SHOW ME THE NUMBERS

Basic principles of data visualization

Lisa Trescott (she/her)
Research Analyst, MiraCosta College

Increase understanding while decreasing cognitive load

AGENDA

PREATTENTIVE ATTRIBUTES

COLOR

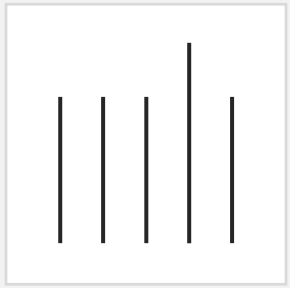
CHART SELECTION

CLUTTER

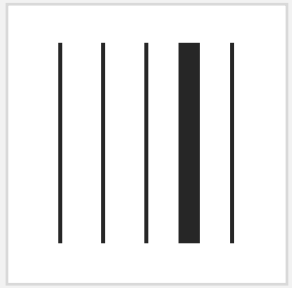
PUTTING IT ALL TOGETHER

PREATTENTIVE ATTRIBUTES

Preattentive attributes are visual properties we notice and process **unconsciously**



Length



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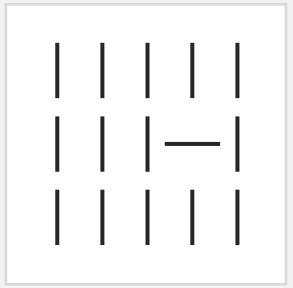
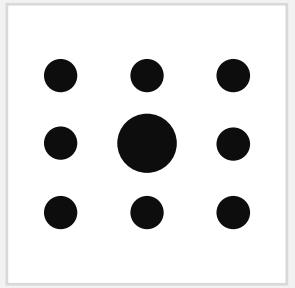
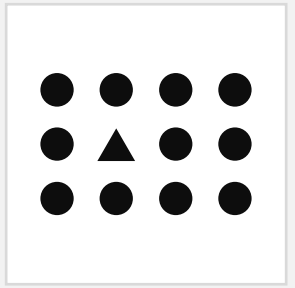


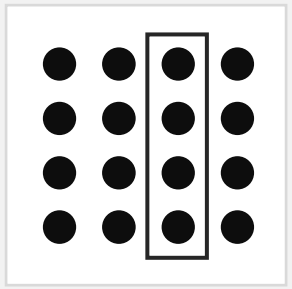
Orientation



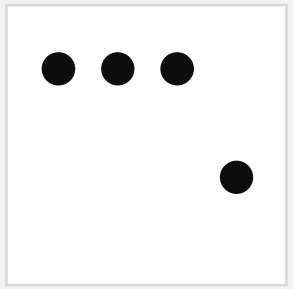
Size



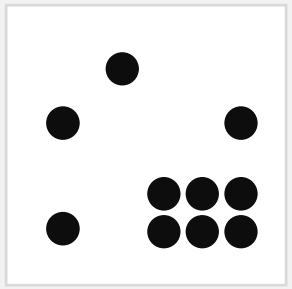
Shape



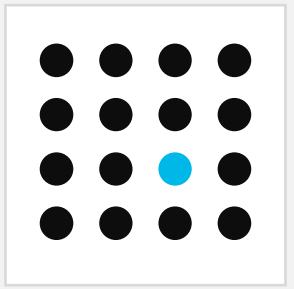
Enclosure



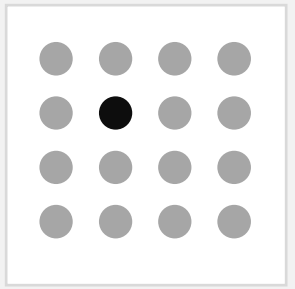
Position



Grouping



Color (hue)



Color (Intensity)

COLOR

Color

When used correctly, color is the most powerful tool you have to draw attention

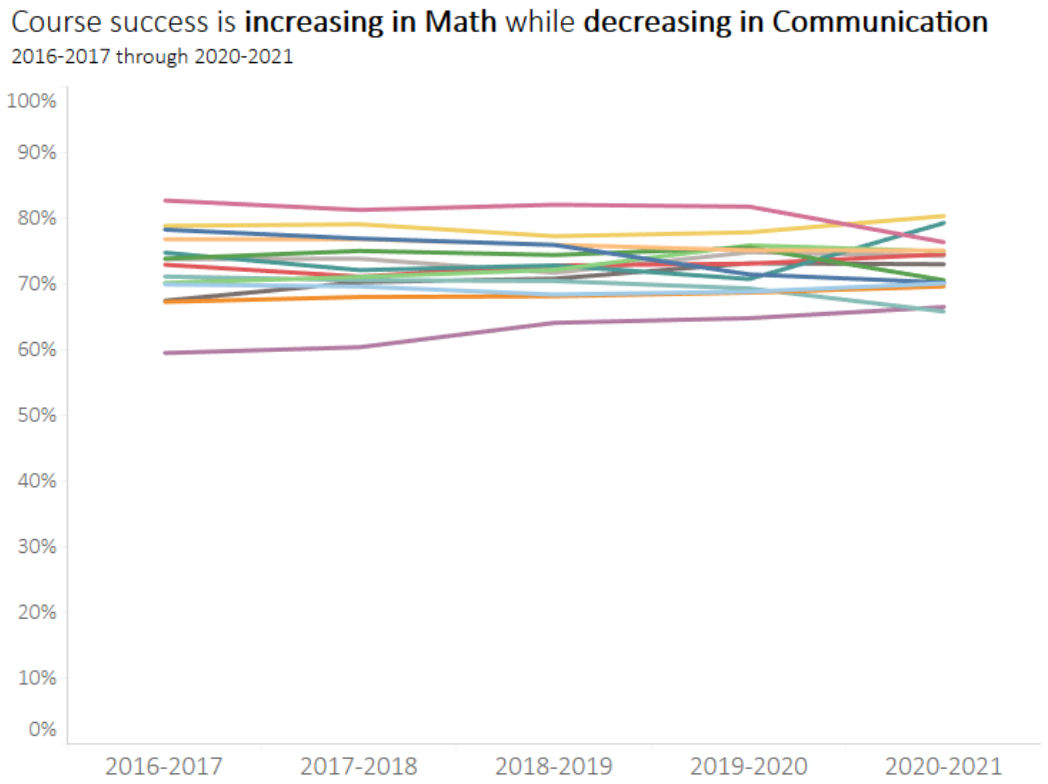
GUIDELINES

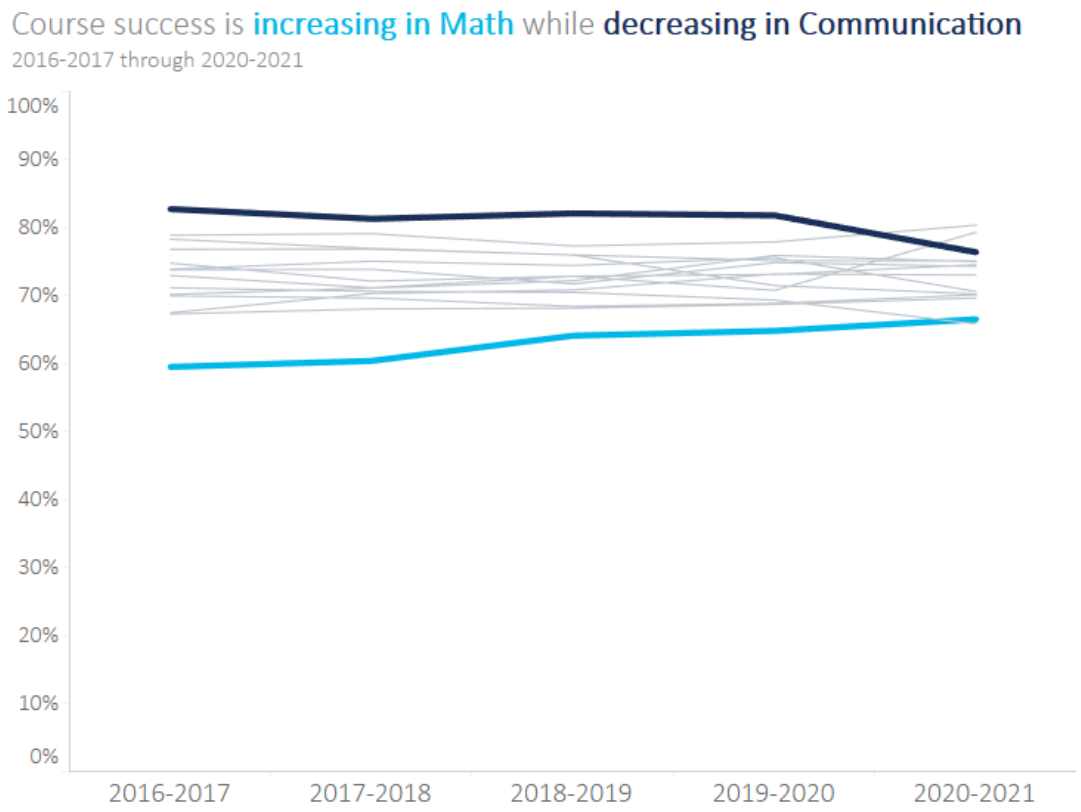
- Use color sparingly
- Make color meaningful
- Design with colorblind in mind
- Consider leveraging school colors

