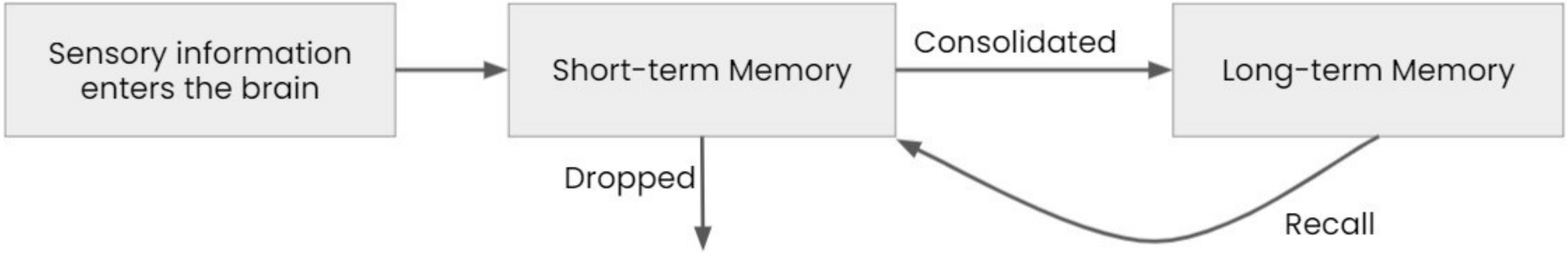
Reduce cognitive load

DATA VISUALIZATION IN POWER BI

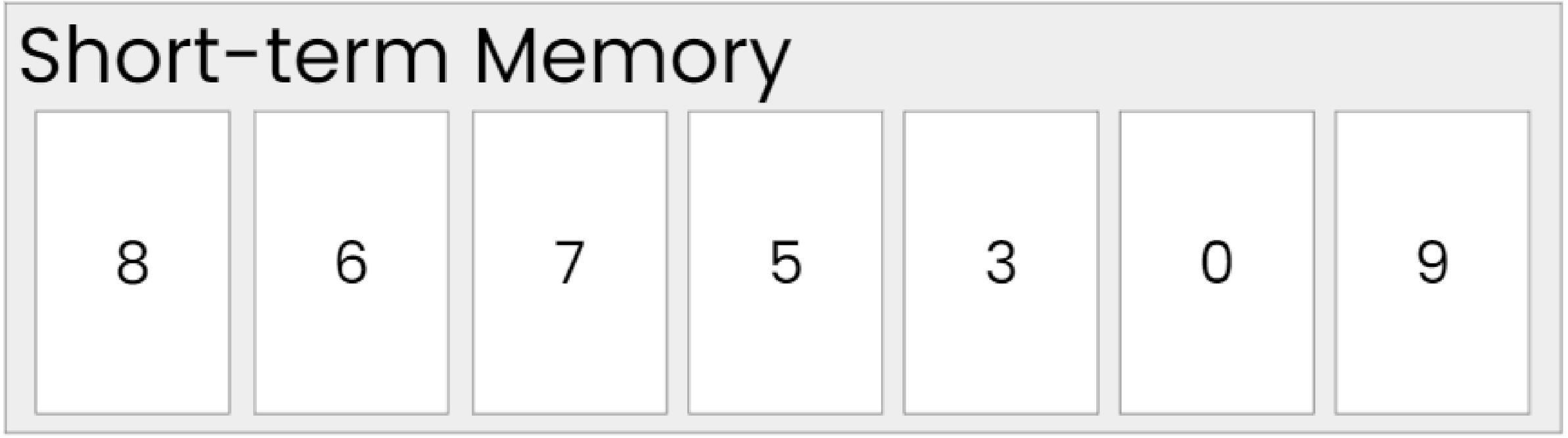
Short-term memory

This is a simplified version of the way humans process signals.



The "magical number seven"

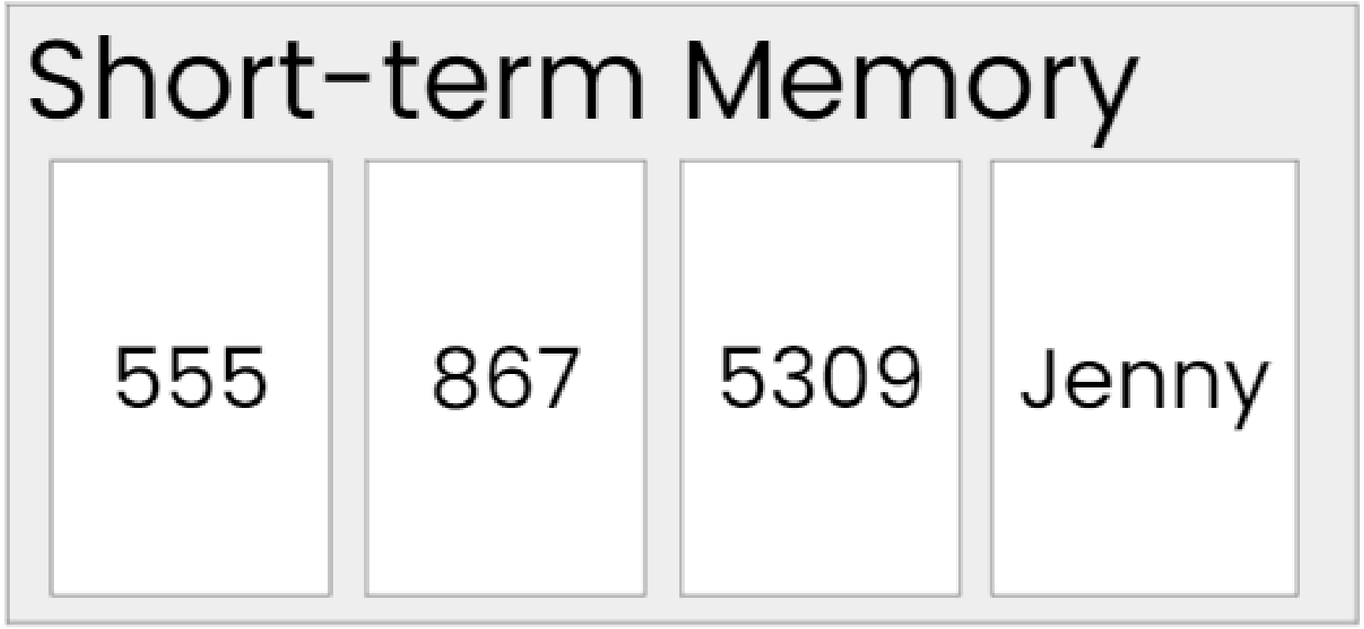
George Miller's research discovered that humans can tend to hold seven (plus or minus two) pieces of information at a time in short-term memory.



