

W.O.W. (Where are Our Women)?

An exploration of female faculty at Harvard and Beyond

Final Project Process Book

CS 171: Data Visualization

Team Powerpuff Girls: Yanni Cho, Rachel Kang, Haixing Xin

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I. Team Expectations Agreement

We expect all team members to contribute to all group projects evenly and to the best of their ability. Everyone should feel that they are responsible to hold up the team and complete their share of work. Each member should arrive promptly for scheduled meetings, and although they may be busy, they should make their best effort to make time for the projects. Everyone should try to be a good team player, exhibiting patience and an encouraging spirit while we work together.

All disagreements or problems that might impact the group should be brought in front of the rest of the team members. We hope that most potential conflicts can be avoided through group discussions. However, if there are any disagreements that cannot be resolved through discussion, we will hold a simple majority vote. All members of the team must be present when discussing or voting on issues that might be controversial or sensitive in nature.

In a circumstance where an individual in the group fails to meet expectations, our group has decided that the other group members will meet with that individual to discuss their role and ways they can better contribute the group's success. In the unfortunate circumstance where an individual repeatedly fails to fulfill our group's mission statement and expectations, despite repeated warning, further actions may include meeting with our group mentor or other CS171 course staff to better address the root of the problem.

II. Project Schedule

10/30-11/15 Project Proposal

11/16-11/12 Project Plan

11/13-11/19 Project prototype V1

- Data scraping and cleaning complete, using real data sets
- At least 1 d3 viz already partly implemented, drafts for 2-3 more viz
- First design of an innovative view
- Rough webpage design structure implemented
- Storytelling clear
- Interactions designed
- Updated process book

11/27-12/3 Project prototype V2

12/11-12/17 Final Project Due

III. Brainstorming Project Ideas:

The following ideas were proposed as potential project topics.

- depression on campus

Motivation: leaving home for the first time, learning to live independently, taking tough classes, As a college student, you might be meeting new people, and getting a lot less sleep. Small or large setbacks can seem like the end of the world, but these feelings usually pass with a little time. But if you have been feeling sad, hopeless, or irritable for at least 2 weeks, you might have depression. You're not alone. Depression is the most common health problem for college students.¹ You should know:
Goal: Help student be aware of:

 - What is depression?
 - What are the signs and symptoms
 - They are not ALONE! (data visualization such as 1 in 4 students use counseling each year)
 - Where can they get help

Data: We can try to find appropriate dataset together.
- Water
 - <http://worldwater.org/water-data/>
 - <https://catalog.data.gov/dataset/usgs-water-quality-data-for-the-nation-national-water-information-system-nwis>
 -
- Planned parenthood
 - https://www.plannedparenthood.org/uploads/filer_public/18/40/1840b04b-55d3-4c00-959d-11817023ffc8/20170526_annualreport_p02_singles.pdf
- WHO
 - <http://apps.who.int/gho/data/node.home>
- UNICEF
 - <https://data.unicef.org/>
- AHA
 - https://professional.heart.org/professional/ScienceNews/UCM_491264_Heart-Disease-and-Stroke-Statistics---2017-Update.jsp
- CDC
 - <https://www.cdc.gov/datastatistics/index.html>
- Sleep
 - <https://sleepfoundation.org/sleep-polls>
 - <https://sleepdata.org/datasets/shhs>
- Education
- Environment related - we can ask how often you drive etc
- Gender inequality
 - <https://data.oecd.org/earnwage/gender-wage-gap.htm>
 - http://www.oecd-ilibrary.org/employment/data/earnings/gross-earnings-decile-ratios_data-00302-en
 - https://www.dol.gov/wb/stats/stats_data.htm

IV. Final Project Idea: WOMEN IN THE WORKPLACE

Potential Resources:

- <https://oir.harvard.edu/fact-book>
- <http://harvard-open-data-project.github.io/catalog/index.html?category=faculty-staff>
- <http://hdr.undp.org/en/content/gender-inequality-index-gii>
- <https://www.bls.gov/cps/tables.htm#annual>
- <https://www.bls.gov/cps/cpsaat11.htm>

Potential Focuses/Ideas:

- Wage gap
- Harvard gender ratio in faculty
- **On** gender inequality existence

- Gender inequality on campus (harvard)
 - Vis: # female vs male professor in 49 concentration
<https://oir.harvard.edu/fact-book>
- Gender inequality among states
 - Vis: # female employment in different occupations
<https://www.bls.gov/cps/cpsaat11.htm>
 - Vis: wage change over time - display both female and male to show the gap
 - Vis: women participation rate (linked with wage vis to show women left due to low pay)
- Gender inequality worldwide
 - Vis: employment among countries
 - Vis: GII

IV- a. Project Proposal

Please talk to your project team about your final project. Decide on a project title and write a 1-2 paragraph abstract. The abstract should include your motivation for doing this project, what you are trying to do and which goal you want to achieve. Also include a description about your planned datasets and where you will acquire them.

You should also get started on your process book, which is essentially your project diary to keep track of your current ToDos, designs, ideas and questions. Please create a google doc and share the link with us in your project proposal.

https://docs.google.com/forms/d/e/1FAIpQLSdyFv20McLOB34LKcXBismE_bLctJlv-WqJiBEb4i3cOBm73A/viewform

*Project Abstract (The abstract should include your motivation for doing this project, what you are trying to do and which goal you want to achieve. Also include a description about your planned datasets and where you will acquire them.) **

We will look at data about women in the workplace. This is inspired by a recent article highlighting how there is a huge gender imbalance among Harvard professors across nearly all departments/concentrations. We will use the UN Human Development Reports to look at the Gender Inequality Index, the Bureau of Labor Statistics that looks at the number of people employed depending on occupation, race, etc, OECD data set that looks at the gender wage gap, as well as information about the gender ratio of professors across multiple universities. We want to highlight the existing statistics about women in the workplace that people may overlook. Our goal is to not only assess these statistics on a national level, but to see how Harvard faculty/staff compare.

*Process Book Link (Throughout the project, we will ask you to document your progress via a process book. Create a Google Document for your process book, and paste the link below. Put in a copy of your project title and abstract in the process book.) **

https://docs.google.com/a/college.harvard.edu/document/d/1O4JA_4Tly3m5wa6vvIA7Lxxx8vBbGnX27z5FPNPiXsE/edit?usp=sharing

IV-b. Elevator Pitch

What do you think the gender disparity is like in the workforce? You might know about the imbalance, but were you aware that there are more female than male faculty in only 6 departments in Harvard faculty?

Our project starts by examining the gender imbalance among Harvard faculty, and then expands to taking a closer look at this imbalance relative to relevant statistics on the national level. With our visualization, we will be able to understand:

1. Why we have this gender gap,
2. How female employment rates have changed over time, and
3. How anyone can help to improve the status quo.

IV-c. Project Plan

Names of all students who have actively worked on the project plan.

Yanni Cho, Rachel Kang, Haixing Yin

Definition of goals and tasks of the final project (1-2 pages)

Our goal of this project is to highlight data about female faculty at Harvard and contextualize it compared to other Ivy League Schools. We will gather data about the gender balance between male and female faculty across different schools as well as examine the historical timeline of female faculty (ex. First female president, first female tenured professor).

1) Interactive Introduction

This will be an interactive section where the user is asked what percentage of the Harvard faculty they think are female. There will be ten stick figures, which upon clicking will turn a different color. Once they hit submit, the correct statistic on the number of female faculty for every ten faculty will be displayed in the same stick figure format.

We already have data on this from the article by the Harvard Open Data Source. In order to implement this, we will need to research how to make such an interactive component.

2) Faculty Gender balance for each department

This will be an interactive pie chart where the user can choose from a list of the 49 concentrations at Harvard listed on the left hand side of the screen to explore the gender balance for each particular concentration. With the selection of a concentration from the panel, a pie chart on the right will update to display the corresponding statistics.

We already have this data also from the Harvard Open Data Source. We will need to how to create a pie chart and how to update it with the interactive element.

3) Harvard compared to other Ivy League Schools

This will be a comparison of Harvard's gender balance statistics to that of other Ivy League Schools. We will display the region of the U.S. map that is relevant to where all Ivy League Schools are located and create a visualization so that when the user clicks a dot (that represents a school), they can see a bar chart with the gender ratio update. The bar chart will always display Harvard's data so that it can be compared across all other schools.