Adapted from *Storytelling with Data* (Knaflic)

USE COLOR SPARINGLY

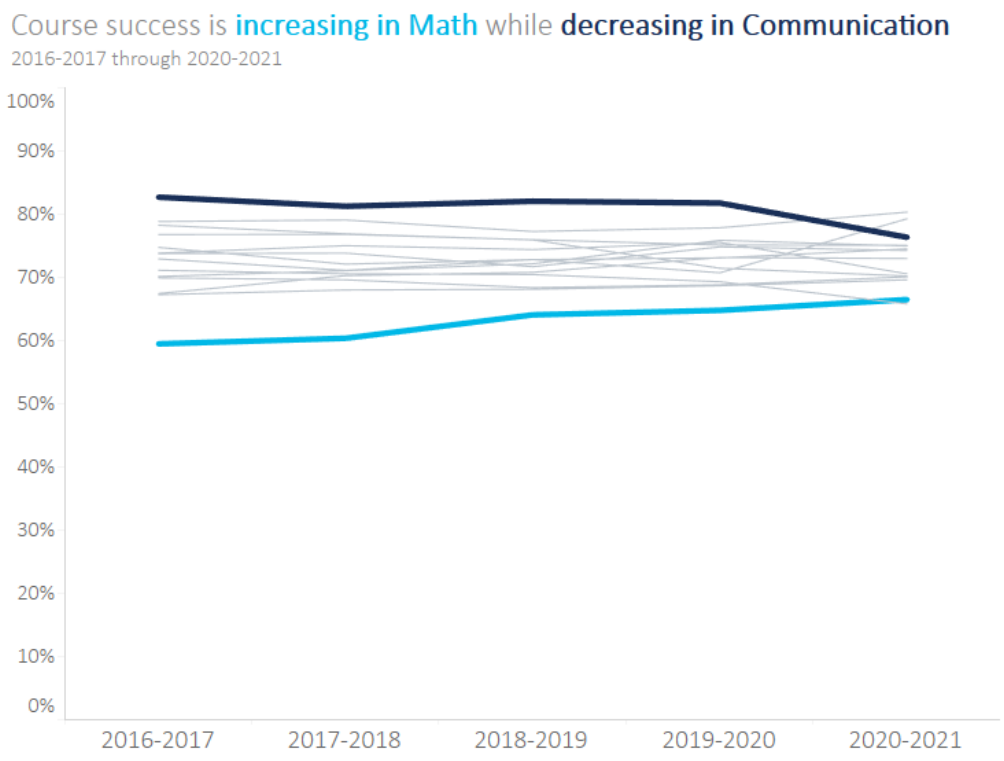
Too many colors prevent anything from standing out, and we lose color's preattentive power

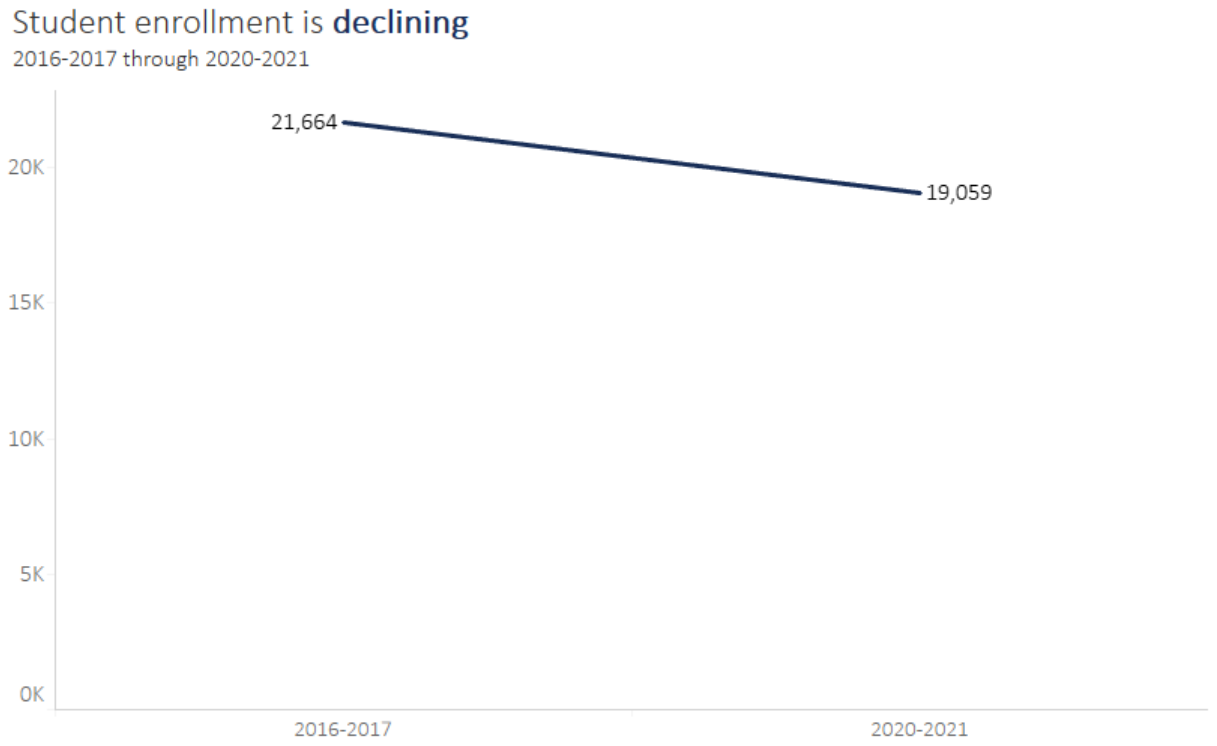




MAKE COLOR MEANINGFUL

Keep color consistent so your user isn't confused





DESIGN WITH COLORBLIND IN MIND

About 1 in 20 people has a form of colorblindness

Blue is the safest hue

Source: https://blog.datawrapper.de/colorblindness-part1/

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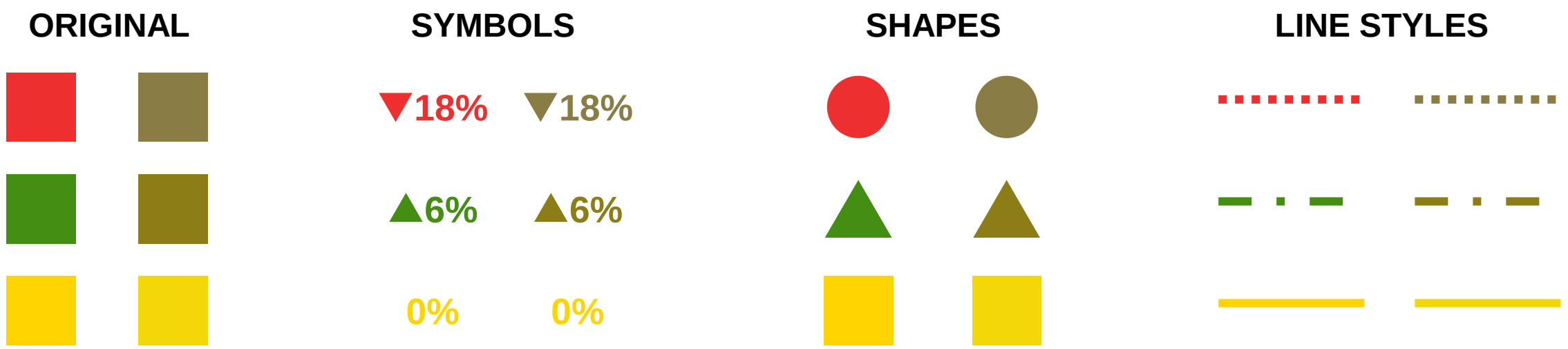
DESIGN WITH COLORBLIND IN MIND

