

Tommy John Visualization Process Book

Matt Timoney, Sean O'Neill, Emily Lawton

{mtimoney, seanoneill, emilylawton}@college.harvard.edu

Overview and Motivation:

Provide an overview of the project goals and motivation for it. Consider that this will be read by people who did not see your project proposal.

TODO for final submission - see proposal for background and motivation

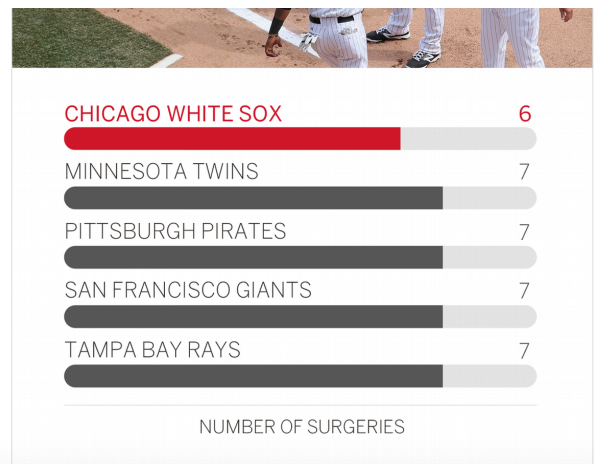
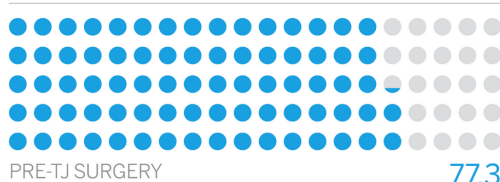
Related Work:

Anything that inspired you, such as a paper, a web site, visualizations we discussed in class, etc.

http://espn.go.com/mlb/story/_/id/12648769/what-missed-tommy-john-surgery

Though this article was published on April 9, shortly after we selected the topic for our project, it addresses the recent increase in *repeat* Tommy John surgeries via a series of simple visualizations. A close spin-off of the content we intend to visualize in our project, this article certainly serves as inspiration. However, we were not impressed by the design choices made here.

Innings pitched



Questions:

What questions are you trying to answer? How did these questions evolve over the course of the project? What new questions did you consider in the course of your analysis?

In the time that has passed since the creation of our project proposal, the main questions we would like to answer have evolved slightly. Questions we are currently focusing on include:

- What ages are most highly represented among players undergoing TJS? How is this changing over time?
 - Our hypothesis here is that the average age of players undergoing TJS is decreasing over time.
- Is improved pitching performance correlated with recovery from TJS?
 - One possible explanation for the surge in interest is the belief that pitchers can throw harder in the aftermath of recovery from Tommy John surgery. In fact, surgeons have been asked by the parents of young pitchers to perform the surgery on their uninjured sons in the hopes of increasing their child's performance and future career prospects. We in turn intend to investigate whether improved pitching performance (measured along several different evaluation metrics) is correlated with recovery from TJS. This visualization project thus has the potential to dispel the potential misconception that Tommy John surgery directly causes improved performance.
- What baseball teams do the players that undergo TJS play for?
 - Are there any geographical concentrations of surgery occurrences?

Data:

Source, scraping method, cleanup, etc.

<https://docs.google.com/a/college.harvard.edu/spreadsheets/d/1gQujXQQGOVNaiuwSN680Hq-FDVSCwvN-3AazykOBON0/edit#gid=0>

We wrote a simple python script to convert the above .csv file to JSON and subsequently cleaned up the data (renamed columns, formatted dates, etc.).

In addition, we scraped the web for pictures of the players in our Tommy John surgery dataset. They reside in the img/players directory in our repository on github.

Exploratory Data Analysis:

What visualizations did you use to initially look at your data? What insights did you gain? How did these insights inform your design?

TODO for final submission

Design Evolution:

What are the different visualizations you considered? Justify the design decisions you made using the perceptual and design principles you learned in the course.

