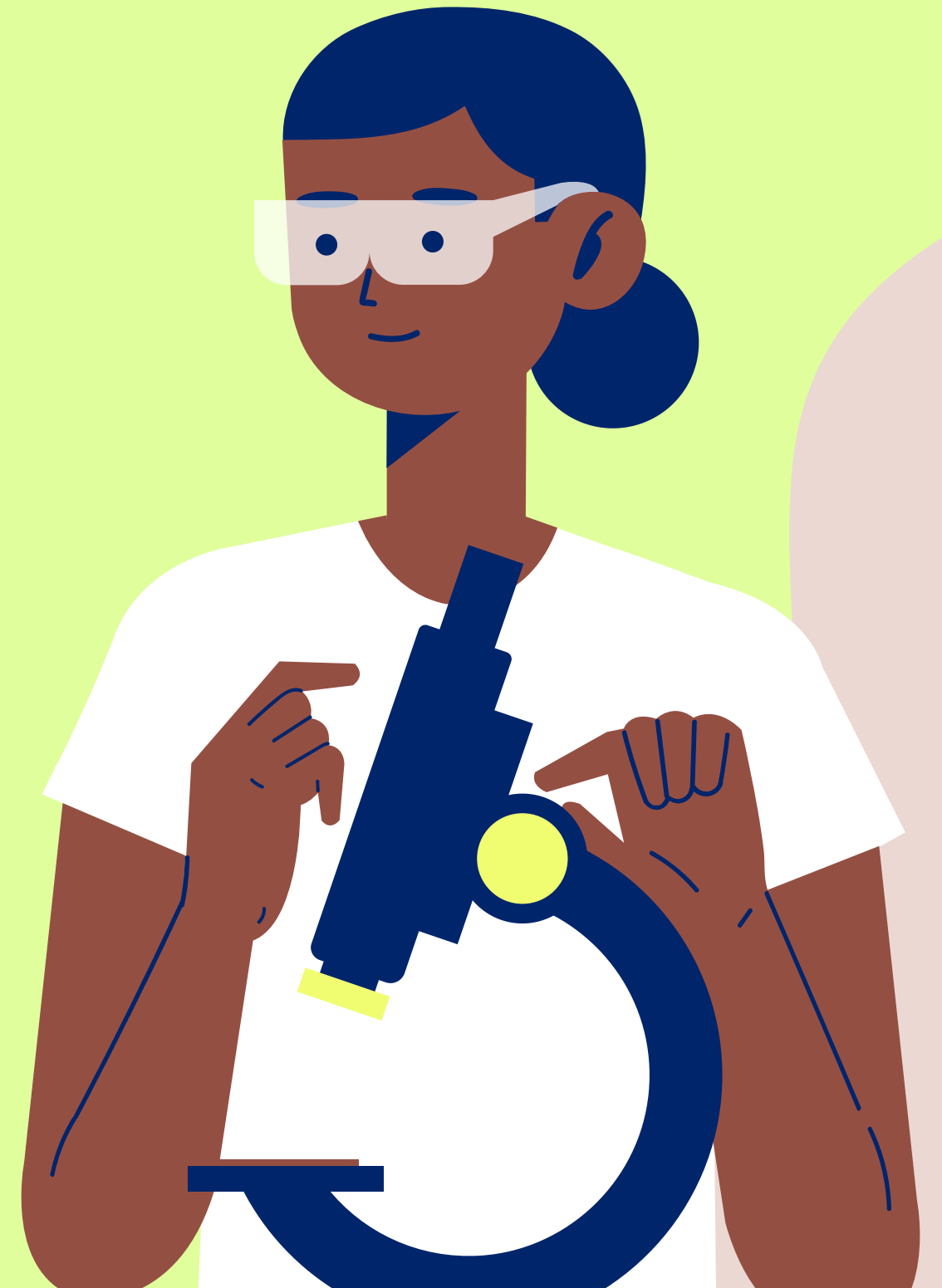


PSYCHOLOGY

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

SYMPHONY HOPKINS
LAUNCHCODE: CODERGIRL STL

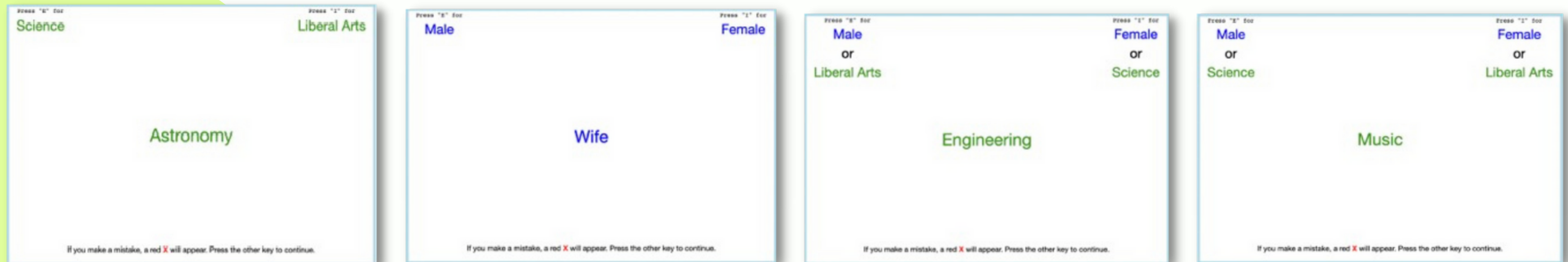


WHAT ARE IMPLICIT ATTITUDES?

"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	sius007
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_num
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

