# Scope Insensitivity & Charitable Giving

[REDACTED], Jackie Chambers, [REDACTED]
ECON4803: Behavioral Economics
Dr. Whitney Buser

# What is Scope Insensitivity?

A common cognitive bias that occurs when people make judgments that show no concern to the number - or scope - of the things they are evaluating

# Purpose

- Explore how scope insensitivity affects decision-making about charitable giving
- Test the effect of a framing treatment on people's ability to overcome scope insensitivity

# Literature Review: Scope Insensitivity

Past literature shows that people are **consistently insensitive to scope** in altruistic contexts.

The reasons for scope insensitivity are not fully understood.

**(1) Emotional Response** (Dickert et al., 2012)
- (a) Unaffected by scope (Dunn & Ashton-James, 2008; Dunn et al., 2008)
- (b) 'Warm Glow' Effect (Baron & Green, 1996)
- (c) 'Collapse of Compassion' (Cameron & Payne, 2011)

**(2) Real-world Limitations**
- (a) Budget constraints (Baron & Green, 1996)

**(3) Irrationality**
- (a) 'Psychophysical numbing' (Fetherstonhaugh et al., 1997)
- (b) Marginal utility (Dickert et al., 2015)

Scope sensitivity varies by group.

**(1) Cultural Norms** (Kogut et al., 2015)

**(2) Numeracy** (Dickert et al., 2018)

**(3) Self-Focus** (Chang & Hung, 2018)

# Literature Review: What makes people more scope sensitive?

(1) Increasing tangibility (Imas & Lowenstein, 2018)

(2) Identifiable victims (Kogut et al., 2015)

- Teaching people to notice scope insensitivity can cause participants to decrease giving to identifiable victims (Small et al., 2007)

(1) Relying on calculation (Hsee & Rottenstreich, 2004; Hasford et al., 2015)

- Combining statistics & emotional info decreases donations (Erlandsson et al. 2016)

(1) Caring about the issue (Bateman et al., 2005)

(2) 'Unit asking' (Hsee et al., 2013)

# Contribution to Literature

- Finds scope insensitivity bias in donations, consistent with the vast majority of the literature
- Investigates scope insensitivity for both human and nonhuman animals, which occurs in fewer studies  (Desvousges et al. 2010)
- Mixes order of options to control for order effects, which may have caused issues in other studies (Bateman et al. 2004; Carson & Mitchell 1995)
- Controls for demographic variables

# Hypothesis

Participants who complete a math activity are less affected by scope insensitivity. Their valuations will change in a way that is closer to proportional than the valuations of those who complete a grammar activity.

# Experimental Design & Methodology

- Created a three-part Qualtrics survey:
  1. **Activity**: Math (intervention) & Grammar (control)
  2. **Contingent Valuation Questions**: 3 groups of 3 open-ended questions that evaluated people's willingness to save the lives of birds, turtles, and humans with small, medium, and large scope; 6 different versions were used that swapped the placement of the scope questions
  3. **Demographic Questions** (age, gender, ethnicity, education, etc.)
- Released survey to GATech clubs and organizations, Reddit survey collection subreddits, and various discord communities
- **No personal identifiers were collected**
- Participants were randomly distributed between activities and form types

# Contingent Valuation Questions Example

- Everything on a separate page

Background Info/Prompt:

“At least 102 species of birds are known to have been harmed by the BP oil spill [in 2010], including black skimmers, brown pelicans, clapper rails, common loons, laughing gulls, northern gannets and several species of tern” (krüg). Consider a hypothetical scenario in which birds are dying due to oil spills, but your donation would guarantee the lives of many birds.

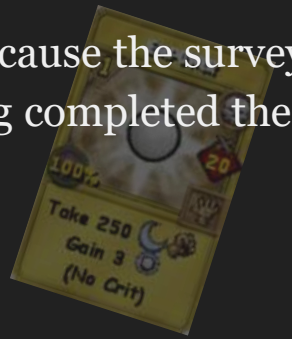
3 Questions of **Increasing Scope**:

1. How much would you be willing to pay (in US dollars) to prevent oil spills with certainty and therefore save the lives of around 2,000 birds?
2. How much would you be willing to pay (in US dollars) to prevent oil spills with certainty and therefore save the lives of around 20,000 birds?
3. How much would you be willing to pay (in US dollars) to prevent oil spills with certainty and therefore save the lives of around 200,000 birds?

