

# Chiaroscuro

## Abstract

Our motivation for doing this project is a desire to analyze Beyonce's Renaissance album from multiple angles. We want to do both a literary and musical analysis, as well as examine how the release of this album impacted global listening trends on Spotify. We plan to gather three datasets accordingly: a narrative dataset that includes patterns in lyrics, characters, cultural references, and current events, a musical dataset that looks at samples from other songs, genres, and musical themes that permeate the album, and a dataset that takes from Spotify's top 200 chart to examine global listening trends surrounding the release of the album. We will acquire the narrative and musical datasets by listening to the album and recording data, and George has a script that mines data from Spotify's top 200 charts.

# Team Agreement

## Work

- Weekly meeting: 4pm Thursdays in the Smith Center
  - Do your best to be on time
  - If you can't make the weekly meeting, it's your responsibility to coordinate rescheduling it
- Meeting structure:
  - Update on what everyone has done individually, problems they've had, etc
  - Orient ourselves in the larger process & update timeline as needed
  - Set goals for the next week
- Try our best to split the work evenly & not overload any one person

## Logistics/ Communication

- Ask for help as needed and be willing to reciprocate
- Keep an eye on the group chat & respond in a timely manner
- Any disagreements, put the issue to a vote
- Be open to compromise!

## Code

- Operate using a git repository
- Comment ur code plz!!
- Provide good detail on git commits

## Signatures:

Hanna Pak

Ibta Chowdhury

George Miliaras

## Date:

10/20/22

# Detailed Plan

## Basic Info:

- Title: Chiaroscuro
- Team Name: Shift in Balance
- Hanna Pak (they/them)
  - [hannacarlie@gmail.com](mailto:hannacarlie@gmail.com)
- Ibta Chowdhury (they/them)
  - [ichowdhury@college.harvard.edu](mailto:ichowdhury@college.harvard.edu)
- George Miliaras (he/him)
  - [gmiliaras@college.harvard.edu](mailto:gmiliaras@college.harvard.edu)

## Background and Motivation:

We are all passionate about music in different ways and wanted to explore an album through various lenses. The album we chose was Beyoncé's Renaissance album, partially because there is a large amount of data we can take from it, but also because it's a groundbreaking album with incredible influence on the musical world. The three of us were interested in doing a music related project for different reasons, so each of us is taking on a type of data collection and analysis that corresponds with our interests. Hanna has a musical background, so they will be focusing on an analysis of the musical aspects of the album. Ibta was interested in exploring the narrative of an album, so they will be looking at the lyrics and narrative shape (a-la the Hamilton project). George had already built a bot that scrapes the Spotify top 200 chart and was also interested in taking on a music-related project, so he will be working on the statistical data surrounding the album.

## Related Work:

- [Hamilton Data Project](#)
- [Various Projects](#)

## Data:

- Musical Data
  - BPM
  - Key
  - Samples of other songs (and data on those songs such as time period, genre, etc)
  - Transitions between songs
  - Genre of music
  - Percentage of spoken lyrics vs sung lyrics
- Lyric Analysis Data
  - Following narratives and progression
  - Following characters
- Charting Data
  - Spotify top 200 ranking for Renaissance and respective songs

- Progressions of rankings on release week and following weeks

**Data Cleanup:**

Most of the data cleanup will be done on the scraped Spotify Charts data. We will perform data cleanup by fixing structural errors in the data (ex. String encodings), handle missing values, and perform data validation on the results of the scraping tool

## Week 9 Meeting: Oct 27

- **Updates**

- George:
  - Pilot version worked on subset of countries
  - Extend to full countries
- Ibta:
  - Collection of lyrical data
  - Analyses are mostly done per lyrical chunk-ish thing
  - Potentially emotional nuance to words? → related to tone
- Hanna:
  - mostly done w collecting musical data just need to get genres
  - confirm keys of some songs (ask friends p perfect pitch to confirm?)

- **Team Discussion (to turn in)**

- Who is your audience? Come up with at least three options and pick one target audience.
  - People who listen to music casually but haven't done a "deep dive" of any one album
  - People who like the album but want to know more about it- THIS ONE!**
  - College students who like Beyonce and enjoy the more nerdy aspects of music
- Describe your target audience in more detail. What do they know? What are their interests? What visualization literacy do they have? At what level of detail will you present information to them?
  - Assume they know & enjoy Beyonce's music and have listened to Renaissance before
  - Assume they have a very basic musical background (knows what a key signature is, knows what bpm is, etc)
  - Assume they want to get into the nitty gritty of the album and not just have an overview of data
  - Assume "mainstream" level of visualization literacy, same level as people who read visualizations in news articles (NYT, etc etc)
  - Detail levels:
    - Present abstracted view of three data categories as well as a more detailed version
    - Abstracted will mostly pictures, detailed will include more numbers
- What questions about your data will be interesting for your audience? Come up with a list of interesting questions that your audience may have about your data. The more, the better, but your team should come up with at least ten questions.
  - Overarching:
    - How do all three parts of our data come together to create feeling and meaning within the album?

- What is the impact of and inspiration behind this album? (perception of album to broader audience, or current audience)

Narrative:

- What are alternative views on this album?
- How does this literary piece fit together throughout the progression of the album?
- How does emotional nuance play into the tone of speech, or musical track?

Musical:

- How has music of the past shaped or influenced Renaissance?
- What are consistent musical characteristic themes within the album?
- How does musical data progress as the story of the album unfolds? Is there a pattern at all?

Spotify:

- How did the album rank on global and country charts ?
- How did individual songs rank on global and country charts?
- How did the album hold up in charts in the months following the release?
- How did the release of the album affect global listening trends?

- What data do you have? Download the data you picked from the website linked in the PDF that describes the data (available on Canvas, week 2). Take a look at it in Excel or Google spreadsheet and give a brief description of each attribute and its data type (categorical, ordinal, or quantitative) in your process book. It's OK if you are not sure about the data type for some attributes - you can simply describe them (e.g., geographic location).