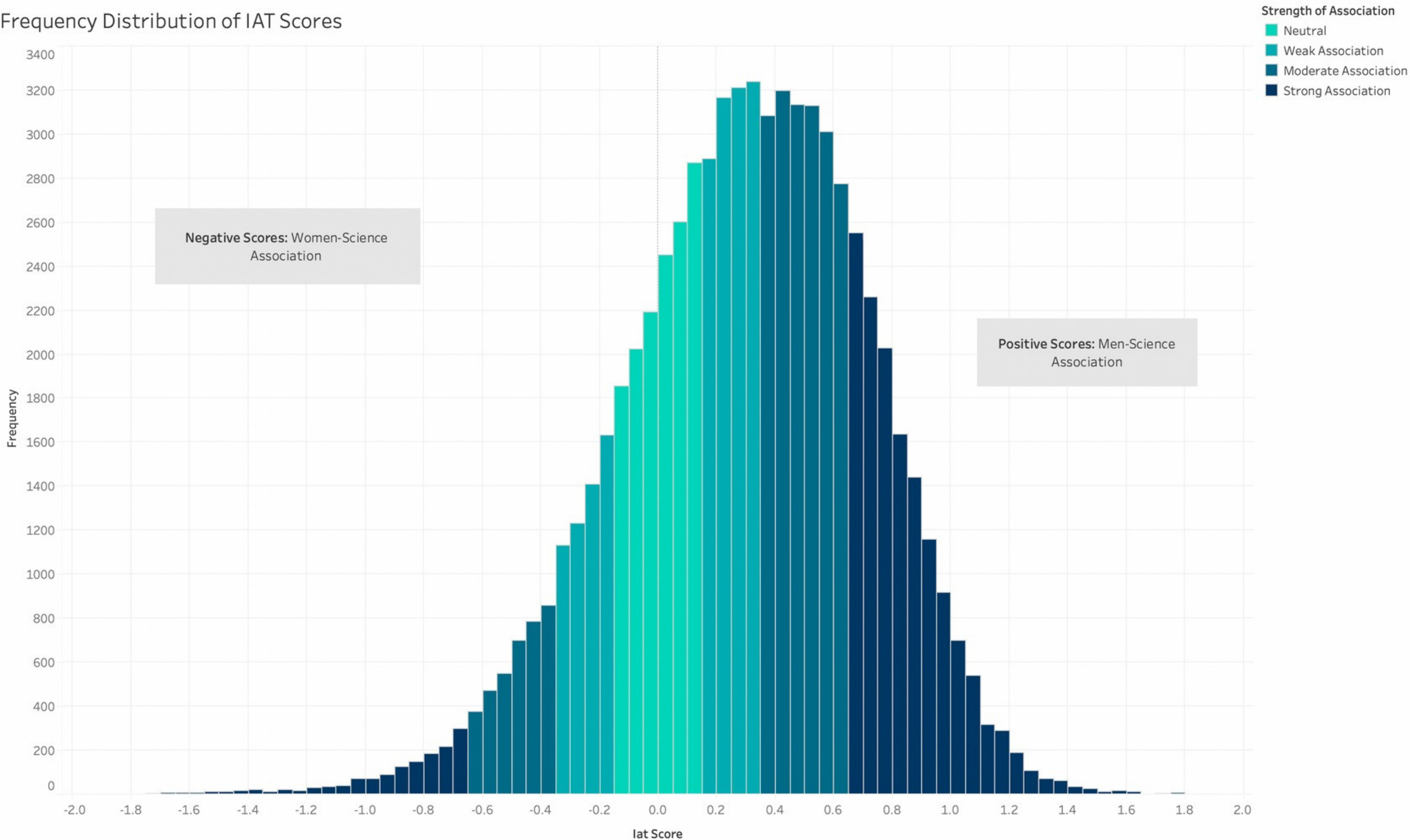
Translating Coded Data

- Used data dictionary to translate coded data