We have found faculty demographics data for Yale and Princeton but have not yet done so for other schools. We will need to finish finding data for other schools and then compile them into one data set. Furthermore, we will need to figure out how to display part of a map and make it interactive with the changing bar charts.

4) Timeline of female faculty

This section will capture the historical timeline of female faculty across all schools. Although there will only be one timeline, users will be able to select which schools they want to have displayed. Each school will be assigned a different color and dots on the timeline will indicate major strides in female faculty for each of the schools such as the first tenured female professor and first female president.

We have found data about this for Harvard but have not yet done so for other schools.

A description of your data and where you will get the data from (at least concrete ideas on where to acquire the data)

After speaking with Alain, our project mentor, we have realized that there is a disparity between the data we have been able to find more easily vs. data we would like to find in order to make a more compelling argument and impactful story. Therefore, we are still working on the specifics depending on what type of data we are able to find. Ideally, we are looking to create a Harvard-based narrative that explores the gender imbalance at Harvard and how that compares to the gender imbalance in other ivy league universities as well as historically at Harvard in and of itself. Nevertheless, below is a listing of the types of data we have found vs. what we are still working to look for:

- **At Harvard:** Is there a gender imbalance among Harvard faculty?
 - To show the answer, we are using data from Harvard's Office of Institutional Research (https://oir.harvard.edu/fact-book/faculty_and_staff) as well as from data collected from the Harvard Open Data Project (spreadsheet attained from <https://medium.com/harvard-open-data-project/gender-disparity-in-harvard-faculty-b253ae949a56>)
- **In other academia:** Is there a gender imbalance among faculty at other Ivy League universities, and how does Harvard's gender imbalance among faculty compare? (This would be the best-case scenario - if not, find data to compare Harvard faculty to faculty in academia in general whether that be on a

national/international scale.) Ideally, we would find data that is most specific and relatable to compare to Harvard.

- We would look for this data by visiting the webpages of other ivy league universities as well as through the National Center for Education Statistics (<https://nces.ed.gov/>)
 - Yale: <https://faculty.yale.edu/faculty-demographics>
 - Princeton: <https://inclusive.princeton.edu/about/demographics>
- Also consider looking at gender imbalance in conjunction with other specific parameters as well to see if this imbalance is more/less present according to age, ethnicity, etc. (Use data from the Bureau of Labor Statistics)
- **Historically:** We will be looking at data concerning Harvard and all other Ivy League universities to see when Harvard had the first female president, dean, tenured professor, professor, and/or any faculty member (specific types of different faculty to be decided). We will be looking at the websites of all these universities as a resource, and if necessary, will consult Harvard's HOLLIS+ database to find something in Widener or any of Harvard's other libraries.

- **Some other factors:** These are more generic background/contextual datasets of the bigger picture and on a larger scale. In other words, these are some ideas that we had considered at the very beginning
 - Change over time: Show the change in female employment over time.
 - In general, we will try our best to be consistent across all datasets with a specific time frame we are looking at
 - Wage gap:
 - We have found a dataset from the AAUW that shows the wage gap in terms of a female:male ratio in each state of the US during the year of 2016 (https://www.aauw.org/aauw_check/pdf_download/show_pdf.php?file=The-Simple-Truth_p.8-9)
 - Exploring the reason why:
 - We are considering gathering personal quotes and stories about what female Harvard faculty find is the most difficult part about being a female faculty member at Harvard and/or perhaps what they themselves think might be the reason for this gender imbalance

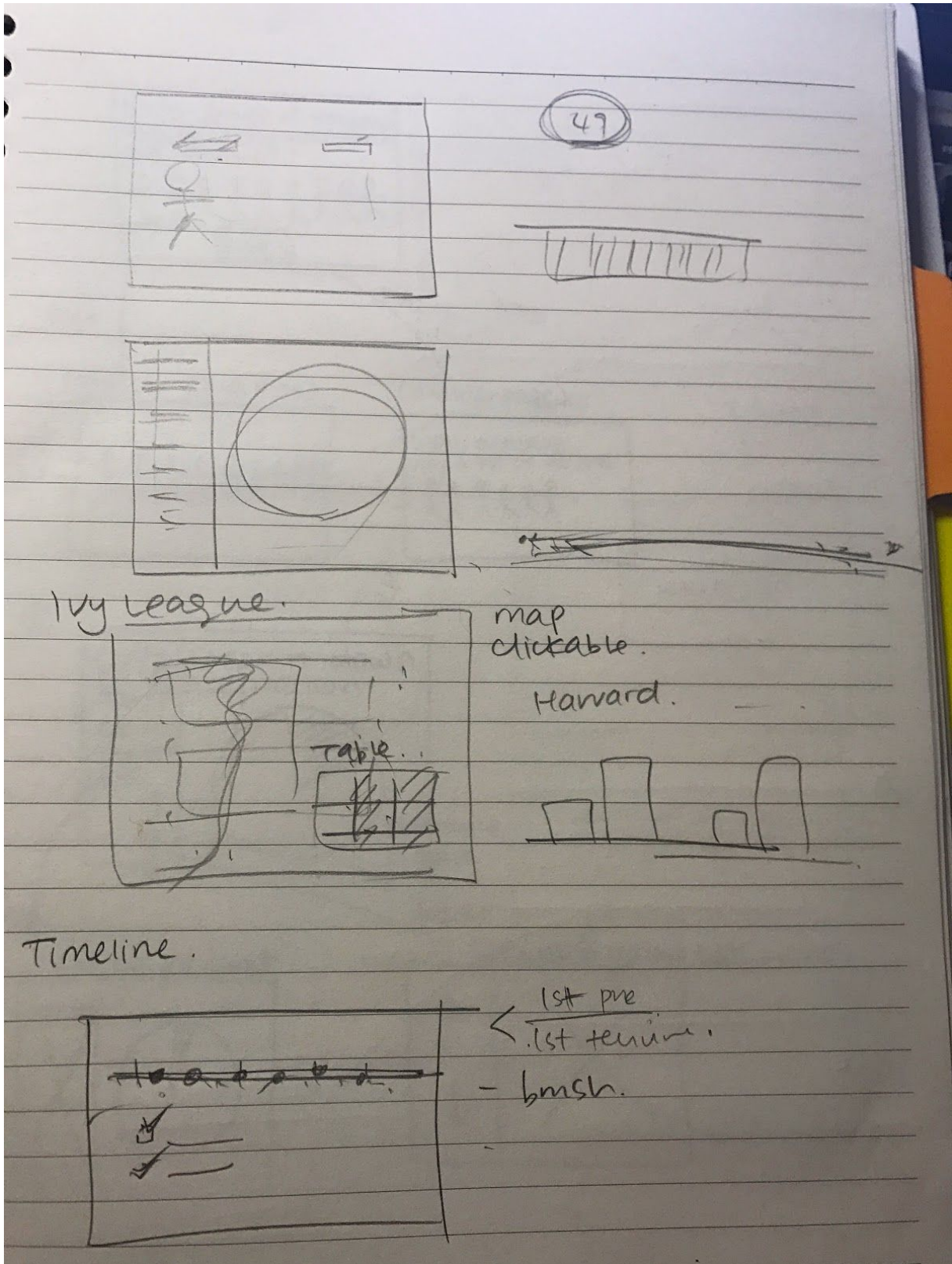
- Education: We will look at data from Organisation for Economic Co-operation and Development to see if differences in level of educational achievement are a factor contributing to the gender imbalance in the workplace and/or the wage gap
(<http://stats.oecd.org/index.aspx?queryid=54743#>),
(<http://www.oecd.org/gender/data/education/#d.en.387789>)
- Family/household activities: We will look at data from the Bureau of Labor Statistics to explore differences in how much time women vs. men spend engaging in household activities
(<https://www.bls.gov/TUS/CHARTS/HOUSEHOLD.HTM>) to help shed light on how a potential reason for the imbalance is that women spend so much more time tending to family and household tasks
- Women in high positions: Another potential thing we considered looking at is the female share of seats on board of the largest publicly listed companies, also as per the Organisation for Economic Co-operation and Development
(<http://stats.oecd.org/index.aspx?queryid=54743#>), as this may correspond with female employment in general

