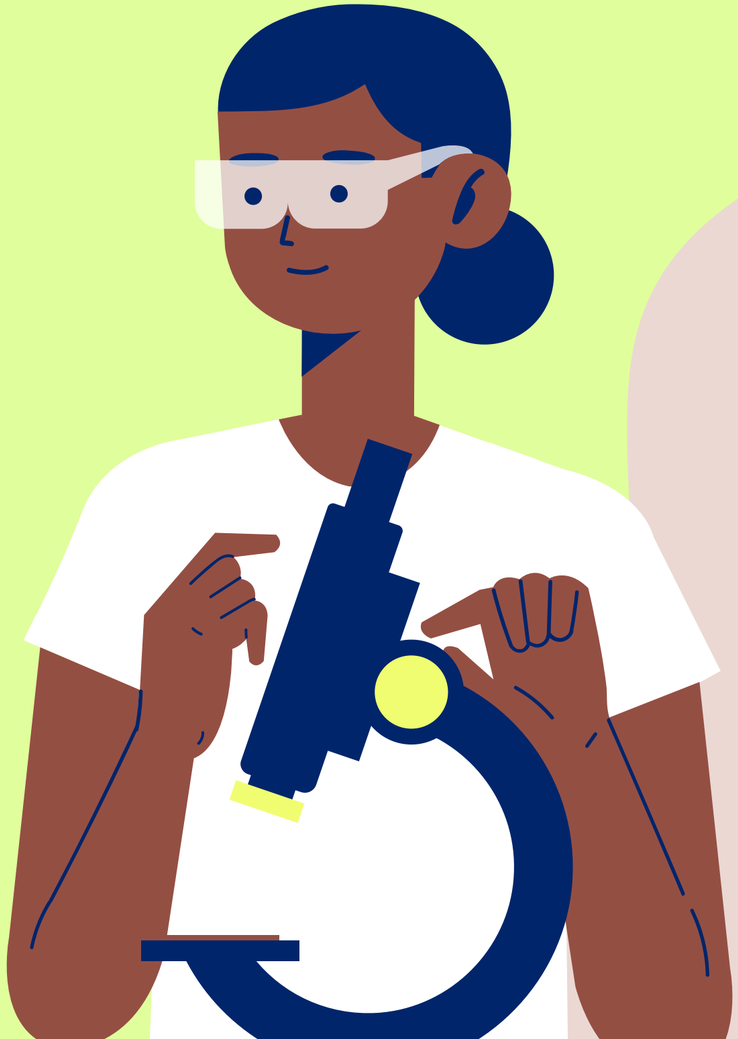
PSYCHOLOGY

HOW DO WE THINK OF SCIENCE AS IT RELATES TO GENDER? AN ANALYSIS OF IMPLICIT GENDER-SCIENCE ATTITUDES

SYMPHONY HOPKINS
LAUNCHCODE: CODERGIRL STL



WHAT ARE IMPLICIT ATTITUDES?

"A relatively enduring and general evaluative response of which a person has little or no conscious awareness" (American Psychological Association, n.d.)

HOW DO WE MEASURE IMPLICIT ATTITUDES?

Implicit Association Tests (IAT)

Source: Harvard's Gender-Science IAT Test (https://implicit.harvard.edu/implicit/Study?tid=-1)

GOALS

- How do we as a society associate gender as it relates to science?
- Can we find any implicit attitude differences between different demographics?
- How do these implicit attitudes manifest in the real world? (Can these implicit attitudes explain gender disparities in STEM?)