Renaming Columns

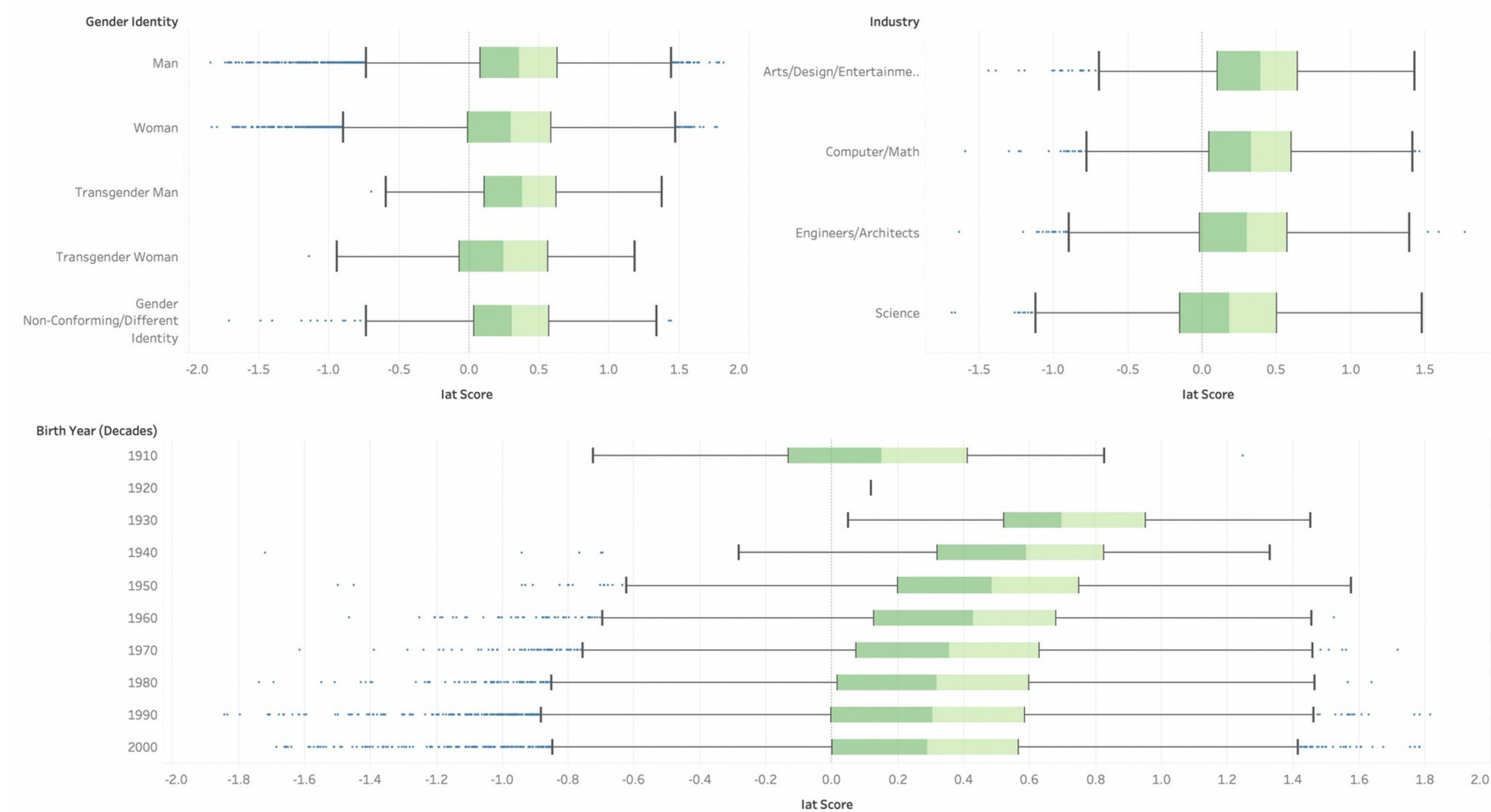
- Renamed columns to make them easier to understand