At least 3 sketches of visualization ideas for your project

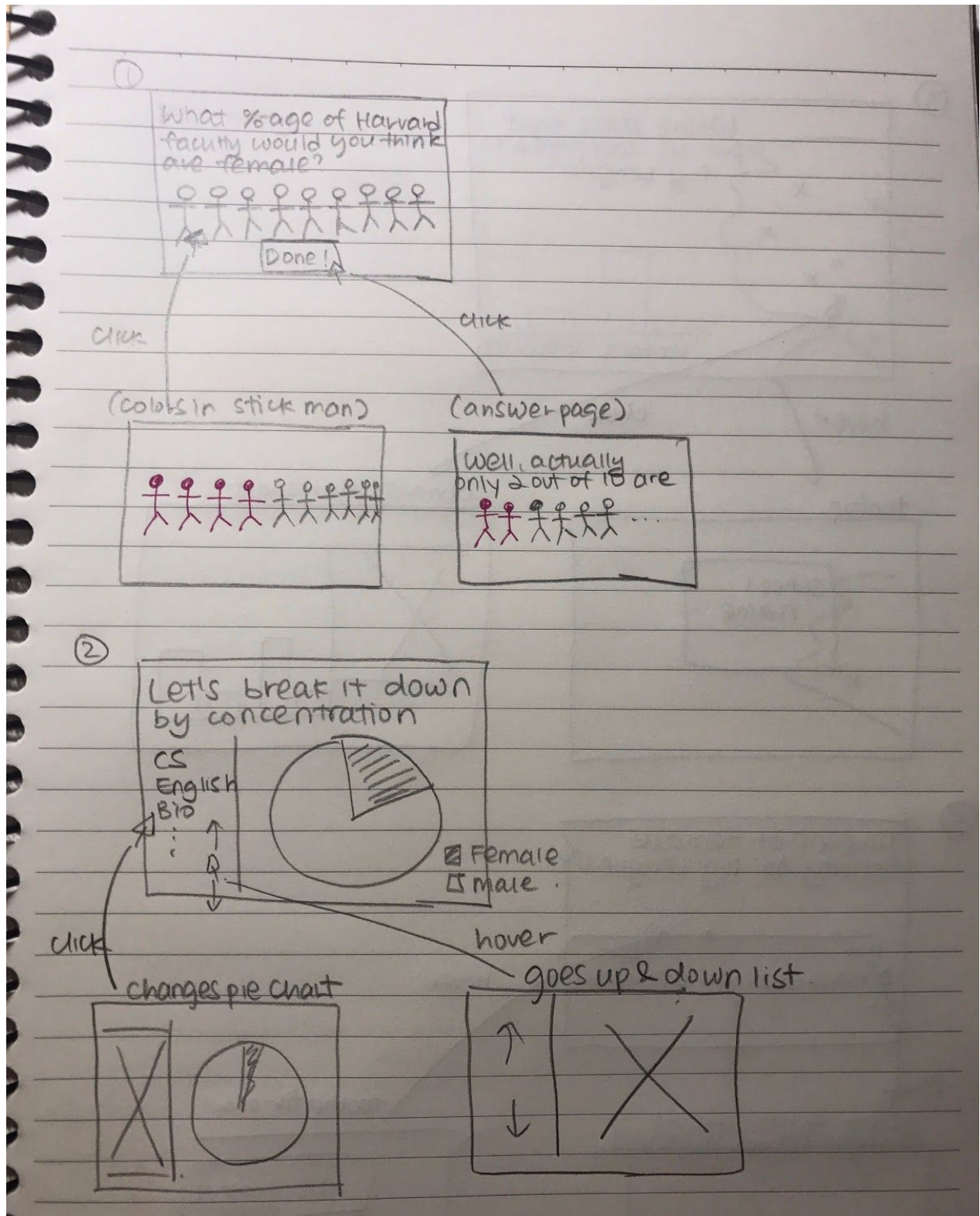
* more detailed visuals incorporated in interaction storyboard (following section)

- Sketch #1:
 - “How many of these Harvard professors do you think are female”
 - Shows 10 stick figures that user can click on and interact with
- Sketch #2:
 - On the left-hand side is a select menu with all the Harvard concentrations
On the right side is a pie chart that shows the gender breakdown in faculty for the selected concentration/department
- Sketch #3:
 - Map of the Northeast region of the US showing the locations of the Ivy League Universities Bar chart showing the gender breakdown in Harvard professors When other universities are selected, bars for selected university is added to bar chart in comparison with Harvard bars
- Sketch #4:
 - Timeline showing 1st female president, 1st female tenured professor, etc. of different universities

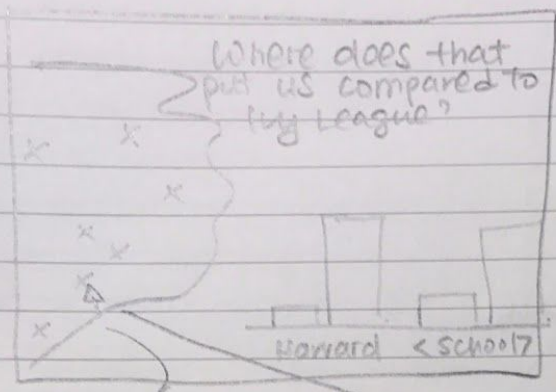
Sketches:



A sketch of an interaction storyboard



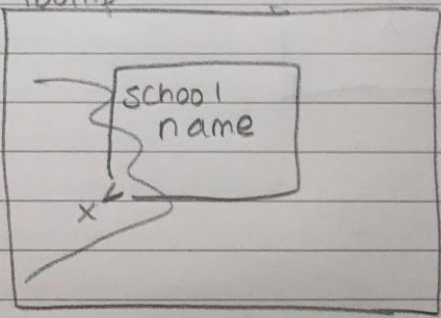
3



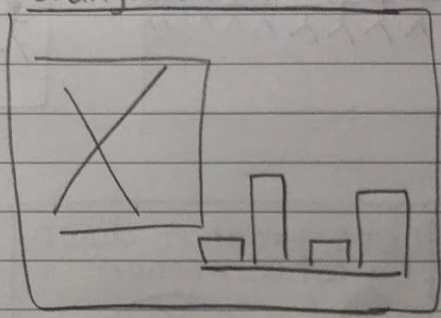
hover

click

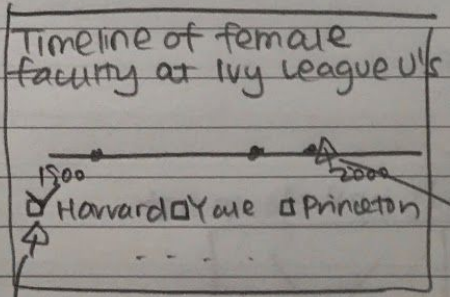
tooltip



changes bar chart



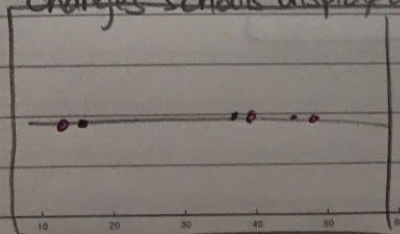
4



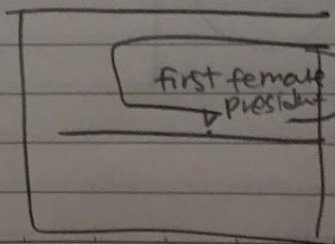
hover

click

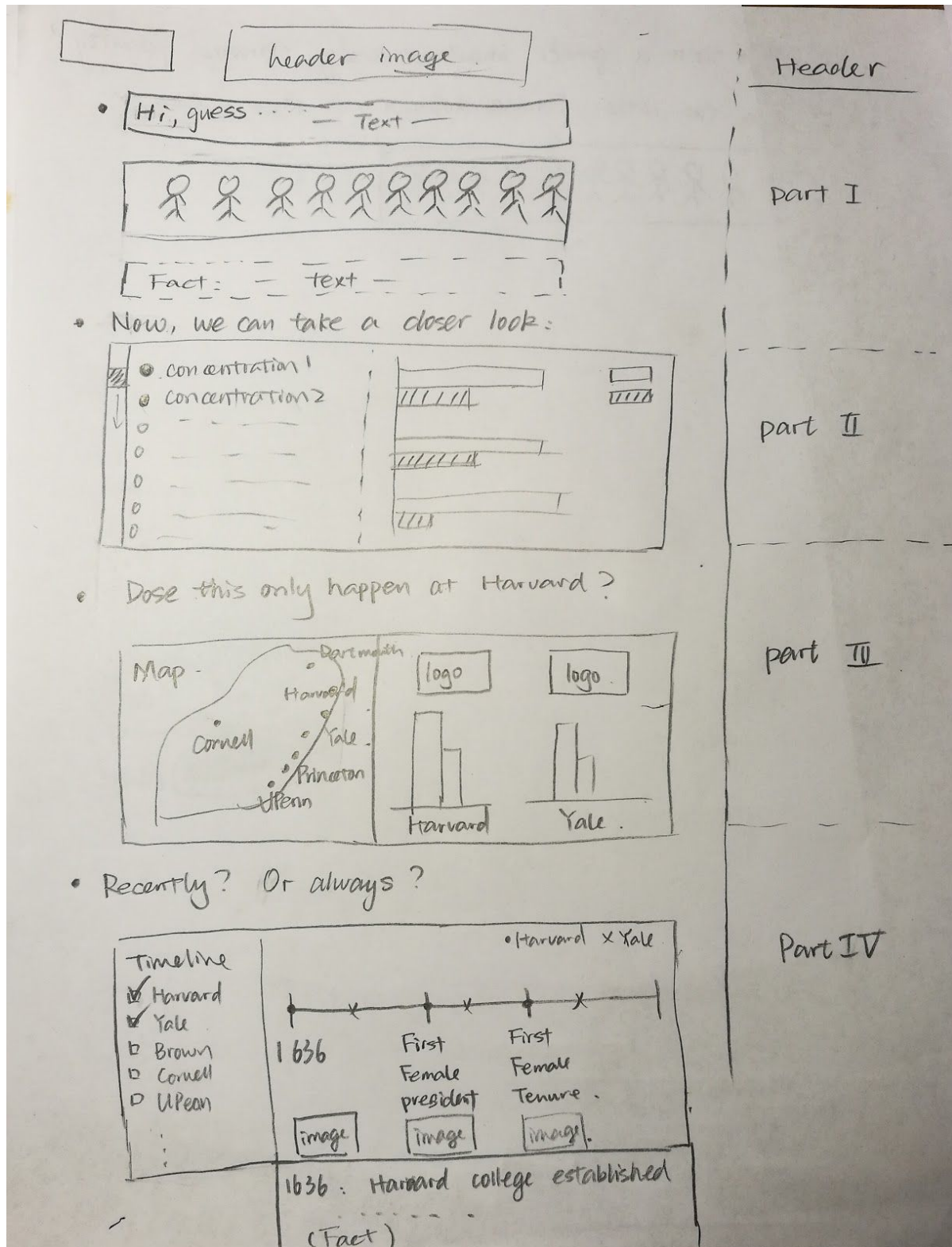
select filter options
changes schools displayed



tooltip for event



A sketch of your web page layout/storytelling



A project timeline (with milestones when you are planning to finish which feature)

11/06 Monday - finalize detailed plan (goal, task, sketch of visualization)

11/09 Thursday - prepare dataset: data scraping and cleaning **(3-4 days)**

11/12 Sunday - webpage design and structure (template with placeholder) **(3-4 days)**

11/15 Thursday - 1 visualization partly implemented **(3-4 days)**

(11/16 Project prototype V1)

11/16-11/22 - Meeting with Alain (this week)

/refine details

/Assign visualization for each team member

11/26 Sunday 2-3 visualization independently implemented

11/27 Monday Visualization integration (pull everything together and make it prettier)

(11/28 Project prototype V2)

(12/11-12/17 Final Project Due)

A feature list (with must-have, good-to-have, and optional items)

- Must-have:
 - Interaction: guess harvard female versus male professor
 - Bar chart + user selection: harvard female versus male professor among concentrations
 - Map: comparison between harvard and other ivy league universities
 - Timeline: timeline of historical events among all ivy league universities
- Good-to-have:
 - Viz: compare Harvard faculty to faculty in academia in general whether that be on a national/international scale.
 - Viz: female employment (maybe in college) change over time
- Optional:
 - Wage gap
 - Exploring the reason why (Education/Family/household activities/Women in high positions)
 - Survey/ quote

A description of team roles

Based on the the rank of model categories, we will be responsible for different part:

- Rachel: Target, Evaluation
- Yanni: Design
- Haixing: Data Wrangling, Implementation

Project Plan Submission:

https://drive.google.com/open?id=1f1LhbjhDYyIIVN8ssFgsjaFE_YHwLDX

V. Brainstorming/Planning: Preparing for Prototype V1

1) Harvard

- Interactive section
 - “How many of these Harvard professors do you think are female?”
- https://oir.harvard.edu/fact-book/faculty_and_staff
- spreadsheet

2) Over time, there has been a decrease in female employment

- Timeline (interactive?)

3) And even where they aren't underrepresented in a certain occupation, there is inequality in the wage gap - something that in fact is a general factor of inequality for women in the workforce everywhere

- Choropleth or some other type of map visualization of wage gap in each state in the US in 2016
- https://www.aauw.org/aauw_check/pdf_download/show_pdf.php?file=The-Simple-Truth p.8-9

Why?

4) Education? No!

- <http://stats.oecd.org/index.aspx?queryid=54743#>

Then what is it?! Well according to Sheryl Sandberg's “Lean In”...


5) Family! Maternity leave, etc

- <https://www.bls.gov/TUS/CHARTS/HOUSEHOLD.HTM>

6) Women in high positions / glass ceilings

- <http://stats.oecd.org/index.aspx?queryid=54743#>
- Female share of seats on boards of the largest publicly listed companies

Potential resources:

- <http://www.oecd.org/gender/data/employment/>
 - <http://stats.oecd.org/index.aspx?queryid=54743>
 - *Employment/population ratio, by sex and age group*
 - <http://stats.oecd.org/index.aspx?queryid=54743>
 - *Employment  : Unemployment rate, by sex and age group*
- <http://www.oecd.org/gender/data/education/#d.en.387789>
 - <http://stats.oecd.org/index.aspx?queryid=74130>

- *Education and earnings* 📍 : Differences in earnings between female and male workers, by educational attainment
- <https://www.bls.gov/spotlight/2011/women/>

2017/11/07

- Helpful links for implementation:
 - Timeline:
 - <https://codepen.io/ritz078/pen/LGRWjE>
 - Rating:
 - <https://codepen.io/jamesbarnett/pen/vlpkh>
 - Map:
 - Lab9

To-do:

- Before 11/09 Thursday:
 - Rachel: bar chart
 - Yanni: data + rating
 - Haixing: map + web page layout
- Before Monday:
 - Combine map and bar chart
 - Partially implement interactive introduction
 - Web page structure and design

More Potential Resources:

- Piechart: <https://bl.ocks.org/mbostock/3887235>
- Timeline: <https://github.com/alangrafu/timeknots>
- Maternity leave data: <https://academic-appointments.fas.harvard.edu/g-other-leaves-family-maternity-parental-medical-and-personal-leaves>
- Age and gender??