EXPLORATORY DATA ANALYSIS (EDA)

Harvard's Gender-Science IAT Dataset (https://osf.io/9gvmw/)

- Data Collected from January 2020 to June 2020
- Approximately 110,000 Rows and 140 Columns
- Included Information Such As...
  - Participant Demographics
  - IAT Scores
  - Statistical Data
  - Survey Data

	session_id	month	day	year	hour	weekday	user_id
count	1.107240e+05	110724.000000	110724.000000	110724.000000	110723.000000	110723.000000	1.107230e+05
mean	2.645368e+09	3.535421	15.532730	2019.981937	13.551367	3.904338	2.908148e+05
std	1.286321e+06	1.831973	8.765753	6.010479	7.060249	1.708363	1.780973e+06
min	2.643542e+09	1.000000	1.000000	20.000000	0.000000	1.000000	-1.000000e+00
25%	2.644314e+09	2.000000	8.000000	2020.000000	8.000000	3.000000	-1.000000e+00
50%	2.645127e+09	3.000000	15.000000	2020.000000	16.000000	4.000000	-1.000000e+00
75%	2.646052e+09	5.000000	23.000000	2020.000000	19.000000	5.000000	-1.000000e+00
max	2.648229e+09	6.000000	31.000000	2020.000000	23.000000	7.000000	1.130873e+07

```
count    69921.000000
mean         0.290230
std          0.430688
min         -1.843300
25%          0.015800
50%          0.316300
75%          0.595500
max          1.816000
```

	birthyear	D_biep.Male_Science_all
birthyear	1.000000	-0.102070
D_biep.Male_Science_all	-0.102070	1.000000

CLEANING PROCESS

Initial Dataframe

	session_id	session_status	study_name	date	month	day	year	hour	weekday	birthmonth	...	sius003	sius004	sius005	sius006	sius0(
0	2643542376	C	Demo.GenderScience.0003	1/1/2020 0:00:16	1	1	2020	0.0	4.0	4	...					
1	2643542453		Demo.GenderScience.0003	1/1/2020 0:36:15	1	1	2020	0.0	4.0		...					
2	2643542545		Demo.GenderScience.0003	1/1/2020 1:28:05	1	1	2020	1.0	4.0		...					
3	2643542546		Demo.GenderScience.0003	1/1/2020 1:28:35	1	1	2020	1.0	4.0		...					
4	2643542547		Demo.GenderScience.0003	1/1/2020 1:29:06	1	1	2020	1.0	4.0		...					

Approximately 110,000 Rows & 140 Columns

Final Dataframe

	birthyear	birthSex	race	ethnicity	highest education	iat score	arts	science	la association	sci association	...	sci importance	math importance	countrycit_num	countryres_nu
0	1985.0	2.0	8.0	1.0	Bachelors Degree	0.371520	5.0	4.0	4.0	5.0	...	3.0	4.0	1.0	1
5	1999.0	2.0	3.0	2.0	Some High School	-0.279224	3.0	5.0	4.0	4.0	...	5.0	4.0	151.0	1
7	1970.0	2.0	6.0	2.0	Bachelors Degree	0.903002	5.0	4.0	4.0	4.0	...	3.0	4.0	14.0	14
9	1992.0	2.0	6.0	2.0	Bachelors Degree	-0.131063	3.0	3.0	4.0	4.0	...	5.0	3.0	1.0	1
11	1987.0	2.0	6.0	1.0	Ph.D.	-0.100814	5.0	4.0	4.0	5.0	...	3.0	4.0	1.0	1

Approximately 34,000 Rows & 27 Columns

Dealing with Missing Data

- Replaced empty cells with NaN values to calculate percentage of missing data
- Dropped rows that did not have IAT scores