Narrative:

- lyrical → categorical
  - narrative analysis (descriptions of lyrics) → categorical
- tone → categorical

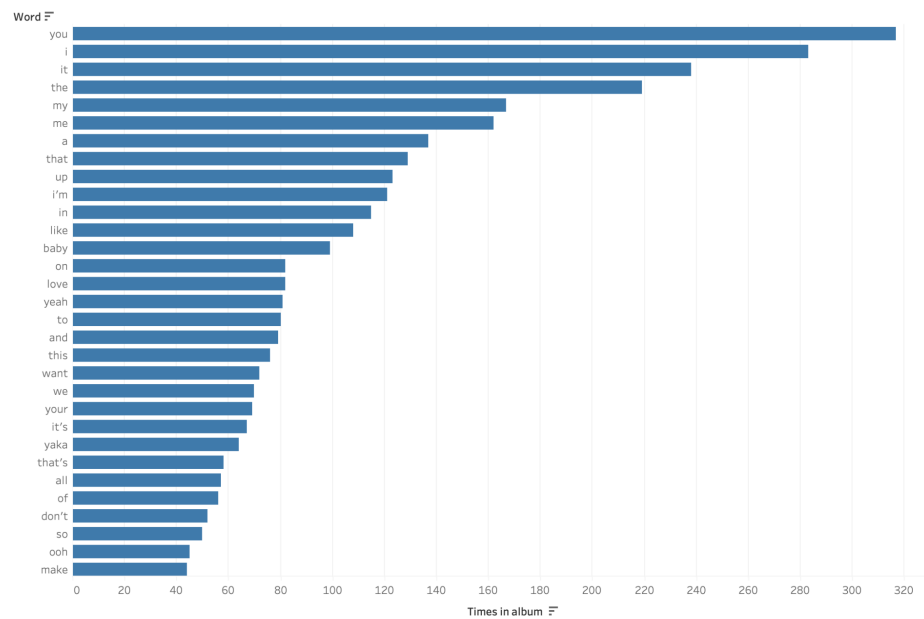
Musical:

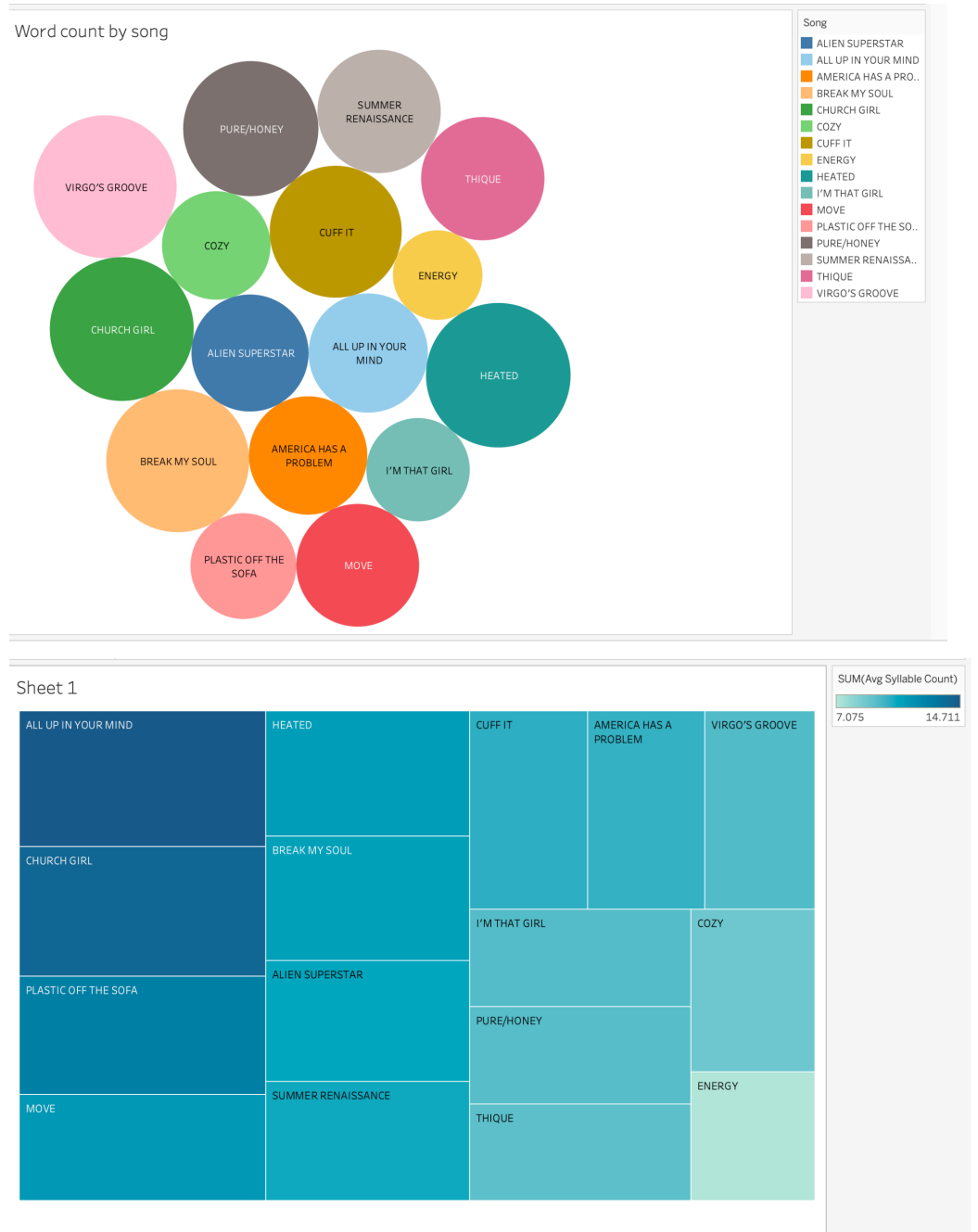
- Track number → quantitative
- BPM → quantitative
- Key → categorical
- Genre → categorical
- Sample → categorical
- Sample year → quantitative

Spotify:

- Song → categorical
- Album → categorical
- Artist → categorical
- Country → categorical
- Peak position → ordinal

- Current position → ordinal
- Week → ordinal
- Streak → quantitative
- Streams → quantitative
- Country → categorical/ geographical location
- **Tableau (to turn in) -- do this by Sunday evening!!**
  - Lyrical (Ibta):



