Design of the Stuttering Implicit Association Test (IAT)

Michael Kremer, Ryan Spears
Adviser: Dr. Tedra Walden
Department of Biomedical Engineering, Vanderbilt University, Nashville, TN

Introduction

- Stuttering can have a negative impact on a person's development as many people hold negative attitudes, stereotypes, and prejudices towards people who stutter
  - These negative affects can manifest themselves in the form of discrimination

Bad Dumb Rotten Joy Good Angry Evil Cheer Happy Nasty **STUTTER** Honor Sad Terrible Fresh Smile Awful Grief Peace Love Horrible Wonderful

- Researchers currently rely on methods for elucidating explicit biases against stuttering
  - However, biased individuals can either knowingly or unknowingly hide these biases due to the influence of social desirability
- The Implicit Association Test (IAT) is a popular social psychology tool that assesses how closely people's brains link concepts [1]
  - Requires test-takers to rapidly pair words or pictures from two target conditions with an attribute
  - Faster responses are interpreted as more strongly associated in memory than slower responses

Problem Statement

- There is a desire to assess implicit biases against stuttering, but there currently is no reliable method of doing so.
- **No IATs exist to serve this purpose.**

Needs Assessment

- There are many possible engineering solutions to this problem, but any solution must:
  1. Be widely available
  2. Be capable of collecting and storing data
  3. Isolate the stuttering bias
  4. Have a robust method of interpreting results
  5. Be accessible to children

Project Goals

- The primary goal is to apply the IAT to measure implicit biases against stuttering
- This design improves upon existing IATs in the following ways:
  - Enhances aesthetic interface
  - Increases customizability
  - Removes need for software download
  - Stores big data
  - **Utilizes audio stimuli**

Young or **Bad** / Old or **Good**

- The program design is also constrained in that the research team intends to adapt it for use with children
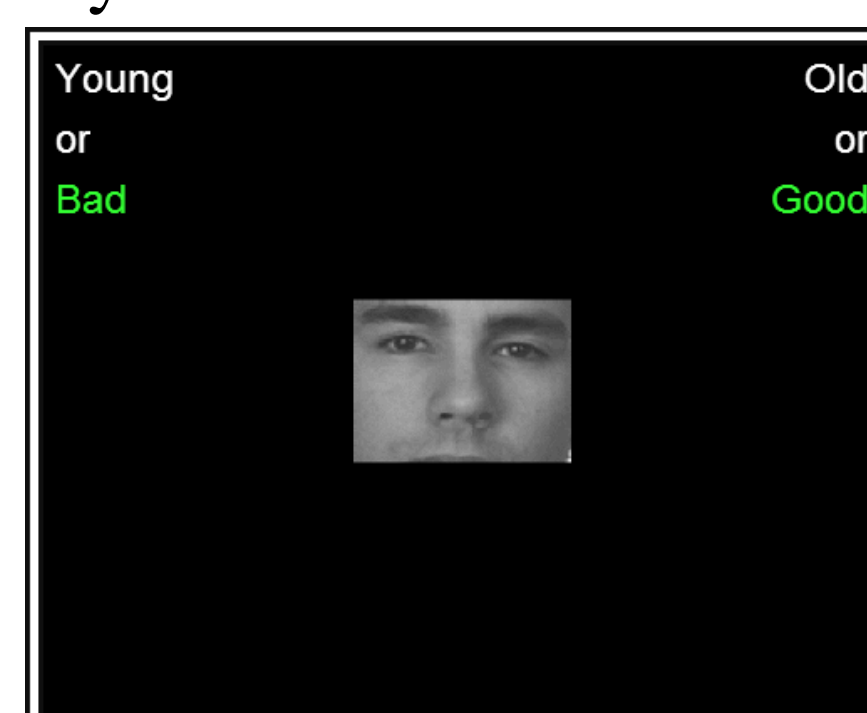
Program Design

