

# Inside Out: Can Joy, Sadness, Anger, Fear, or Disgust affect your security?

Eric Chan-Tin  
Department of Computer Science  
Loyola University Chicago



**FEAR**



**JOY**



**DISGUST**



**ANGER**



**SADNESS**



Disney · PIXAR  
**INSIDE  
OUT**

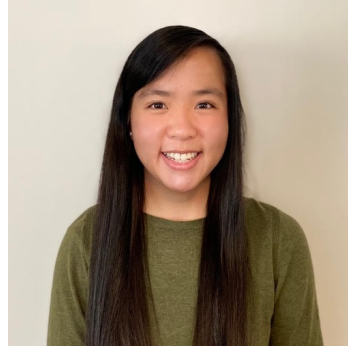
ET Panache

facebook/PixarInsideOut

# Collaborators/Acknowledgments



Spencer Johnston



Anna Bakas



Daisy Reyes



Anne Wagner



Shelia Kennison



# Research Questions

- Do personality types affect strength of password created?
- Does background security knowledge affect strength of password created?
- Can behavior be changed?

# Personality Types

- Big Five
  - Extraversion
  - Openness
  - Agreeableness
  - Neuroticism
  - Conscientiousness
- True Colors
  - Blue
    - Empathetic, compassionate, cooperative
  - Orange
    - Energetic, Spontaneous, charming
  - Gold
    - Punctual, organized, precise
  - Green
    - Analytics, intuitive, visionary

# Security Knowledge

- Human Aspects of Information Security Questionnaire (HAIS-Q)
- 9 Questions
  - "It's acceptable to use my social media passwords on my work accounts"
  - "It's a bad idea to share my work passwords, even if a colleague asks for it"
- Scale of 1 to 7
  - Strongly disagree, Disagree, Somewhat disagree, Neither agree/disagree, Somewhat agree, Agree, Strongly agree

# Password Strength

- Dropbox zxcvbn password strength estimator  
(0 to 4)
- Our metric (0 to 5)
  - > 8 characters
  - Numbers
  - Special character
  - Upper case
  - No dictionary word