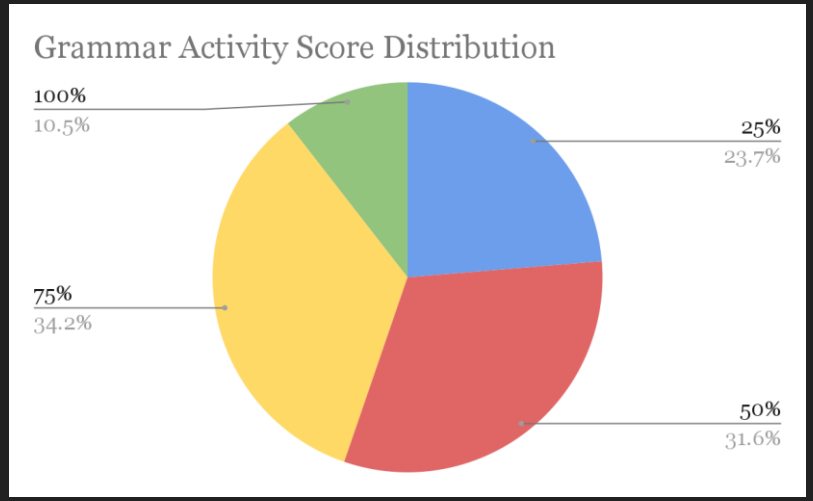
# Sample Overview

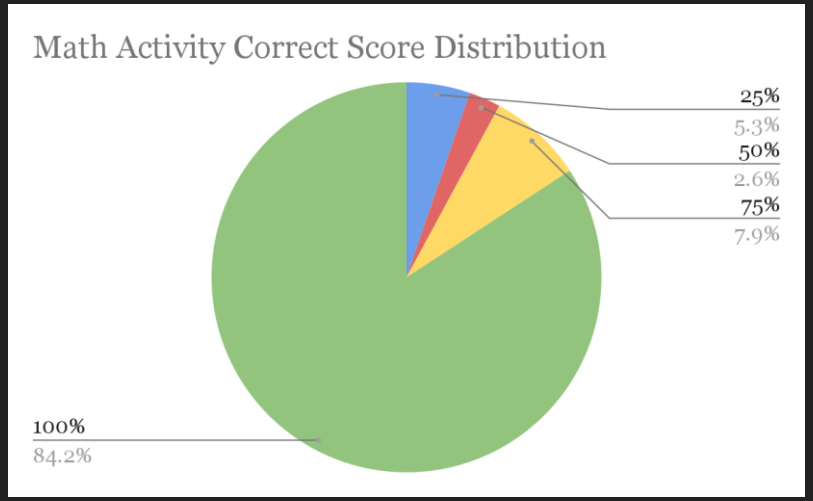
- **Sample size** is **77 participants**
- includes both **paid** and **unpaid** participants
    - Most paid participant responses could not be identified because the survey was designed to be anonymous, but confirmation of having completed the survey and payment did occur
- Data collection **spanned a month** from 10/18/22 to 11/18/22





