Piano Genealogy

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Project Repository: https://github.com/jacobfloisand/dataviscourse-pr-pianogeneology

Background and Motivation

We all share a common interest in piano and are intrigued by the instrument. Two of us have studied piano for many years and find a lot of joy playing music. However, we all have a great appreciation for the instrument as a whole. We wanted to create a visualization that would be fun and informative about the history of the instrument we love so much. Further, the piano has become a popular instrument in Western culture. Yet, an early predecessor to the piano, called the monochord, looked very different from the modern piano. We were inspired by the tree visual on the Yamaha page and wanted to show some of how the piano has evolved into what it is now.

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Questions we set out to answer

- How has the piano evolved over the centuries?
    - Design, intentions, sound, etc.

  This turned out to be the main question we set out to answer. Seeing the different piano-like instruments and how they sounded is the most interesting and engaging part of the visual.
- How has the modern popularity of the piano changed?
    - Purchase history

  This is a very interesting question that gets answered fairly well with the purchase data we had for the more modern pianos. It would have been much more interesting, however, to have been able to see purchase history for the older instruments as well. As such, we don't feel this question was answered with justice, and the visual could have perhaps done without this data altogether.
- Create some exposure to different aspects of piano history.

    - Learn when different kinds of pianos emerged.
    - Learn how quickly piano-like instrument designs spread to people in general.

  We feel that the overall objective to create exposure to piano history was achieved quite well. The viewer learns about the different kinds of pianos that emerged, but how quickly the instrument spread is not clearly demonstrated by what we show. There are significantly more data points on the timeline as time moves on, but this may simply be due to bias of the source we pulled those events from rather than the spread of pianos to more people.
- Viewers are able to see the important steps in the piano's "evolutionary tree" so to speak, and then grow their knowledge by being presented with important events for some of the piano-like instruments.

Data

The datasets we used for the visualization are small and straightforward and did not require cleanup. We did, however, spend some time formatting the data to enable us to tell a more simple story. For example, we truncated the timeline event text so that we could fit more on the page. Then the full text is available to the reader by a tooltip. We used several different sources (linked at the end of this document). We used purchase history, pictures, text, sound, and even a gif.

- http://www.historyofpiano.net/piano-history/timeline-of-piano/: historical data about the evolution of the piano, extracted into a csv file.
- http://www.bluebookofpianos.com/uspiano.htm: historical piano purchases by type of piano, extracted into a csv file.
- https://www.yamaha.com/en/musical_instrument_guide/piano/structure/: lineage of different pianos across the years, recreated into a json file.
- https://www.kaggle.com/arshadgeek/piano-notes-transcription: soundbites for the different sounds on a keyboard. We intended to use these soundbites, and then ultimately decided against it.

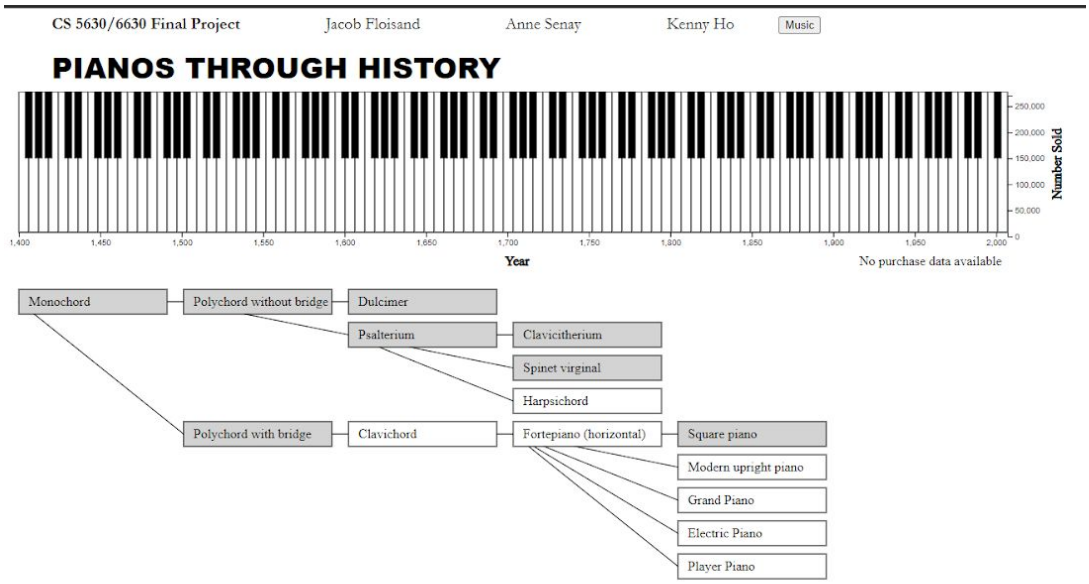
Visualization Exploration and Design Evolution