Design Studio (April 14):

See `design_studio_feedback.md`

Meeting with Hendrik (April 14):

Our meeting with Hendrik following the design studio was constructive. We received feedback on our initial design choices and made several revisions to the features we included in our proposal:

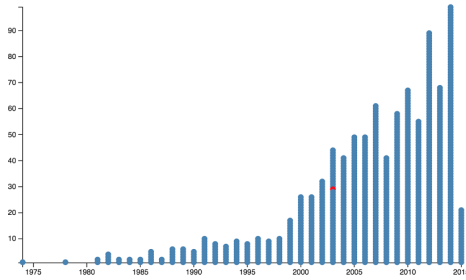
- We discussed our listed must-have features and optional features, ultimately deciding that visualizing player salary over time should be an optional feature and that visualizing player performance before and after surgery should have higher priority.
- When talking about visualizing the geographical location of players undergoing TJS over time, we decided that unless we see very distinctive trends in basic graphs a map is not necessary.
- During our conversation, we brought up how we intend to make our visualization interactive. These ideas include brushing functionality on the `countVis` (which shows the number of Tommy John surgeries performed over time) and the ability to search for specific players.
- Continuing the conversation from our design studio, we discussed the pros of presenting our visualizations as a story. As mentioned in our design studio feedback, the direction of our story will continue to become more apparent as our visualizations develop.

Project Milestone (April 17):

The current state of our visualization is as follows:

Tommy John Vis

X-axis: ☐ by Month ☒ by Year



HERE should be little Histograms

Enter player name...

Paul Byrd



Surgery Date: 7/1/2003
Surgeon(s): Dr. James Andrews
Recovery Time: 12 months
Team: ATL
Position: P

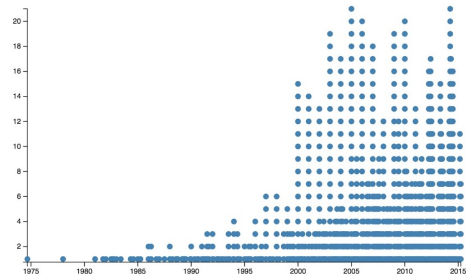
The above screenshot shows `countVis` (which visualizes the number of Tommy John surgeries over time, satisfying one of our must-have features) on the left and `playerVis` (which shows the player name and picture along with various information regarding his surgery) on the right. The x-axis of the graph on the left can be changed from month to year by switching the radio button and vice versa. Hovering over a surgery occurrence causes the node to turn red and the player's name and picture along with other information is shown at right.

Just from this initial visualization, we can already see that there has indeed been a huge spike in the number of Tommy John surgery occurrences in the past five years. Why the dramatic increase? Hopefully we may have an answer to this question at the completion of our project.

We have also begun implementing a slider that enables viewers to select a range of ages to filter the graph by.

Tommy John Vis

X-axis: ☒ by Month ☐ by Year



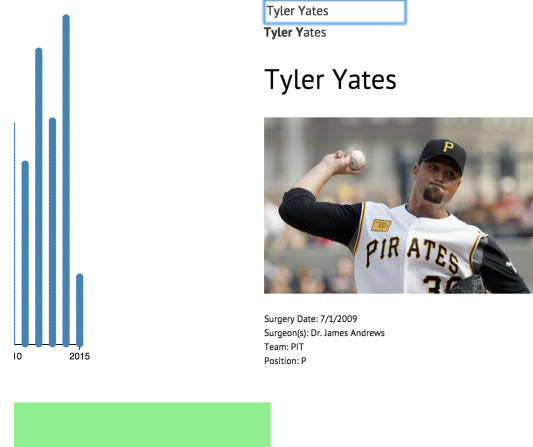
HERE should be little Histograms

Christian Binford

Christian Binford



Surgery Date: 1/1/2009
Team: KC
Position: P



These next two screenshots demonstrate the player search functionality. Viewers may enter in a player's name to bring up their picture and corresponding Tommy John surgery information. This is useful if a viewer has a specific player in mind they want to check up on.

As we met each of the goals we set out to achieve by Milestone 1, we are satisfied with the progress we made thus far on our project. Comments on this iteration of our design are as follows:

- We feel as though the ability to hover over surgery instances to view individual player information is a strong asset.
- The spacing in `countVis` is distracting, and we are not very fond of our decision to use circles to represent surgery occurrences.
- With our decision to represent surgery instances with circles in `countVis`, brushing may not be as intuitive as it is with an area layout.

Back to the drawing board:

- When users search for players or hover over specific surgery occurrences in `countVis`, show the picture of the player and the player name in the backdrop of `countVis` itself.
- Enable users to search not only for players but also for teams.
- Possibly have surgery occurrences be nodes that can be grouped by team, age, or a performance metric.

Implementation:

Describe the intent and functionality of the interactive visualizations you implemented. Provide clear and well-referenced images showing the key design and interaction elements.

TODO for final submission

Evaluation:

What did you learn about the data by using your visualizations? How did you answer the questions? How well does your visualization work, and how could you further improve it?

TODO for final submission