[1]Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. Psychological Review, 63(2), 81-97.

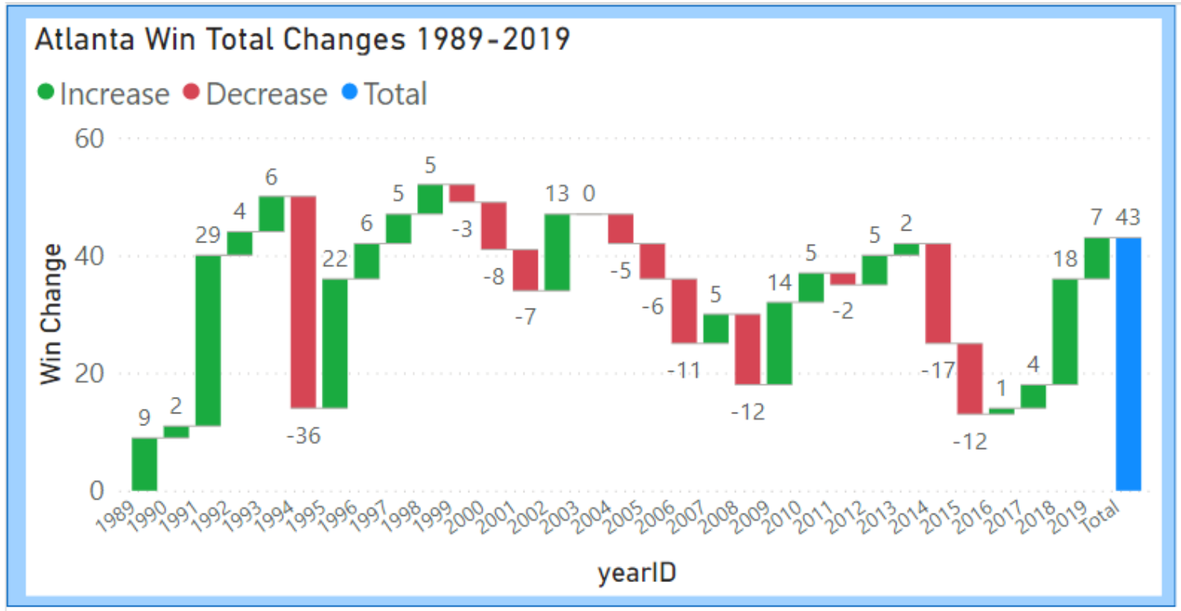
Or maybe 4?

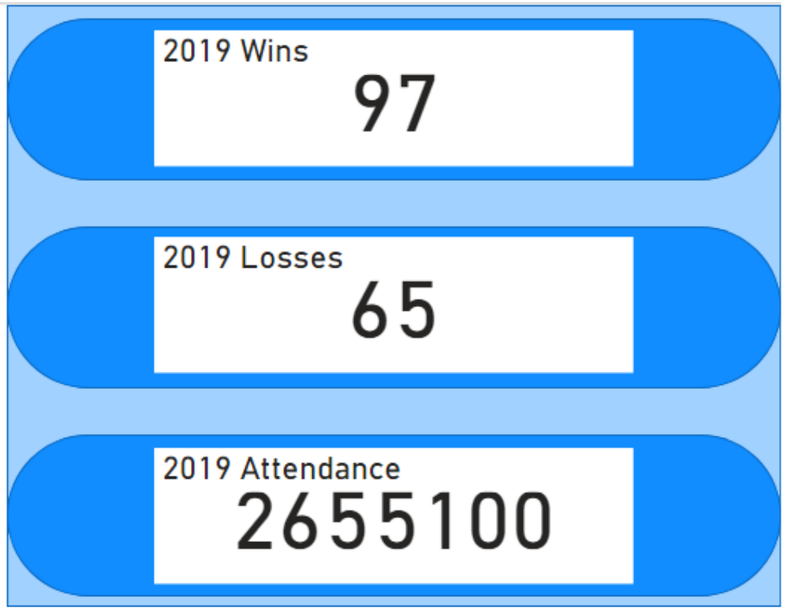
Further research indicates that this may be closer to 4 +/- 1but that we can "chunk" information together.

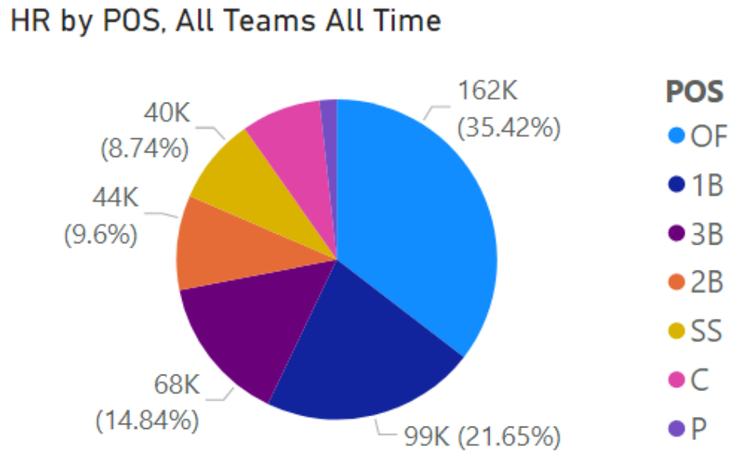


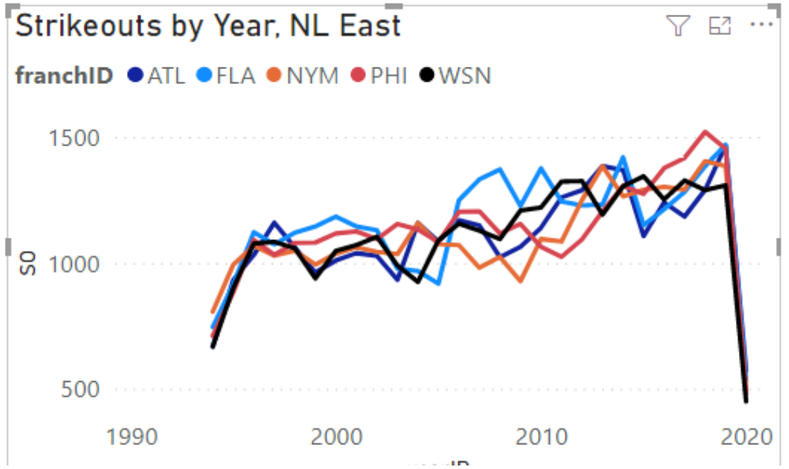
[1]Cowan, N (2001). The magical number 4 in short-term memory: a reconsideration of mental storage capacity. Behavioral Brain Science, 24(1), 87-114.