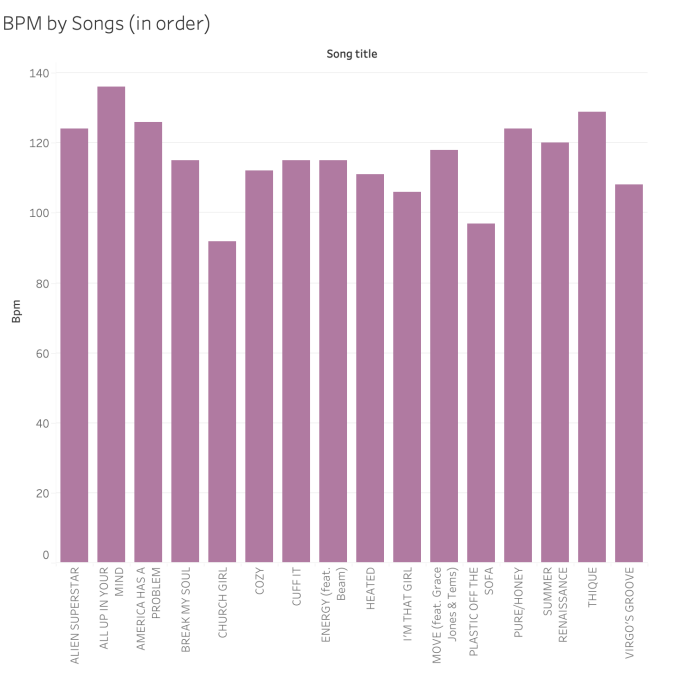


I think the questions compared to the data that I was able to pull from tableau were significantly more open-ended, and kind of shows the limitations of data visualization in the scope of this entire project – it might not be as good for analysis, and may show some of the weaknesses of quantifying something that is sometimes less than quantifiable, lyrically, at least.

○



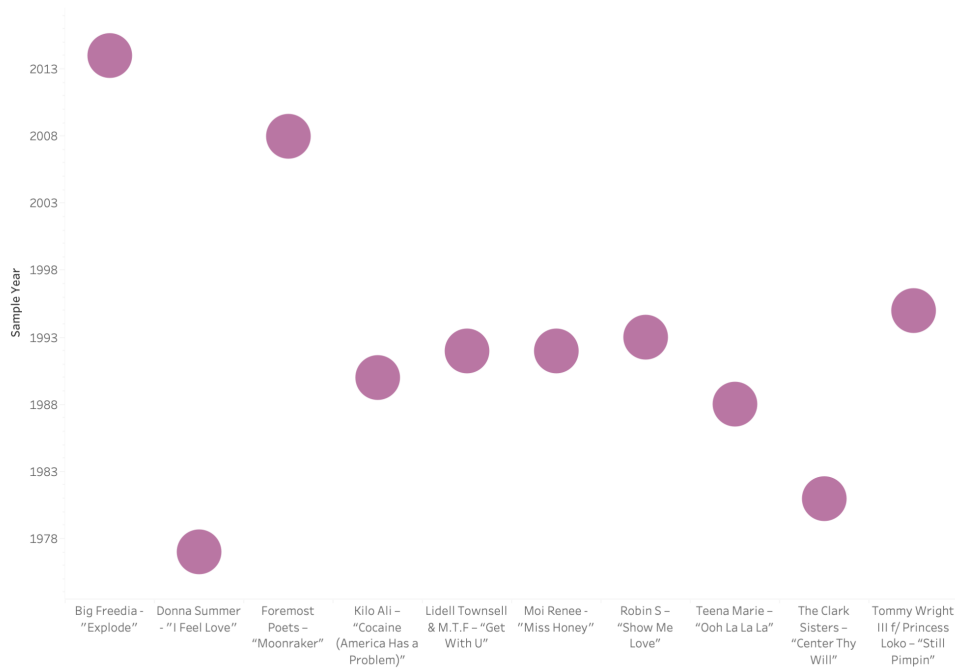
- Musical (Hanna):



Which Songs Transition Seamlessly to the Next Song?

Song title	
ALIEN SUPERSTAR	<div></div>
ALL UP IN YOUR MIND	<div></div>
AMERICA HAS A PROBLEM	<div></div>
BREAK MY SOUL	<div></div>
CHURCH GIRL	<div></div>
COZY	<div></div>
CUFF IT	<div></div>
ENERGY (feat. Beam)	<div></div>
HEATED	<div></div>
I'M THAT GIRL	<div></div>
MOVE (feat. Grace Jones ..	<div></div>
PLASTIC OFF THE SOFA	<div></div>
PURE/HONEY	<div></div>
SUMMER RENAISSANCE	<div></div>
THIQUE	<div></div>
VIRGO'S GROOVE	<div></div>

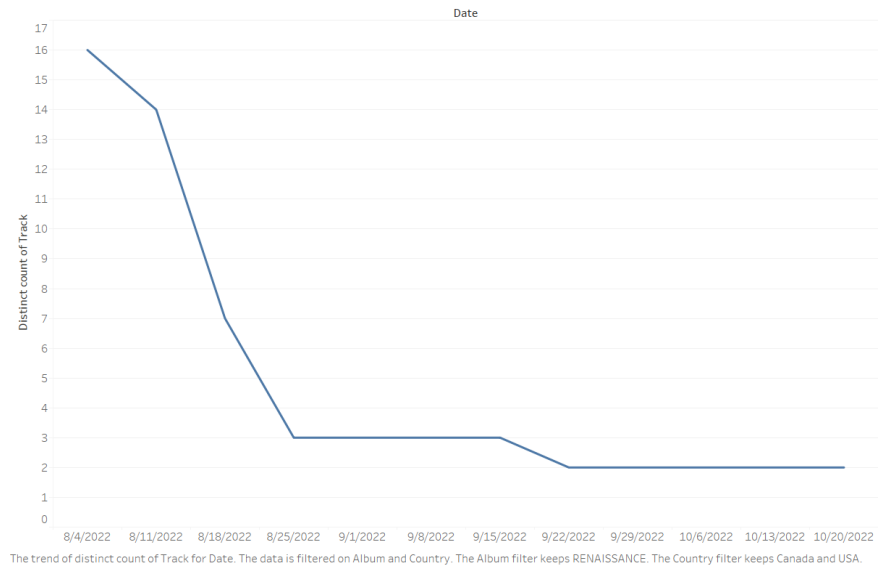
What Years Are The Samples In The Album From?