Dealing with Unnecessary Data

- Created a new dataframe to only include necessary columns

Converting Data Types

- Converted a few numerical columns from strings to floats

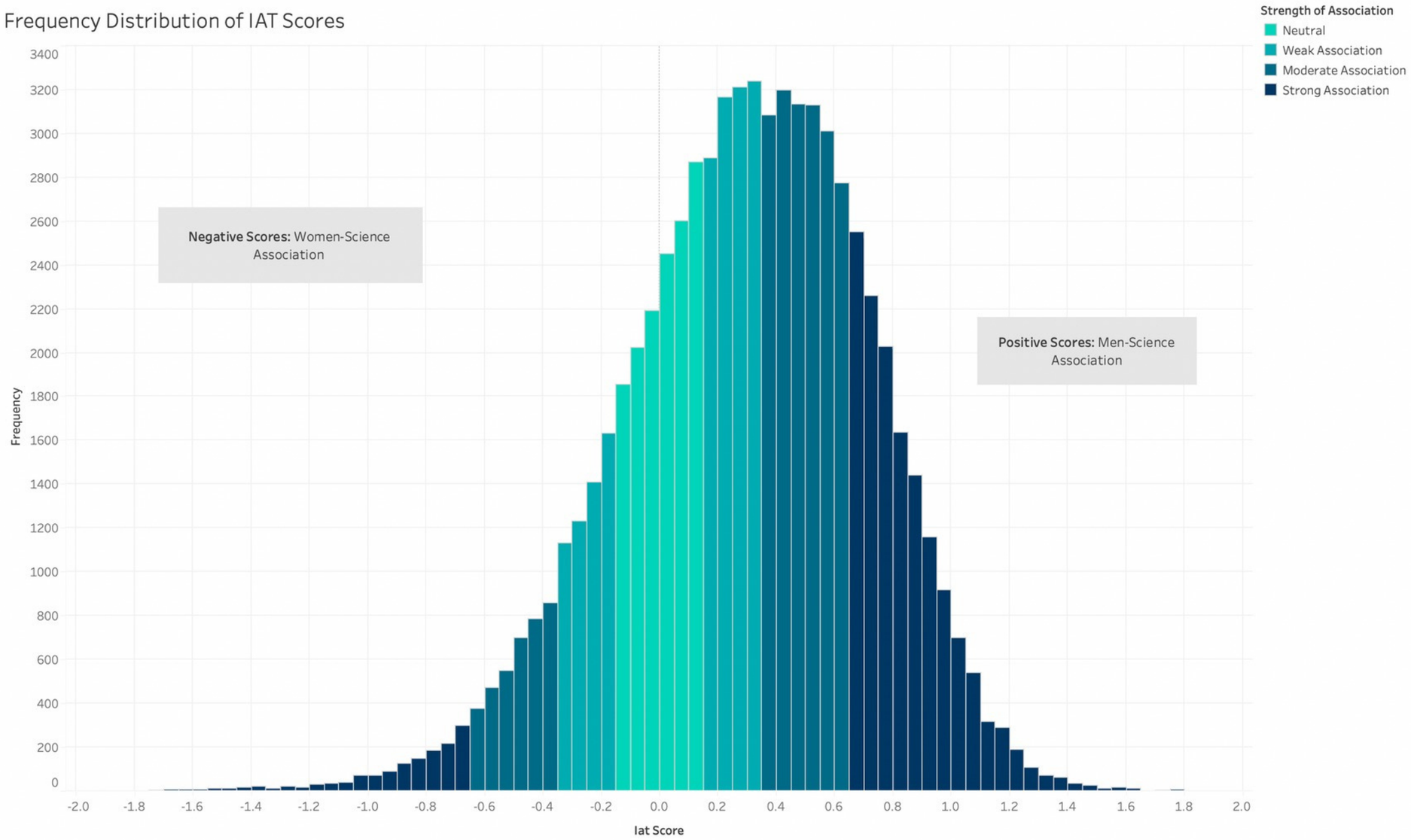