Cognitive load





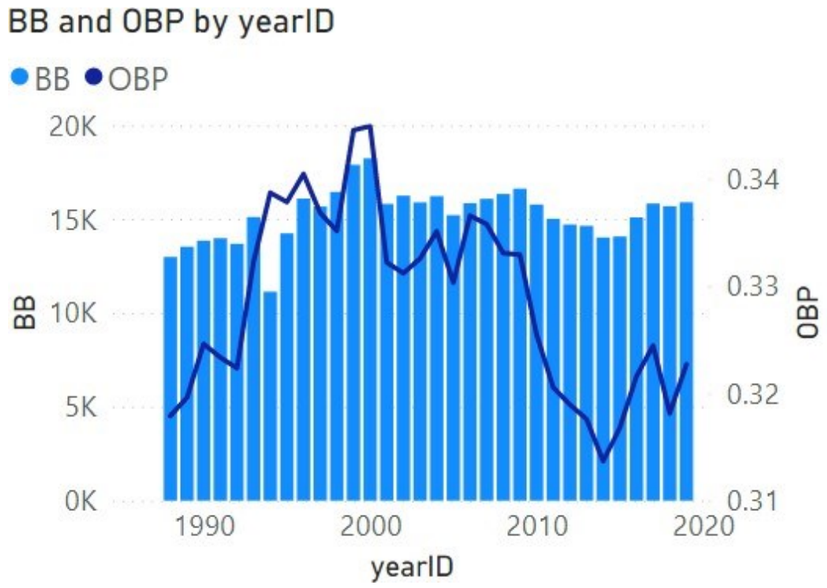


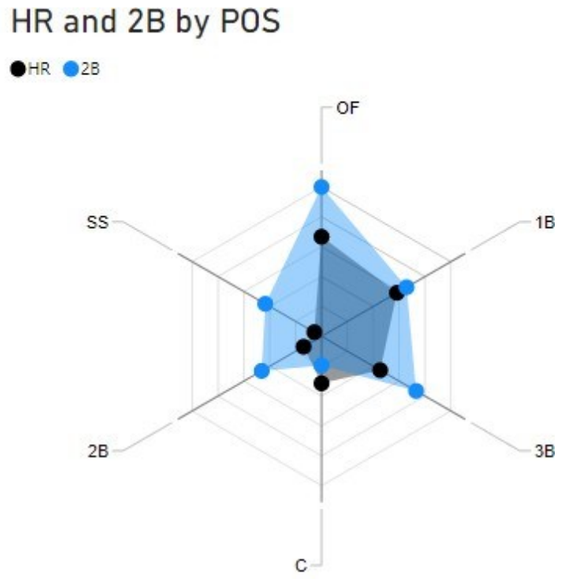


Reducing cognitive load

Quick wins in reducing cognitive load:

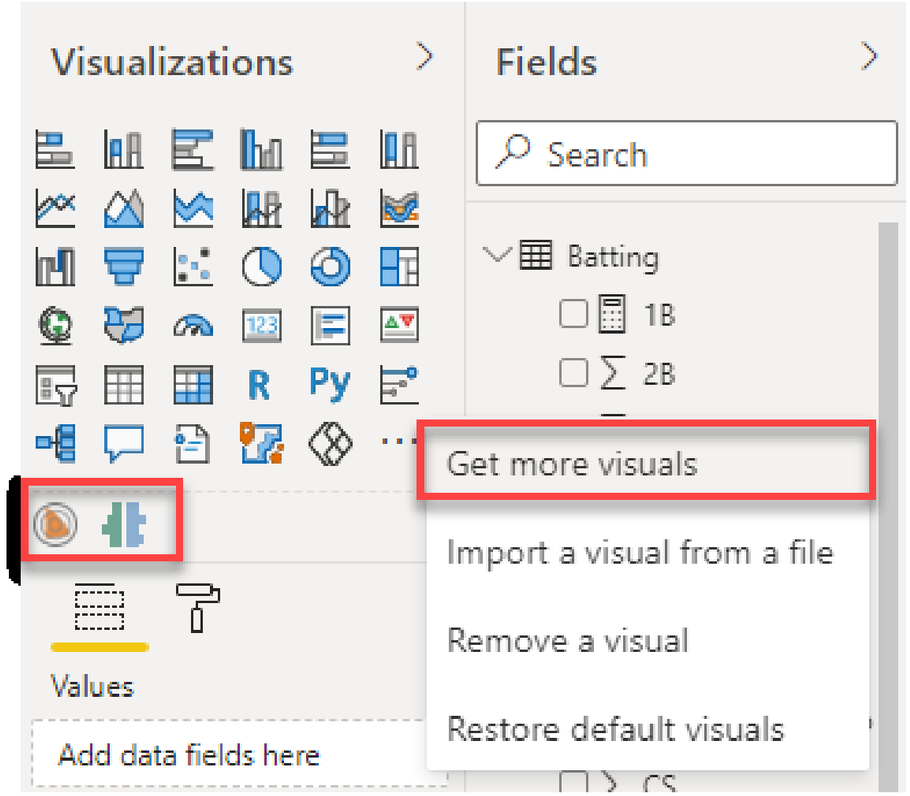
1. Tailor the page to your audience
2. Focus on one story per report page
3. Strike the balance between information-rich visuals and confusing the audience