2017/11/09

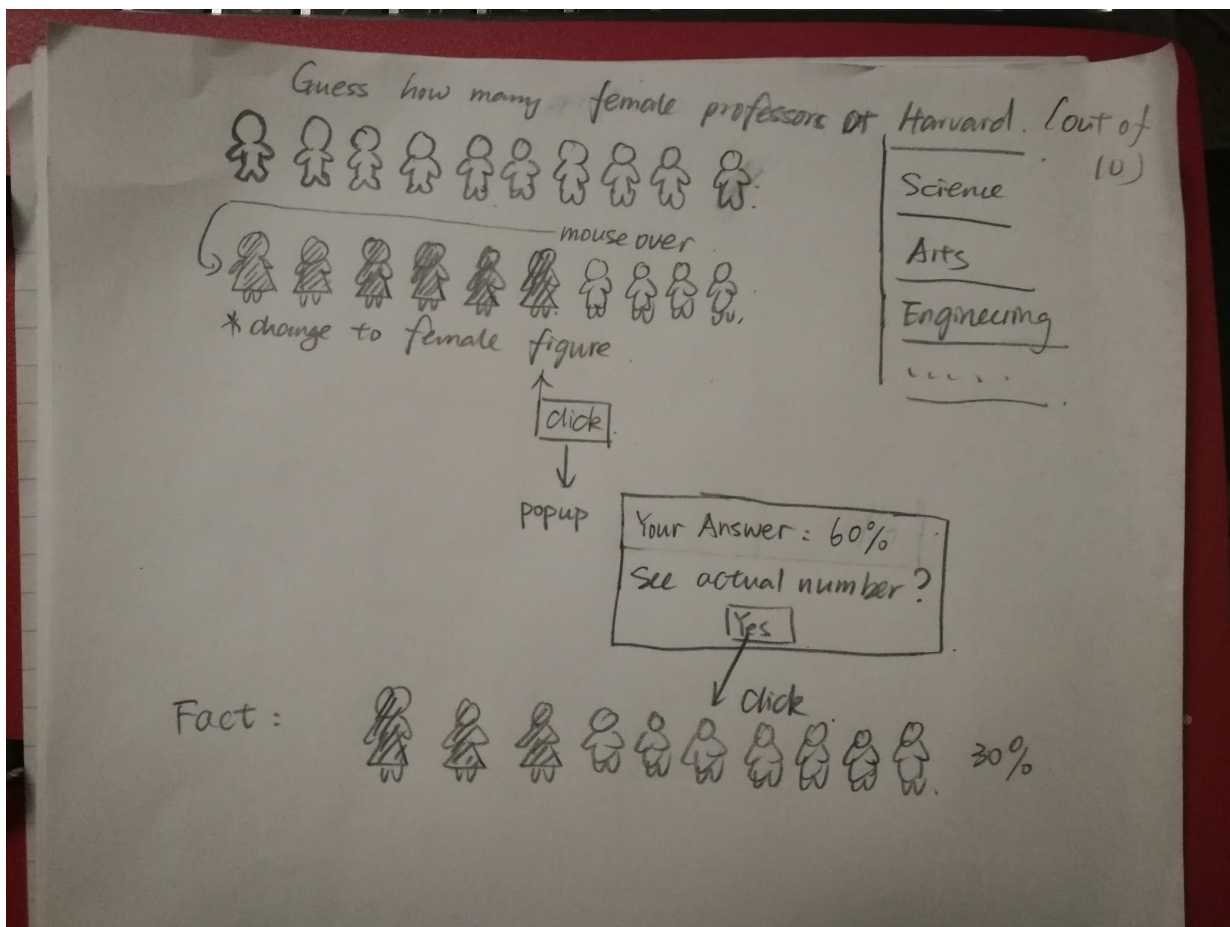
- Set map as static
- change map's popup to mouseover
- Adjust map size
- Add click event listener to marker (then Rachel you can change the function to your bar-chart function)

2017/11/12

- Prototype V1 submission
 - Yanni, Rachel, Haixing all worked on it!
- Dropdown (work)
- Map (work)
- Pie chart (need legend indicate gender)
- Bar chart (partially implemented, also might change to other vis)

2017/11/13

- Innovative design (google drive)
- Pie chart legend



VI. Brainstorming/Planning: Preparing for Prototype V2

Comments from V1:

Hello Team,

I see that you are making your way towards the initial implementation phase. Please see my below comments, and let me know if you have any questions!

- Pie chart: Alphabetize academia fields in dropdown, center numbers in their pie slices, and use percentages instead. You can remove the dashes from the legend; also add padding.
- You might want to get the logos of the other universities to overlay on the map. Out of curiosity, what is the map going to be used for?
- What is the first bar chart for?
- I noticed that you used different colors across the webpage. Colors are very effective when mapping to types of data, so please use judiciously. For example, if blue was used to encode males, then it's best to only use blue to encode males throughout the whole page.
- Please consider spending some time to write out your story, and to convey your narrative on the webpage. At the moment, I as a user see pieces of ideas but can't quite tie them together.
- I could not find a submission for your storyboard. It is vital to have a storyboard to help lay out your story.
- I could not find a first design of an innovative view.

2017/11/22

Discussion:

- Replace map and bar chart viz
- Work on timeline
- Think about more global / general data
- Think about storyline
- Sent out a survey for Harvard faculty/students
 - Ask if they think there is an imbalance
 - What they think the gender imbalance is (in terms of % of female faculty)
 - Ask why they think there is an imbalance
 - Ask what they think could be done to mitigate this imbalance
- Double-check Harvard data (faculty vs. professors)

- Time dimension - time-sensitive issue!
 - Timeline
 - Vertical
 - Across ivy universities
 - Include milestone events in history related to gender, and only if it adds value to our story
 - Universal suffrage
 - Woodstock
 - LGBTQ
- Wage gap? Between ivy universities
 - <http://faculty-salaries.startclass.com//5537/Harvard-University#Salary%20By%20Gender&s=2ZVgcf>
 - <http://colleges.startclass.com/>
 - <https://data.chronicle.com/166027/Harvard-University/faculty-salaries/>
- Other potential viz idea - radar chart?
 - Multiple dimensions
 - # faculty, # deans, # department heads...
- Compare concentrations/departments across ivies?
- Look for aggregate numbers/stats for higher education in general
 - 2016 stats is also ok
- Clarify this is specific to US

2017/11/23

- Replaced original bar graphs that was next to map to have a transition and show school shields

2017/11/25

- Made wage gap visualization
- Thought of sunburst visualization to replace original piechart

Data on Ivy League Schools Faculty Gender Make-up

	Male	Female	
Brown University	0.66	0.34	https://www.brown.edu/about/facts/faculty-and-employees
Columbia University	0.7	0.3	http://www.columbia.edu/cu/opir/abstract/opir_faculty_gender_1.htm
Cornell University	0.68	0.32	http://diversity.cornell.edu/sites/default/files/uploaded-files/Cornell%20University%202016%20Inclusion%20Report.pdf
Dartmouth College	0.682	0.318	https://www.dartmouth.edu/~oir/data-reporting/factbook/faculty.html
Harvard University			
University of Pennsylvania	0.673	0.327	https://diversity.upenn.edu/diversity-at-penn/facts-and-figures#faculty
Princeton University	0.76	0.24	(full professors only), https://inclusive.princeton.edu/about/demographics
Yale University	0.71	0.29	https://faculty.yale.edu/faculty-demographics

Resources for Timeline

https://faculty.harvard.edu/files/fdd/files/timeline-final_32.pdf

<https://visitorcenter.yale.edu/book/women-faculty-forum>

<https://president.yale.edu/about/past-presidents>

<https://princetoniana.princeton.edu/history/women>

<https://blogs.princeton.edu/mudd/2014/11/history-of-women-at-princeton-university/>

https://www.brown.edu/research/pembroke-center/sites/brown.edu.research.pembroke-center/files/uploads/87306_Timeline.pdf

http://c250.columbia.edu/c250_events/symposia/history_women_timeline.html#1900

<http://www.archives.upenn.edu/histy/features/women/chronotext.html>

<https://150.cornell.edu/timelines>

Quotes/Text from Online Resources:

http://www.nytimes.com/1993/01/24/us/rare-in-ivy-league-women-who-work-as-full-professors.html?page_wanted=all#h (1993)

- Eight other women are on the 51-member faculty of the school, but none are full professors. "I would like some company," Dr. Leboy said.
- 'Inequity continues after women are hired.' → wage gap
- "What it comes down to basically is a reluctance to believe that women are as good as men," said Mary W. Gray, professor of mathematics and statistics at American University in Washington who is also a lawyer. "Generally, it's much worse in universities than in the corporate world because academics are so arrogant we don't think anyone can tell us what to do."
- Judith Rodin, who, as provost of Yale, is the highest-ranking woman in the Ivy League, said universities needed to rethink their hiring policies to increase the number of female and minority faculty members. "We're trying very hard," she said. "That's not a defense, it's an explanation. And if we're serious about having our faculty reflect the graduate pool, and more closely reflect what we see at the undergraduate level, we need to rethink our tenuring policies."

https://www.huffingtonpost.com/2014/06/23/male-female-faculty-salaries_n_5521422.html (2014)

- Several of the most prestigious colleges and universities in the country pay male faculty on average about \$40,000 more than their female colleagues, according to a new analysis by data website [FindTheBest](#).
Four Ivy League institutions — the University of Pennsylvania, Columbia, Princeton and Harvard — were among the 10 schools with 50 or more faculty members that had the greatest wage gap between men and women.
- The University of Texas M.D. Anderson Cancer Center, which came in at No. 10 on gender wage disparity, also paid the highest average salary for female faculty — \$271,000.
- Another one of the 10 best paying schools for female faculty, the Massachusetts Institute of Technology, actually paid female professors over \$7,000 more on average than male professors.

https://nces.ed.gov/programs/digest/d16/tables/dt16_315.10.asp

- male/female # of faculty up to 2015

https://nces.ed.gov/programs/digest/d16/tables/dt16_316.20.asp

- Average salary of full-time instructional faculty on 9-month contracts in degree-granting postsecondary institutions, by academic rank, sex, and control and level of institution: Selected years, 1999-2000 through 2015-16
- 2015-16 all institutions faculty in the US
 - Male faculty: \$89,190
 - Female faculty: \$73,782

<http://www.catalyst.org/knowledge/women-academia>

- Women Are Less Likely Than Men to Achieve Tenure
 - While women held nearly half (48.9%) of all tenure-track positions in 2015, they held just 38.4% of tenured positions.
- Women were more likely to be found in lower-ranking academic positions.
 - While women represent over half (51.5%) of Assistant Professors and are near parity (44.9%) among Associate Professors, they accounted for less than a third (32.4%) of Professors in 2015.
 - Women held over half (57.0%) of all instructor positions, among the lowest ranking positions in academia.
 - 22.1% of women faculty are in non-tenure-track positions, compared to 16.8% of men faculty.