We started out by brainstorming some ideas of what we would like to show about the history of the piano. We determined that the main objective would be to show the evolution of the piano from its beginnings to the instrument we have today. We worked through several design options that included the story telling points. We also wanted to include some appropriate chart junk to make the visual more interesting since the data is simple and piano keys are so recognizable (See Figures 2, 2.1, 2.2, 3, 4, 5, and 6 below). Our final design before beginning is in Figure 1, below.

- We chose a line chart with years on the x-axis to depict important timeline events (orange-colored circles) and also the purchase history of pianos. The user can hover over the line to see an exact number of sales for a given year. Similarly, the user can hover on one of the orange circles to see information about an important event. We wanted to make piano keys part of the visualization and chose to include them in the line chart. We played with the idea of how best to encode the purchase history within them and ultimately decided it was best to use them mainly as background art.
- The central focus of the visual evolved into being the tree diagram showing the evolution of piano-like instruments. Much of the interactivity revolves around this tree. A user can click on one of the piano-like instruments in the tree and the data in the line graph will be updated to reflect the purchase data for that instrument (when available). In addition, when selected, an event box will also be populated (see Figure 2.1) displaying more data (events, pictures) for each instrument with interactivity to demonstrate its unique sound.

The formatting for the visual was very important because there are three different components that need to act as a whole. The user interaction between them needed to be intuitive. Because each piece is part of the whole, we wanted the visual to fit on the screen without the need for scrolling. Maximizing the screen space proved to be more important than we originally thought.

At the milestone this is the layout we had based on our original design:



As we started trying to implement the event box, it became clear that the space was too crowded. We really needed to fit everything on one page. So, at that point, we decided

to take some ideas from some of our other original drawings and rotate our line graph with the piano keys and put them on the side of the visual. We also added static timeline events that give a brief overview of the information in the timeline events. We also eliminated all unnecessary text like our names, which were not important for the visual. We also rotated the tree to give us more vertical space to put the event box below, allowing for a much less crowded feel overall.

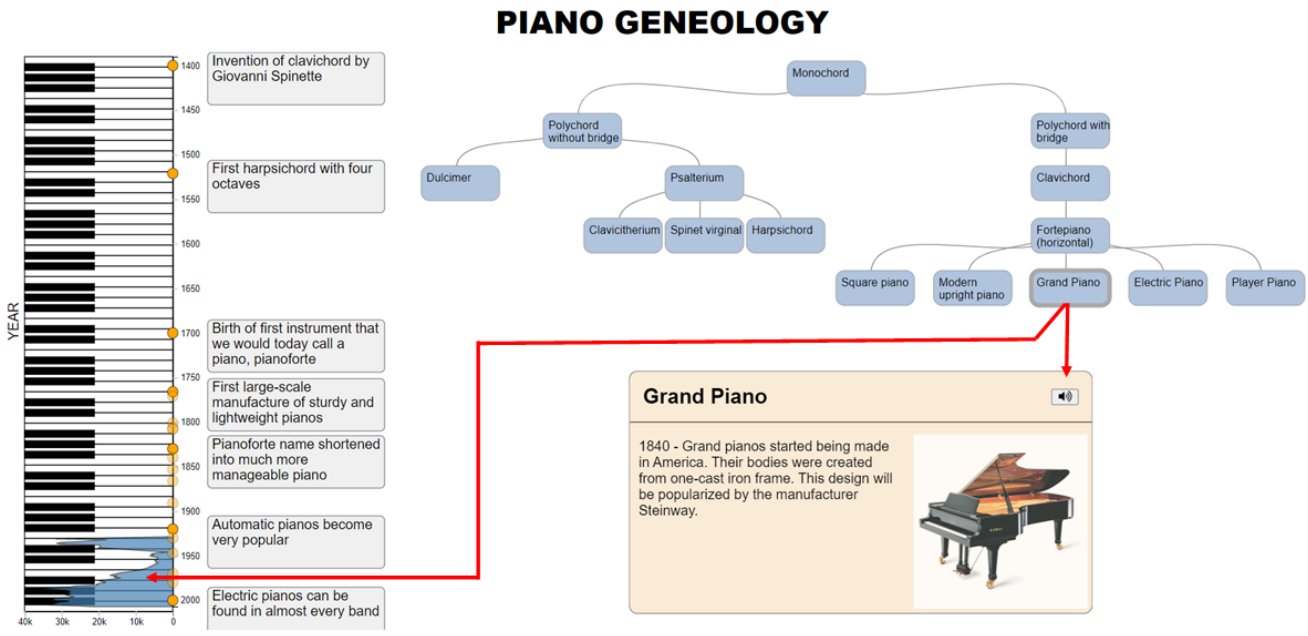
By adding the static timeline events, we eliminated a lot of the interactivity between the tree and the timeline. This makes it simpler, but it would be better if we had more events so that we could have developed more interactivity with each tree node like we did the event box.