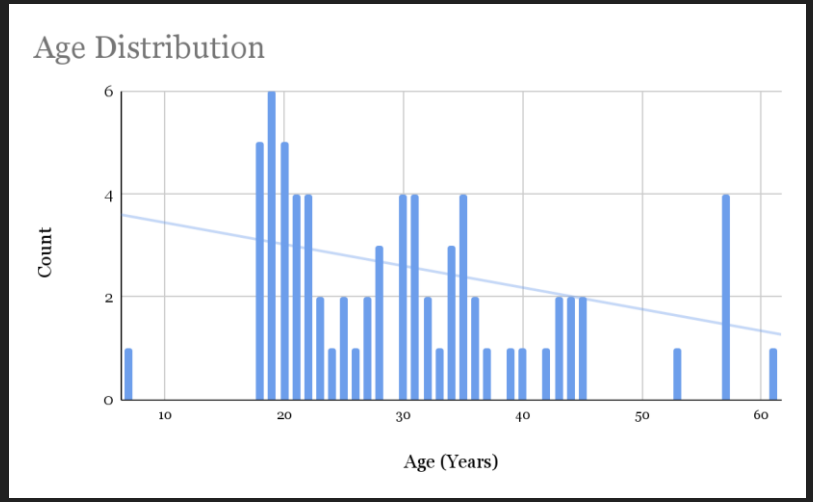
# Intervention Score

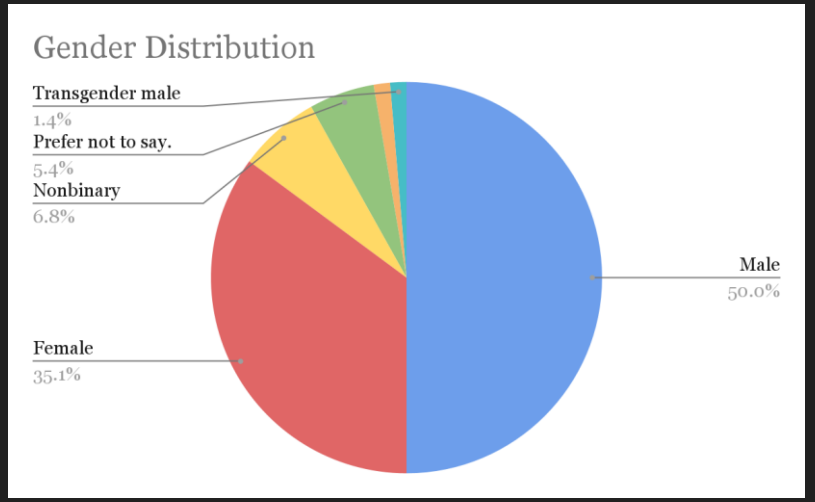



- **39 participants** received the Math Activity (**Intervention**)
- **38 participants** received the Grammar Activity (**Control)**
- **Math Activity participants scored 32% on average higher** (90% avg. score) than Grammar Activity participants (58% avg. score)

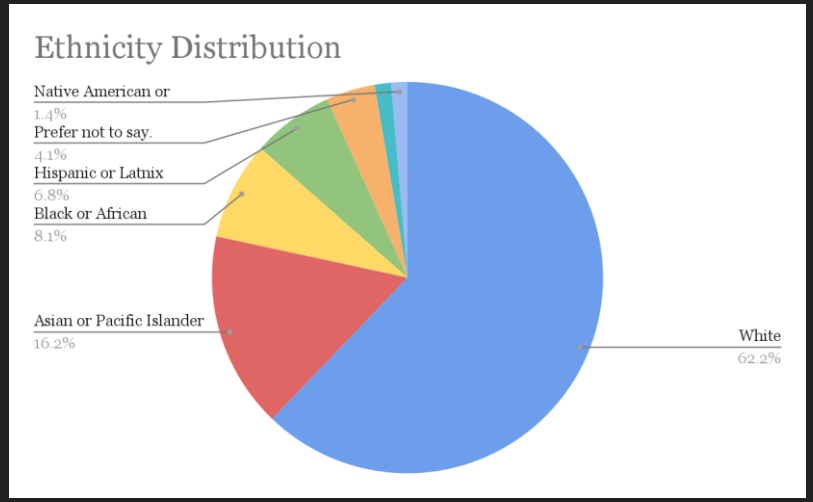
# Sample Age and Gender

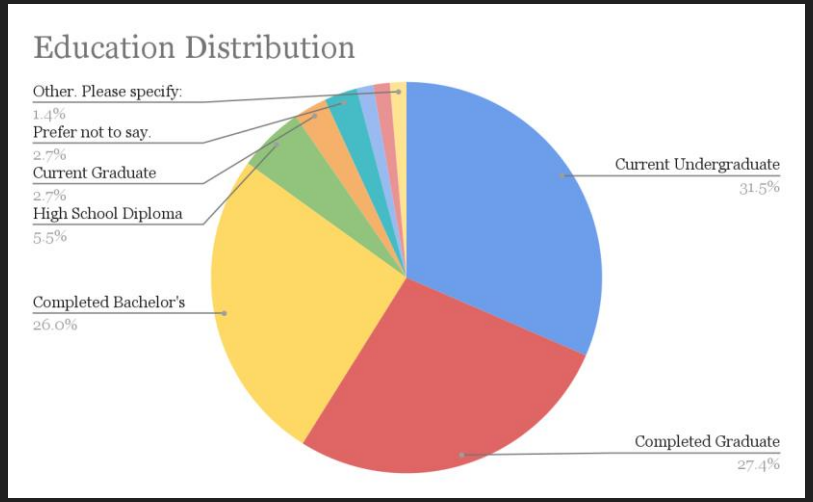



- **Average age** is approximately **31 years**
- **Gender** is **majority Male** (50.0%) with 35.1% Female
- GATech has a gender distribution of 68.50% Male and 31.50% Female (Fall 2021
- The U.S. has a gender distribution of 49.5 percent male and 50.47 percent female

# Sample Ethnicity and Education




- **Majority White ethnicity**
- **91% higher education** (Undergraduate and above)
- **63.3%** of U.S. people age 25 and older have higher education (some college or more)

# Analysis Overview

1. Clean the data
    a. Import survey results into excel
    b. Remove invalid responses
    c. Pre-calculations: determine accuracy scores and important averages
        i. ‘accuracy_bird’, ‘accuracy_turtle’, ‘accuracy_human’
            (1) Found by calculating each participant’s  per life value, calculating the absolute value difference of per life values between increasing scope questions, and averaging the differences for each question group
        ii. ‘accuracy_score’ - the sum of the three calculated question group accuracy variables