- Women of Color Are Underrepresented in Academia
 - Asian women held 4.9% of tenure-track positions and 3.0% of tenured positions.
 - Black women held 3.6% of tenure-track positions and 2.3% of tenured positions.
 - Latinas held 2.7% of tenure-track positions and 2.4% of tenured positions.
- Mothers in Academia Often Face a “Baby Penalty”
 - In the sciences, married women with children are 35% less likely than married men with children to attain tenure-track positions after completing their PhDs.
- Men Outearn Women at All Faculty Levels
 - At all categories of institutions, full professors who are women earned on average \$98,524 a year compared to \$104,493 for their male colleagues in 2016–2017. That’s 94.3% of what men earned.
- More Women Are Becoming College Presidents, but Progress Remains Slow
 - From 1986 to 2016 the number of women college and university presidents jumped from 10% to 30%, a 200% increase.

<http://onlinelibrary.wiley.com.ezp-prod1.hul.harvard.edu/doi/10.1111/soc4.12372/full> (2016)

- Although women are now the majority of degree recipients and their share of initial academic appointments approximates their representation among degree recipients, substantial gender inequality persists.
- institutionalized policies and subtle biases, rather than overt discrimination, perpetuate gender inequality.
- Women are the majority of enrollees at American colleges and universities and now exceed men in the receipt of Associate's, Bachelor's, Master's, and Doctoral degrees (National Center for Education Statistics [2013](#)). Moreover, women's share of initial academic appointments roughly approximates their representation among newly minted PhDs (Krefting [2003](#)).
- Women occupy only about one-third of all academic positions, are overrepresented among faculty members at community colleges and primarily undergraduate institutions (Bank [2011](#)), and, when on the tenure track, achieve promotion to full professor at a slower rate than their male counterparts (Krefting [2003](#); Misra et al. [2011](#)).
- Accordingly, women are underrepresented at top ranks and in administrative positions (Niemeier and González, [2004](#)). Yet women are also disproportionately overrepresented among part-time, temporary, and non-tenure-track faculty, positions that are more tenuous and far less well paid (Curtis [2011](#)).
- Finally, women faculty members are disproportionately impacted by family commitments during their academic careers, contributing to and exacerbating these inequalities in career progression, experiences, and rewards (Mason, Wolfinger, and Goulden [2013](#)).
- Initial academic appointments have been identified as one key juncture at which women may disproportionately “leak” out of the tenure-track academic pipeline. In the early career stage, women are more likely than their male counterparts to initially enter contingent (i.e., part-time or non-tenure-track) positions or exit academia altogether rather than securing tenure-track academic appointments (Mason, Wolfinger, and Goulden [2013](#); Wolfinger, Mason, and Goulden [2009](#)).
- considerable research points to the role of cultural gender schemas and institutionalized policies as explanations for this sex segregation. Mason, Wolfinger, and Goulden ([2013](#)) demonstrate that women seek and take contingent faculty positions in part because they do not see traditional, tenure-track academic careers as compatible with family life. This further compounds gender inequity in initial appointments because women are more likely than comparable men to have full-time employed and/or academic spouses (Jacobs and Winslow [2004a](#); Mason, Wolfinger, and

Goulden [2013](#)). Having a spouse with an established career makes the geographic mobility typically required for tenure-track appointments difficult, while securing two tenure-track appointments for a dual-career academic couple is rare enough to have been called “the holy grail of dual-career accommodations” (Wolf-Wendel, Twombly, and Rice [2003](#): 103).

- Women are disproportionately impacted by this not just because they are more likely to have full-time employed or academic spouses but, because of the way in which gender is embedded and institutionalized in relationships and families, also because women in general are less likely to have their careers prioritized in couples and are consequently less likely to dictate geographic moves (Pixley and Moen [2003](#)).
- Moreover, parenthood more negatively impacts women's likelihood of entering a tenured faculty position (Mason, Wolfinger, and Goulden [2013](#); Wolfinger, Mason, and Goulden [2009](#)). In fact, Wolfinger, Mason, and Goulden ([2009](#)) find what might be termed a fatherhood premium in early career appointments – men with children are more likely than their childless counterparts to be on the tenure track (rather than in adjunct positions); the opposite is true for women.
- Yet other gender inequities persist at this career stage. Women are more likely to secure tenure-track positions at community colleges and predominantly undergraduate institutions (PUIs), yet these are precisely the institutions that pay less and provide faculty with fewer resources to enhance their reputation within their disciplines (Bank [2011](#)).
- Not only do family obligations affect one's likelihood of securing a tenure-track appointment and achieving tenure, but these career achievements also shape family formation behaviors – and in gendered ways. Women in tenured and tenure-track positions are more likely than comparable men to be single or divorced, and only one-third of women who begin a tenure-track appointment without children will eventually become mothers (Mason, Wolfinger, and Goulden [2013](#)). Academic careers are less family-friendly than similar high-status careers, including law and medicine, for both men and women (Mason, Wolfinger, and Goulden [2013](#)).
- Although gaps have narrowed in recent decades, compared to men, women are less likely to earn tenure overall, less likely to be tenured at their original institution, and if they change institutions, are more likely to move to a less prestigious department in their field (Weisshaar [2015](#)).
- Moreover, while salary is a key reason for men's departure from STEM disciplines, women are less satisfied and more likely to leave their careers (and “leak” from the academic pipeline) due to inhospitable departmental climates (Kaminski and Geisler [2012](#)), suggesting that interactional biases become embedded in institutional cultures in ways that disproportionately disadvantage women. Even when women are successful in obtaining tenure, there is evidence that they are disadvantaged in other ways at this career stage.

VII. Brainstorming/Planning: Preparing for Final Submission

Comments from V2:

Here are my comments on your submission:

- There needs to be a title that represents your project on top of the page.
- If the user guesses correctly on the initial questionnaire, you do not need to display the additional row of people sprites. In addition, I would have the following layout: -- Guess people -- Thick line divider -- Correct people -- Supporting text (i.e. "Your is guess is...")
- Please make sure the correct and incorrect people sprites are exactly the same size.
- Your story is progressing from one section to the next, so please make sure that the user does not see anything in the subsequent views until they are done with their current one.
- In the doughnut chart, what do the colors mean? You may want to add text explaining what the colors mean. Also, what is the peripheral black? Another thing you may want to add are instructions around understanding the doughnut chart. Looking at the doughnut chart alone does not give an accurate insight into gender distribution. You will need to add a supporting meter of sorts to show the percentage distribution between males and females. Also, please increase the font size of the text in the middle of the chart (i.e. "... of the faculty are women").
- You mention "inequity continues" in your line chart. You will need to make the case for inequity in the first 2 visualizations before you can use it. That is, looking at the gender distribution alone is not sufficient to arrive at inequity. You may want to add supplementary material that can help the user arrive at that conclusion. For example, if in ballet 7 out of 10 dancers are female, would that be enough to say that there is inequality in the hiring of male ballet dancers? Food for thought. The wage gap though has much more a correlation with inequity than the previous 2 visualizations. Please add commas in the dollar figures that are 1000 or over.
- For the other ivy leagues visualization, make sure to accentuate what the wage gap refers to. For example, "The average wage gap for 2017 across all departments is \$13,005" (don't forget to add the comma).
- In the nation-wide text, it would help to have supporting statistics. For example, getting the stats for having the same number of women apply to be in academia as men would be super helpful. Then you have a really strong case for deliberate underrepresentation.

Please increase the font size here so that it is legible. "it is clear that there is a greater imbalance at Ivy League Universities than at the average US postsecondary institution" do you have supporting data for this? If so, please include it in your text or visualizations.