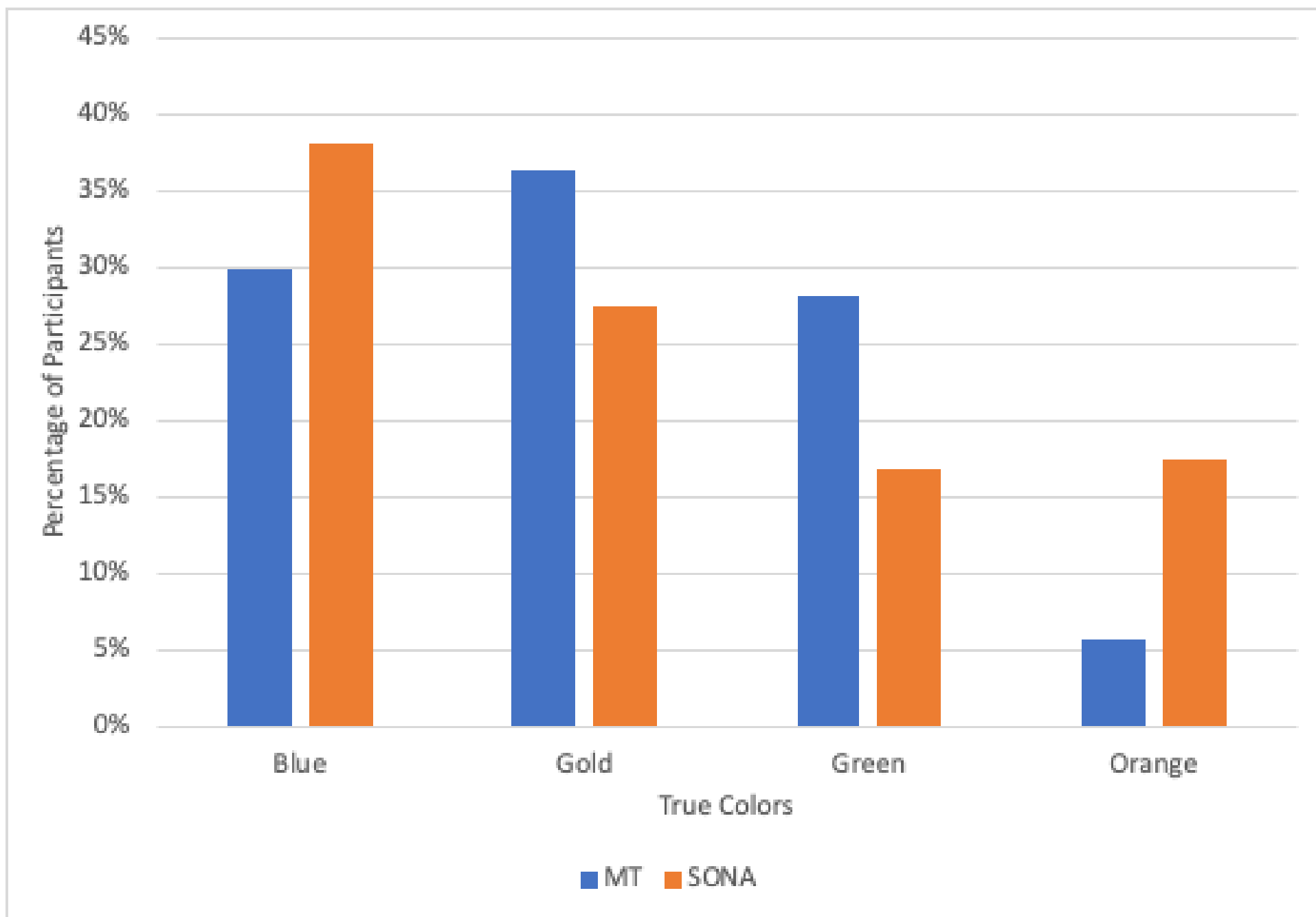
# Online Survey

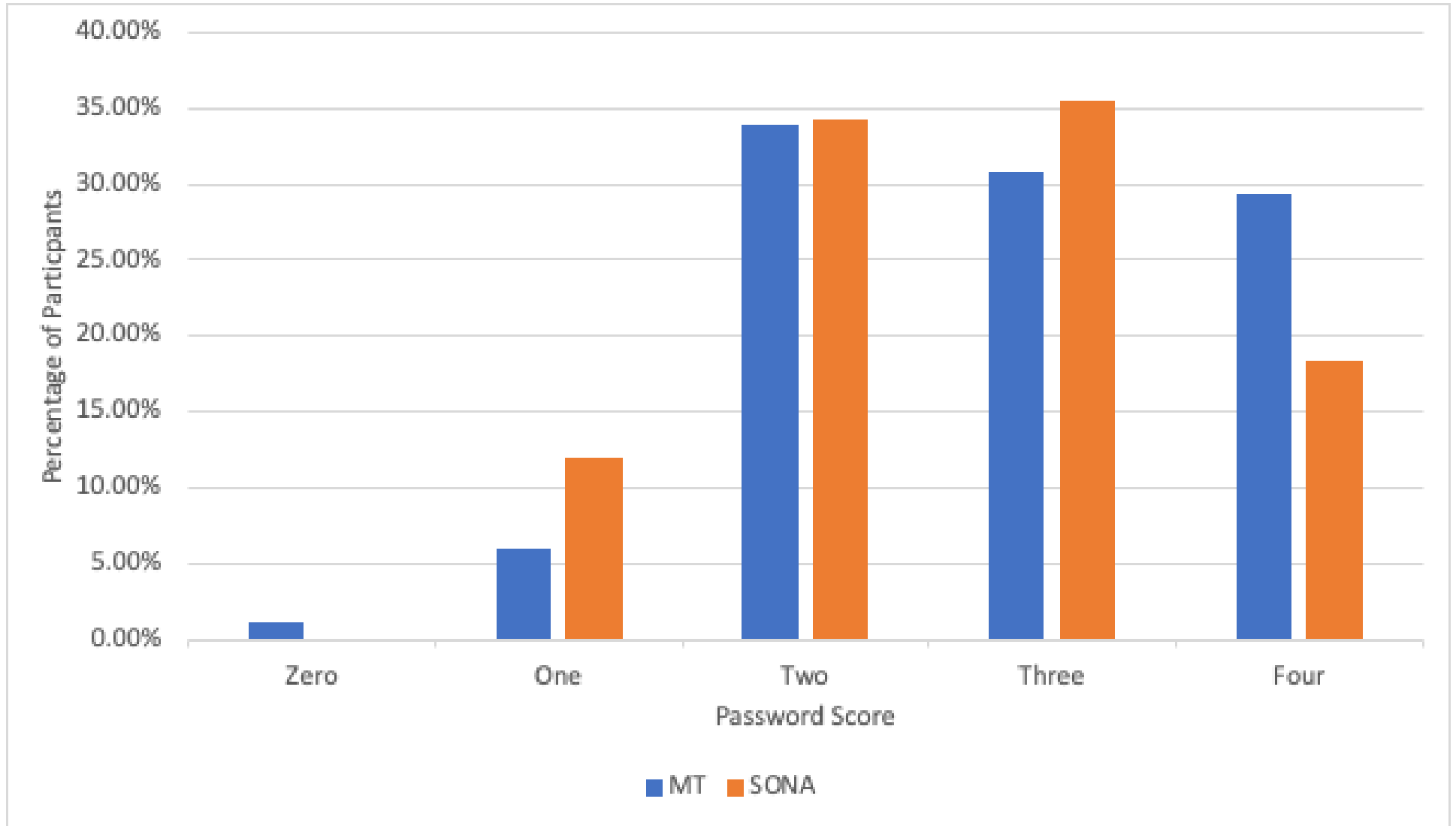
- Qualtrics
- Two parts
  - Part 2: one month later
- SONA participants compensated with credits
- MTurk participants compensated financially