If you use non-colorblind friendly palettes, don’t rely on color alone to communicate



CONSIDER LEVERAGING SCHOOL COLORS

Identify one or two school colors to use as “look here” colors combined with a neutral

MiraCosta College

Look here

Look here

Everything else

CHART SELECTION

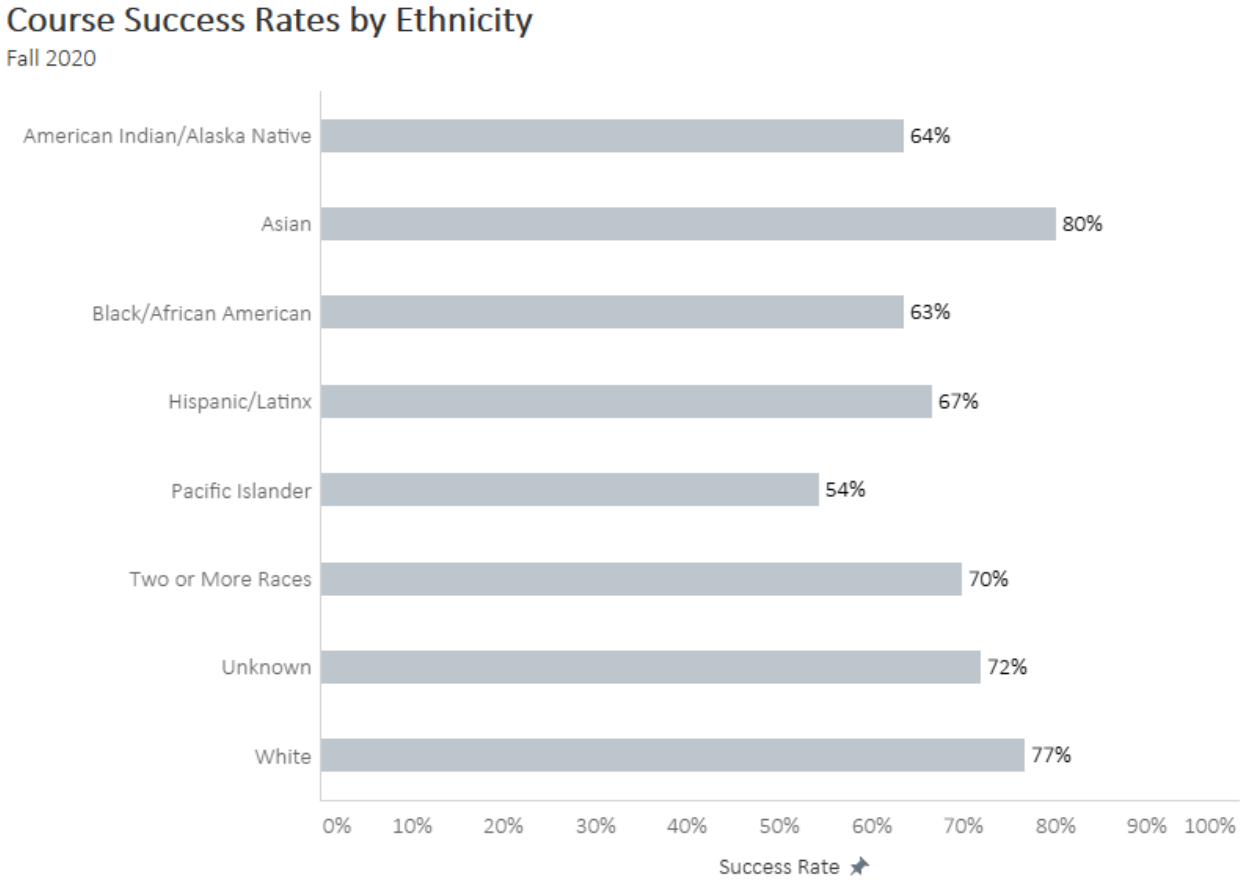
What are you trying to show?

Select a chart that most clearly gets your message across to your audience

- Compare values
- Show trends
- Highlight key points/insights

Compare Values

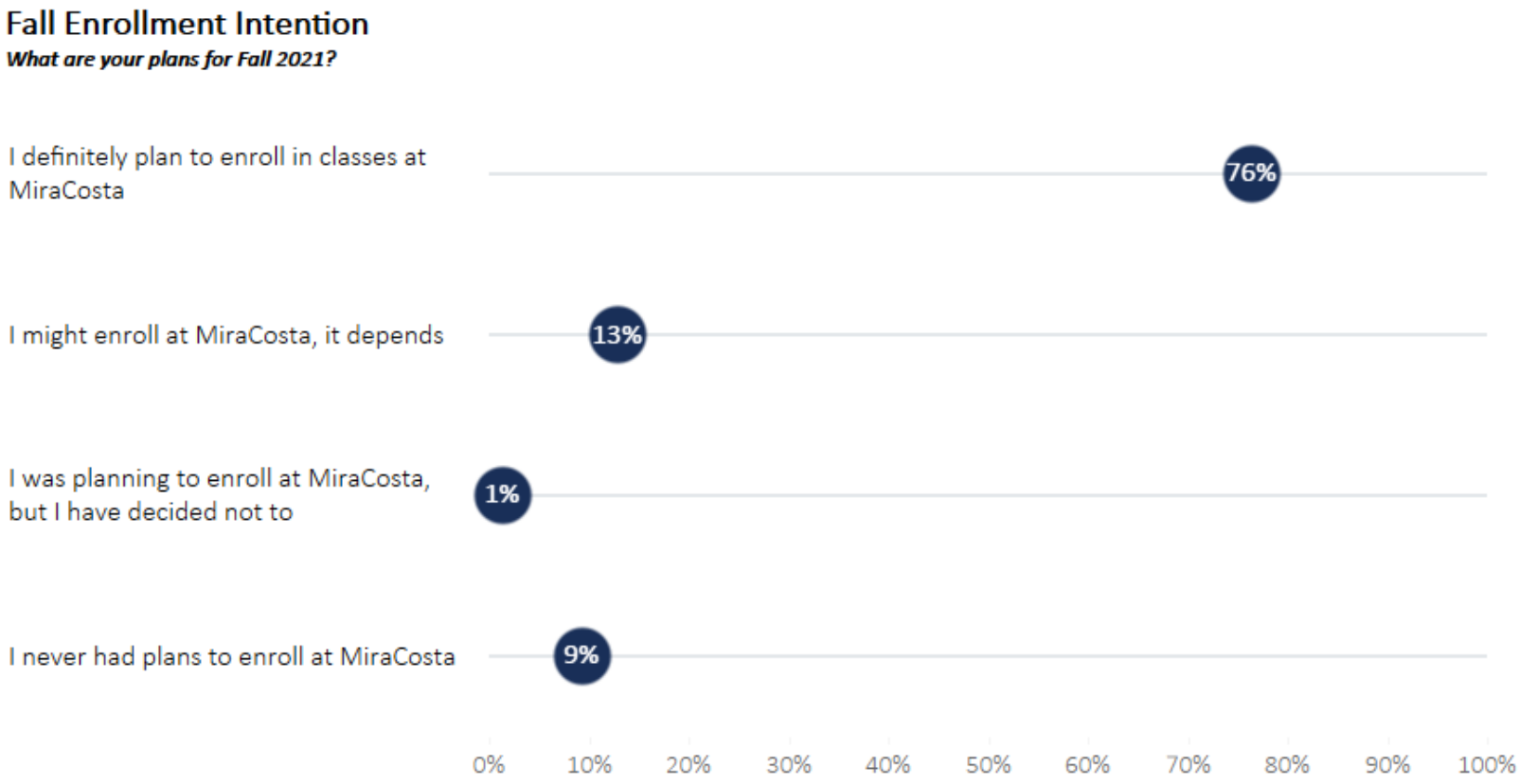
- Bar chart
- Dot plot
- Dumbbell chart
- Scatterplot



