the topic
- Core values
- Practical implications on personal life

The Experiment

STEP 4: Pre-Treatment Questions

- *"To what extent do you agree that…"*
  - *Video Games: "Violent video games do not contribute towards youth violence"*
  - Corporate Income Tax: "Lowering federal corporate income tax rate creates jobs"
  - Incarceration: "*Incarceration does not reduce crime rates*"

The Experiment

STEP 5: Context + Evidence + Presentation

Topic	Evidence
Video Games	**Evidence 1** - In a 2007 scientific study conducted by a group of researchers in the Unites States, 1254 children (53% female, 47% male) were asked if they play video games or not. To 1126 children who reported playing video games, 17 possible reasons for playing video games were presented. The children then selected one or more reasons for playing video games. It was found that the majority of children play video games for recreational purposes rather than violence inciting reasons. The statistics of the survey are shown in the [charts/tables] below. **Evidence 2** - It was found that the video games sales quadrupled between 1995 and 2008, whereas the overall juvenile crime and juvenile murder rates declined. The supporting evidence is shown in the [charts/tables] below. **Evidence 3** - In another study conducted in 2005, a comparison between juvenile crimes and video games sales in the Unites States and Japan was performed. The results showed that more juvenile murders happened in the United States as compared to Japan, whereas the per capita video games sales in Japan was much higher than that in the United States. The findings of the study are shown in the [charts/tables] below. **Sources**: FBI website, Entertainment Software Association website, Computer Entertainment Supplier's Association (CESA), Japan's Ministry of Justice website

The Experiment

STEP 5: Context + Evidence + Presentation

- **Evidence 1** - In a 2007 scientific study conducted by a group of researchers in the Unites States, 1254 children (53% female, 47% male) were asked if they play video games or not. To 1126 children who reported playing video games, 17 possible reasons for playing video games were presented. The children then selected one or more reasons for playing video games. It was found that the majority of children play video games for recreational purposes rather than violence inciting reasons. The statistics of the survey are shown in the [charts/tables] below.

Recorded response of children for playing computer games (in %).
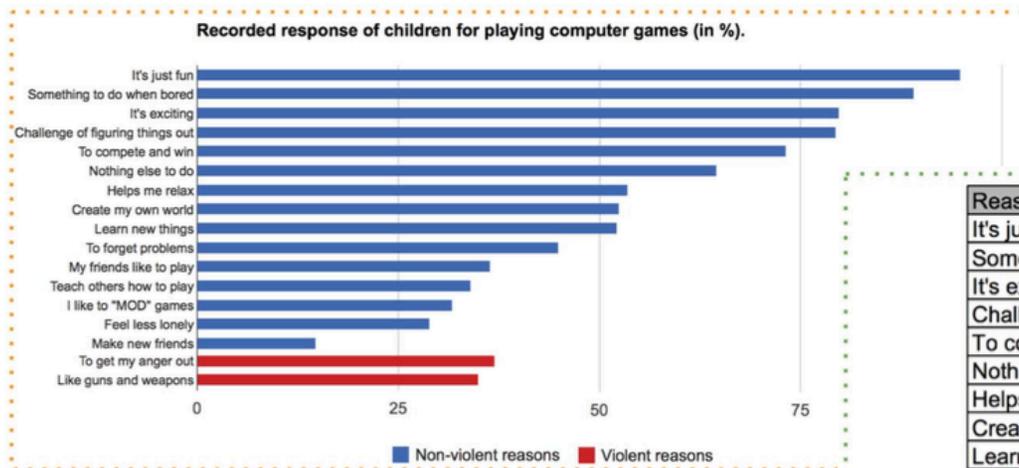
Reasons for playing video games	Agree percentage	Reason type
It's just fun	94.85	Non-violent
Something to do when bored	89.05	Non-violent
It's exciting	79.8	Non-violent
Challenge of figuring things out	79.35	Non-violent
To compete and win	73.2	Non-violent
Nothing else to do	64.65	Non-violent
Helps me relax	53.5	Non-violent
Create my own world	52.5	Non-violent
Learn new things	52.25	Non-violent
To forget problems	45	Non-violent
My friends like to play	36.5	Non-violent
Teach others how to play	34	Non-violent
I like to "MOD" games	31.75	Non-violent
Feel less lonely	29	Non-violent
Make new friends	14.75	Non-violent
To get my anger out	37	Violent
Like guns and weapons	35	Violent