Implementation

The Tree visual controls most of the interactive components of the visual. Clicking a tree node will change the event box with the instrument picture and sound. It will also plot the purchase history data for the modern pianos.

The timeline serves a story-telling purpose within the visual, but does not cause any interaction among the other components.

The even box has a sound button that will play a music example of the instrument displayed in the event box. It does not have any other interactivity elements.



Evaluation

We originally thought that sound bites for the keys on the piano might be really cool, but came to the conclusion that they were completely unnecessary. They would only be of interest to someone who is already familiar with a piano. Rather, the optional feature of sound examples of the different instruments began to feel more relevant with regards to the intent of the visual to educate the viewer. The sounds of the instruments is maybe the most interesting piece of information we could have included. We switched our focus at that point to include more music examples to engage the audience.

If we were to do the next evolution of this visual, we would add more transition elements to help guide the viewer more towards a story. In a major redesign, we would probably eliminate the timeline events altogether, including purchase history. We would start with a single tree node (monochord). The event box would have the picture and text about the monochord as well as the music. Then by clicking on the monochord node, the tree would expand to the next level, where the user could then click on those instruments to learn more about them. Since this is the most interesting and engaging part of the visual, we would focus more attention on creating something more beautiful as well as functional.

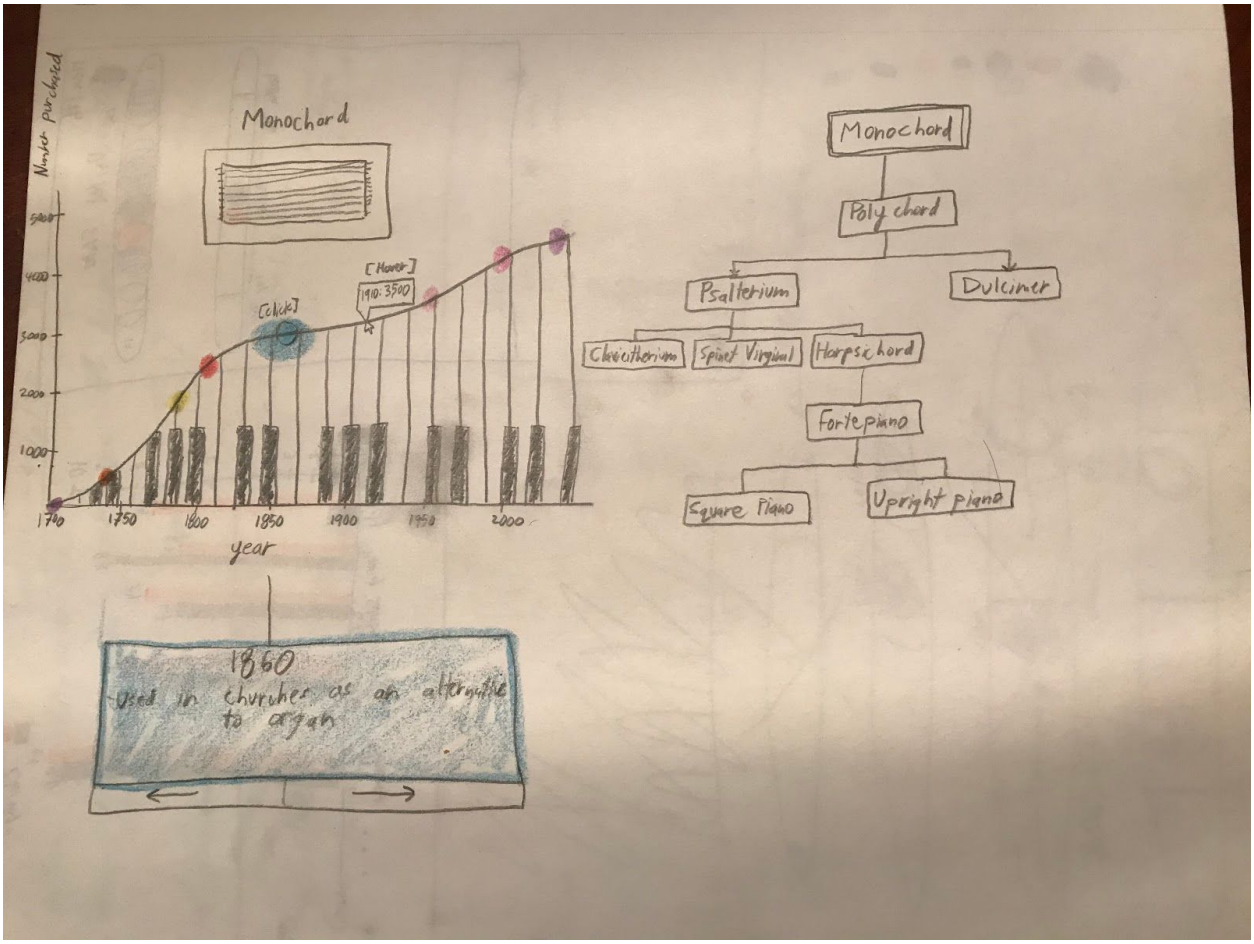


Figure 1 - Finalized Visualization

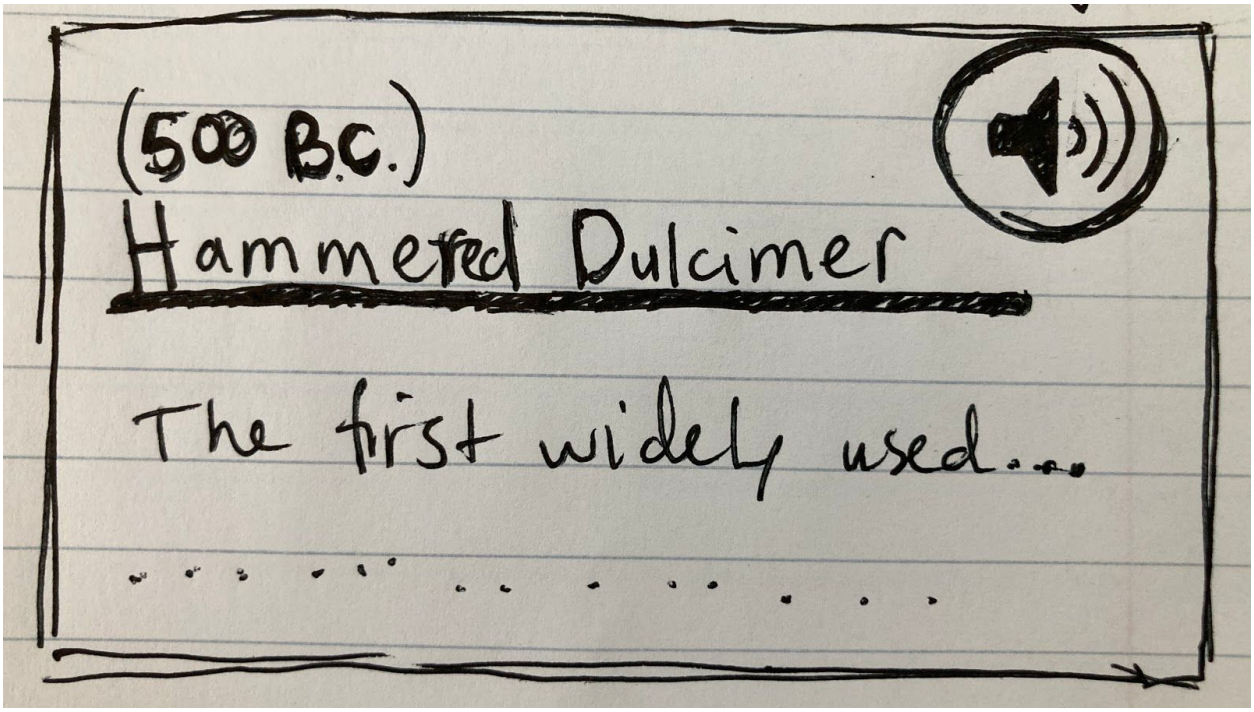


Figure 2 - Brainstorm idea(Instrument Sound - Optional Feature)