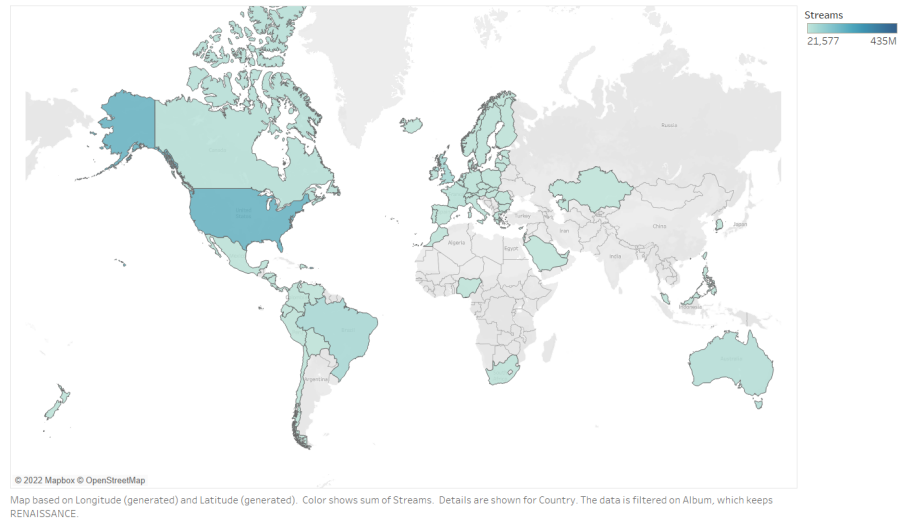
The questions I answered in Tableau were much simpler and less interesting than the ones we came up with as a group. I think this is because there are limitations on what Tableau can represent, particularly with musical data. For example, ideally, I would represent the keys as the traditional "Circle of Fifths" image and categorize the tracks using this format. Tableau doesn't have this functionality, so I felt quite stifled in my efforts to present less number-driven data.

#### ○ Spotify (George):

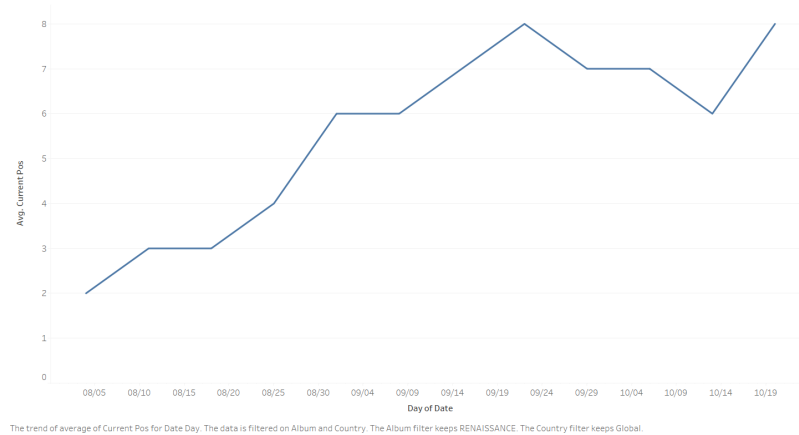
Number of songs in Top 200 for North America



Renaissance Top 200 Streams by Country



Renaissance Average Global Position



Through the above visualizations we can explore on a basic level how the album was perceived on release and in the weeks following its release. For example, we see that the Renaissance picked on position 2 on the week of its release. Additionally, through the first graph we can see the number of songs from the album on the top 200 weekly charts in North America, while through using a geographical map we can view and compare the total streams across countries. All this information contributes to our understanding of the effect of the album both globally and in individual countries.

## Week 10 Meeting: Nov 3

### Data:

<https://docs.google.com/spreadsheets/d/1wLlh3JP61Qp5mwmfWxVg1YIEMnAVcpkqCWJC507kalY/edit?usp=sharing>

[https://drive.google.com/drive/folders/14D2YszjDXwN8EbGWQwdd-XyCFAtN\\_3M0?usp=sharing](https://drive.google.com/drive/folders/14D2YszjDXwN8EbGWQwdd-XyCFAtN_3M0?usp=sharing)

[https://drive.google.com/file/d/1cSqIT3m34CrNFWBU\\_sHxshoo0sxJee59/view?usp=share\\_link](https://drive.google.com/file/d/1cSqIT3m34CrNFWBU_sHxshoo0sxJee59/view?usp=share_link)

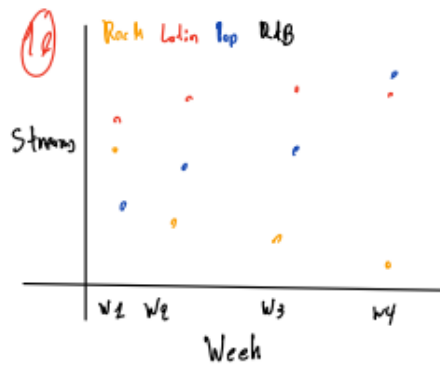
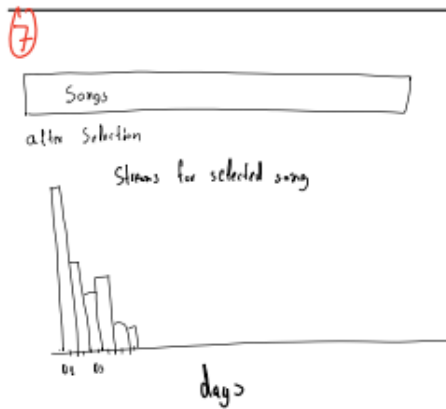
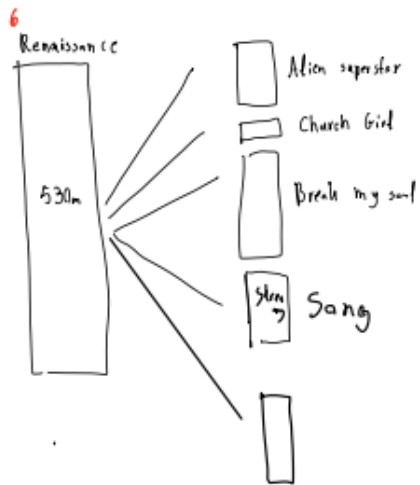
[https://drive.google.com/file/d/1oROB8oy8ys0nCOMyQmtbc3zErVYVSalf/view?usp=share\\_link](https://drive.google.com/file/d/1oROB8oy8ys0nCOMyQmtbc3zErVYVSalf/view?usp=share_link)