- The program employs a JApplet (Java Applet) to run a GUI (Graphic User Interface) to display the IAT
  - It is intended to be operated in a web browser
- Prior to the test, user demographic data is collected

Nonstuttering e / Stuttering i

Round 1
- Users are asked to pair "nonstuttering" and "stuttering" speech to the left and right, respectively, as quickly as possible when presented with stimuli
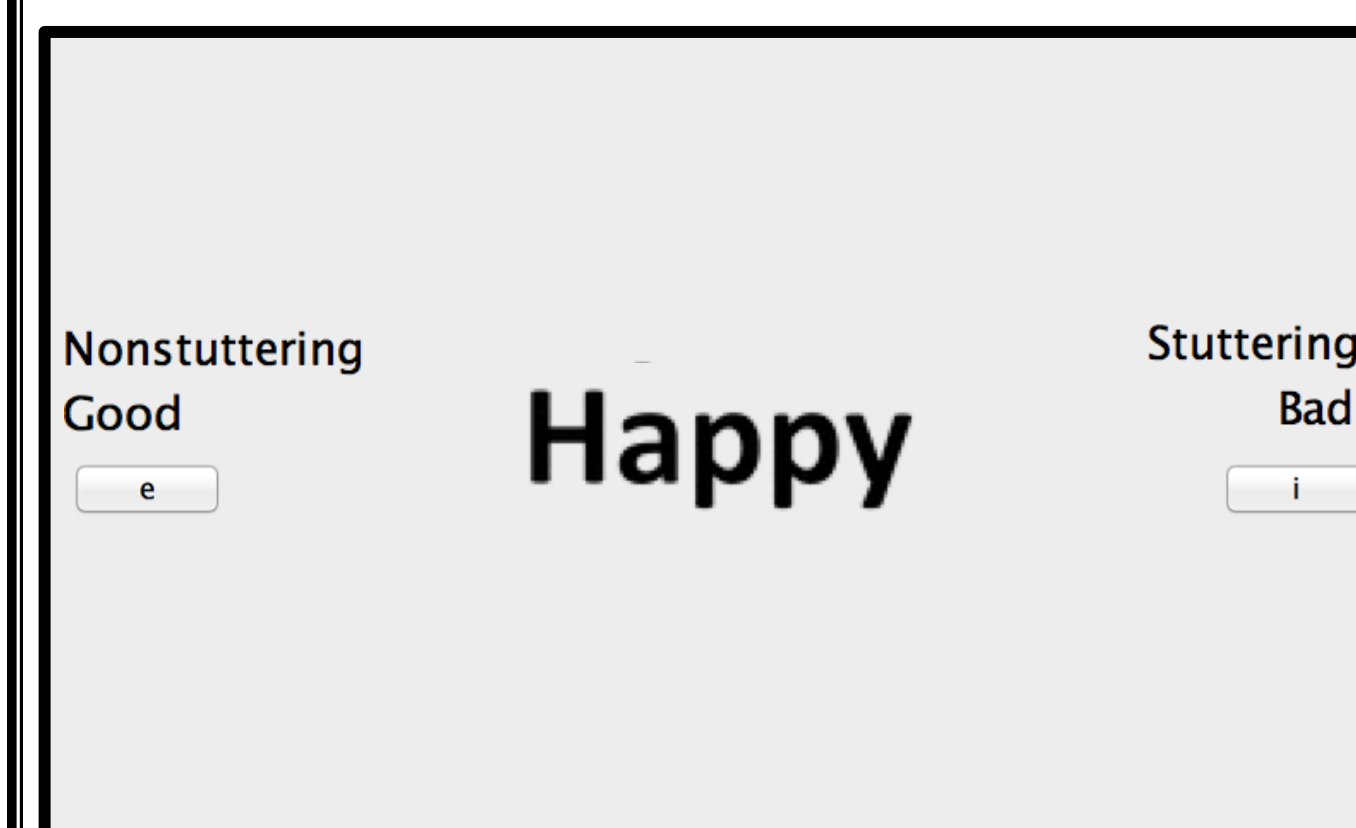- This round is a <u>training round</u>, and no data is collected