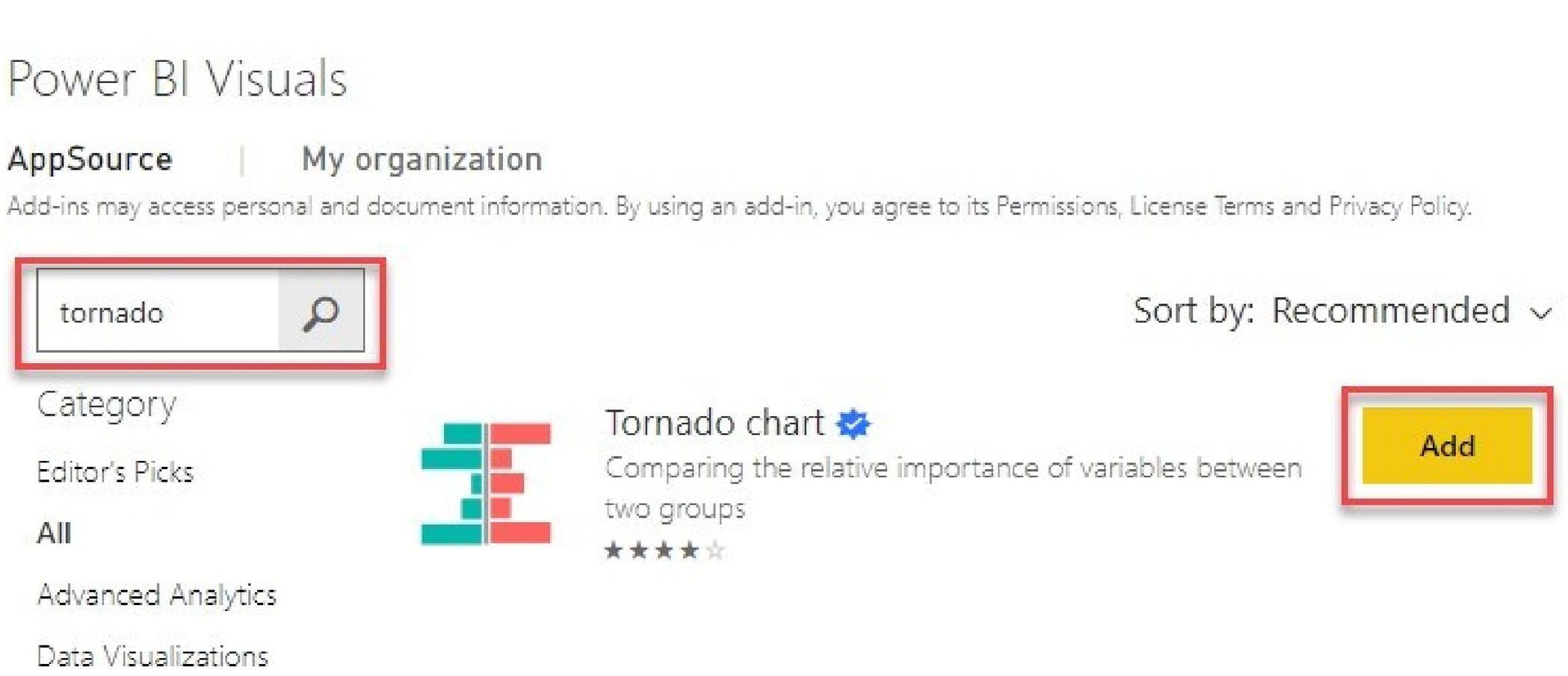
Custom visuals in Power BI

Custom visuals can be loaded into a Power BI report.



Microsoft AppSource

AppSource is a centralized marketplace for Power BI custom visuals.



Thinking of our audience

Historian persona

- How has offensive productivity changed over time?
- Is an emphasis on power hitting a detriment elsewhere?

Let's practice!

DATA VISUALIZATION IN POWER BI

Questions…

Reducing cognitive load

Reducing cognitive load is an easy way to improve the usability of your dashboards. Which of the following techniques are effective at reducing cognitive load, and which are not?

Use a larger font size

Use several complex visuals to tell a story

Focus on one story per page

Remove borders, expressive backgrounds, and shapes which do not convey information

Use visuals the users already understand

Combination charts and custom visuals

DATA VISUALIZATION IN POWER BI

Let's practice!

DATA VISUALIZATION IN POWER BI

Less is more

DATA VISUALIZATION IN POWER BI

Line and Area Charts Exercise

In this exercise, we will use a line chart to track three important rate statistics for batting: batting average (`AVG`), on-base percentage (`OBP`), and slugging percentage (`SlugPct`). Then we will see how these statistics move over time using area charts.

Line charts are a great way of tracking historical changes in a small number of features. But, you will see that area charts do not always make great replacements for line charts.

Step 1

Load `3_1_line_and_area_charts.pbix` from the Exercises folder on the Desktop. Then, create a new page called "Batting Trends" and add a slicer for year based on the `Batting` table. Put this slicer on the right-hand side and change the slicer header's "Title text" to "Years".

Step 2

- Add a new line chart and track batting average (`AVG`), on-base percentage (`OBP`), and slugging percentage (`SLG`) by year. All of these measures are available from the `Batting` table.
- Stretch the line chart to fit approximately 75% of the canvas space horizontally and fill approximately 50% of the canvas vertically.
- Change the "Title" of the chart to "Batting Rates by Year" and the X axis to read "Year".
- Disable the title from the Y axis and change "Value decimal places" to `3` .

Step 3

- Change the line chart to be an area chart.

Note that doing this adds visual noise and actually adds confusion because the chart does not start at the origin.

- Change the chart back to a line chart.

Which year had the highest on-base percentage (OBP) on record?

Combo Charts Exercise

Batters can adopt a stance to either improve "home runs" (`HR`) or "hits"(`H`). But, they only will increase their "batting average"(`AVG`) when they focus on "hits" because doing "home runs" is more difficult. Since this relation seems to be negative, we might expect that the "batting average" will decrease as the number of "home runs" increases.

In this exercise, we will test whether this negative relation holds. Combination charts are best used in situations such as where you wish to compare a rate variable and a counting variable over time.

If you have lost any progress, close any open reports and reload `3_2_combo_chart.pbix` *from the Exercises folder on the desktop.*

Step 1

Add a new line and clustered column chart visual. Have this new visual take up the space underneath the line chart.

Step 2

- Using the `Batting` table, visualize Home Runs (`HR`) and Batting Average (`AVG`) over time. Use `HR` as the bars and the `AVG` as the line.
- Format the chart so that the "Title text" reads "Batting Average and Home Runs over Time".
- Change the X axis "Axis title" to read "Year".

Step 3

Because number of home runs (`HR`) is a counting measure, it makes sense to try to use the same number of games for comparison.

Knowing that since 1963 there has been the same number of games, create a slicer and filter the selection to 1963-2019.

Looking at batting average versus number of home runs over time, how would you characterize the relation between the two? That is, how tightly do the variables move together?

- ○ Move together, but weakly (weakly positive correlation)
- ○ Move in opposite directions, but weakly (weakly negative correlation)
- ○ Move strongly in opposite directions (strongly negative correlation)

Tornado Chart Exercise

Critics claim that batters who get more "home runs"(`HR`) are larger,powerful, but slower; meanwhile, players who have many "stolen bases"(`SB`) tend to be smaller and faster, but not as powerful. This implies a negative relation between "home runs" and "stolen bases". In this exercise, we will use a custom tornado chart visual to see whether the conjecture above holds.