Translating Coded Data

- Used data dictionary to translate coded data

Renaming Columns

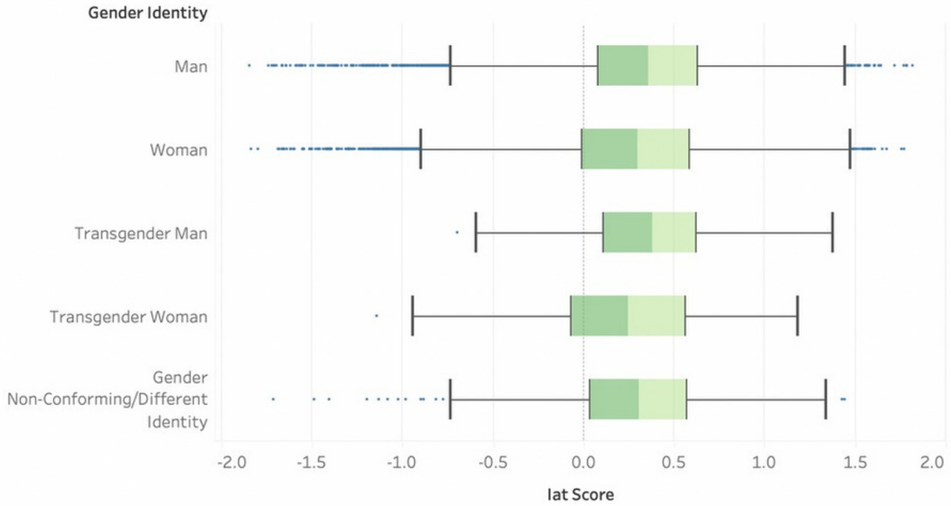
- Renamed columns to make them easier to understand