IAT SCORE FREQUENCY DISTRIBUTION

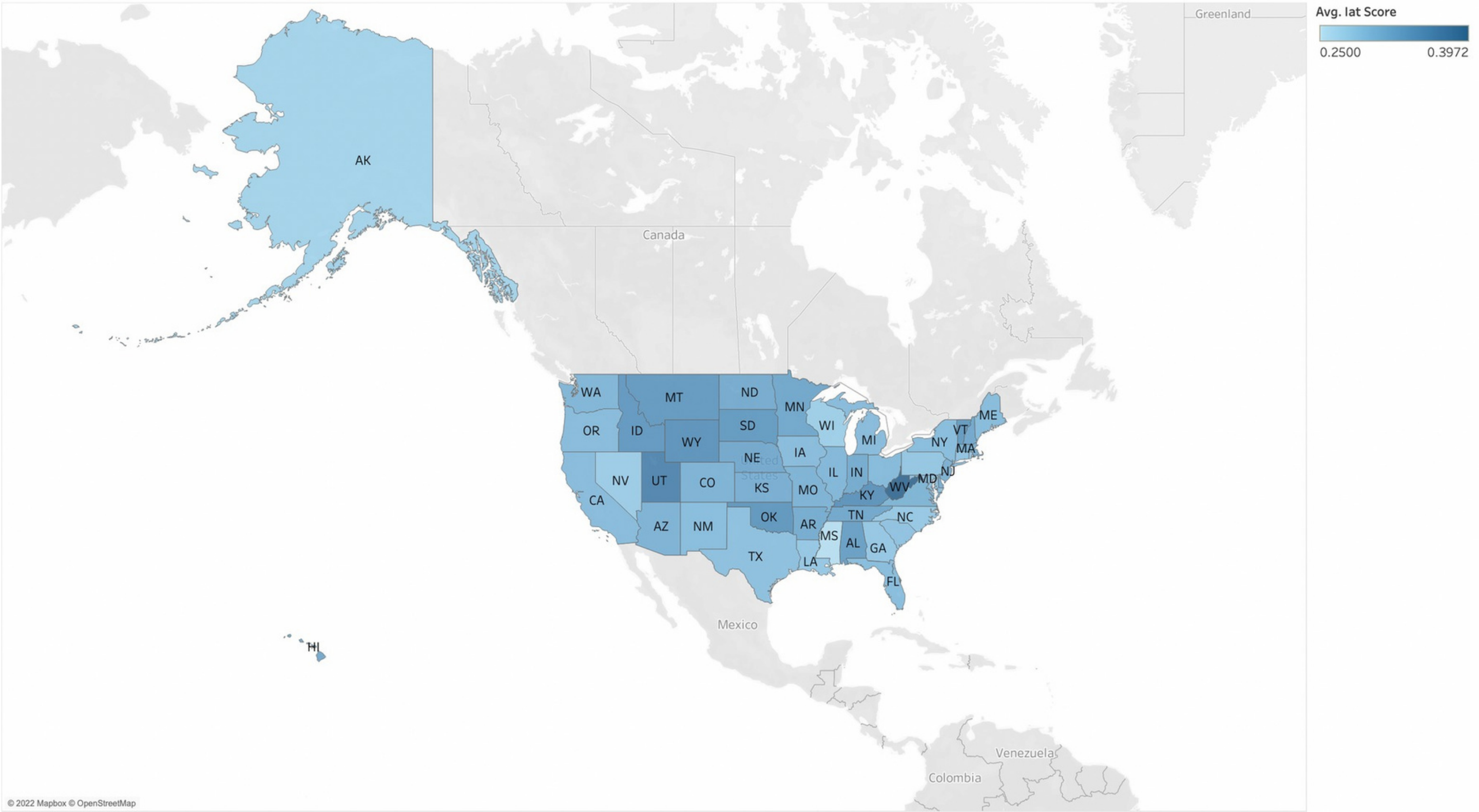


Strength of associations were determined using Blanton et al. (2014) IAT score assessments.

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 be 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**

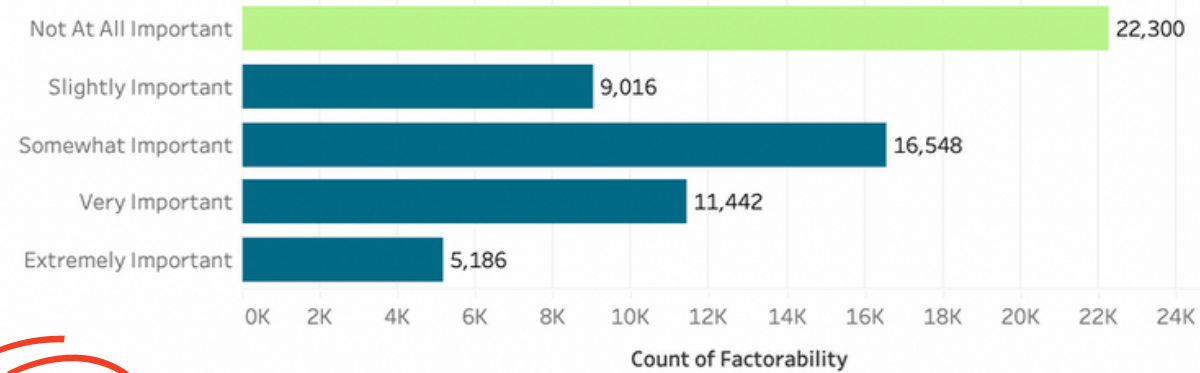
- There is a weak correlation between implicit attitudes and behavior, making IAT scores not great for predicting behavior (Greenwald, Nosek, & Banaji, 2014)

OKAY...NOW WHAT?