1. Determine variables for regression
    a. Dependent variable(s): ‘accuracy_score’, ‘accuracy_bird’, ‘accuracy_turtle’, ‘accuracy_human’
    b. Independent variable: ‘math_activity’
    c. Explanatory variables: see next slide

1. Run regressions and joint-significance tests

# Explanatory Variables

- activity_score
- Form type variables: ‘msl’, ‘slm’, ‘lsm’, ‘lms’, ‘mls’
- age
- gender
- race/ethnicity
- education
- income
- essential spending: ‘ess_spend’
- non-essential spending: ‘noness_spend’
- ‘charity_past’
- ‘charity_future’

# Regression

Basic Multivariable Linear Regression Model

$$y = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots \beta_n x_n + \varepsilon$$

where, y = accuracy score
$x_n$ = the nth independent variable
$\beta_n$ = the nth coefficient
$\varepsilon$ = error

| Model | Equation | Interpretation |
|---|---|---|
| Level-Level Regression | $Y = \alpha + \beta X$ | One unit change in $X$ leads to $\beta$ unit change in $Y$ |
| Log-Linear Regression | $log(Y) = \alpha + \beta X$ | One unit change in $X$ leads to $100 * \beta$ percent change in $Y$ |
| Linear-Log Regression | $Y = \alpha + \beta\, log(X)$ | One percent change in $X$ leads to $\beta/100$ unit change in $Y$ |
| Log-Log Regression | $log(Y) = \alpha + \beta\, log(X)$ | One percent change in $X$ leads to $\beta$ percent change in $Y$ |

https://www.kdnuggets.com/2017/10/learn-generalized-linear-models-glm-r.html/2

# Results

After multiple regressions testing for joint significance with different models: linear-linear, linear-log, log-linear and log-log,

- It has been concluded that there is no significance between:
  1. **Overall** accuracy score,
  2. Accuracy score for the **bird-related** questions,
  3. Accuracy score for the **turtle-related** questions, &
  4. Accuracy score for the **human-related** questions

  and the **Math activity**, considering the other explanatory variables of interest as well

# Descriptive Statistics: Per-Life Valuations

| | Mean | Median | Mode | Minimum | Maximum |
|---|---|---|---|---|---|
| **Bird** | $9.63 | $.01 | $0 | $0 | $500 |
| **Turtle** | $152.49 | $.50 | $.50 | $0 | $25,000 |
| **Human** | $74,737 | $5 | $0 | $0 | $10,000,000 |

## Calculated Accuracy Scores

| | Grammar Activity | Math Activity |
|---|---|---|
| **Bird** | 7.24 | .356 |
| **Turtle** | 351 | 4.83 |
| **Human** | 144,478 | 562 |
| **Overall** | 144,863 | 568 |

*Larger scores corresponds with more discrepancy between an individual's answers, meaning they were less sensitive to scope. A score of 0 would indicate perfect sensitivity to scope.*

# Limitations

- Since the Grammar Activity was **more difficult** than the Math Activity, it serves as an **imperfect control** to compare with
  - Frustration from knowing fewer correct answers **may affect willingness to pay**
  - **Non-Response Bias** - More participants who received the grammar activity **chose to not complete** the survey compared with participants who received the math activity
- Our results **cannot be generalized to the United States population** due to a disproportionate number of young people, men, and people with some higher education
- **Incomplete/Insufficient responses** result in **not meeting** the Central Limit Theorem's requirement of 30 minimum responses for approximately normal distribution
  - Results from comparisons between the 6 different form types might not accurately reflect the true nature of the differences

# Final Notes

In conclusion, we can not confidently say that our math intervention led to statistically significant results.

Areas of future research include:

- Ensuring similar difficulty levels between the control activity and treatment activity
- Testing different control activities - physical fitness, meditation, etc
- Increasing sample size
- Alternate wording of survey questions to decrease confusion
    - Hypotheticals and self-reported guesses are unreliable

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# Appendices

## Descriptive Statistics: Per-Life Valuations

| | | Mean | Median | Mode | Minimum | Maximum |
|---|---|---|---|---|---|---|
| **Bird** | Small | $14.17 | $.03 | $0 | $0 | $500 |
| | Medium | $7.89 | $.10 | $.001 | $0 | $500 |
| | Large | $6.83 | $.001 | $.001 | $0 | $500 |
| **Turtle** | Small | $365 | $1.25 | $100 | $0 | $25,000 |
| | Medium | $75.67 | $.50 | $5 | $0 | $5,000 |
| | Large | $16.93 | $.10 | $.05 | $0 | $1,000 |
| **Human** | Small | $144,044 | $50 | $100 | $0 | $10,000,000 |
| | Medium | $78,744 | $5 | $5 | $0 | $5,000,000 |
| | Large | $1,421 | $.62 | $.25 | $0 | $50,000 |