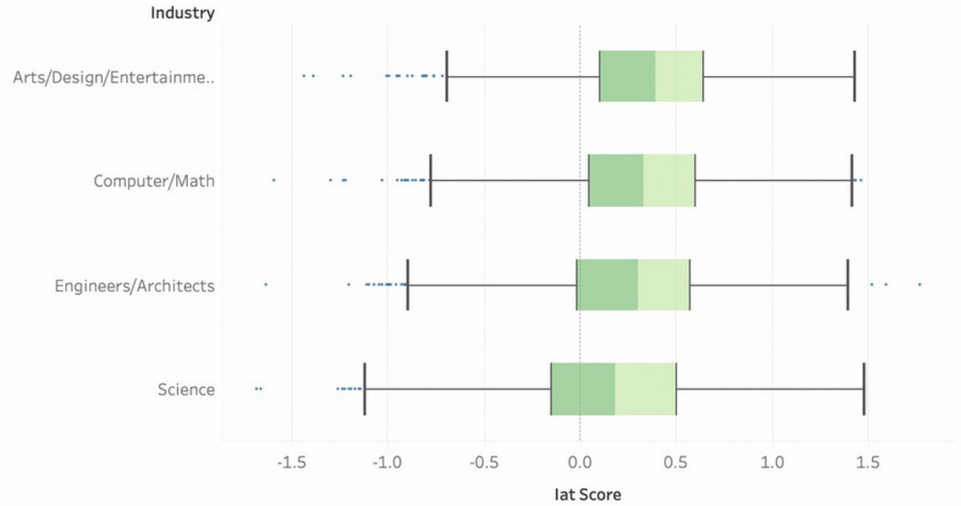
IAT SCORE FREQUENCY DISTRIBUTION

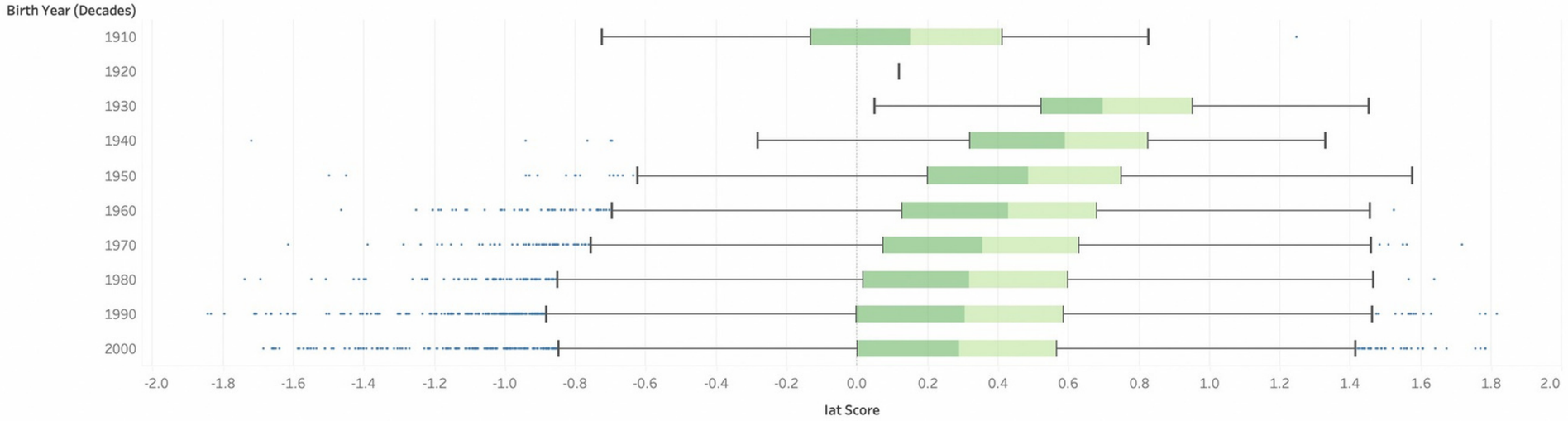


Strength of associations were determined