If you have lost any progress, close any open reports and reload `3_3_tornado_chart.pbix` from the Exercises folder on the desktop.

Step 1

On the `Batting Trends` page, add a new custom *Tornado* chart on the bottom right-hand corner, fitting beneath the year slicer. It could take half a minute before the tornado chart visual option appears.

Step 2

- Set the tornado chart to track "stolen bases" (`SB`) and "home runs"(`HR`) by year. All of these columns come from the `Batting` table.
- Then, sort the tornado chart by year (either ascending or descending).
- Change the "Title text" for the visual to "Speed versus Power".

Step 3

Narrow down the year range from 2003-2019.

Looking at stolen bases versus home runs over time, how would you characterize the relationship between these two measures?

- ○ Negative relationship
- ○ No relationship
- ○ Positive relationship

Your Assignment

Submit all of the exercises for Part 1 and Part 2 of the exercises.

ALSO

Identify and create visuals for 5 insights for the Miami Marlins.

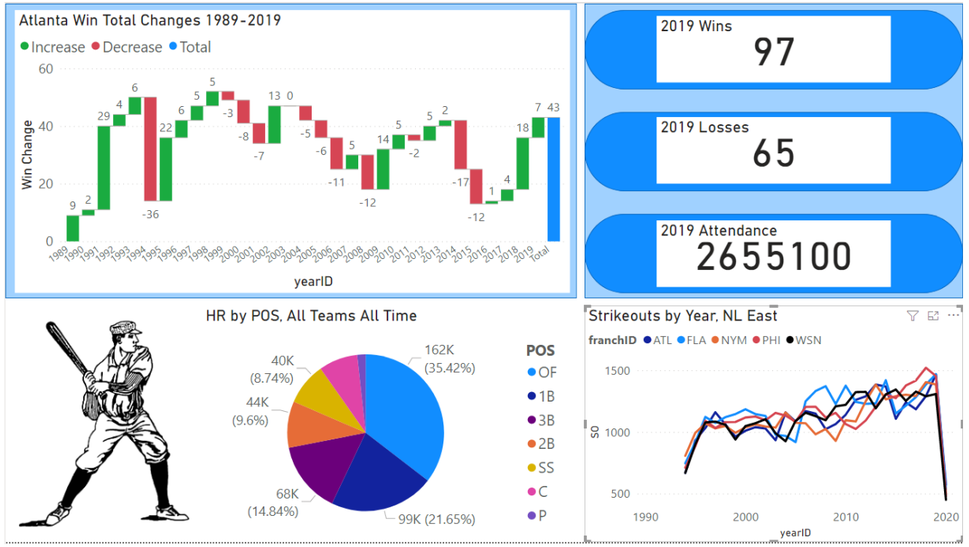
Keys to good visual design

Before adding something to a dashboard:

- Does this contribute to the story?
- Is this the right visual element?
- Is this visual element necessary?

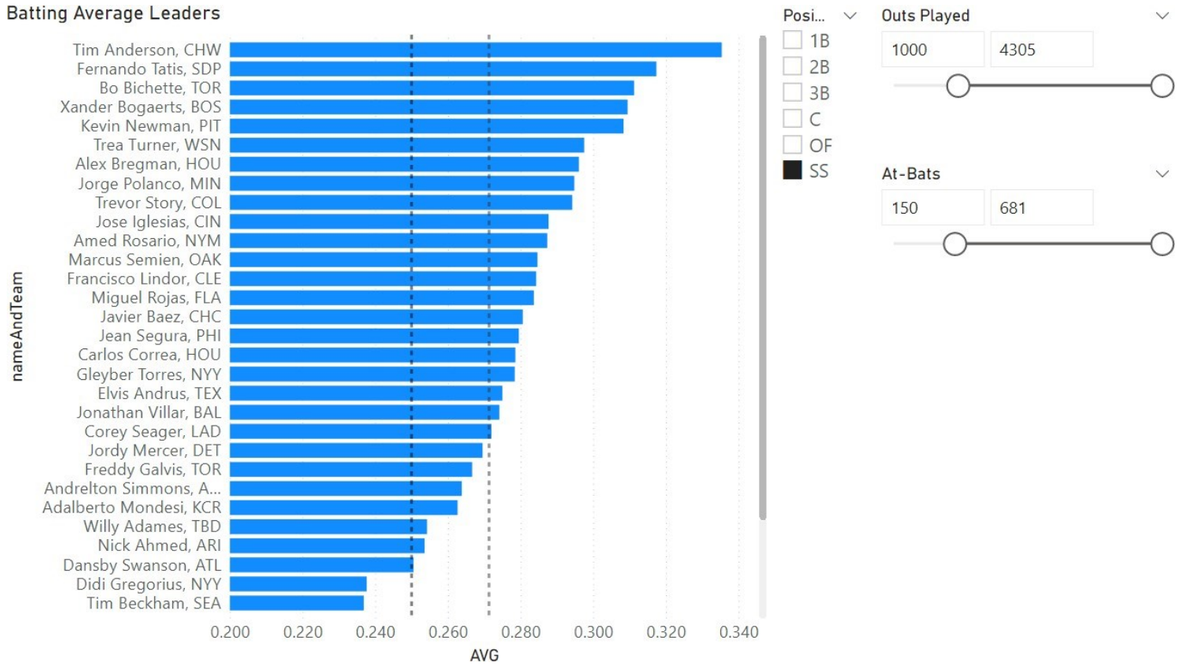
Promoting the story

- What story am I trying to tell?
- Does this new visual align with the story?
- Will my audience see it that way?