Sketch ID	Question (changed since initial ID)	Author	Votes
6	How were individual songs and the album perceived in terms of total streams?	GM	HP IC GM
7	Popularity of individual songs in terms of streams over the first 10 days?	GM	
8	How popular was the album across countries (songs/streams in top 200)?	GM	HP IC
9	How did the album ranking change over the first few days?	GM	
10	What was the effect of the album on listening trends?	GM	
1	What do the words distributed look like?	IC	
2	What do the lyrics mean, how does this fit into the broader album? (Genius API to save time, lol)	IC	HP IC GM
3	What is the progression of the story over time?	IC	GM
4	How do the audio features over time change per song over the progression of the album	IC	HP
5 + 5.1	What does the rhythm of the music look like over time? What does audio frequency look like over time?	IC	
11	How has the music of the past shaped this album?	HP	
12	What musical themes/patterns show up in the album?	HP	
13	How has the music of the past shaped this album?	HP	IC GM
14	What musical themes/patterns show up in the album?	HP	
15	What musical themes/patterns show up in the album?	HP	HP IC GM

**Winners:** 6, 8, 2, 4, 13, 15

**Sketch Rationale:** We chose these sketches because we feel like they best represent our initial goals for the project, which were to explore the various facets of Beyonce's Renaissance album and dig deep through our three respective lenses. Both the authors of these sketches and the other group members agree that these sketches will "cover all our bases," so to speak. Additionally, it brings forward the idea that music is more than just words and sounds and helps us visualize different aspects of this album and music generally.

George



8

Changeable globe depicting streams

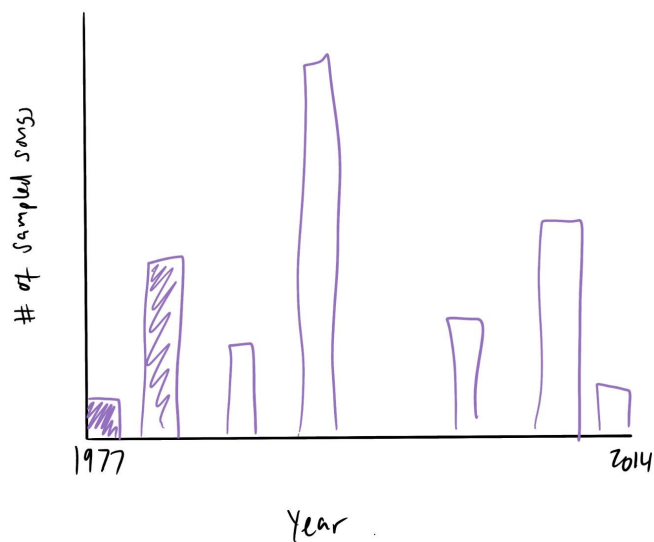


Hanna



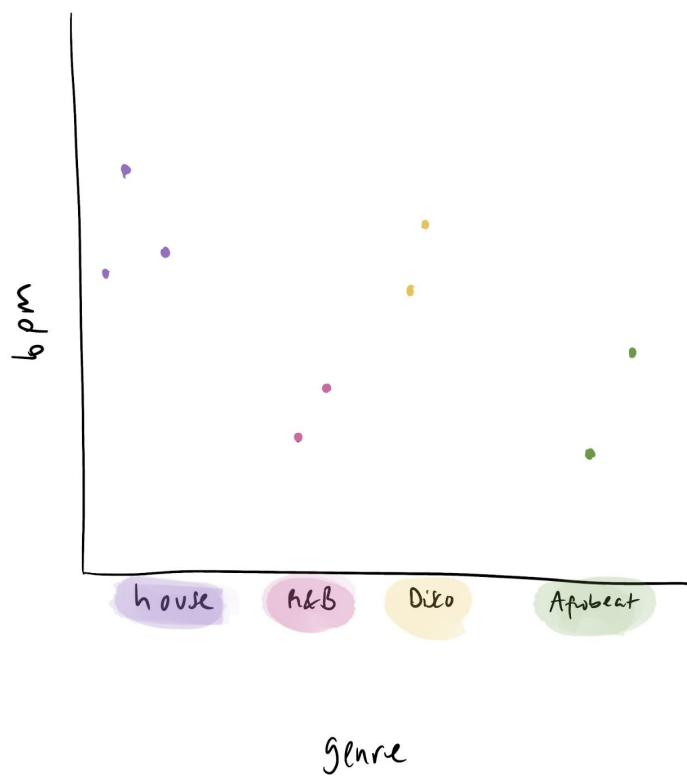


How has the music of the past influenced this album?



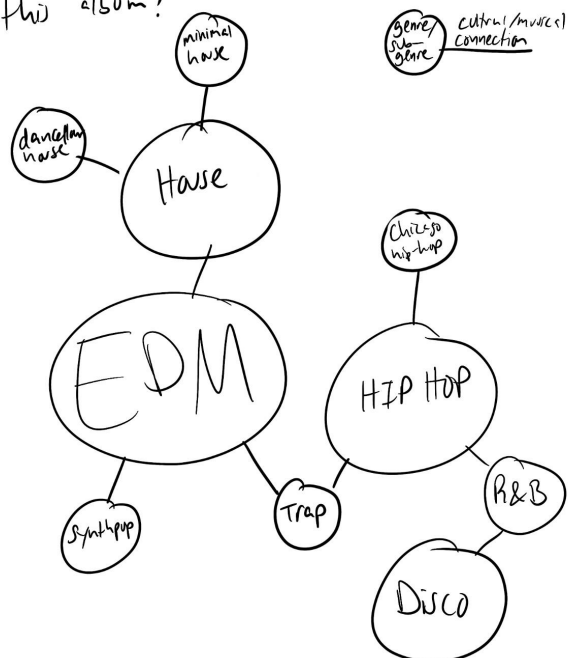
11.

What musical patterns exist in the album?



12.

How has music of the past influenced this album?



13.

What musical themes/patterns show up in the album?