- Start Y axis at 0
- Use horizontal labels
- Variations: bar-in-bar, lollipop, butterfly

Compare Values

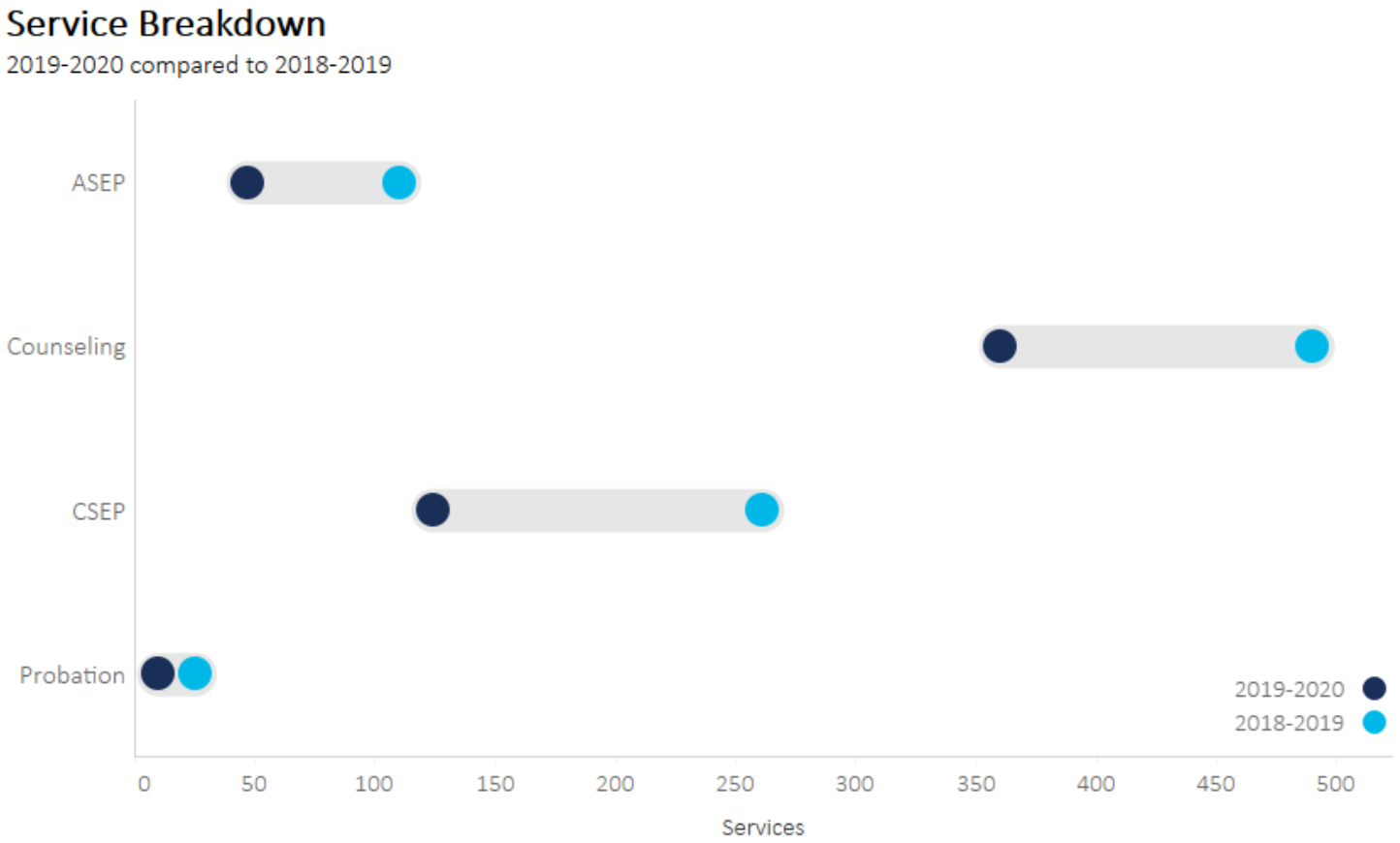
- Bar chart
- Dot plot
- Dumbbell chart
- Scatterplot



- Leverages position (preattentive attribute)
- Add a line to help orient your user

Compare Values

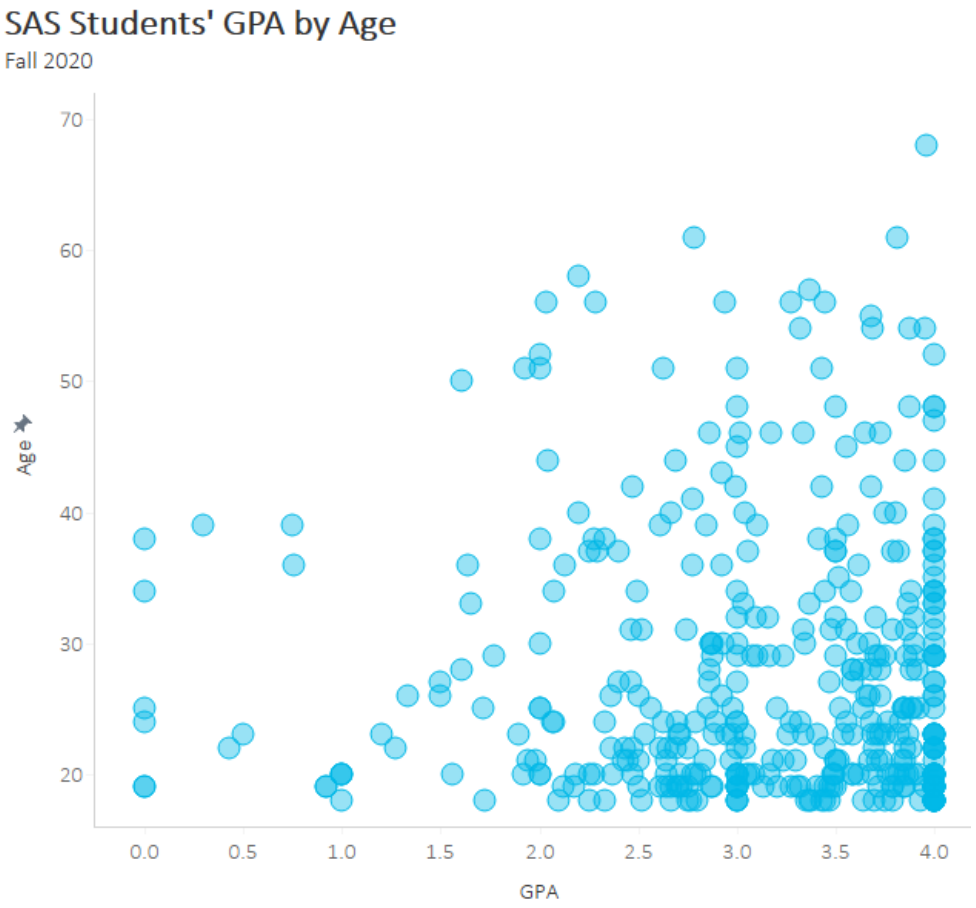
- Bar chart
- Dot plot
- Dumbbell chart
- Scatterplot



- Best when comparing 2 time points
- Similar data points can get crammed or overlap