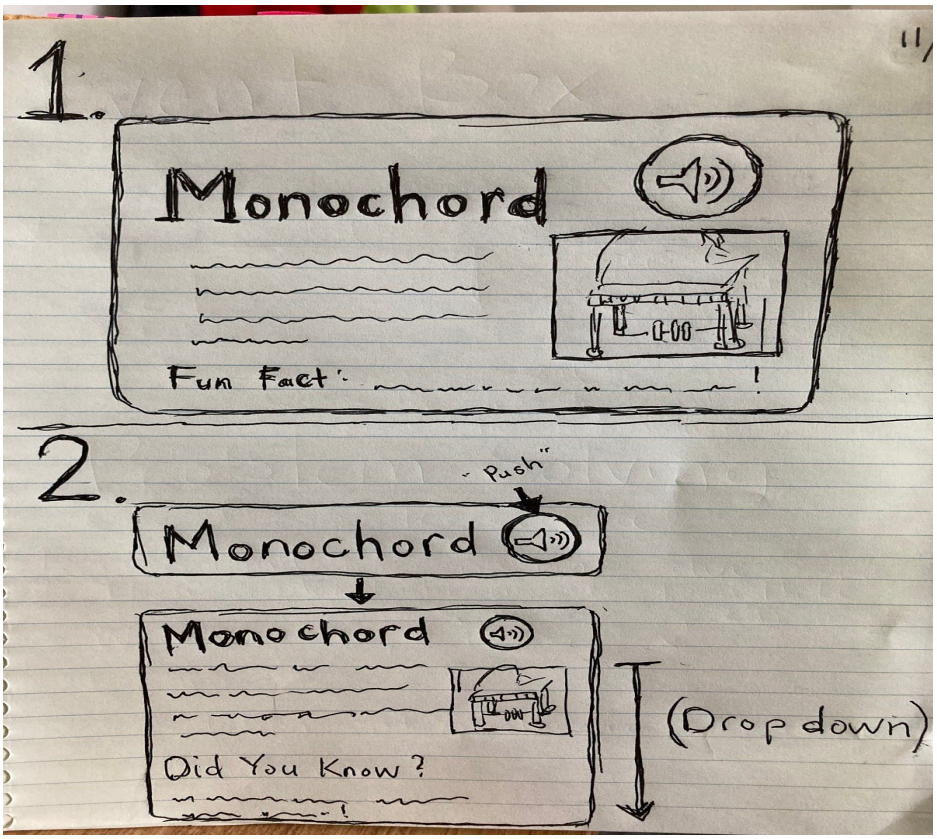
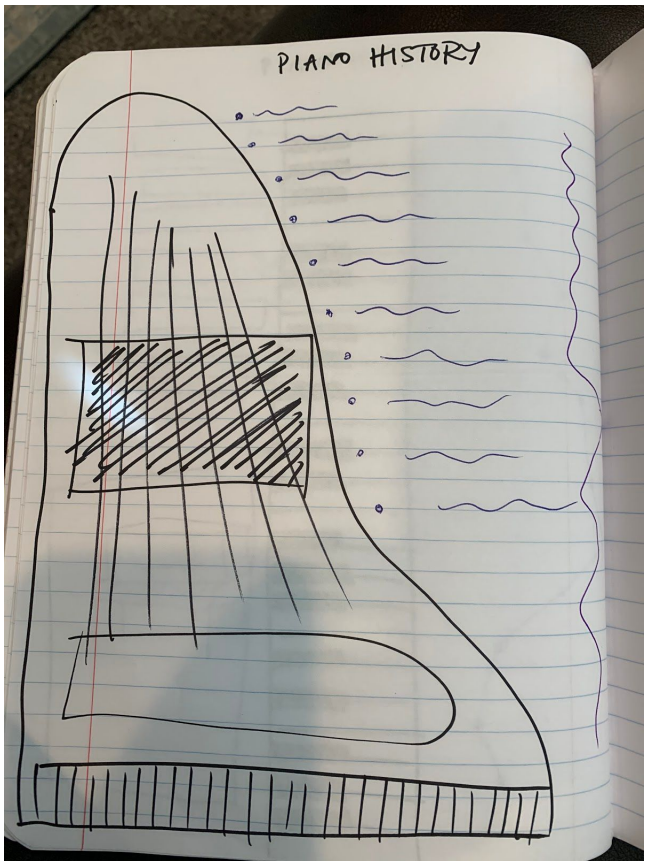