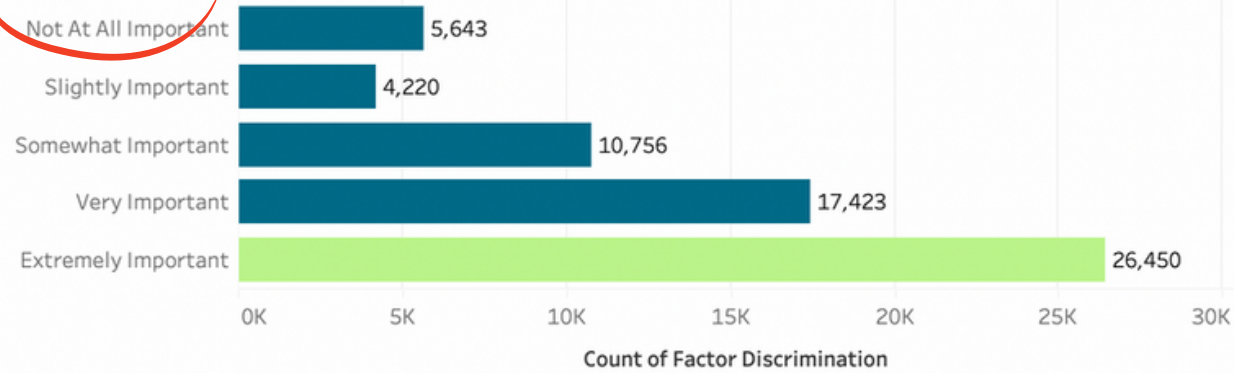
Possible Directions for Future Research

Questionnaire: Women hold a smaller portion of the science and engineering faculty positions at top research universities than men do. The following factors are sometimes offered as reasons for this difference. Please rate how important you think each factor is for explaining this difference:

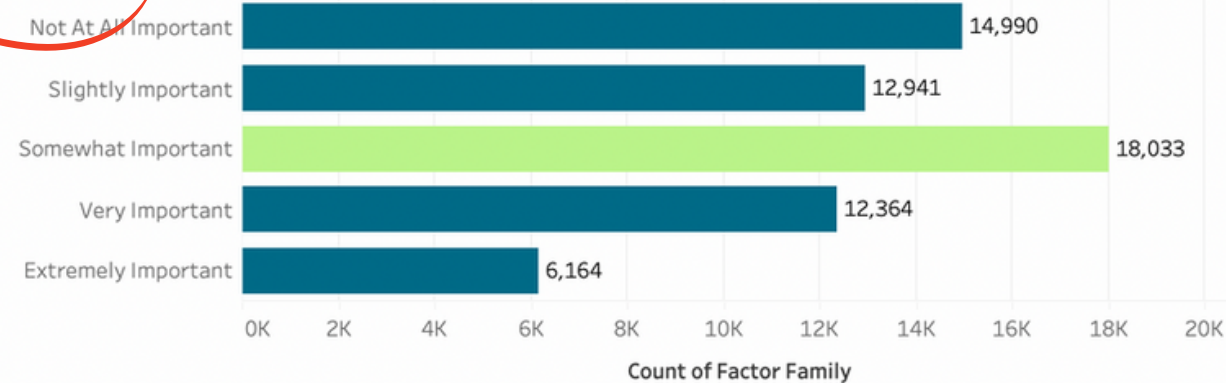
Ability



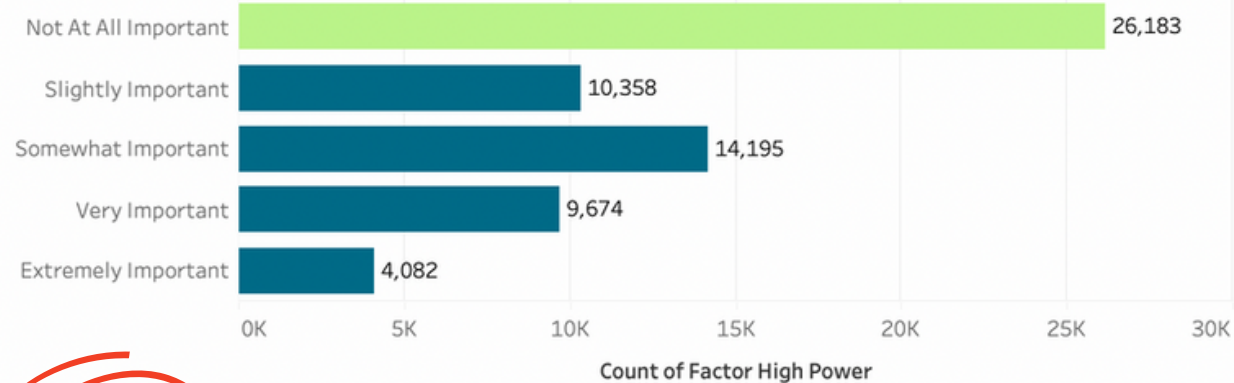
Discrimination



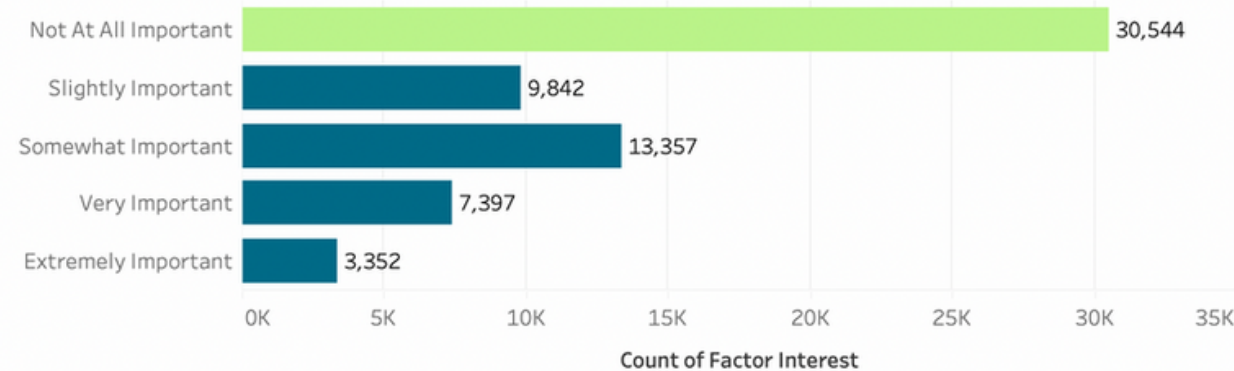
Family



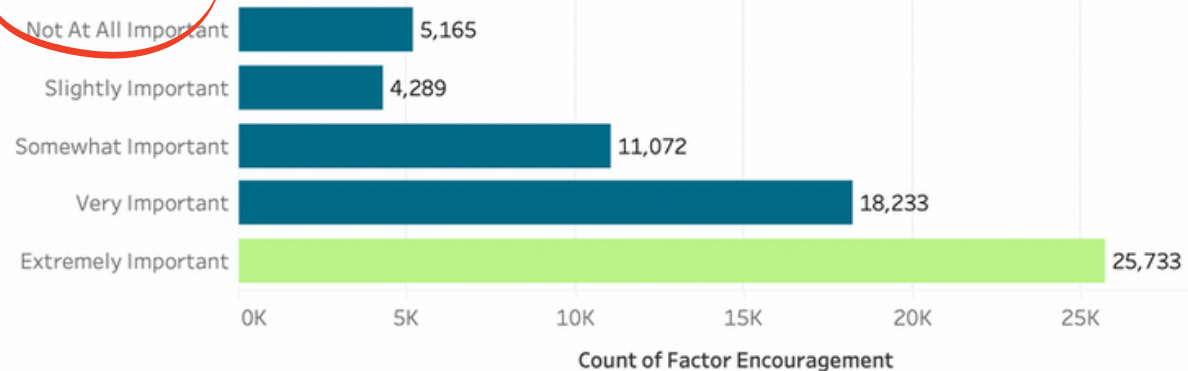
Power



Interest



Encouragement

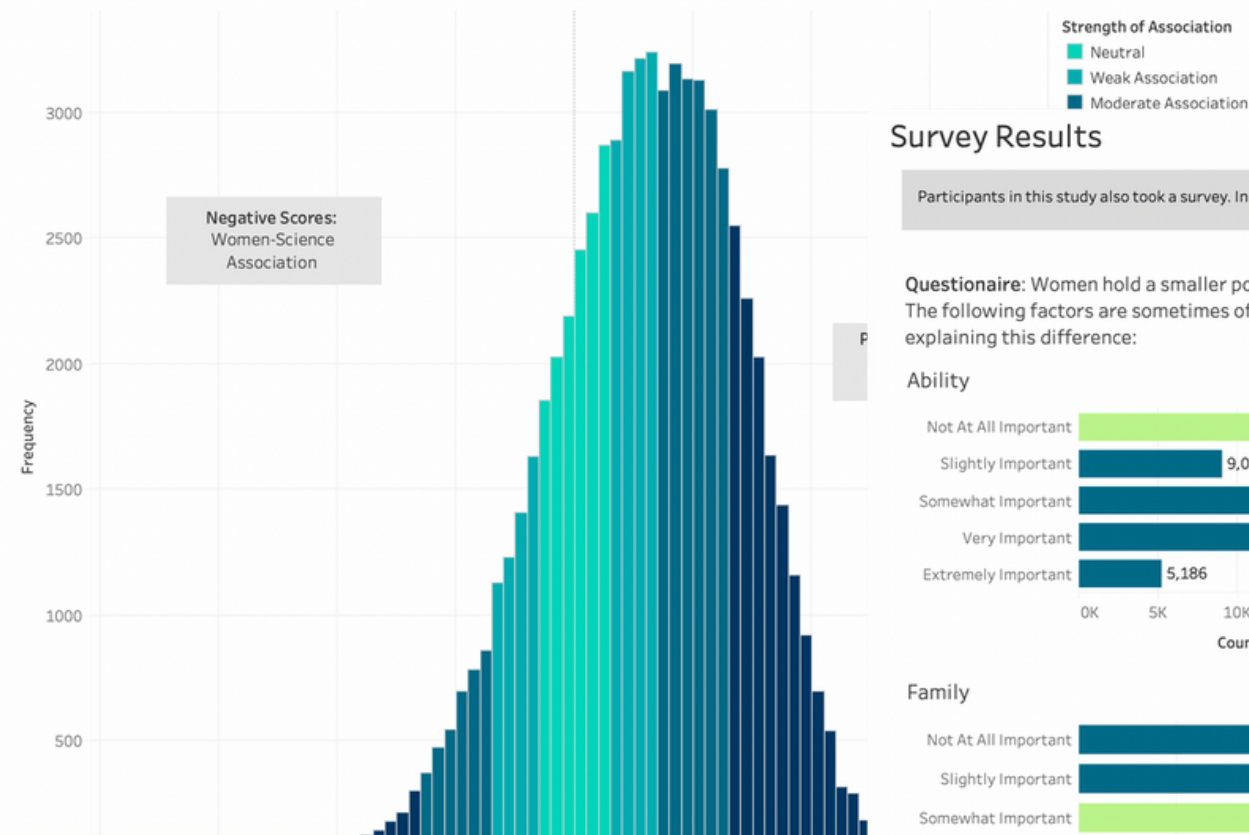


- For future research, we could possibly look at how discrimination, family, or encouragement affects gender disparities in STEM.

TABLEAU VISUALIZATIONS

How do we think of science as it relates to Gender? An Analysis of Implicit Gender-Science Attitudes

The Implicit Association Test (IAT) was created to implicitly measure people's bias towards social groups, as it became more difficult to explicitly measure it due to social desirability bias, or the tendency to answer in a way that shows oneself in