Compare Values

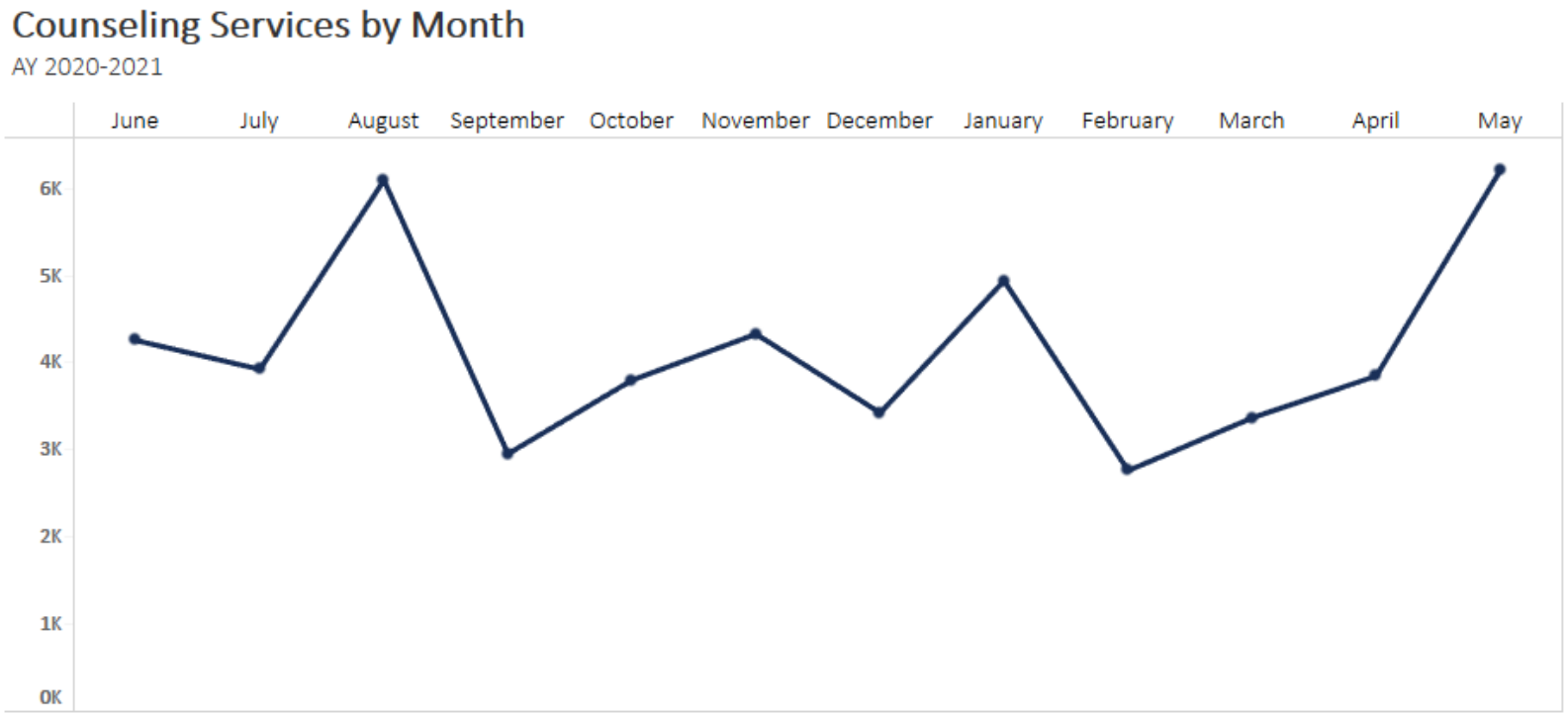
- Bar chart
- Dot plot
- Dumbbell chart
- Scatterplot



- Compare 2 continuous variables
- Add transparency to points to help users see overlapping points