Good e / Joy / Bad i
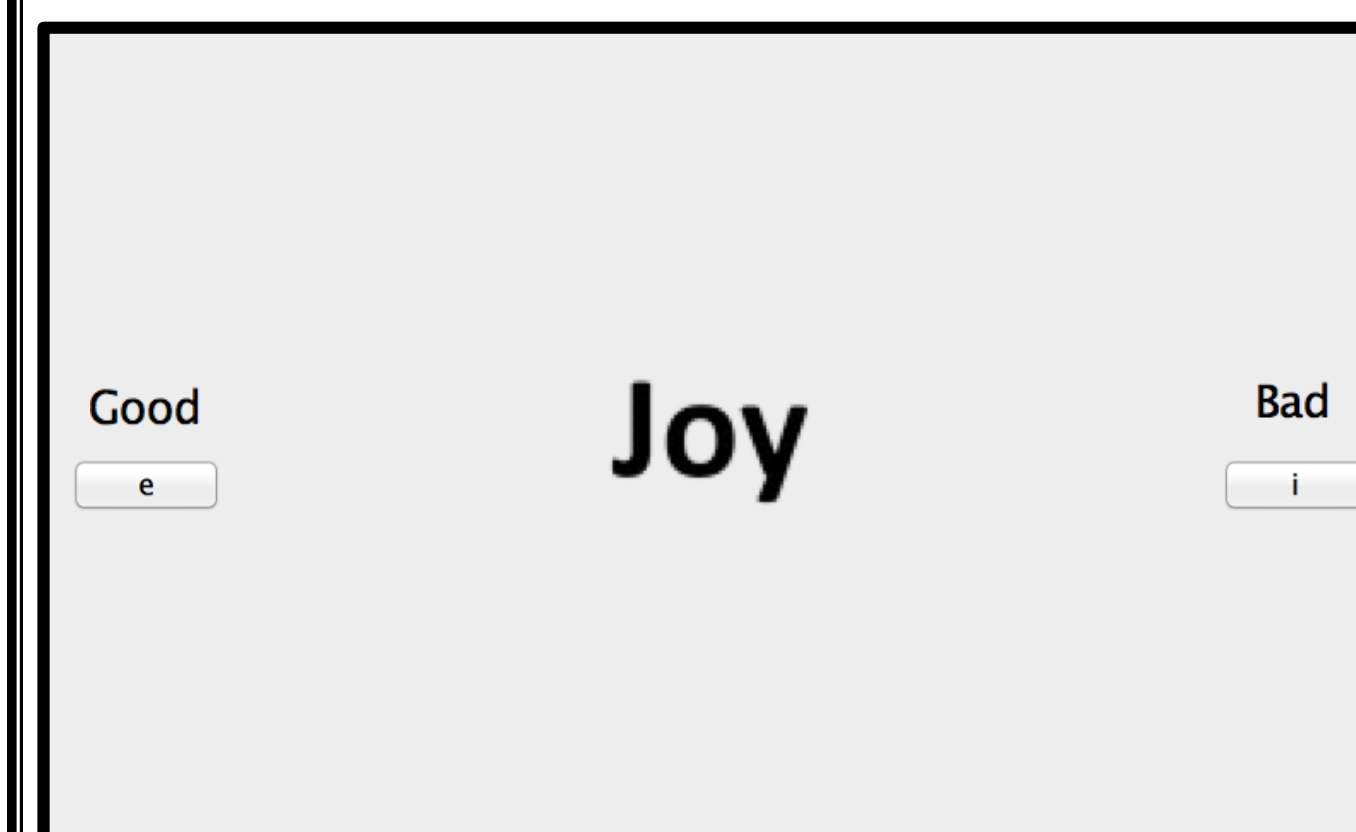
Round 2
- Users are asked to pair written words with positive and negative connotation to the left and right, respectively, as quickly as possible when presented with stimuli
- Again this round is a <u>training round</u>, and no data is collected