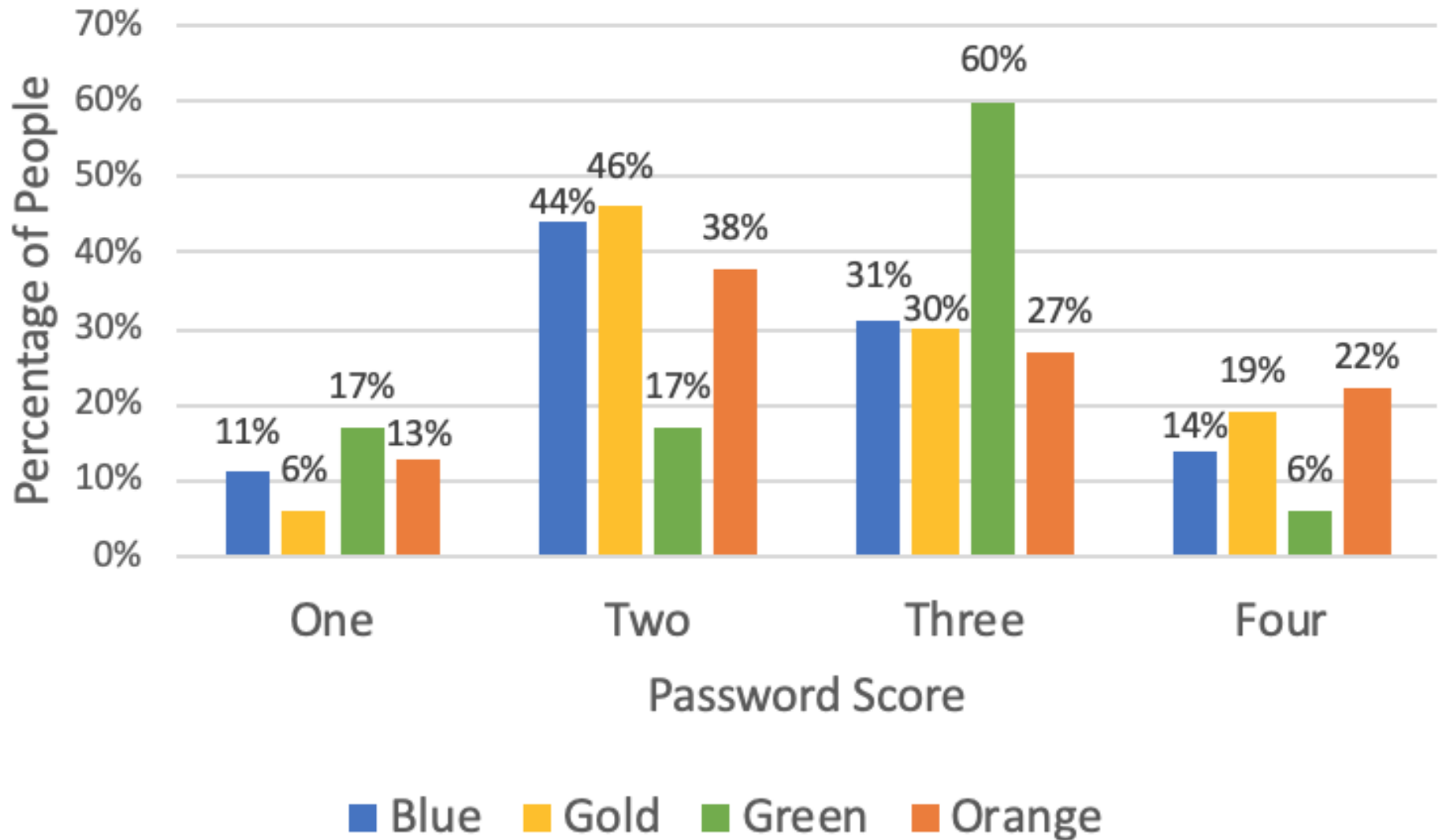
# Data Collection

- Starting September 2019
- SONA
  - Intro to Psychology university students
  - 254 participants and counting
- Amazon Mechanical Turk (Mturk)
  - 413 participants and counting