I'M THAT GIRL  
COZY  
ALIEN SUPERSTAR

CUFF IT  
ENERGY (feat. Bean)  
BREAK MY SOUL

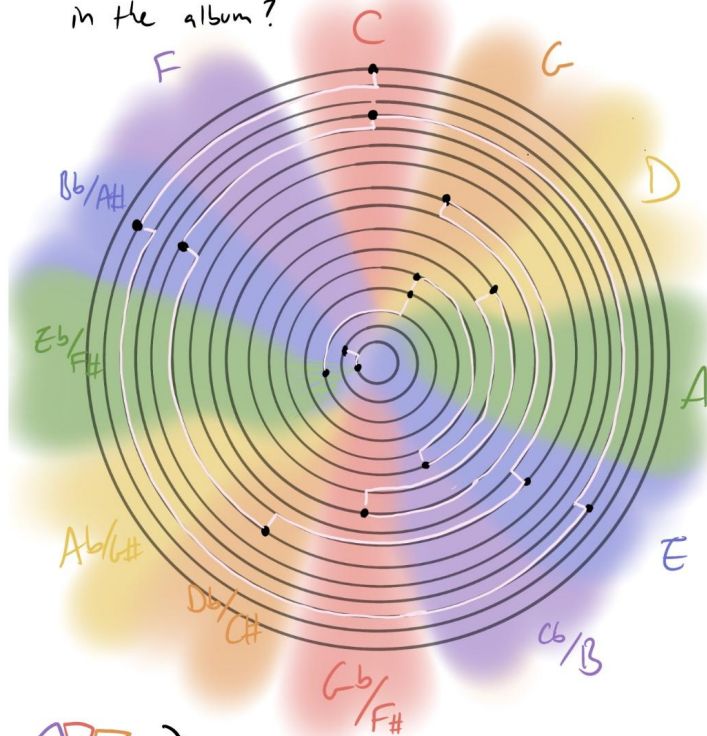
CHURCH GIRL

↓ etc

Songs1 } seamless  
Songs2 } transition  
Songs3 } clear  
          } transition  
          } b/w  
          } songs

14.

What musical themes/patterns show up in the album?



"Circle of fifths" key representation



concentric circles represent track, line shows progression from key to key

15.

## STORYBOARDING:

### Key Insights:

- Hanna
  - Renaissance is a modern reflection of the genres that shaped much of the music scene we know and love today
  - Renaissance's musical complexity makes it a compelling listen and pays homage to the music by which it was influenced
- George

- Renaissance released on the top of country charts in North America and Europe
- Individual songs showed big variability in popularity on both release and on the days following the release.
- Songs like Break my Soul, CUFF IT, and Alien Superstar spearheaded the release of the album and presence on global charts.
- Ibta
  - The representation of subjective audio features can help build out the narrative
  - The narrative and meaning behind lyrics that tell a cohesive story that might not have been recognized previously

### **Main Insight:**

- So what:
  - Renaissance, heavily influenced by the music of the past, was a revolutionary album in both its musical and narrative complexity, which allowed it to top the charts and hold a mirror to societal issues.
- Rationale:
  - This “so what” combines our three data angles well and breaks down the album into more than just the lyrics or audio. It adds nuance and depth beyond simply listening to the album; it allows the viewer to see the effects of and influence behind the album.

### **Storyboarding:**

- Act I: Global Impact

# Explore the global release of Renaissance

country selection

Country:

Streams:

Position:

Top Song:



The album debuted the best in the US, getting to #1 at the top 900 charts and over 100,000,000 listens

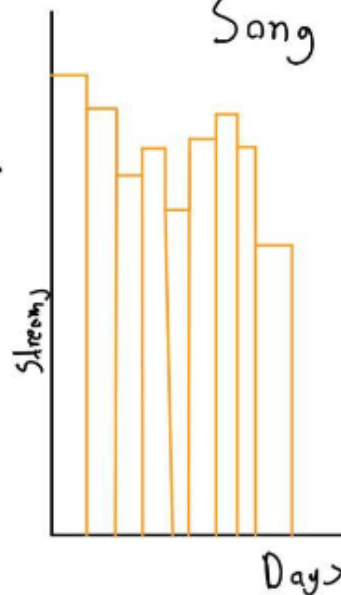
## Explore the songs that made Renaissance