Nonstuttering Good e / Happy / Stuttering Bad i

Round 3
- The tasks of the previous two rounds are combined in this round, as users are presented successively with audio or words and are asked to sort as quickly as possible
- This round is an <u>experimental round</u>, and latencies (time to correct response from presentation of stimuli) are recorded

Stuttering Good e / Peace / Nonstuttering Bad i
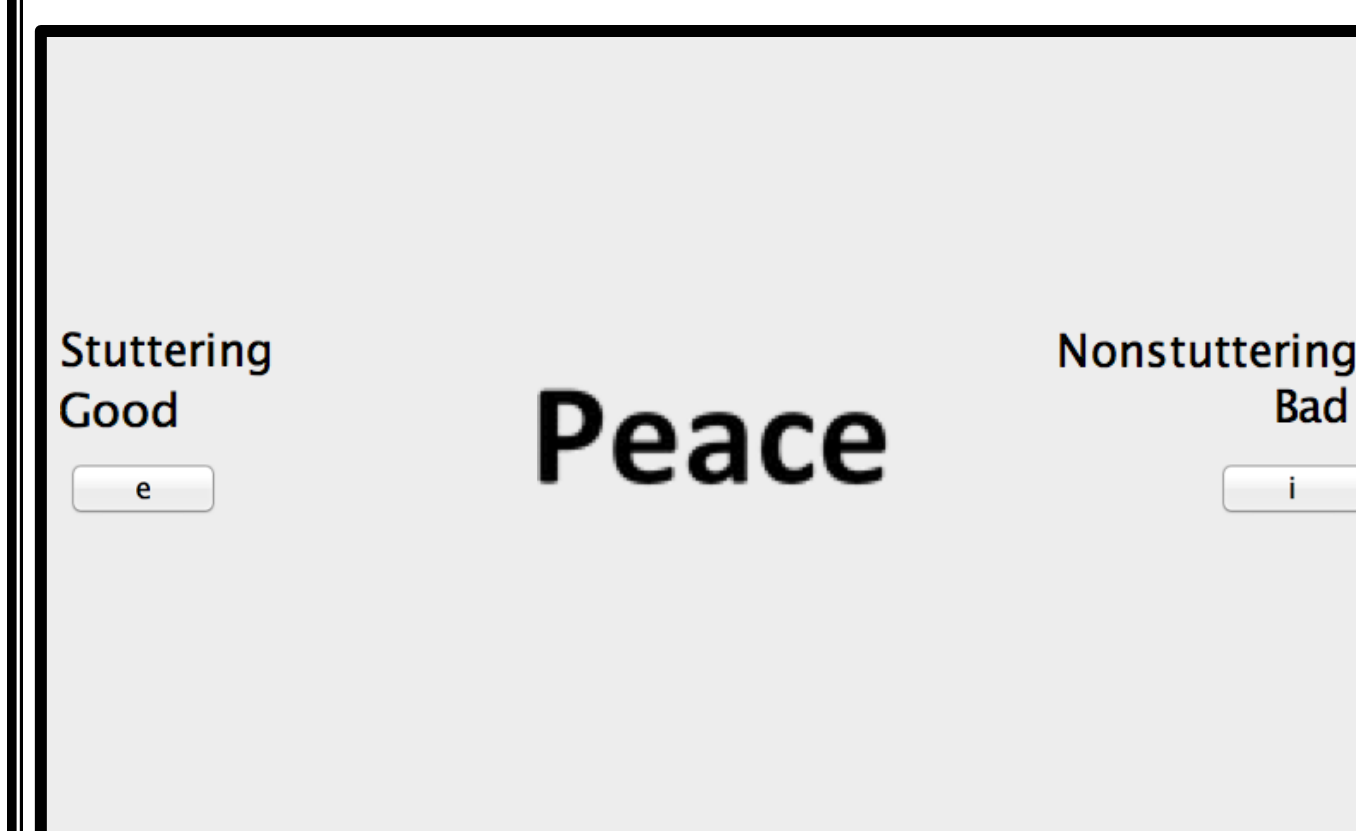
Round 4
- The target conditions of "nonstuttering" and "stuttering" switch sides, and users are asked to complete the same task as in Round 3
- This round is an another <u>experimental round</u>, and latencies are again recorded.