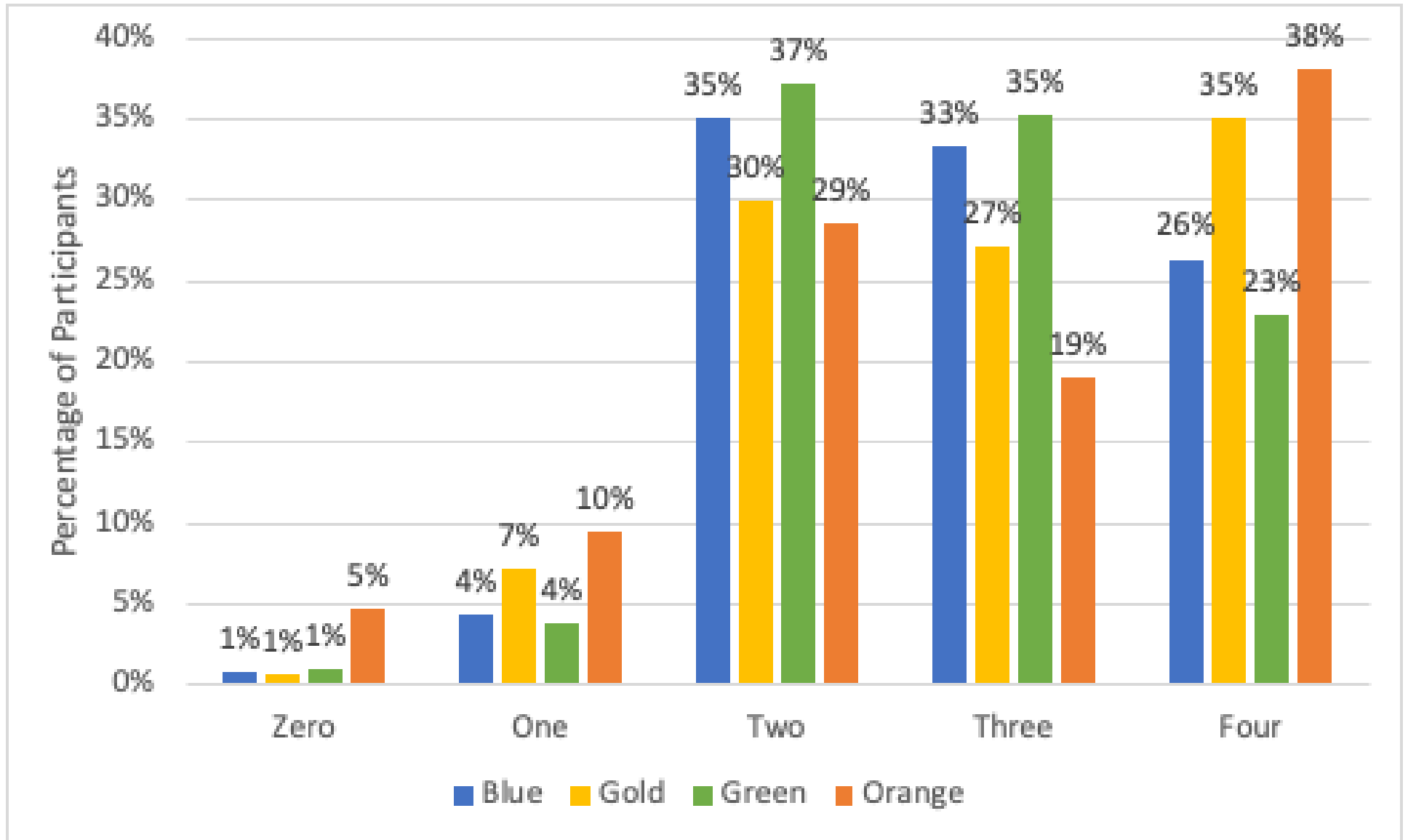




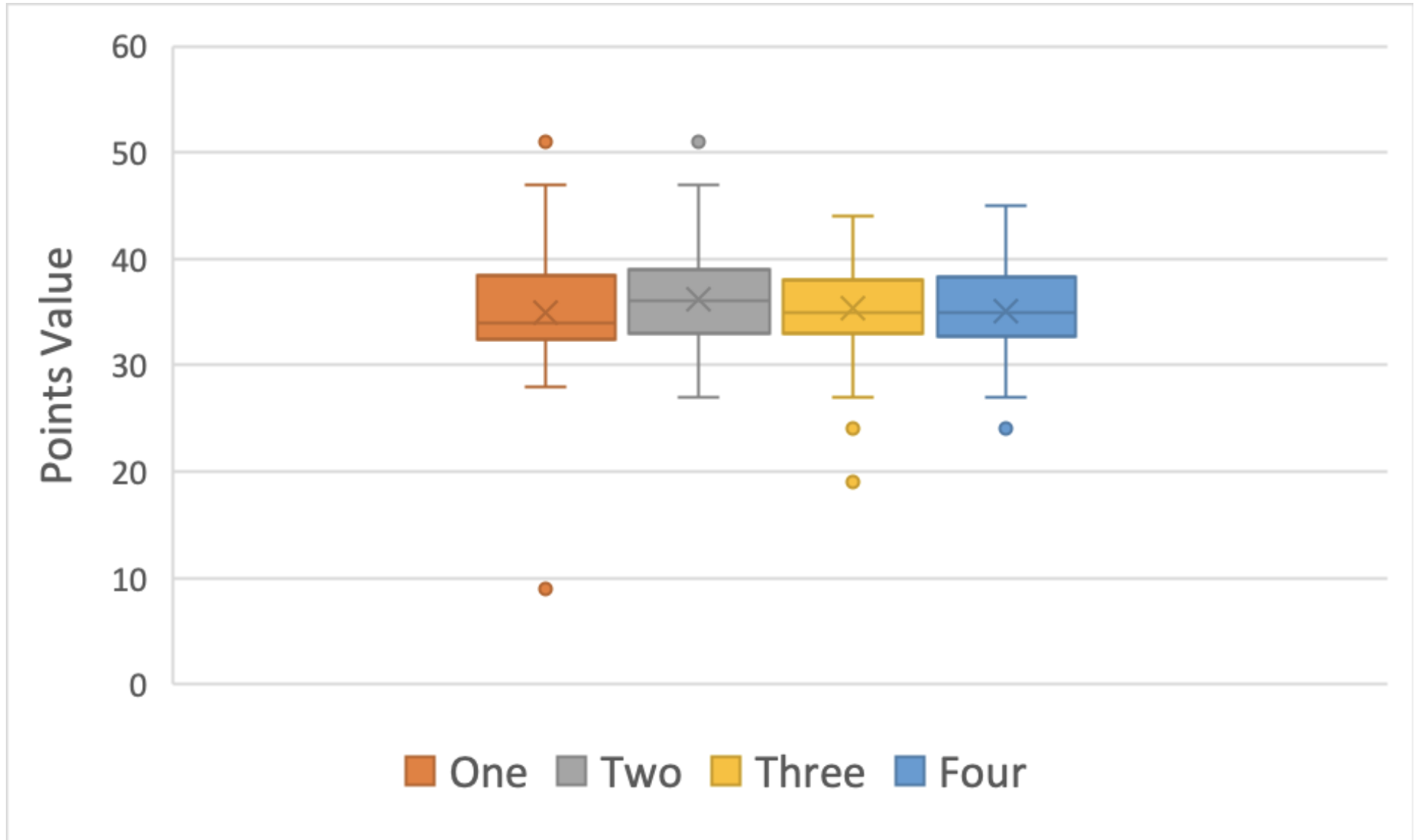
# SONA



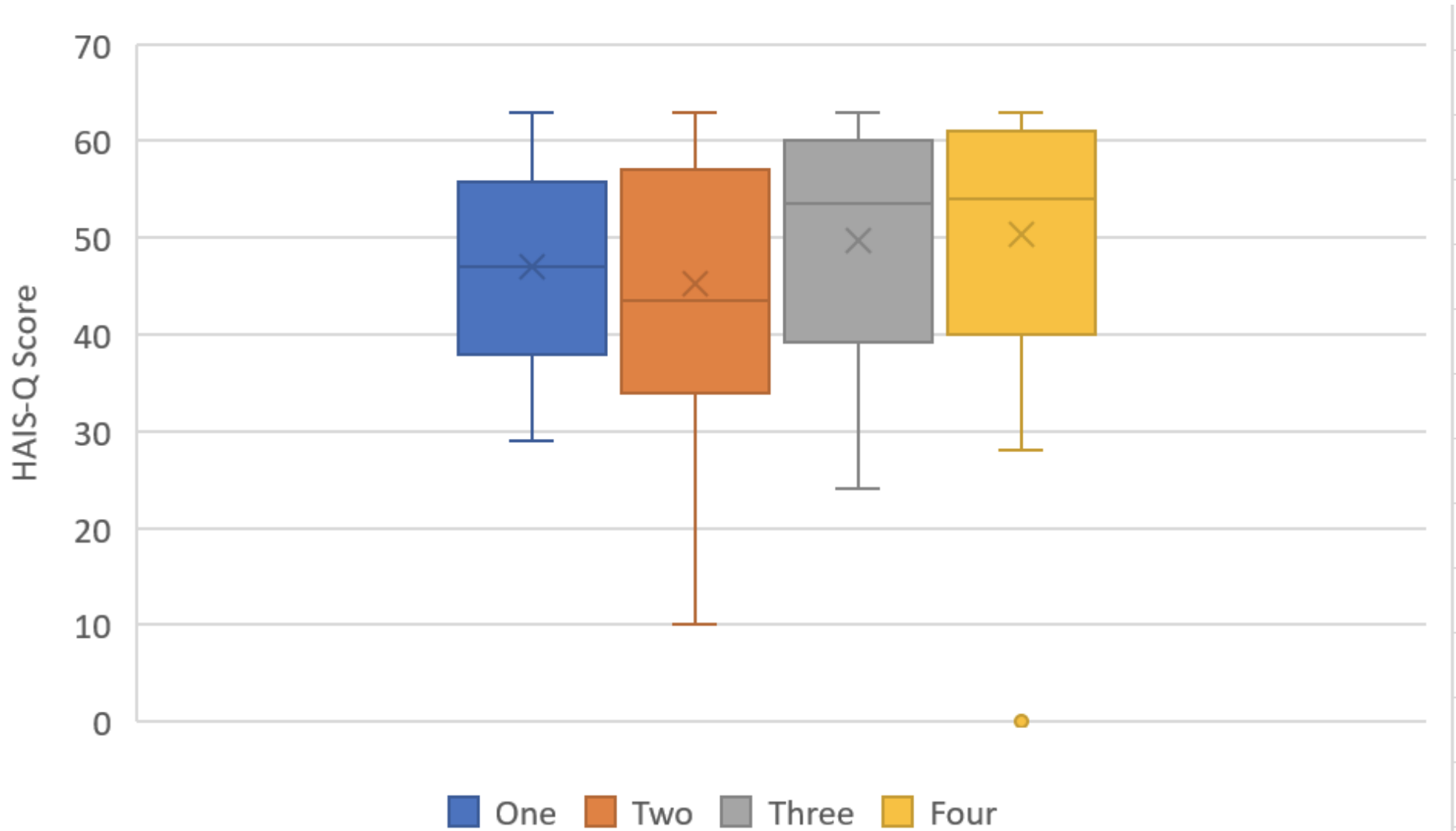
# MTurk

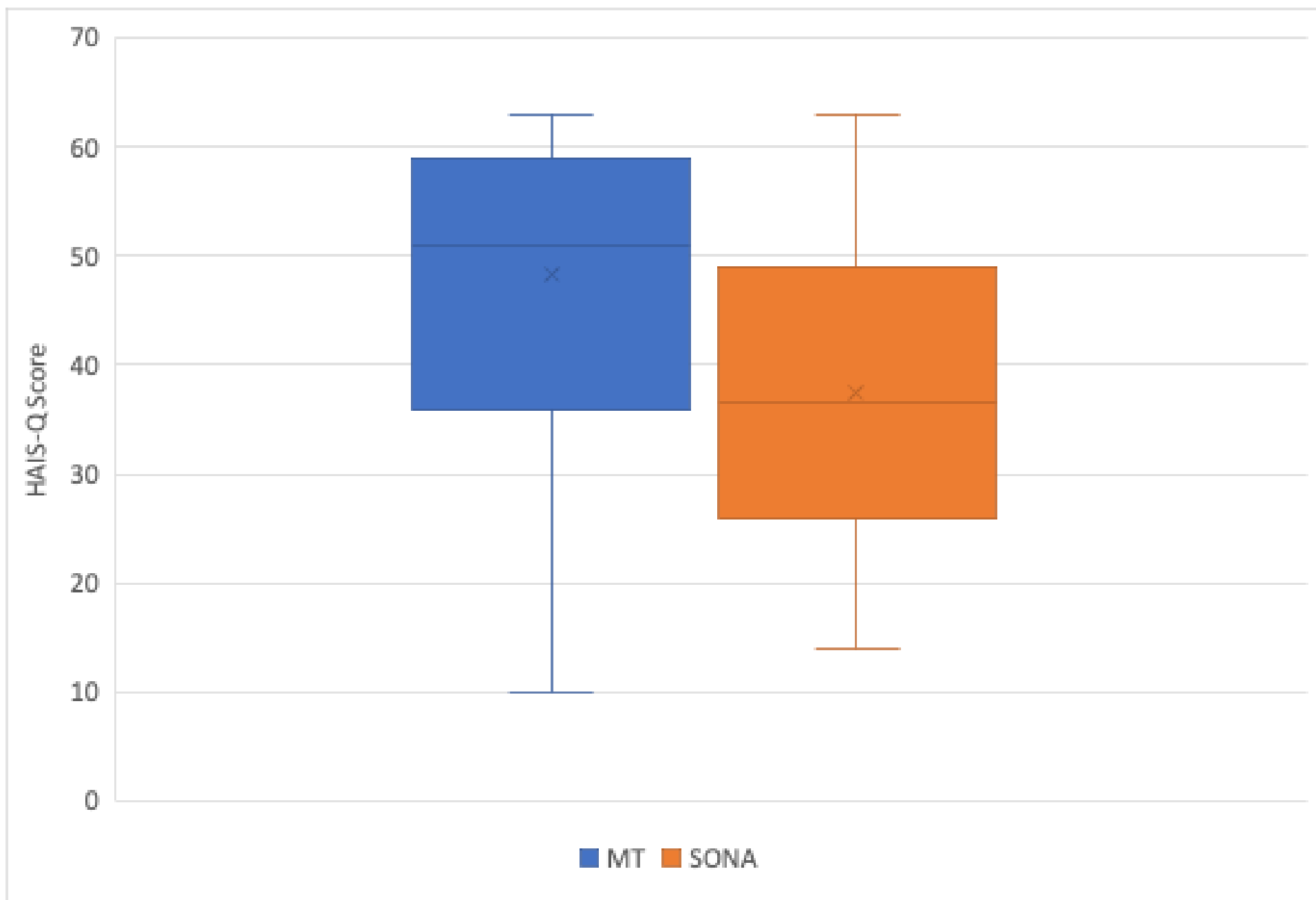


# SONA

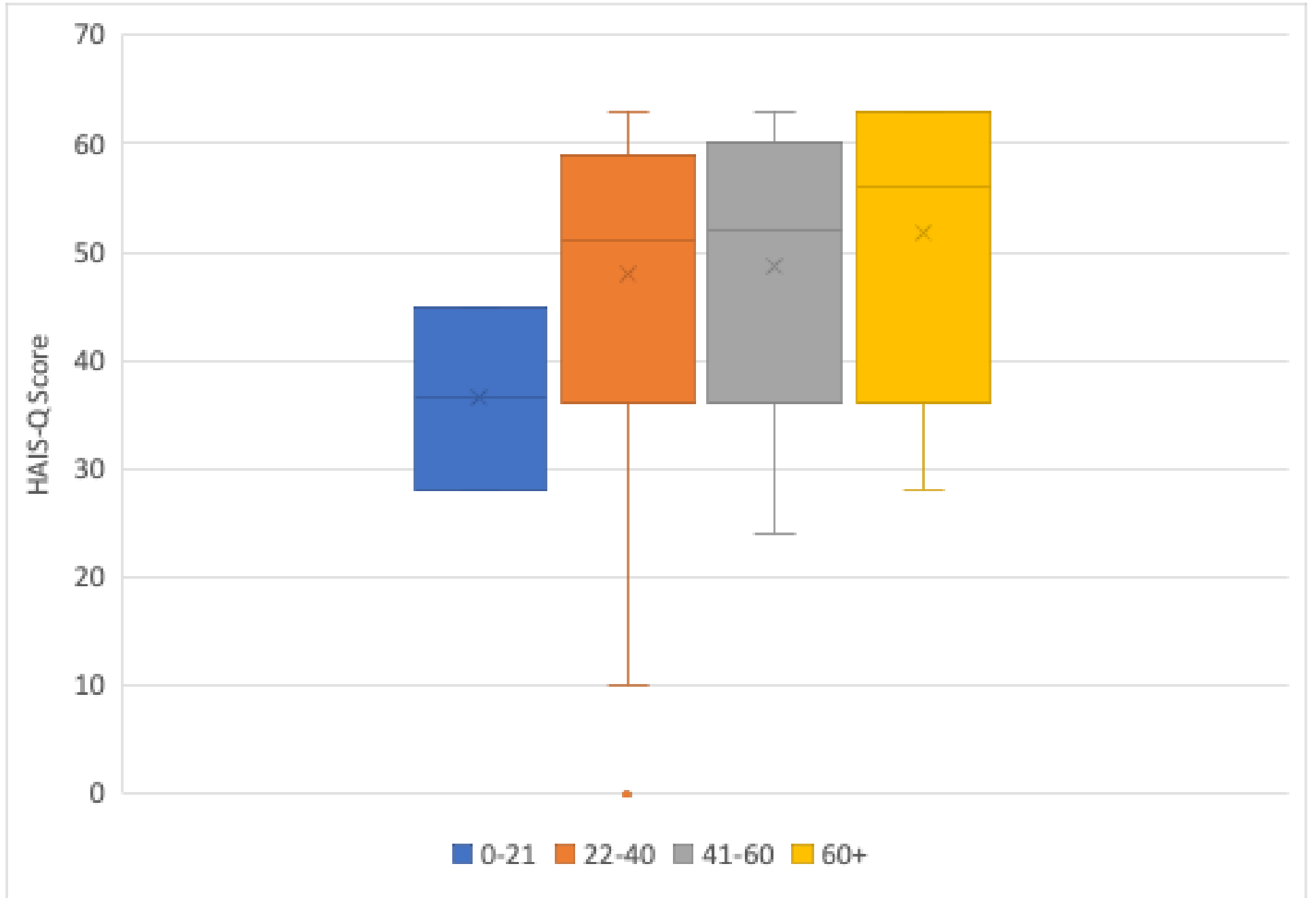


# MTurk









# Password Strength Estimator

- Correlation of 0.8 for zxcvbn and our metric

Score	zxcvbn	Our Criteria
Zero	0	0
One	29	11
Two	100	65
Three	85	107
Four	40	66
Five	0	7

# Messaging

As you know, all of your online accounts – including social media, email, and banking – require passwords each time you log in. A strong password is the best protection from hackers. The strongest passwords contain uppercase letters, lowercase letters, numbers, and special symbols (e.g., !, &, @, \*, etc.). Also, the strongest passwords are used for only one account, so different accounts should have different passwords. Take the time and add the following to your plan as soon as possible: create a strong password for each online account!

# Effect of Messaging in HAIS-Q

True Colors Personality Type	HAIS-Q Average Score for Part 1	HAIS-Q Average Score for Part 2
Blue	5.23	5.84
Gold	5.71	5.9
Green	5.12	5.62
Orange	5.16	5.68

# Research Questions

- Do personality types affect strength of password created?
  - **YES**
- Does background security knowledge affect strength of password created?
  - **NO**
- Can behavior be changed?
  - **MAYBE**

# Future Work

- Strong results
  - Personality can be a strong link to security
- More data is being collected
- Targeted messaging
- Part 2 expansion: create new passwords
- More personality styles: cognitive, anxiety, stress, trust, etc.

# Thank you!



## Questions?

Eric Chan-Tin: [chantin@cs.luc.edu](mailto:chantin@cs.luc.edu)