using Blanton et al. (2014) IAT score assessments.

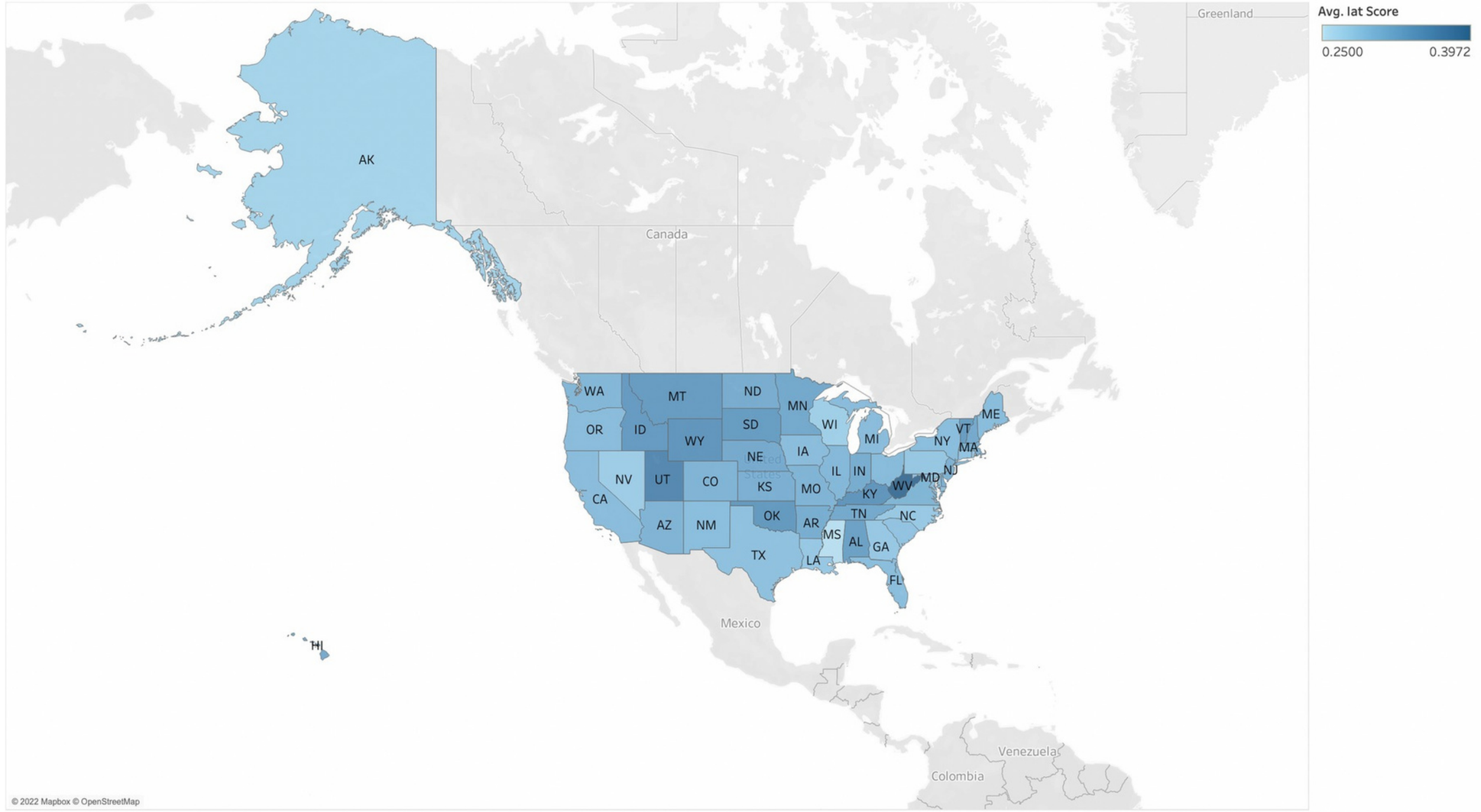
IAT SCORE DISTRIBUTION ACROSS SELECT DEMOGRAPHICS