- The timeline is very informative. You will need to find a way to have it fit entirely into the page; either by keeping vertical with zooming capability, or by having it be horizontal (the text will then be diagonal).

- "Click to see what another student thinks!" should change text after the first click. For example, "Click again for another student's opinion!". In the next set of student comments there is one that is just "-"; you may want to remove that.

- If you are using an iframe for your survey, then I suggest you expand it enough such that the user does not have to scroll through it. Here are my overall suggestions:

- Please add any data that supports your hypothesis. There is a lot of good data but I feel that there is a lot of text guiding the user into arriving at a conclusion that requires more data.

- A touchup to the entire site is needed. I am sure you are working on the CSS; all in all, please make sure that everything is legible to the end user.

- Think about your project as a story, and each visualization as a paragraph. Make sure that each paragraph segues into the next seamlessly. Add text and data that support these transitions. Get the feedback of colleagues and family; see what their thoughts are.

- I am not sure if you will have time to implement more views, but as a group of 3 students we expect a wider breadth out of the final submission.

Prototype V2 In-Class Feedback

- Wage gap
 - Put commas in numbers
 - Do it as a percentage not just a number
- Timeline
 - Fit on one screen
 - Maybe make it horizontal
 - Make more schools show up at once

Feedback from Team 1:

CS 171 Project Presentations

(Give the completed form to the team you gave feedback on. They will have to scan it in and attach it to their final submission.)

Your Names: DAN TOMPKINS

Your E-mail: dtompkins@gsd.harvard.edu

Name of group you evaluated: POWER PUFF GIRLS

What is good about the group's visualization?

The interaction of the user is pretty great → asking them to complete a survey or guess really gets them involved with the website and engaging w/ the data

The storyline is very clear. You did a good job connecting a big problem to personal experience.

What could be improved?

The overall visuals could use a lot of development

→ more storytelling

- linking the different visualizations together to create a cohesive story

→ Readability

- stronger text, more organized (columns)

- emphasizing the disparity between male/female wages with clearer text or more prominent graphs

Timeline, compare two universities.

Is the message clear? What is the message?

The message is there + pretty clear, but could be much stronger with the suggested improvements

Feedback from Team 2:

CS 171 Project Presentations

(Give the completed form to the team you gave feedback on. They will have to scan it in and attach it to their final submission.)

Your Names: Michelle Ho, Cindy Zhao, Ziqi Guo

Your E-mail:

ChiaChi-ho@g.harvard.edu, zguo@g.harvard.edu, x-zhao@g.harvard.edu

Name of group you evaluated:

Power puff girls

What is good about the group's visualization?

We really liked the landing visualization.

We think the 2nd viz is the right choice, we like the color.

What could be improved?

Landing viz: animate the answer instead of button

Should landing page (make the 1st viz into a page)

2nd viz: ~~make~~ show text & labels on donut chart to make it more intuitive

map viz: make a button to show all x. female faculty/wagegap across different schools.

in general, make texts more readable

Is the message clear? What is the message?

Yes, the message is that the gender

12/9 Call with Alain

- Make everything hidden (displayNone) and make only next section appear and only once user interacts with current section
 - Especially with first interactive question
 - `d3.select(" ").style("display", "none"/"block");`
 - HTML5 onscroll
 - github.com/Prinzhorn/skrollr
- Reword everything in storyline to be suggestive and explorative rather than conclusive - careful with wording!
 - To further examine this, we took a look at peer Ivy league schools
 - Something looks a little off
- Sunburst
 - Fix colors (ok)
 - Name of concentration above pie charts (ok)
 - "2 out of 29 faculty are female" moved to the right above the pie charts, under concentration name, underlined (ok)
 - Remove underlines under "Full professor ratio", etc. (ok)
 - For no data / lack of data, include gray circle that indicates "no data" (ok)
 - Make text in center bigger (ok)
 - Text for instructions (ok)
- Make sure bar in wage gap graph goes all the way to the end (ok)
- Timeline
 - Make tooltip bar go all the way down to bottom
- Nation-wide phenomenon text
- CSS
 - `body { width: 100% }`

12/10 Email with Alain

Guessing game

- For when people guess at 30%, rephrase to "Correct! About 3 in 10 Harvard faculty.."

Sunburst

- It is difficult to query the legend against the parent categories. It would have been best to use labels.
- Use a different pointer instead of arrow when the user hovers over the diagram.
- In the pie chart, use something that is colorblind friendly (as opposed to red and green; you can try colorbrew.org).
- When a slice is hovered over, it should stay prominent; currently, it is fading back to its original state.
- The percentage in the middle of the diagram can be rounded. Decimal places are competing with the main figures.
- Instead of "NAN" use "Data not available"
- Hovering over the middle of the diagram is causing it to break?
- The instructions need to be aside, in a less prominent fashion. In other words, you should reserve the main text area for the story of faculty imbalance.

Line chart

- Add 50px top margin over 'FACULTY POSITION'.
- Scale the x-axis to about 80% of its width. This way, you can comfortably place the legend outside of the chart. If you do this, you can also ignore my last point and place the dropdown in the new available area.
- Make the on-demand overlay 100% opaque.

Ivy view

- Same with my above comment on instructions. Place them in an aside box. Reserve main space for the gender story.
- The pink borders are not really needed, since the elements are grouped by proximity. However, if you must, then change the border from 3px to 1px in thickness.
- Replace "Females (by faculty type) earn..." with "Female faculty earn as".

Nation-wide phenomenon

- You don't need to indent paragraphs.
- "Nevertheless, it appears that there is a greater imbalance at Ivy League Universities than at the average US postsecondary institution." Do you have the data for this? If not, best to remove.

Timeline

- Re: instructions need to be more subtle, to make way for the main story line.
- Make the Dartmouth check button disabled; also have Dartmouth be in light gray.
- Make the overlay text bigger so that it is more legible.
- The years are hard to read; you might want to use the color black instead of pink.
- Timeline fill color is too prominent; lightGray would be good.
- The individual circles should have the fill color as their stroke color. The white fill color only adds more work for the brain.

Concluding paragraph

- "Something seems to be a little off..." Based on the data, something is actually off. So you can confidently say "The data shows that something is off. So how do people..."
Because after all, while you do know the causes you actually do know per the stats that there is an imbalance.
- Move left-side arrows closer to each and right-side arrows closer to each other; otherwise, the right arrow on the left side and left arrow on the right side can come across as one group.

Please remove all "..." in your narratives.

Changes

- added title page
- Added navigation bar
- changed background color
- changed fonts
- changed colors for Sunburst to make more colorblind friendly
- added wage gap data for different faculty levels
- changed wording of storyline to better convey existent data
- Added scrolling view for the website
- Added labels for Sunburst
- Implemented carousel for responses
- Fixed the images for the ivy league map
- Used leaflet to change style of ivy league map
- Added interactive pie charts adjacent to the sunburst diagram to display the breakdown of faculty positions for each concentration
- Changed text on wage gap chart to display gap as percentage
- Added rectangle over the text in order that it is clearer
- Changed thickness of timeline
- Added checkboxes for timeline
- Added feature to show more information for timeline

- Added button to select all schools for timeline
- Added icons for the national data
- Added references and about sections
- Added transition to wage gap chart

Outline for final version:



W.O.W. Where are Our Women?

An exploration of female faculty at Harvard and beyond.

Take a look around your classroom.

You will most likely see an even distribution between male and female students.

But what about the professor lecturing in front?

Based on your experience, what percent of Harvard faculty would you guess are listed as female?

Hover over to highlight the number of faculty (out of 10) that you think are female.