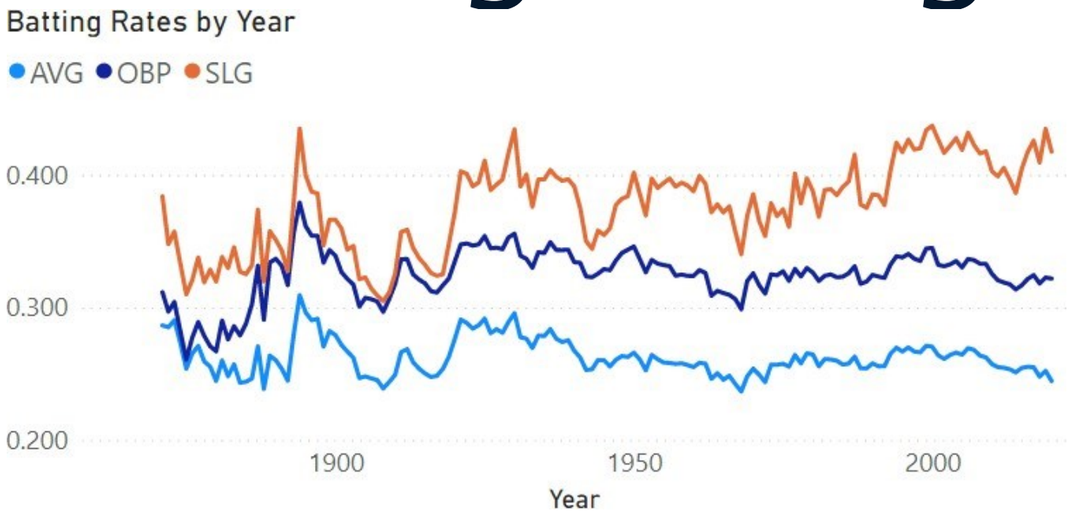


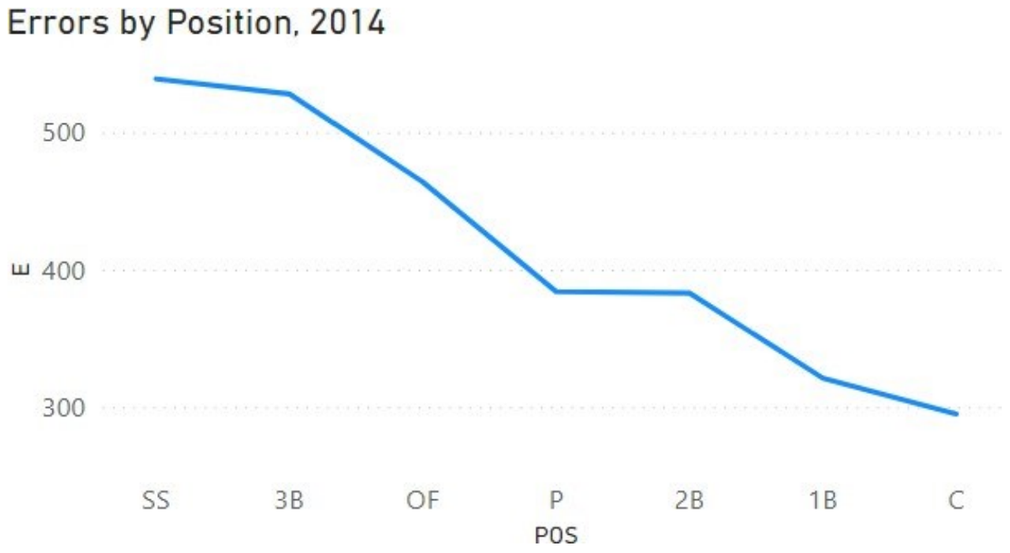
Story-telling in a world of choices

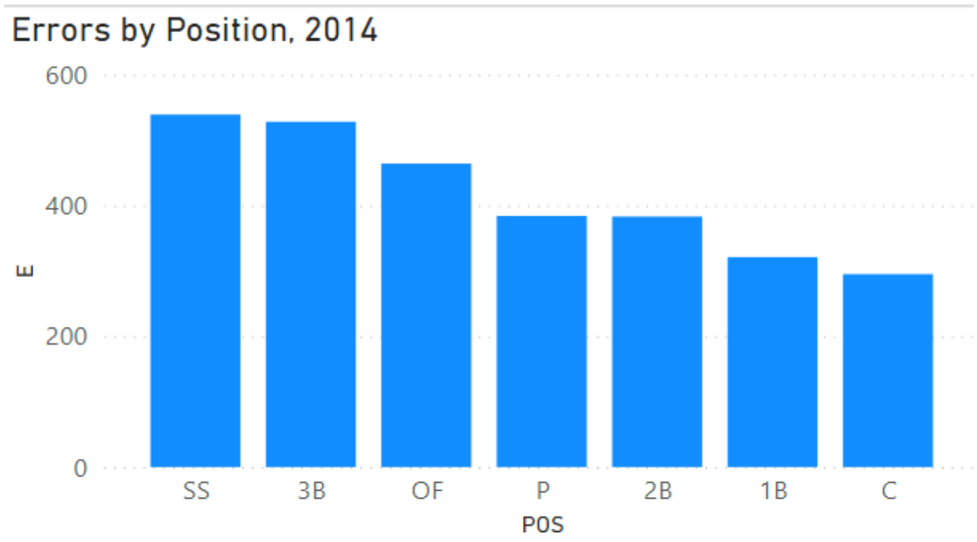
- Filters and slicers give users exibility
- Flexibility limits your control
- Understand user needs and the types of stories they can pull from the data