a favorable light. For this project, I analyzed data from Harvard's 2020 Gender-Science IAT to examine people's beliefs about science as it relates to gender. After taking the IAT test, participants are given a score ranging from -2 to +2, with -2 being an extremely strong association between women and science, +2 being an extremely strong association between men and science, and 0 being neutral. The strength of the associations were determined using Blanton et al. (2014) IAT score assessments. (Dataset Source: <https://osf.io/9gvmw/>)

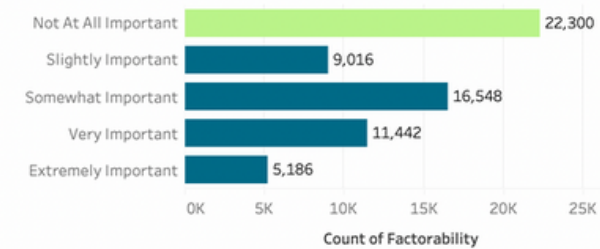


Survey Results

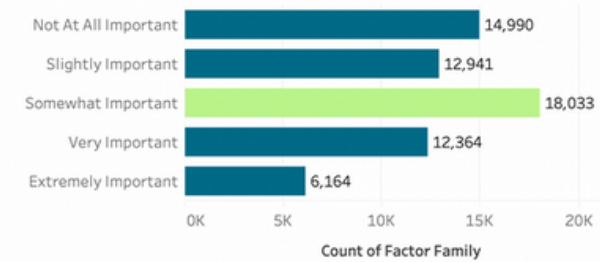
Participants in this study also took a survey. In the survey, they were asked about the gender gap in STEM and the possible reasons why it exists.