The Experiment

STEP 6: Attention Check Questions

The Experiment

STEP 7: Post-Treatment Questions

- Same as pre-treatment questions
  - *"To what extent do you agree that…"*
    - *Video Games:* "*Violent video games do not contribute towards youth violence*"
    - Corporate Income Tax: "Lowering federal corporate income tax rate creates jobs"
    - Incarceration: "*Incarceration does not reduce crime rates*"

The Experiment

STEP 8: Qualitative Feedback

Results
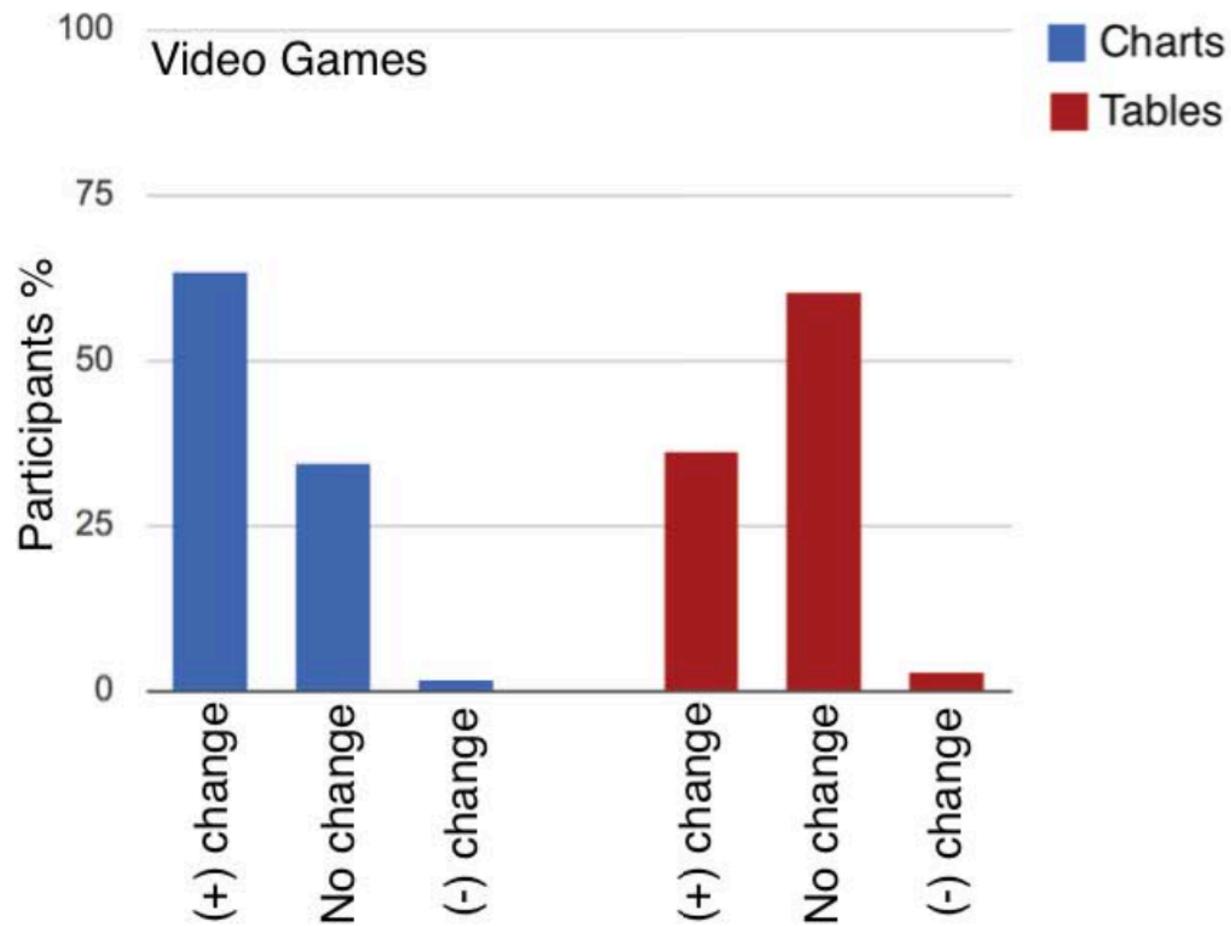
Results
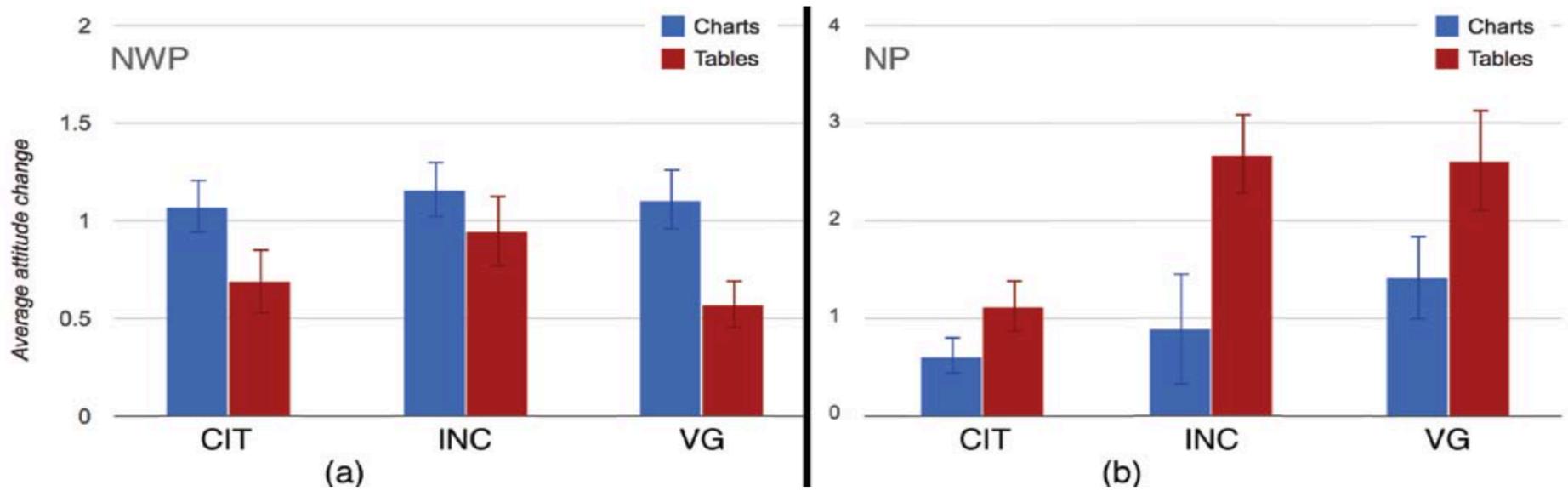
Results

- Why do people NOT change their mind?
  - Skepticism
  - Anchoring to core beliefs
  - Complexity
  - Already persuaded

- Why do people change their mind?
  - Struck by evidence
  - More persuaded

Critiques - Strengths

- Sets a good ground
- Thorough in topic selection
- Thorough in experiment description

Critiques - Weaknesses

- Effect of topic on persuasion
  - Limited generalization due to topic choices

- Role of medium on persuasion
  - Why did the negatively polarized people prefer

- Multiple dimensions of persuasion
  - How tied are participants to their initial view?

- Visualization Selection
  - Is a bar chart the best representation?

- Lack of demographics presented
  - Could have skewed the results – maybe people who are more skeptical fell into a certain category
  - Amount of education?

- Population used
  - Mechanical Turk vs lab experiment

- Structure of the question
  - Aimed to positively persuade people on all topics
  - "*To what extent do you agree that violent video games do **not** contribute towards youth violence*"

- Topic selection
  - People complained they were skeptical of the data, could use fake scenarios instead

Summary

- Charts may be a more persuasive visualization (~8%) than tables if you do not have a strong belief on the topic