Show Trends

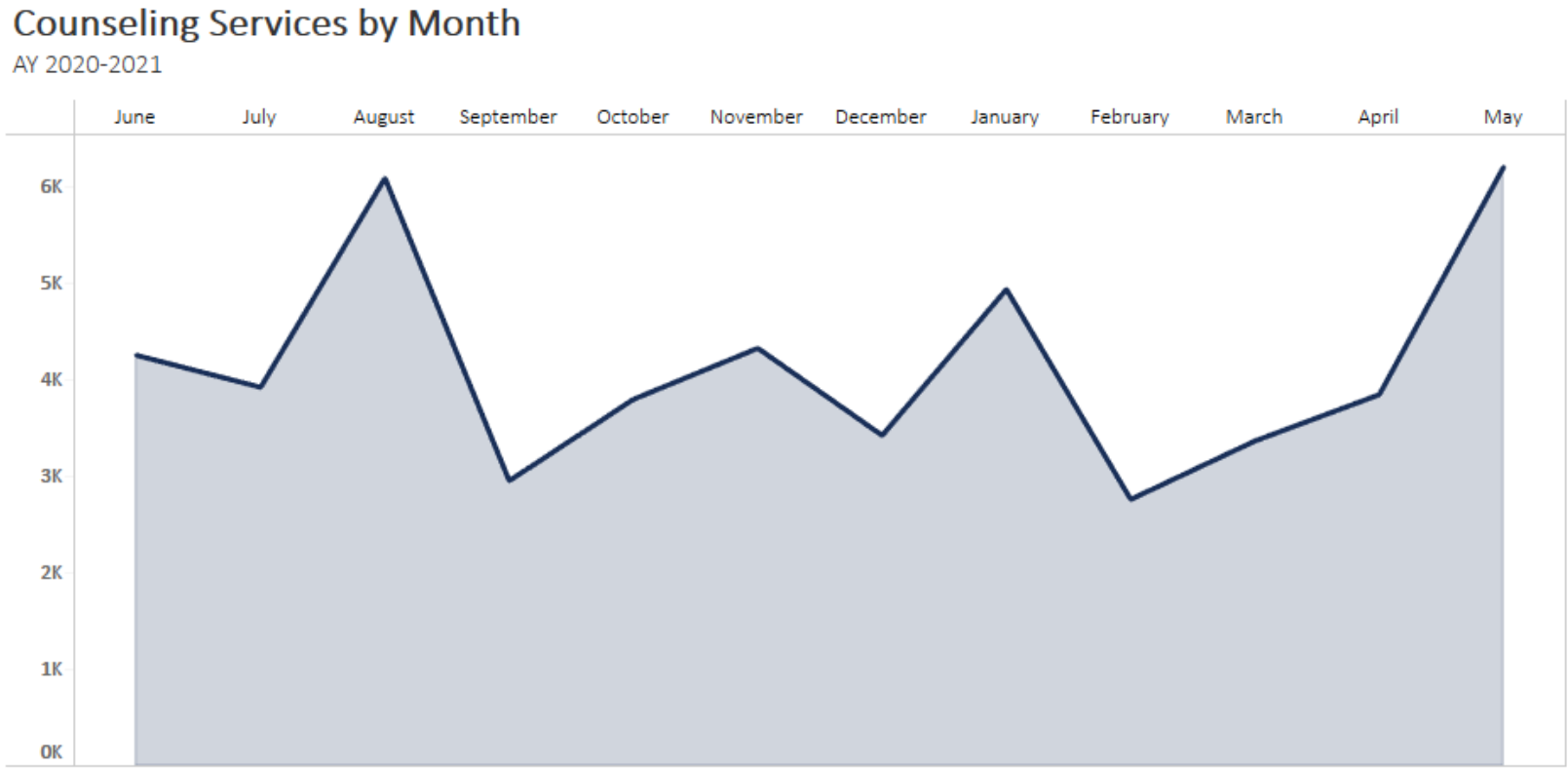
- Line chart
- Area chart
- Slope chart



- Show time-series data
- No more than 4 lines

Show Trends

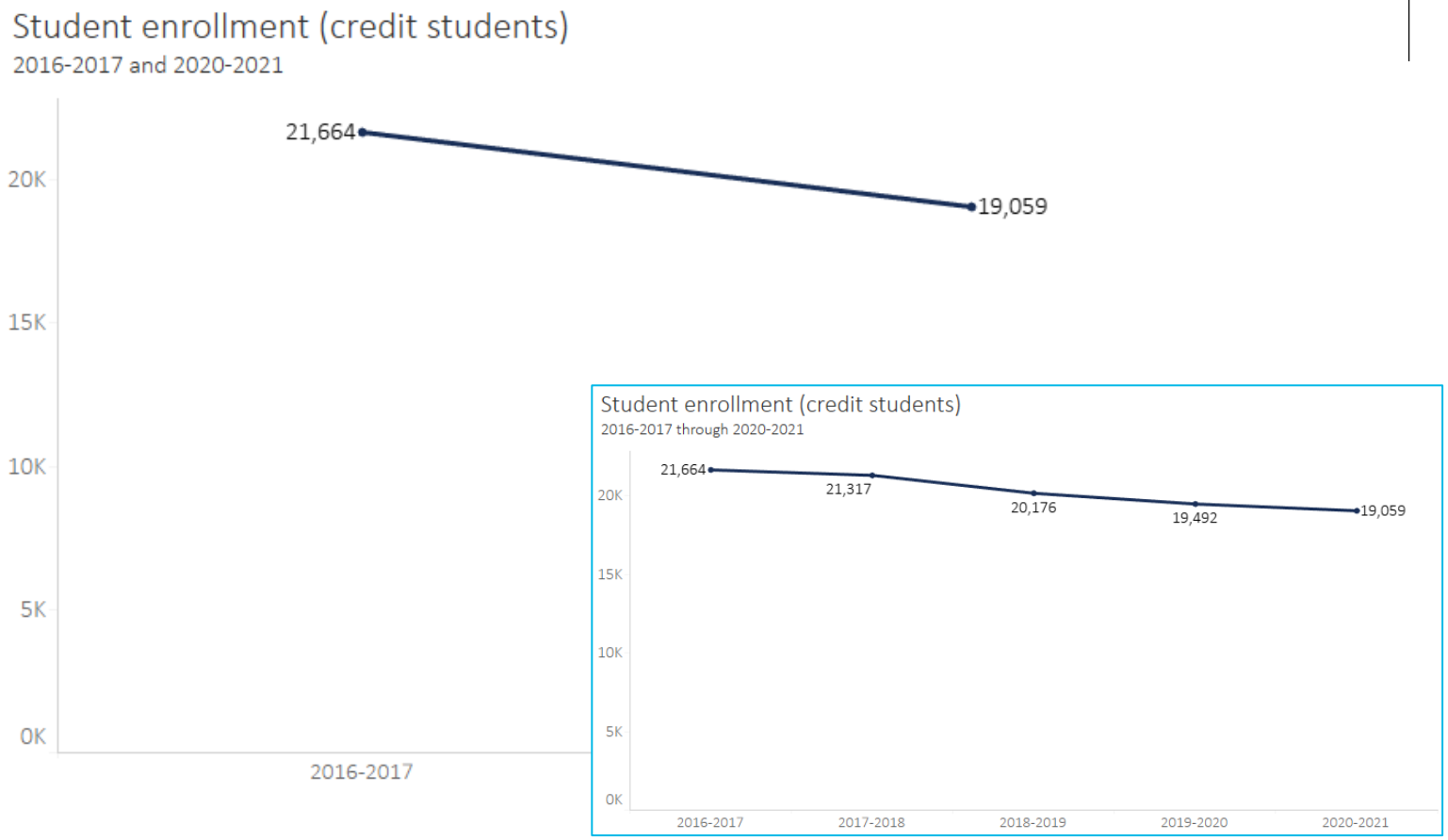
- Line chart
- Area chart
- Slope chart



- Show time-series data
- Add transparency
- Don’t stack

Show Trends

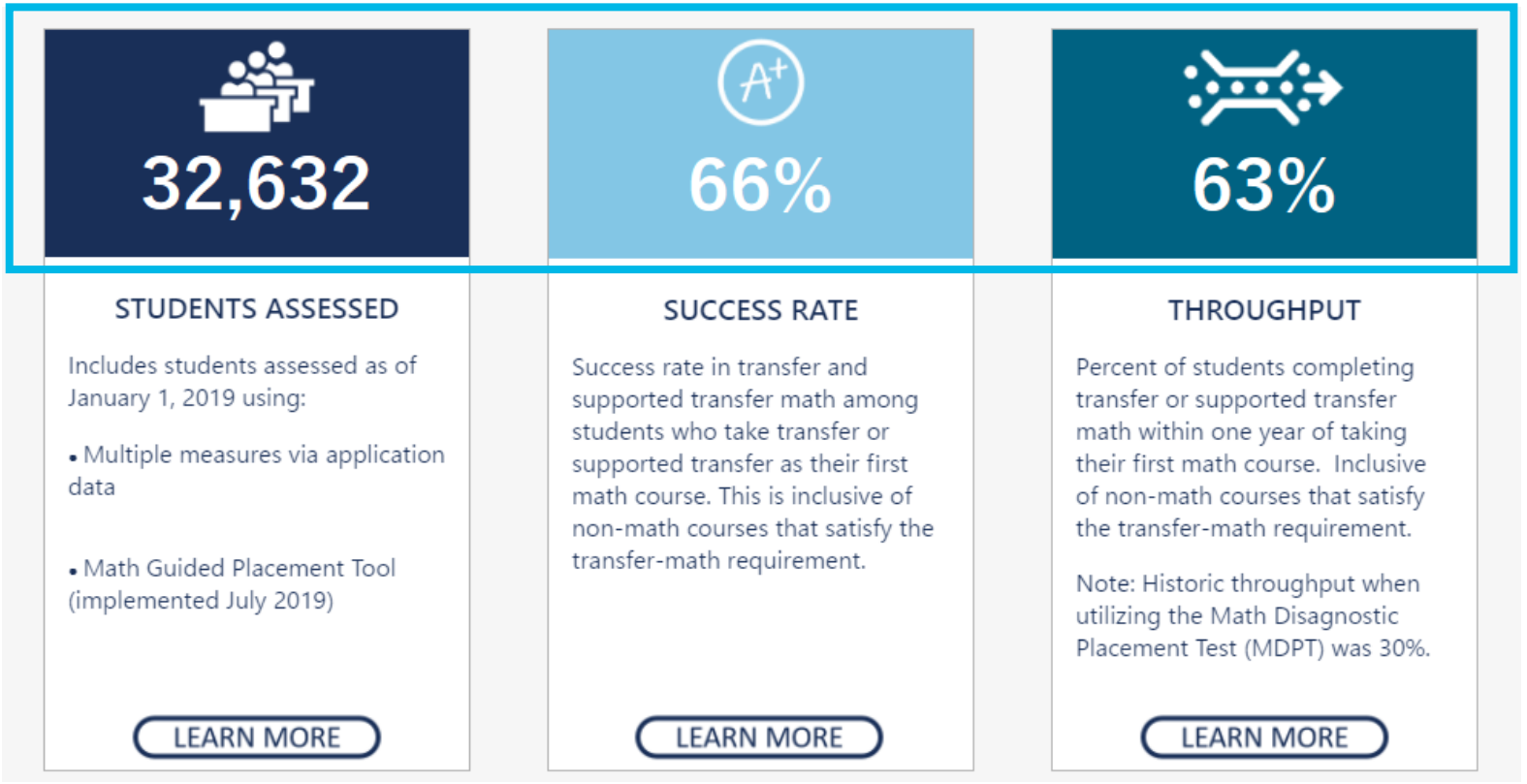
- Line chart
- Area chart
- Slope chart



- Show relative increases/decreases between 2 time points
- If removing time points between start and end dates, ensure those time points all trend the same directions

Highlight Key Points

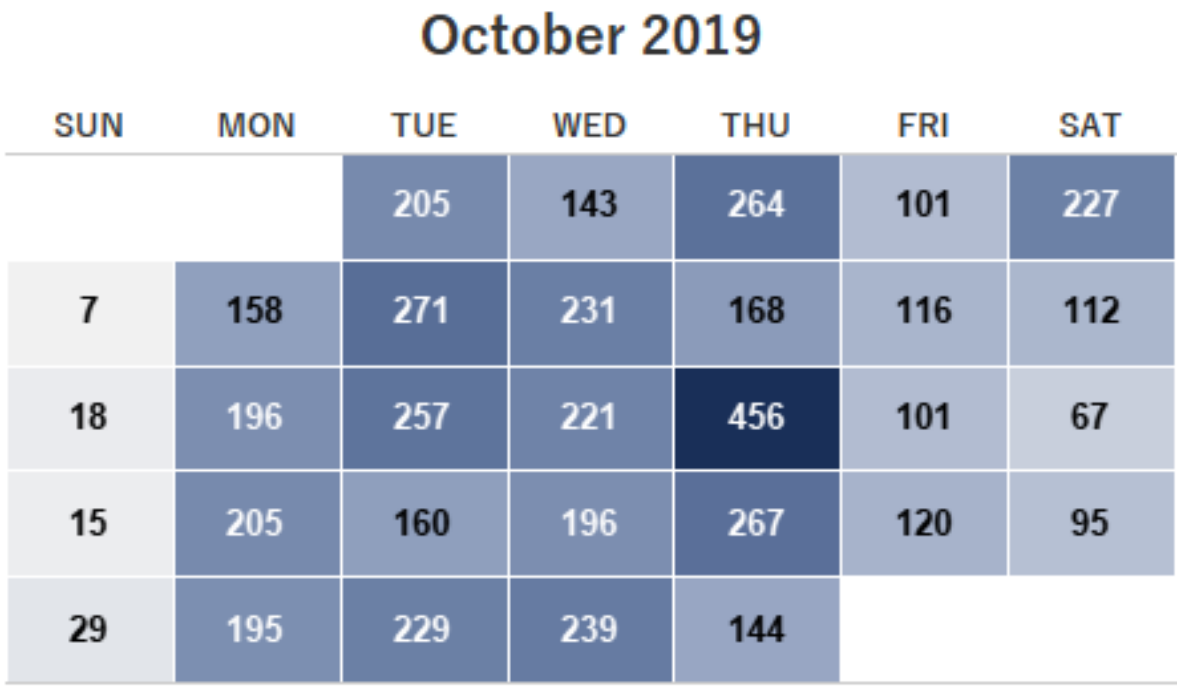
- BAN (Big Attention Number)
- Heat map
- Highlight table