Streams



Streams

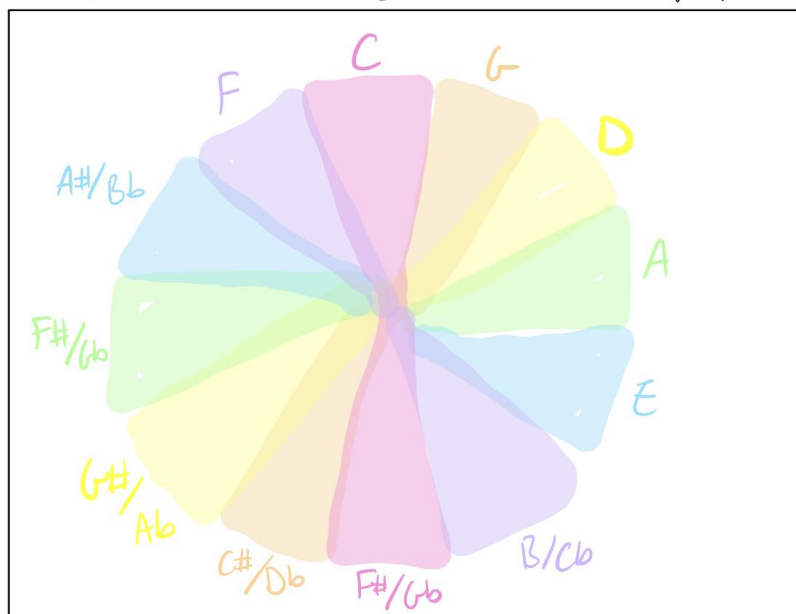
Song



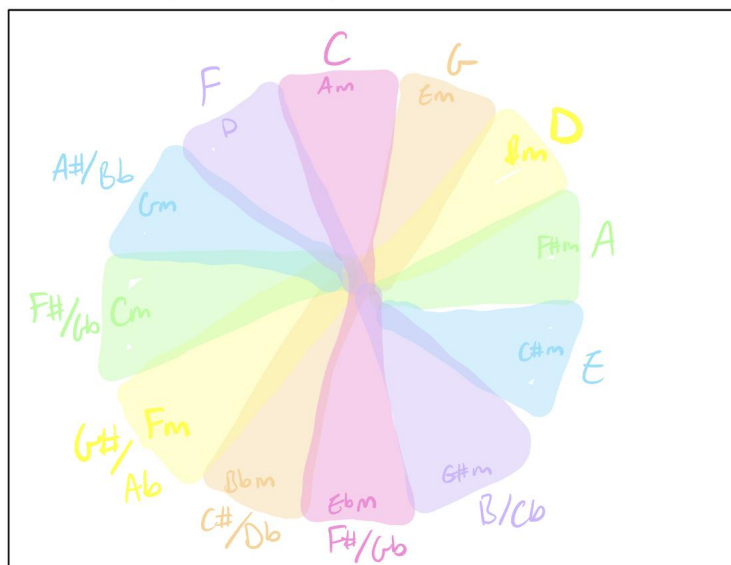
Break my soul spearheaded the release of the album and preluded Beyoncé's new song

- Act II: Music

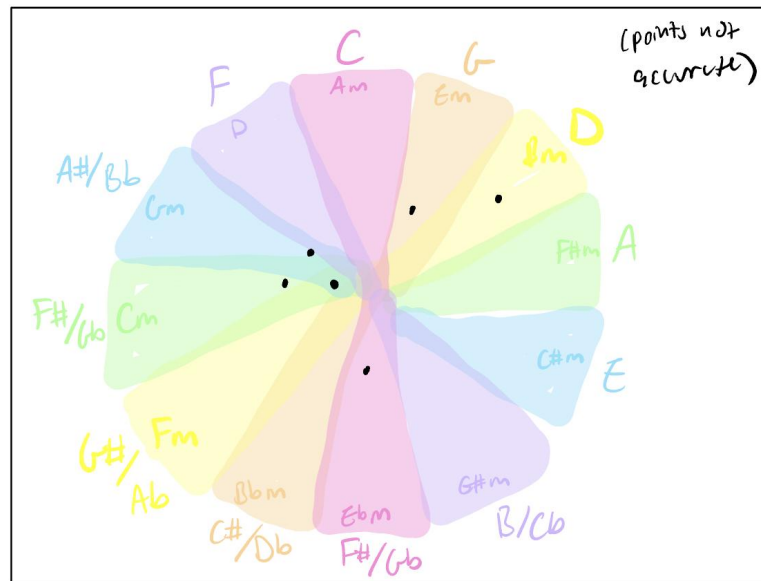
Introva: "this is the circle of fifths. It's used in music to represent the relationship between keys. It's built clockwise by starting at middle C and moving up a fifth interval"



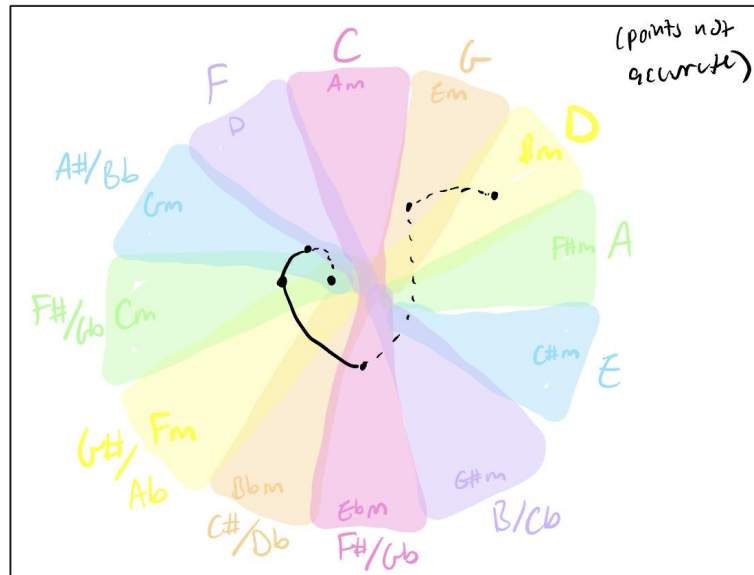
"each major key has a minor counterpart"



'this is all of the songs on Renaissance,  
placed in the size of the key they're in. The  
songs start in the middle with I'M THAT GIRL  
and end on the outside with SUMMER RENAISSANCE'

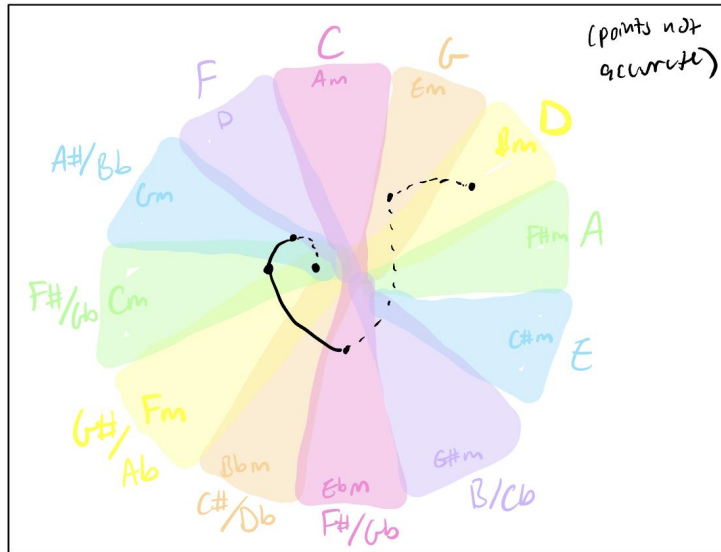


"Some songs transition seamlessly into one another, while some songs have a clear delineation between them"





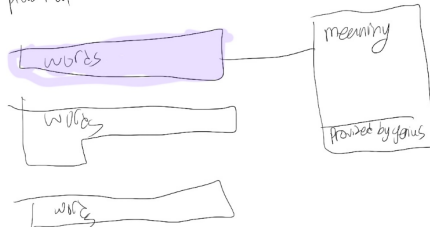
"RENAISSANCE begins, interestingly, in the key of C minor and jangles to other keys, some with more presence than others, but ends up in the key of C major, the most stable and familiar key signature in western music"