AVERAGE IAT SCORE ACROSS U.S.



RESULTS

- How do we as a society associate gender as it relates to science?
  - We are more inclined to associate men with science.
- Can we find any implicit attitude differences between different demographics?
  - There does not seem to a difference in implicit attitude across demographics.
- How do these implicit attitudes manifest in the real world? (Can these implicit attitudes explain gender disparities in STEM?)
  - **Hindsight is 20/20: This was a big question to ask from one dataset.**

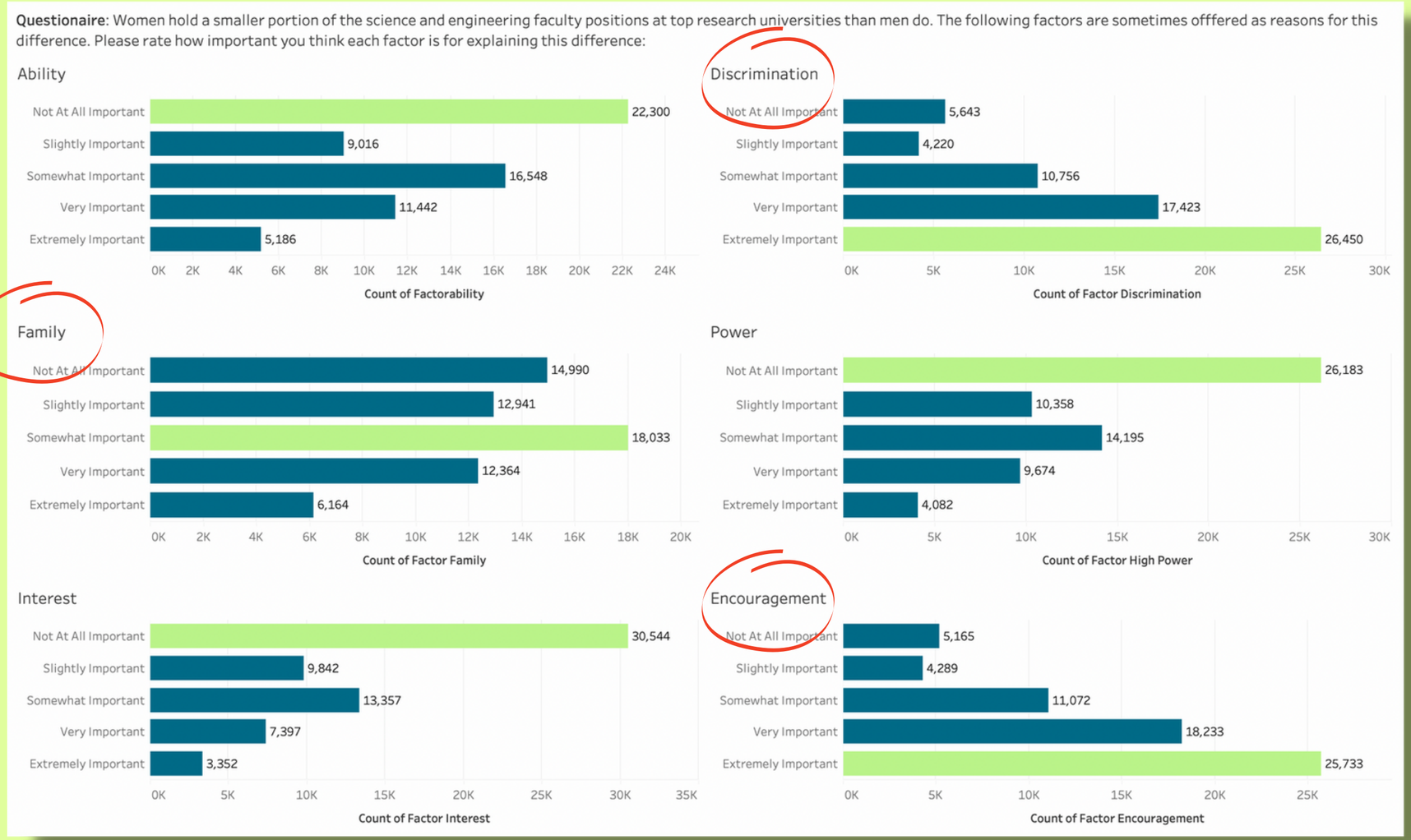
IMPORTANT NOTE ABOUT THE IAT

A.K.A. Something I Wish I Had Known Before Conducting this Analysis

- There is a weak correlation between implicit attitudes and behavior, making IAT scores not great for predicting behavior (Greenwald, Nosek, & Banaji, 2014)