Post-test Data Processing
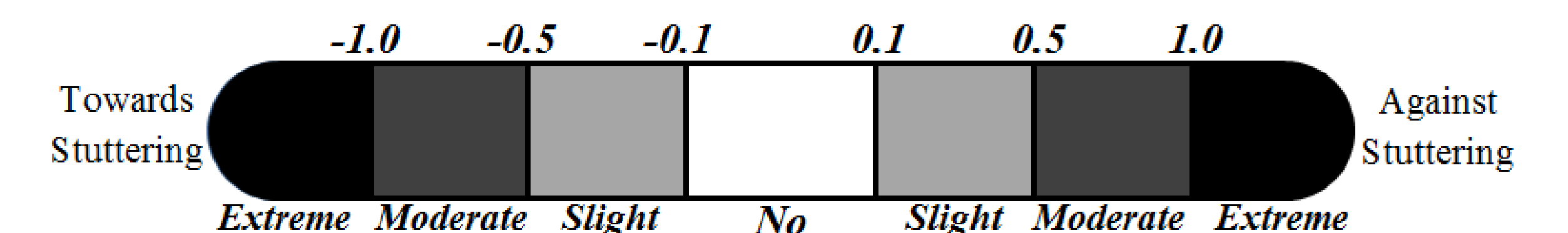- Individual trials indicating random response (<400ms) or task distraction (>10s) are excluded
- With the remaining data, the D statistic is calculated [2]
- Users are asked to rate how they explicitly perceive people who stutter and people who do not stutter on several attributes

$$D = \frac{(\bar{x}_{consistent} - \bar{x}_{inconsistent})}{s_{all\ trials}}$$

Equation 1. Calculation of the D measure, where s indicates the sample standard deviation, *consistent* refers to rounds when "stuttering" and "bad" are paired, and *inconsistent* refers to rounds when "stuttering" and "good" are paired.

User Feedback

- A more positive D score indicates a higher negative association with people who stutter as compared to people who do not stutter

-1.0 -0.5 -0.1 0.1 0.5 1.0
Towards Stuttering / Against Stuttering
Extreme Moderate Slight No Slight Moderate Extreme

- Users are given an indication of the level of their implicit bias on a scale of no, slight, moderate, or strong preference either towards or against stuttering

Results

- Pilot data was collected from 20 study participants
- Each participant in the dataset had a consistent bias (an automatic preference for people who do not stutter)
  - These ranged from slight to moderate bias
- Preliminary data indicates that it is common for people to hold an implicit bias against individuals who stutter