Choosing the right visual element

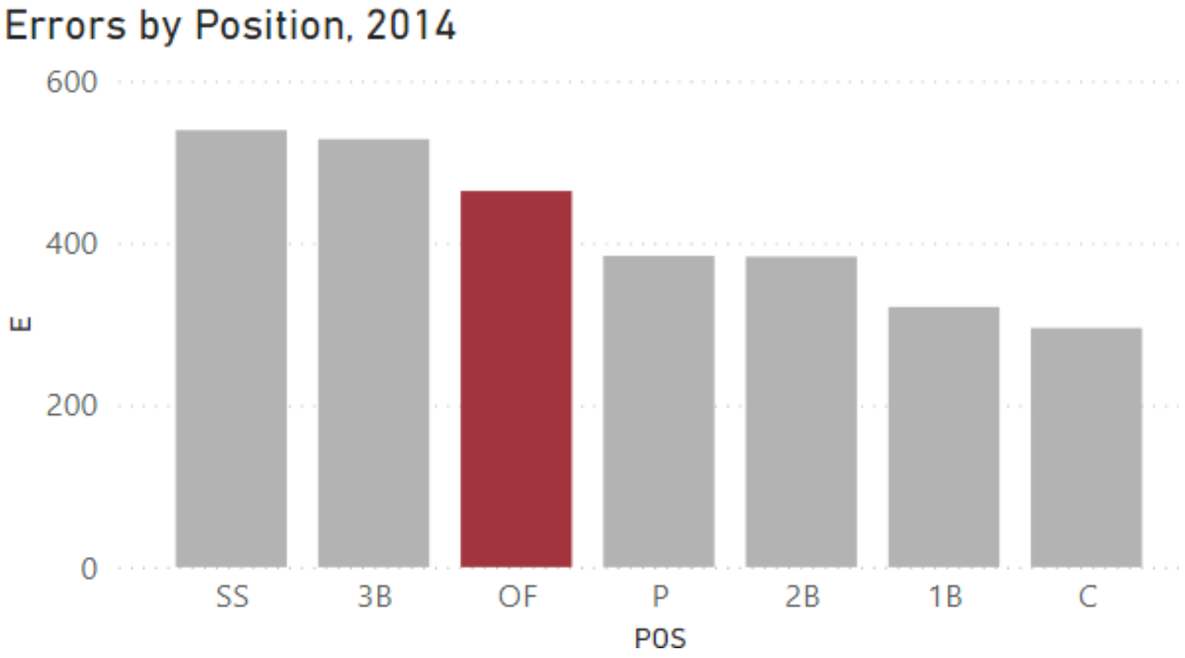






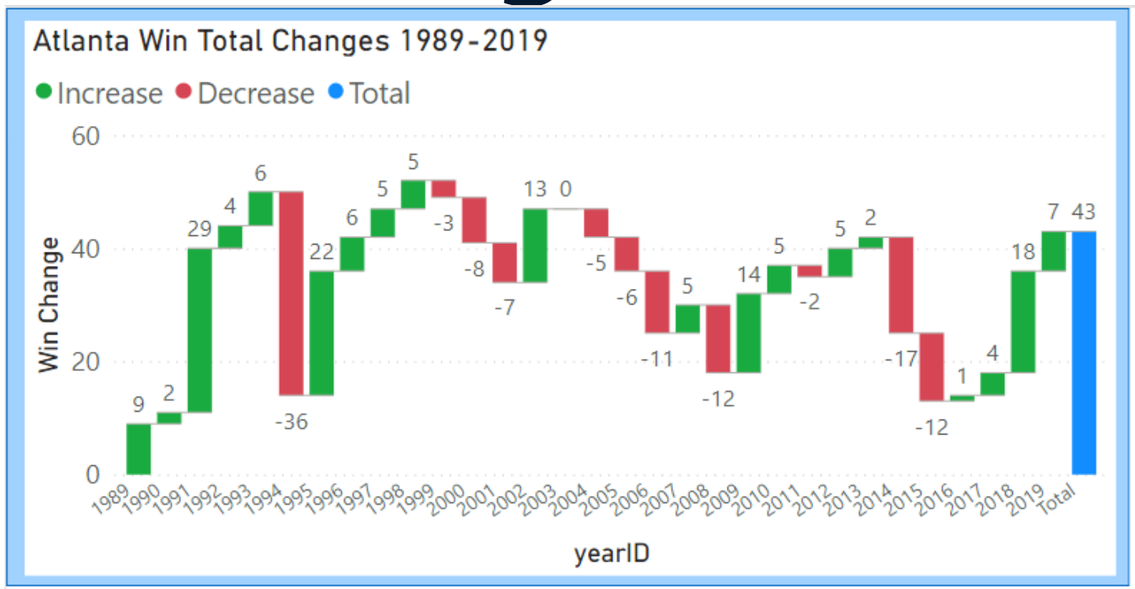
Color as an emphasis

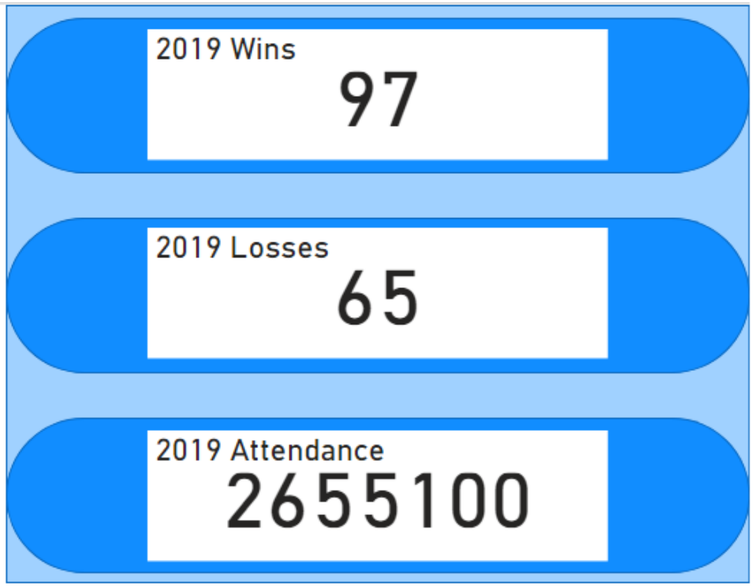
- Color is a "pre-attentive attribute"
- Use neutral colors for bars
- Pick one emphasis color
- Color is a garnish