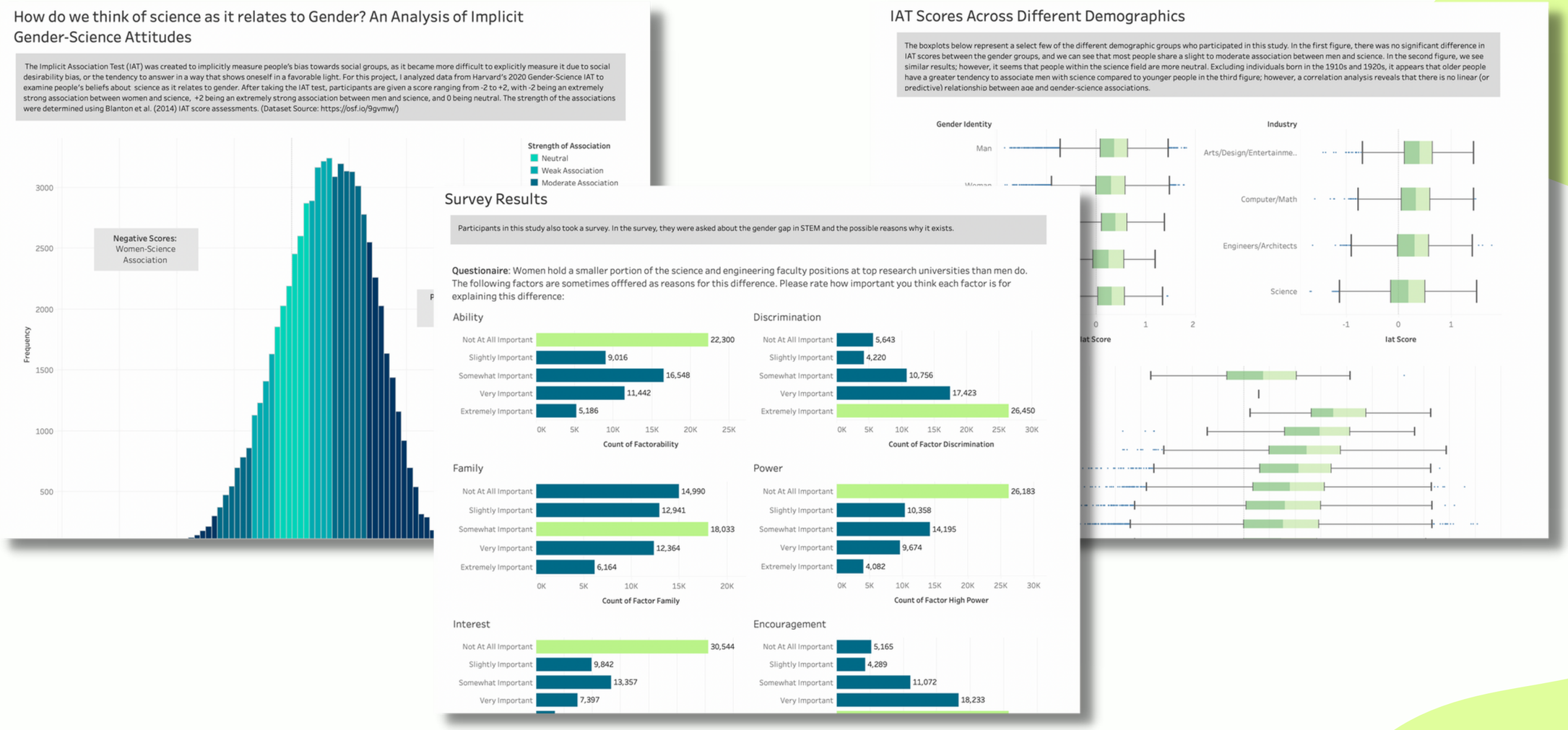
OKAY...NOW WHAT?

Possible Directions for Future Research



- For future research, we could possibly look at how discrimination, family, or encouragement affects gender disparities in STEM.

TABLEAU VISUALIZATIONS



https://public.tableau.com/views/IATAnalysis/HowdowethinkofscienceasitrelatestoGenderAnAnalysisofImplicitGender-ScienceAttitudes?:language=en-US&:display_count=n&:origin=viz_share_link

REFERENCES

- Blanton, Hart & Jaccard, James & Burrows, Christopher. (2014). Implications of the Implicit Association Test D-Transformation for Psychological Assessment. *Assessment*. 10.1177/1073191114551382.
- Greenwald, A. G., Banaji, M. R., & Nosek, B. A. (2015). Statistically small effects of the Implicit Association Test can have societally large effects. *Journal of personality and social psychology, 108*(4), 553–561. https://doi.org/10.1037/pspa0000016
- American Psychological Association. (n.d.) *APA Dictionary of Psychology*. Retrieved March 8, 2022, from https://dictionary.apa.org/implicit-attitude

LINKS

- Harvard Gender-Science IAT Test https://implicit.harvard.edu/implicit/Study?tid=-1
- Harvard Gender-Science IAT Dataset https://osf.io/9gvmw/
- GitHub Repository https://github.com/symphopkins/IAT-Project.git
- Tableau Visualizations
  - https://public.tableau.com/views/IATAnalysis/HowdowethinkofscienceasitrelatestoGenderAnAnalysisofImplicitGender-ScienceAttitudes?:language=en-US&:display_count=n&:origin=viz_share_link

THANK YOU FOR LISTENING!

If you have any questions or comments, please let me know.