D-statistic Distribution — Frequency vs. D-statistic range
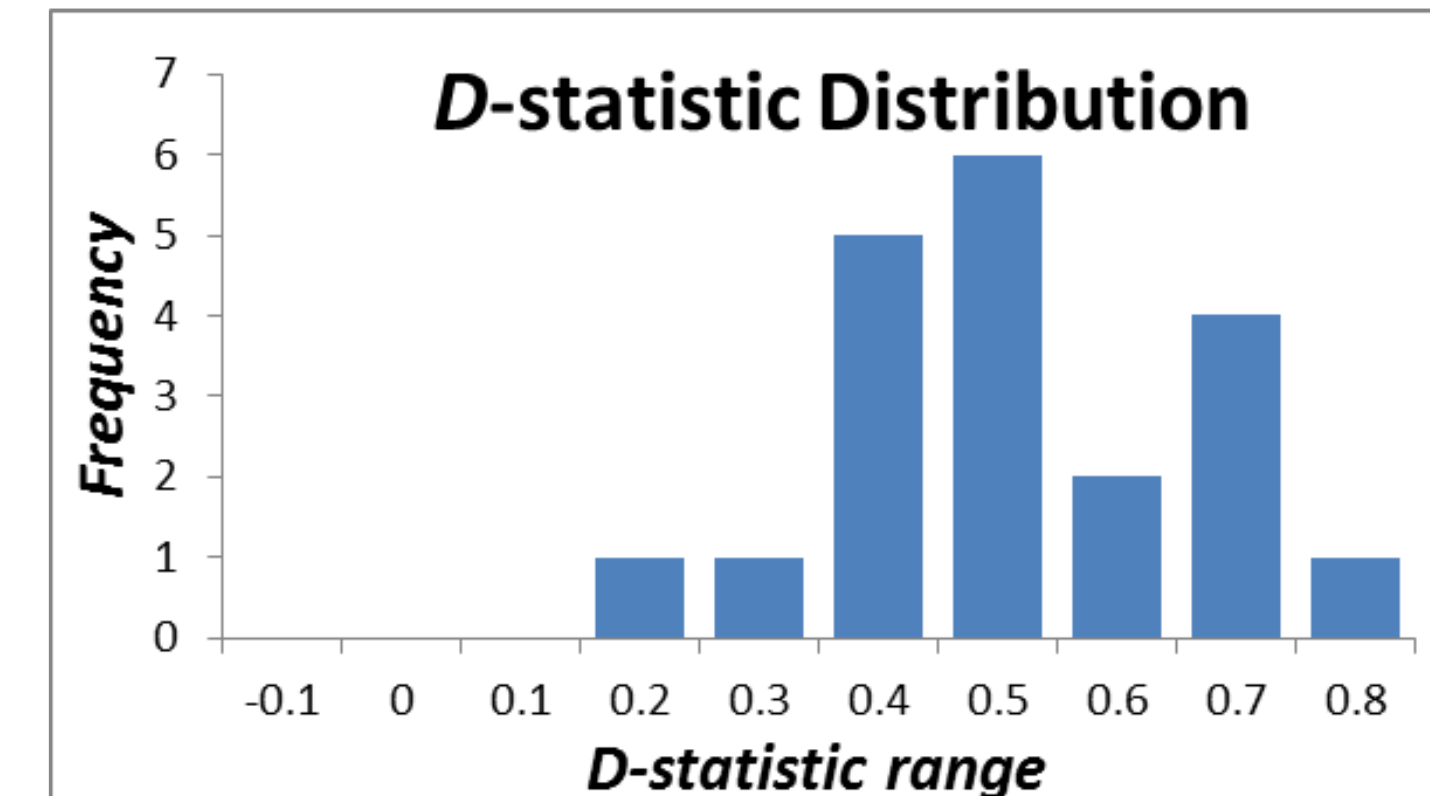
Next Steps

- Further data collection is necessary to validate program output data
- Modifications to IAT must occur to make program accessible to children
  - Replacement of connotation words with pictures
- Large-scale collection of data will allow for rigorous interpretation of state of implicit bias against those who stutter

Acknowledgments

References

[1] Greenwald, A.G., McGhee, D.E. & Schwartz, M. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, 74, 1464-1480.
[2] Nosek, B., Greenwald, A.G., & Banaji, M. (2007). The Implicit Association Test at age 7: A methodological and conceptual review (pp 265-292). In J. Bargh (Ed.), *Automatic processes in social thinking and behavior*. Psychology Press.
https://implicit.harvard.edu/implicit/