- Main takeaways
- Use with icons, symbols (▲▼), spark lines, plain text

Highlight Key Points

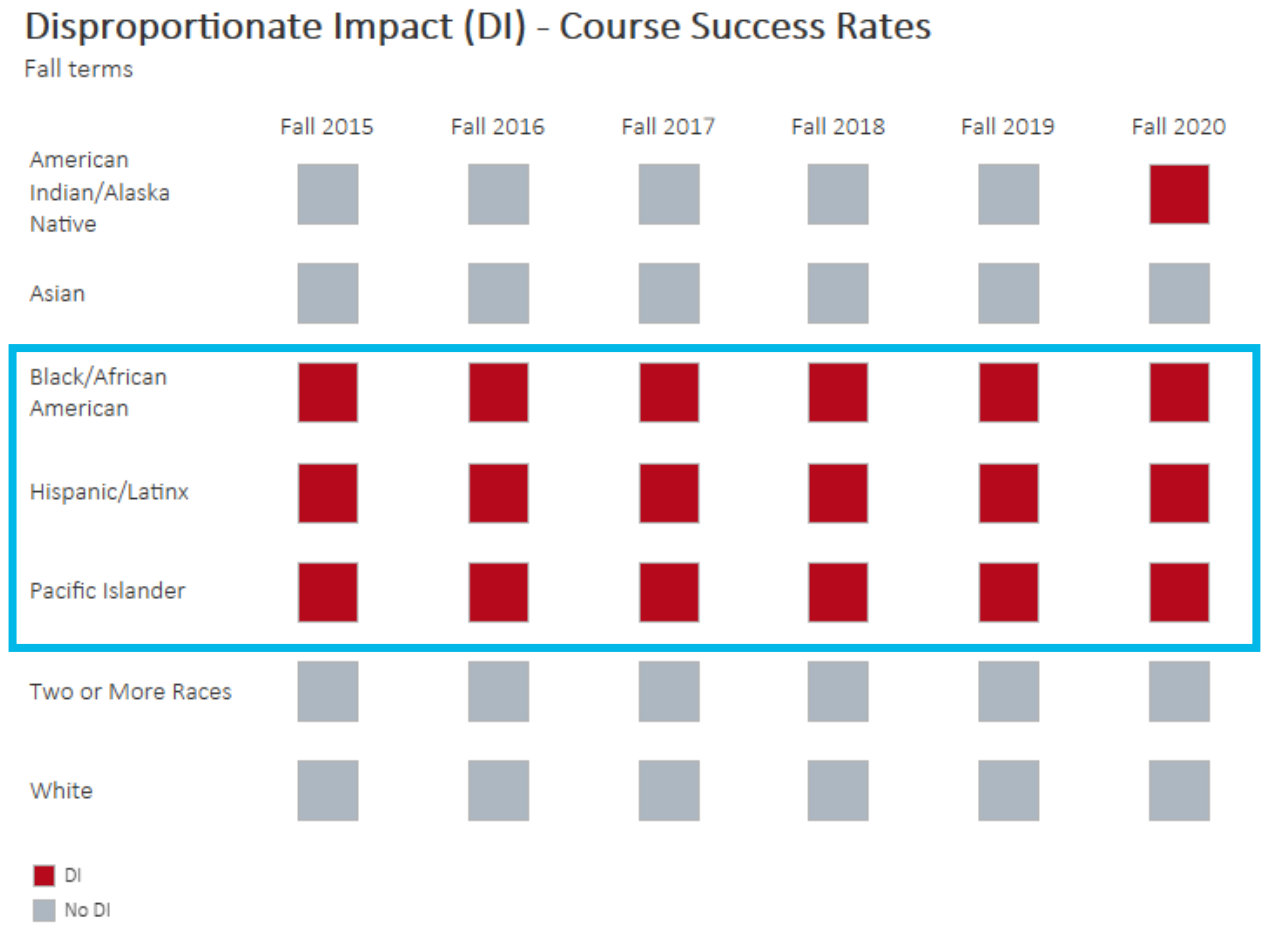
- BAN (Big Attention Number)
- Heat map
- Highlight table



- Leverage color to convey magnitude of a number
- Use with sequential and diverging color palettes

Highlight Key Points

- BAN (Big Attention Number)
- Heat map
- Highlight table



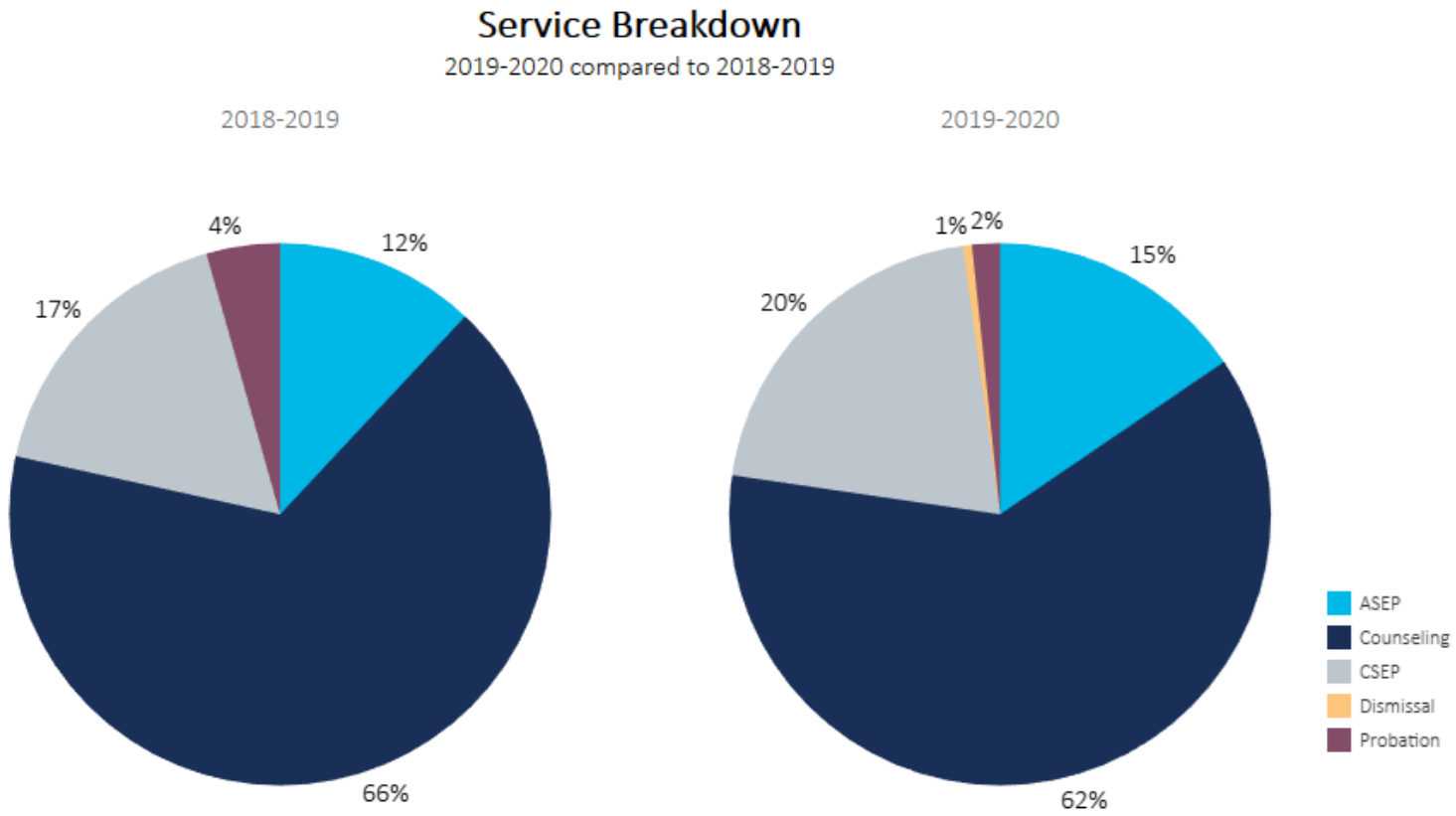
- Leverage color to quickly identify points of interest
- Typically used to enhance crosstabs