Questionnaire: Women hold a smaller portion of the science and engineering faculty positions at top research universities than men do. The following factors are sometimes offered as reasons for this difference. Please rate how important you think each factor is for explaining this difference:

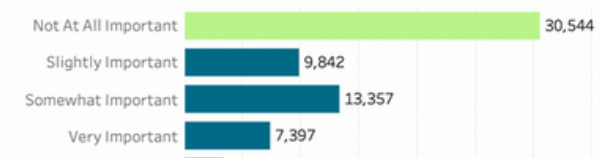
Ability



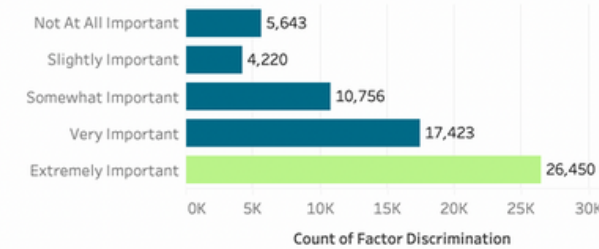
Family



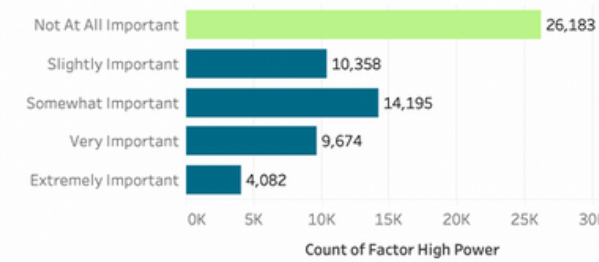
Interest



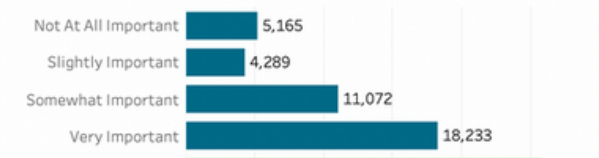
Discrimination



Power

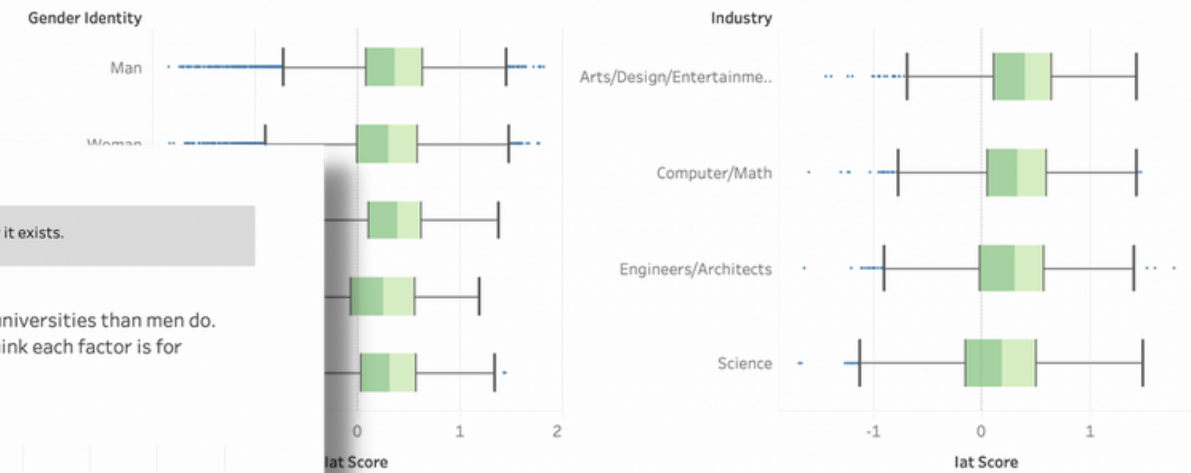


Encouragement



IAT Scores Across Different Demographics

The boxplots below represent a select few of the different demographic groups who participated in this study. In the first figure, there was no significant difference in IAT scores between the gender groups, and we can see that most people share a slight to moderate association between men and science. In the second figure, we see similar results; however, it seems that people within the science field are more neutral. Excluding individuals born in the 1910s and 1920s, it appears that older people have a greater tendency to associate men with science compared to younger people in the third figure; however, a correlation analysis reveals that there is no linear (or predictive) relationship between age and gender-science associations.



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/HowdowethinkofscienceasitrelatestoGenderAnAnalysisofImplicitGenderScienceAttitudes?: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.