Figure 2.1 - Event Box Design Option 1
Figure 2.2 - Event Box Design Option 2



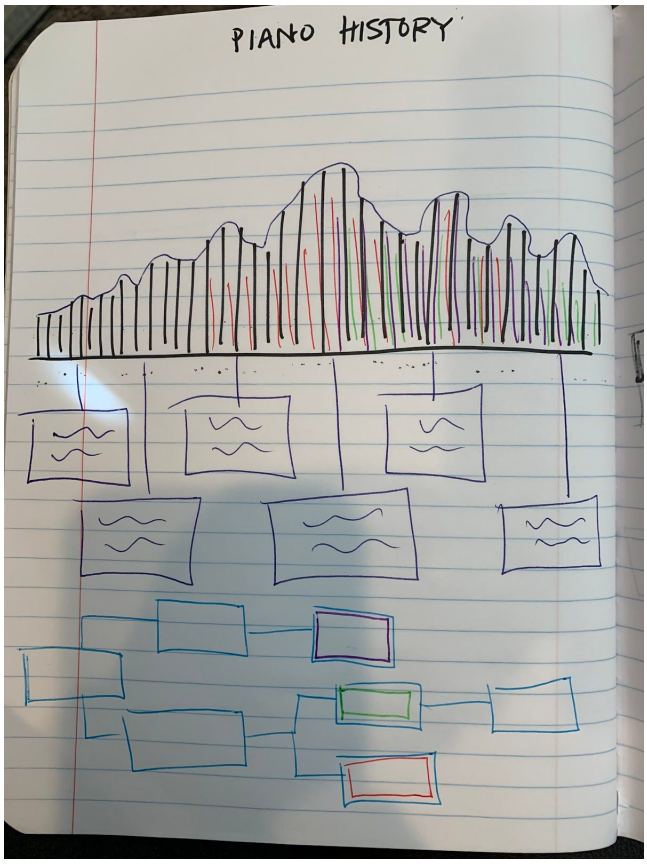
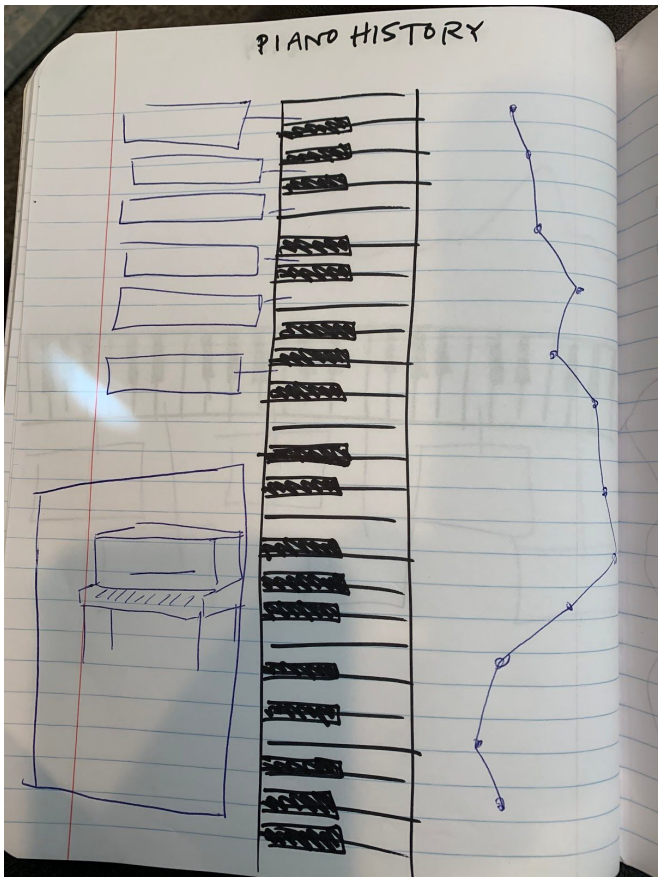