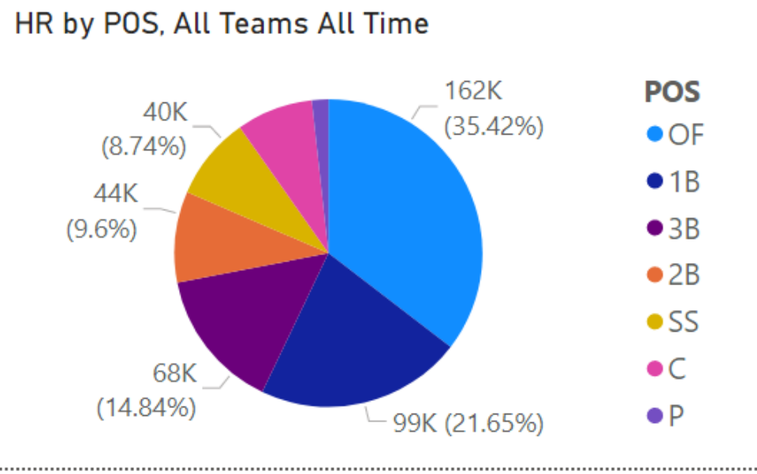


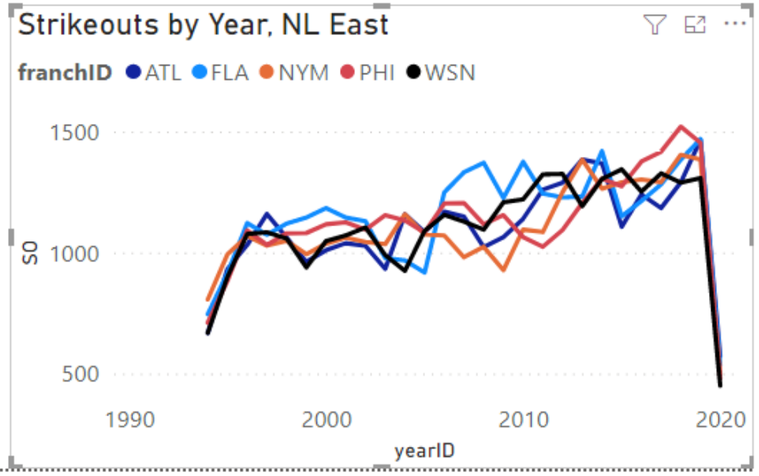
The importance of negative space

De-cluttering a dashboard



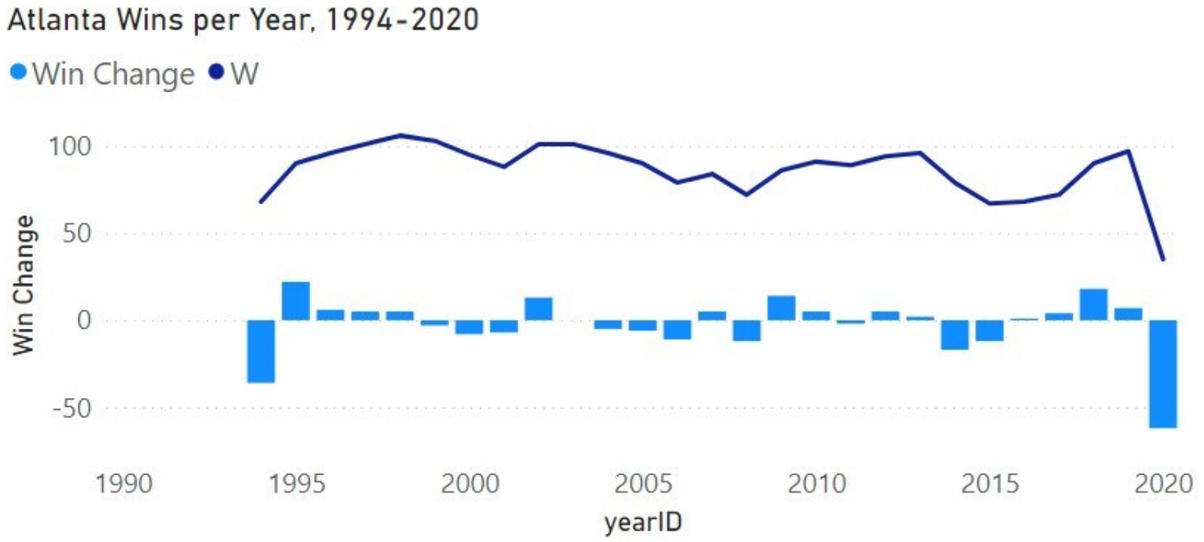


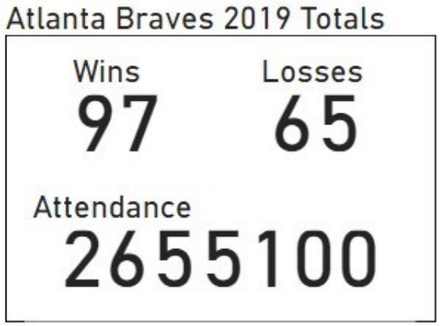


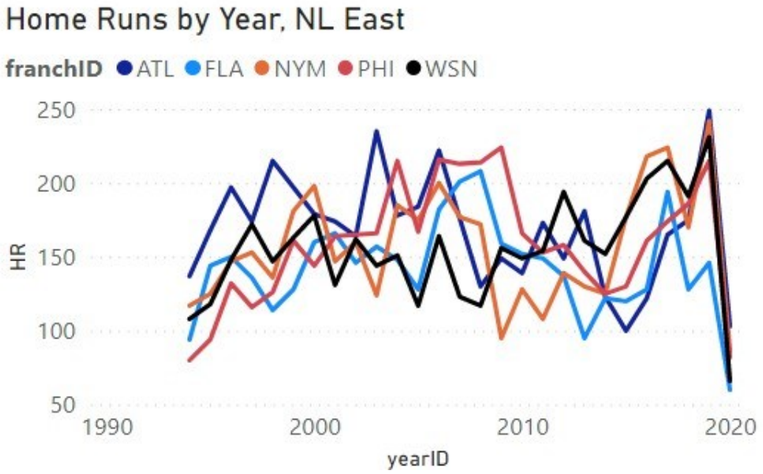


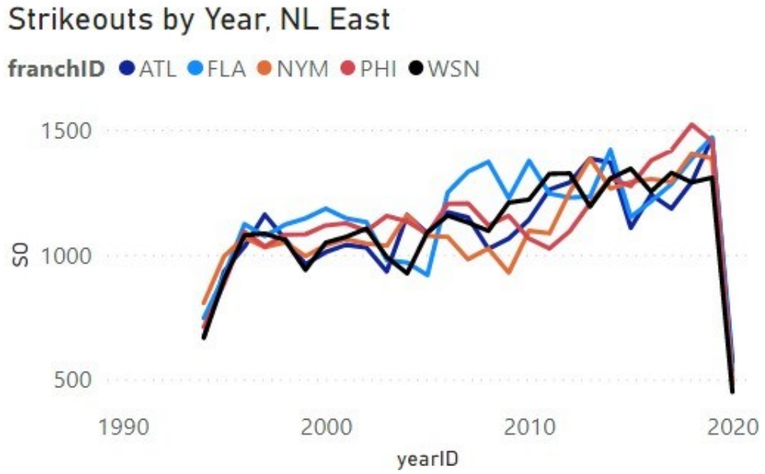
De-cluttering a dashboard

A Less Cluttered Dashboard









Thinking of our audience

General Manager persona

- Who played at each position for our team and how much did they play?
- How well is our team meeting expectations around on-base percentage and errors?

Let's practice!

DATA VISUALIZATION IN POWER BI

Shares, gauges, and KPIs

DATA VISUALIZATION IN POWER BI

Let's practice!

DATA VISUALIZATION IN POWER BI

Data visualization in Power BI

Part 1

- Know your audience
- Dashboards vs. pixel-perfect reports

Part 2

- Evoking an emotional response

Part 3

- Reducing cognitive load

Part 4

- Good visual design
- Effective use of colors
- De-clutter a dashboard