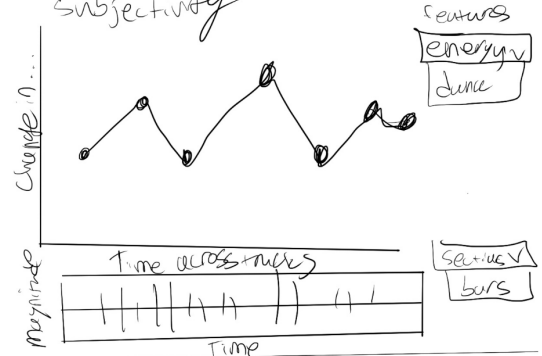
\* highlight  
each point /  
set of points  
w/ words appear

- Act III: Narrative

Exploration of narrative



Exploration of audio features and subjectivity



Hook: insightful data on subjectivity of this music (high energy, lyrical insight, etc): What do others think of this music and what do these songs represent or mean?

rising insights: how should we visualize this/who will be consuming this and how do we cater it towards them? will it be people that have already listened and want to know more?

main message: lyrical breakdown available  
-> breakdown of lyrics and meaning + subjective ideas of how this music is represented (through spotify's audio analysis)

solution: visualize (using previous sketches, subjectivity and lyrical meaning), provide those meanings/analyses on narrative through genius

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## Week 12 Meeting: Nov 17

### Updates

- 3 visualizations mostly done

### To-do

- Make one long page, george -> hanna -> ibta sections (going down)
- Color palette:
  - Titles: primary (white) → #FFFFFF
  - Section headers/subtitles: neutral-content (beige/orange) → #DDA54C
  - Descriptive text: primary-focus (off white) → #CCCCCC
  - bars/ non-scaled charts: secondary-content & accent-content (lilac & accent-content) → #ADCBFF, #F9B8E4
  - Scaled charts: MORE SATURATED secondary-content & accent-content
  - Background: black → #000000
- Keep separate html pages to avoid commit issues (and then combine into one webpage later)
- Ibta will add temporary nav bar for now

## Week 13: Nov 24

### CS 171 – Think-Aloud Study 1

Please copy this form into your process book first!

Tester Name: Emma Ton

Tester Email: [anh\\_ton@college.harvard.edu](mailto:anh_ton@college.harvard.edu)

General Observations from the think-aloud study:

- Color scheme looked good!
  - They enjoyed some of the visualizations and the colorschemes we had chosen and found it easier to tell things apart due to the contrast
- 

What does the tester like about your data story?

- Being able to follow musical impact and get a digest of certain parts of the music

What improvements does the tester point out?

- Fixing some of the visual artifacts that all of us missed throughout the entirety of the project as we were developing them

Was the intended key message clear to the tester? Why or why not?

- Not entirely, this might also have to do with adding more text to make it a bit easier to understand, or making visuals more intuitive or interesting

Did the tester get your next steps or call to action? Why or why not?

- It wasn't fully clear specifically because there might've been not enough background

**Tester Name: Bobby Groves**

**Tester Email: robertgroves@college.harvard.edu**

**General Observations from the think-aloud study:**

- The beta-tester recognised that the site was in a working state of development.
- They enjoyed the globe visualization although they found the controls a little bit laggy and they didn't immediately recognise the click functionality. Additionally, they were confused by the color scaling but once understanding the functionality they enjoyed the insight in the data. Point also made: the tooltip, although readable, was clipping outside of the screen, and they hoped for a better frame/design of the tooltip.
- For the Songs distributions, they liked the animations but expressed the need for more text to support and explain the visualization better. Additionally, they identified many bugs and said that the visualization should have more elements to it.
- For the circle of fifths, they really enjoyed the uniqueness of the visualization and they found the supporting text insightful and easy to understand/ follow. Although, they expressed that they would like for the visualization to be larger and the points easier to click/ hover over. Lastly, they really liked the nature of the visualization but requested that there was also a color aspect to the lines in order to follow the sequential nature of the songs' order in the album.
- For the histogram, they liked the information provided by the tooltip, but expressed doubt as to if the histogram was the most effective visualization to display the data.
- For the line plot, they really enjoyed the information provided but pointed out that it would gain by some supporting text. Still the data were very easy to follow and clearly displayed.
- While, for the narrative analysis, they said that they would like a different formatting in the data but really appreciated the supporting text and the explanations it provided for each song
- 

**What does the tester like about your data story?**

- The beta-tester appreciated the different approaches in exploring "Renaissance".

**What improvements does the tester point out?**

- General bug fixing, formatting, making text easier to read and stand out more, placement of tooltips etc.
- Additionally, they expressed desire to see more flesh out and detailed visualizations especially in the first part and the histogram.

**Was the intended key message clear to the tester? Why or why not?**

- It was, the sequential nature of the story and the clear (although unfinished :/) visualizations clearly highlighted the key takeaways of each section

**Did the tester get your next steps or call to action? Why or why not?**

- They did, our next steps align with the problems and issues that the beta tester identified as well as improving on our already existing work that they enjoyed.

## Think-aloud takeaways

Based on the results of your 'think aloud' study, what would you improve in your data story?

- Add more explanation as to the different visualizations and narratively tie the visualizations together better
- Smooth out bugs
- format to make tooltips clearer & easier to use
- Add some kind of progression signaling to the circle of fifths

Are there any additional insights and visualizations you would use? Would you amplify or change your message?

Did your narrative work? Did the tester get your takeaways?

- We do not need any further visualizations, but should refine & perfect the ones we have
- The narrative and connections between visualizations should be strengthened to better get across the message
- The tester did get our takeaways!

Decide as a team which of these improvements you will implement and write down your decisions and why you made them in your process book as a numbered list.

Implement the intended changes and check them off your list (e.g., adding "done"). You can distribute the tasks among your team members. If you are unable to implement specific changes, please explain why and describe the expected results in your process book.

1. George:
  - a. Format spotify globe tooltip to be clearer
  - b. Include key for how many streams are represented by one person (avatar thing)
2. Hanna:
  - a. Strengthen narrative between visualizations
  - b. Format tooltip to be clearer
  - c. Add color progression to songs in circle of fifths
3. Ibta:
  - a. Clean up index.html formatting
  - b. Fix bugs in graph visualization
  - c. Add tooltip to lyrics