Figure 3(Left) and Figure 4(Right) - Brainstorm Ideas



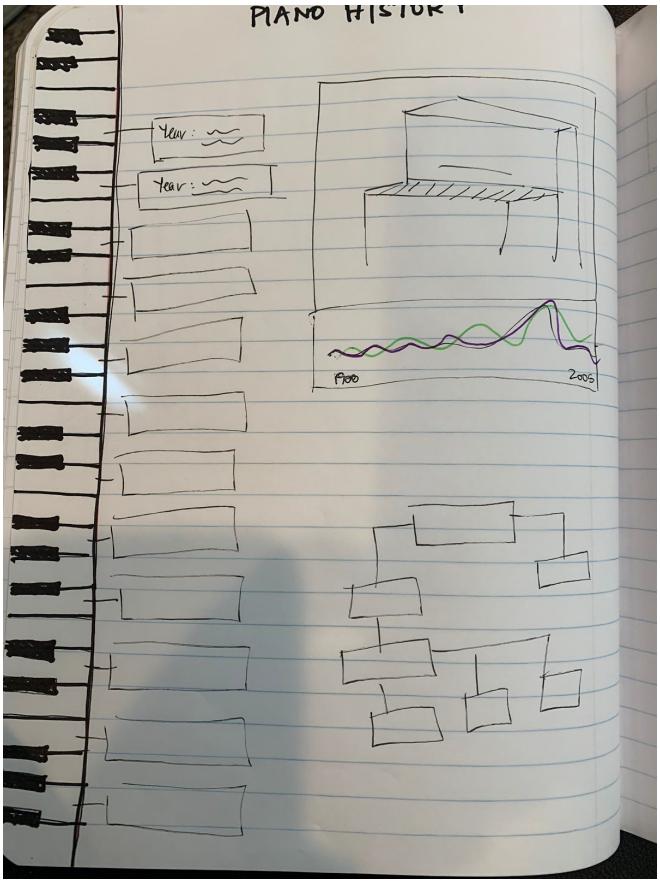


Figure 5(Left) and Figure 6(Right) - Brainstorm Ideas

Sources

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https://www.britannica.com/art/harpsichord

Clavichord: https://www.youtube.com/watch?v=2PsYnu2msUU
http://www.tomlinsonharpsichords.com/instruclav1.html

Monochord: https://www.youtube.com/watch?v=c1aCNMIZ5IM
https://jenbree.com/history-of-the-piano/

Psalterium: https://www.youtube.com/watch?v=4u41wwgpE_Q

Electric Piano: https://www.youtube.com/watch?v=XegVsFG1vjQ
https://www.americanmusical.com/yamaha-dgx660b-portable-digital-piano/p/YAM-DGX660-LIST

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https://www.madeinchicagomuseum.com/single-post/qrs-music/

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Audio:
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Grand piano:
https://usa.yamaha.com/products/musical_instruments/pianos/premium_pianos/cf_series/index.html

Square piano: https://www.metmuseum.org/art/collection/search/504241
Upright piano: https://kawaius.com/product/st-1/

Hammered Dulcimer
Audio: https://en.wikipedia.org/wiki/Hammered_dulcimer

Grand Piano
Audio: https://www.youtube.com/watch?v=W9uIaMMchqY

Modern Upright Piano
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Square Piano
Audio: https://www.youtube.com/watch?v=zfMiP1yXXak

Polychord
Image: https://saitenart.ch/polychord/index.en.html

Psalterium
Image: https://commons.wikimedia.org/wiki/File:Psalterium.jpg

Clavicitherium
Image: https://en.wikipedia.org/wiki/Clavicytherium
Audio: http://www.hubharp.com/kits/kits4-2.htm

Spinet Virginal
Image:
https://www.google.com/search?q=Spinet+virginal&tbm=isch&ved=2ahUKEwijvvG19JntAhXHa80KHRLKBncQ2-cCegQIABAA&oq=Spinet+virginal&gs_lcp=CgNpbWcQAzICCABQ6LYHWOi2B2CLuAdoAHAAeACAAUSIAUSSAQExmAEAoAEBqgELZ3dzLXdpei1pbWfAAQE&sclient=img&ei=xVG8X-PHIMfXtQaSlJu4Bw&bih=642&biw=1588#imgrc=HKSeyoVL75rpvM
Audio: http://www.hubharp.com/kits/kits4-2.htm

Fortepiano (horizontal)
Image:
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Electric Piano
Image: https://www.piedmontpiano.com/all-used-pianos/1939-storytone-spinet

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