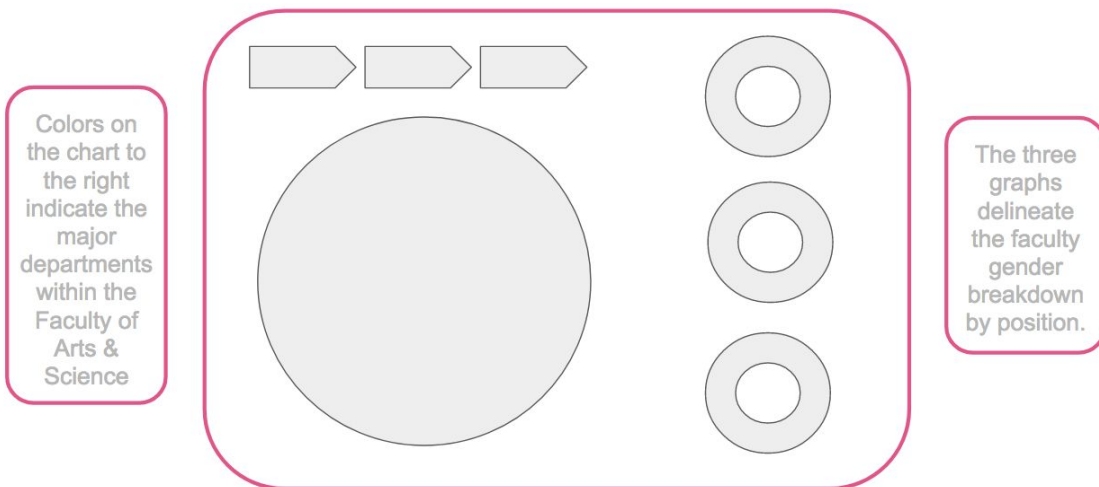


Your guess is 30%. Very close! The correct answer is **31.7%**.

There is a clear gender imbalance among Harvard faculty.

Let's break it down by concentration.

Hover over each concentration in the outer ring to determine the number of female faculty.



Colors on the chart to the right indicate the major departments within the Faculty of Arts & Science

The three graphs delineate the faculty gender breakdown by position.

And let's take a look at the wages as well...

Among other forms of inequality, it can be clearly quantified by the wage gap between gender.

Wage gap between male and female

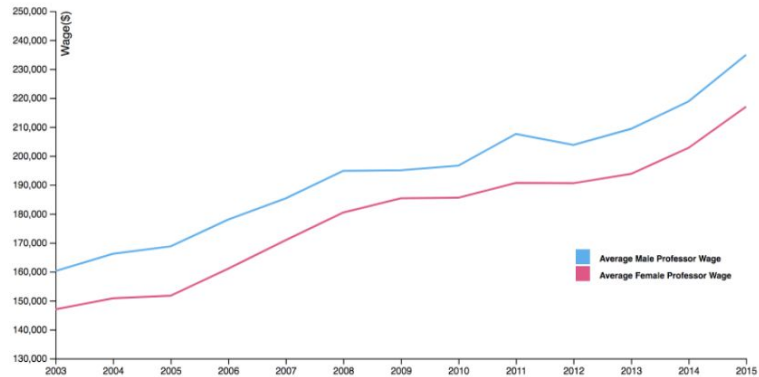
Full Professors

Associate Professors

Instructors

Lecturers

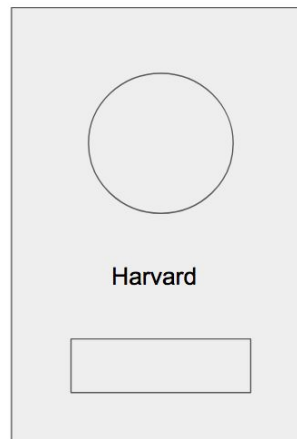
at Harvard



But this is not simply a problem at Harvard.

This is a consistent trend across peer schools.

Click on an Ivy-League University for information about their female faculty.



In fact, this is a nationwide phenomenon.

**Women are underrepresented
in academia**

Blablabla

Blablabla

Blablabla

Blablabla

blablabla

**Men outearn women at all
faculty levels**

Blablabla

Blablabla

Blablabla

Blablabla

blablabla

So how do people at Harvard feel about all this? And what now?

An overwhelming majority already understand that there is a gender imbalance among Harvard faculty. As it stands, this is 86.1% of those who responded to our survey.

Here are some of their thoughts:

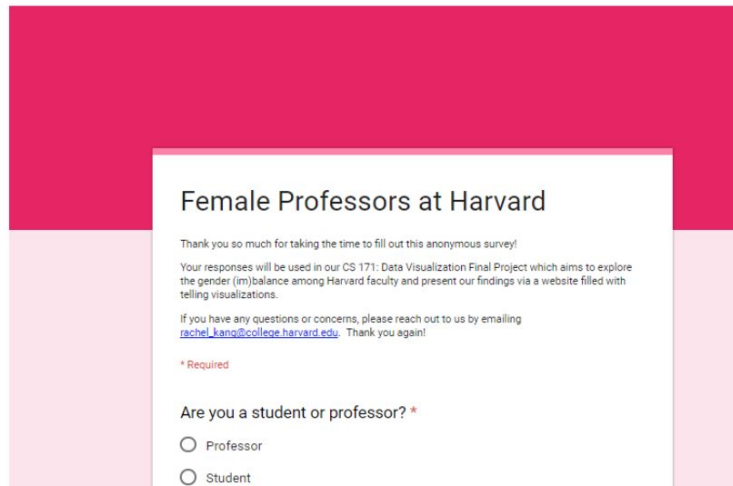
If you believe that there indeed is a gender imbalance, why do you believe this is the case? What can be attributed to this imbalance?

"I think there is a gender imbalance within the mathematics, natural sciences, and life sciences departments (basically anything having to do with STEM). It appears that female faculty are more prevalent in the humanities departments. Not sure why though, potentially because Harvard hires well-known, established professionals in their respective fields, and there happen to be more male candidates in STEM."

If you believe that there indeed is a gender imbalance, why do you believe this is the case? What can be attributed to this imbalance?

"I think there is a gender imbalance within the mathematics, natural sciences, and life sciences departments (basically anything having to do with STEM). It appears that female faculty are more prevalent in the humanities departments. Not sure why though, potentially because Harvard hires well-known, established professionals in their respective fields, and there happen to be more male candidates in STEM."

Now tell us how YOU feel!



The image shows a survey form titled "Female Professors at Harvard". The form is set against a white background with a pink border. The text on the form includes a thank you message, a description of the project's purpose (exploring gender balance among Harvard faculty), and contact information for Rachel Kang. A required question asks if the respondent is a student or professor, with radio button options for "Professor" and "Student".

Female Professors at Harvard

Thank you so much for taking the time to fill out this anonymous survey!

Your responses will be used in our CS 171: Data Visualization Final Project which aims to explore the gender (m)balance among Harvard faculty and present our findings via a website filled with telling visualizations.

If you have any questions or concerns, please reach out to us by emailing rachel.kang@college.harvard.edu. Thank you again!

* Required

Are you a student or professor? *

Professor

Student

About this Project

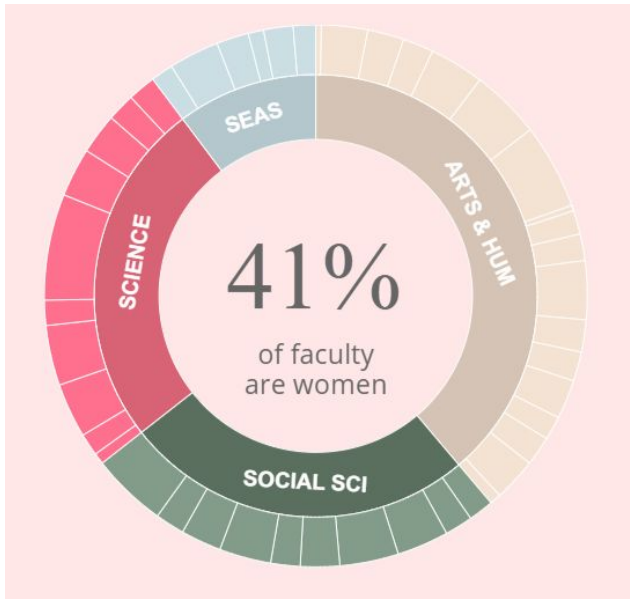
This project was completed by Yanni Cho, Rachel Kang, and Haixing Xin.

To learn more about how this project came to be, and to see where our data/information comes from, please take a look at our process book [here](#).

A few important notes:

- Our visualizations are based on publicly available data and information; any and all potential errors reflect those of these online resources.
- We would like to take special note to address that the gender-binary nature of this project is based merely on the data/information we were able to find in the time we had provided to work on this project. The lack of data concerning nonbinary gender identities is a serious issue that reflects the gravity of the problem. Due to the lack of data on this and due to our focus on women, however, this was not given the attention needed.

Please reach out to us if you have any questions or concerns, and thank you for visiting our site!



And let's also take a look at differences in wages.

Wage Gap Between Male and Female Professors at Harvard

Hover over the graph to see the difference in wages by gender. You can select the faculty position using the select box below.

FACULTY POSITION:
Full Professors