Charts to Avoid

- Pie/Donut charts
- Stacked bar (and area) charts
- Uncommon/complex charts

AVOID: PIE/DONUT CHARTS

We aren’t naturally good at comparing angles, arcs, and area of a circle

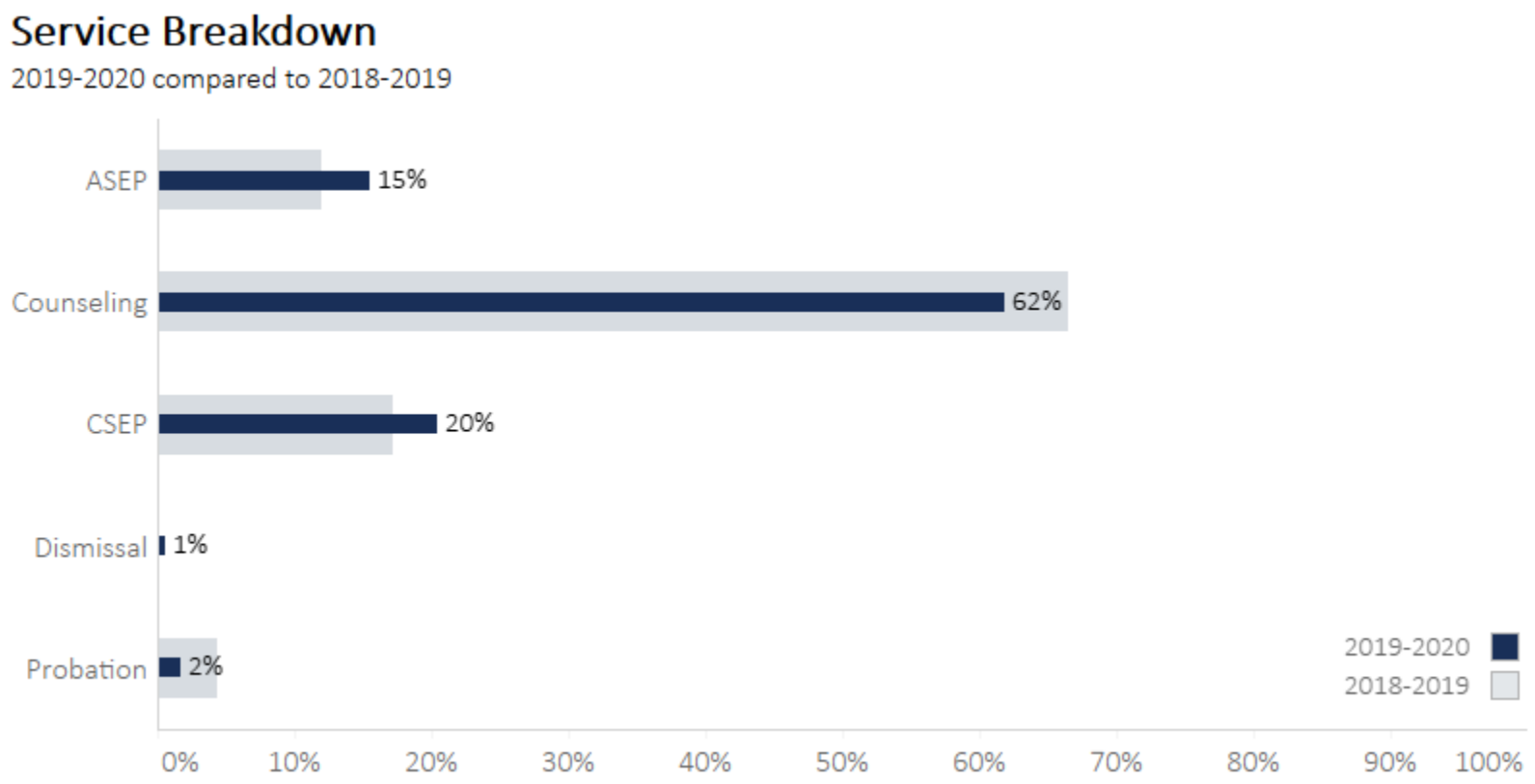


If you use a pie chart, do so responsibly

- No more than 3 slices
- Make sure all slices add up to 100%
- Don’t use for comparisons

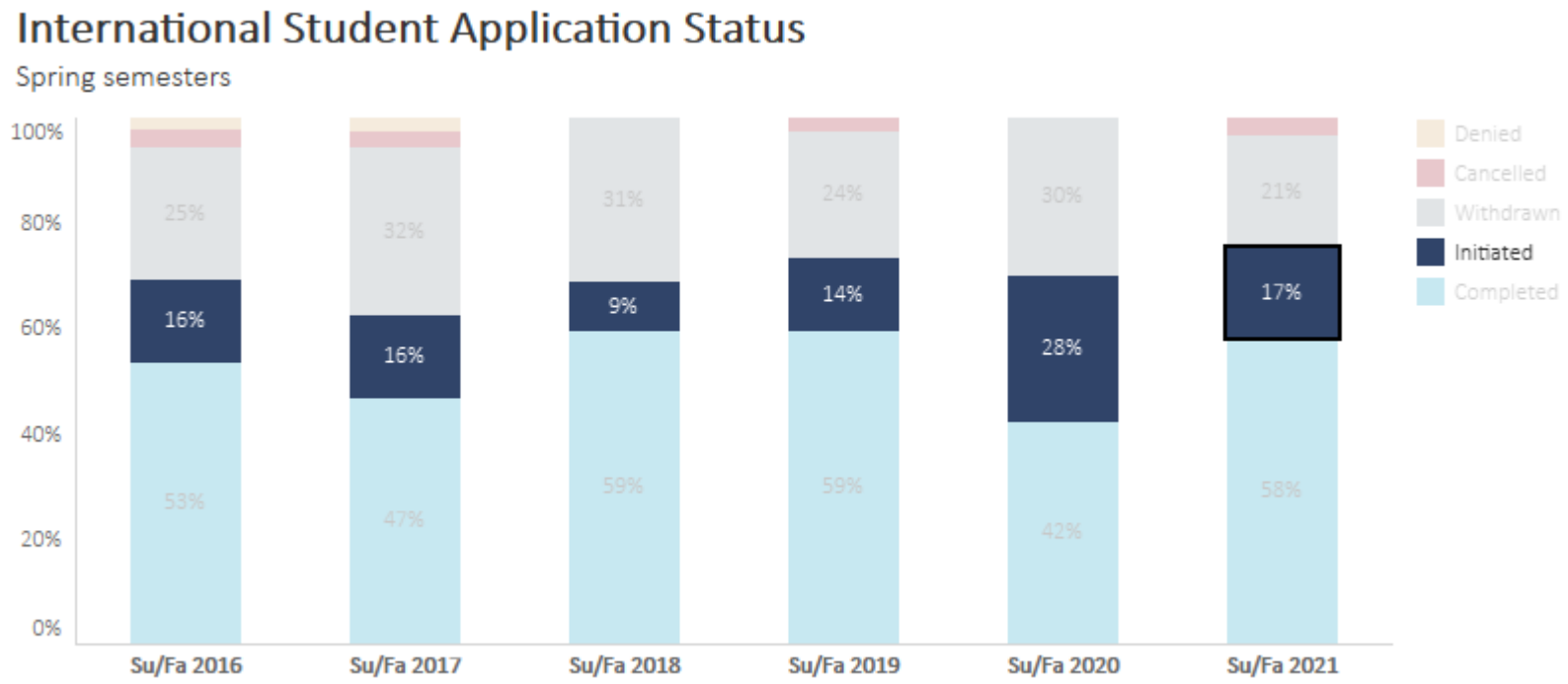
USE INSTEAD OF PIE/DONUT CHARTS

Bar charts



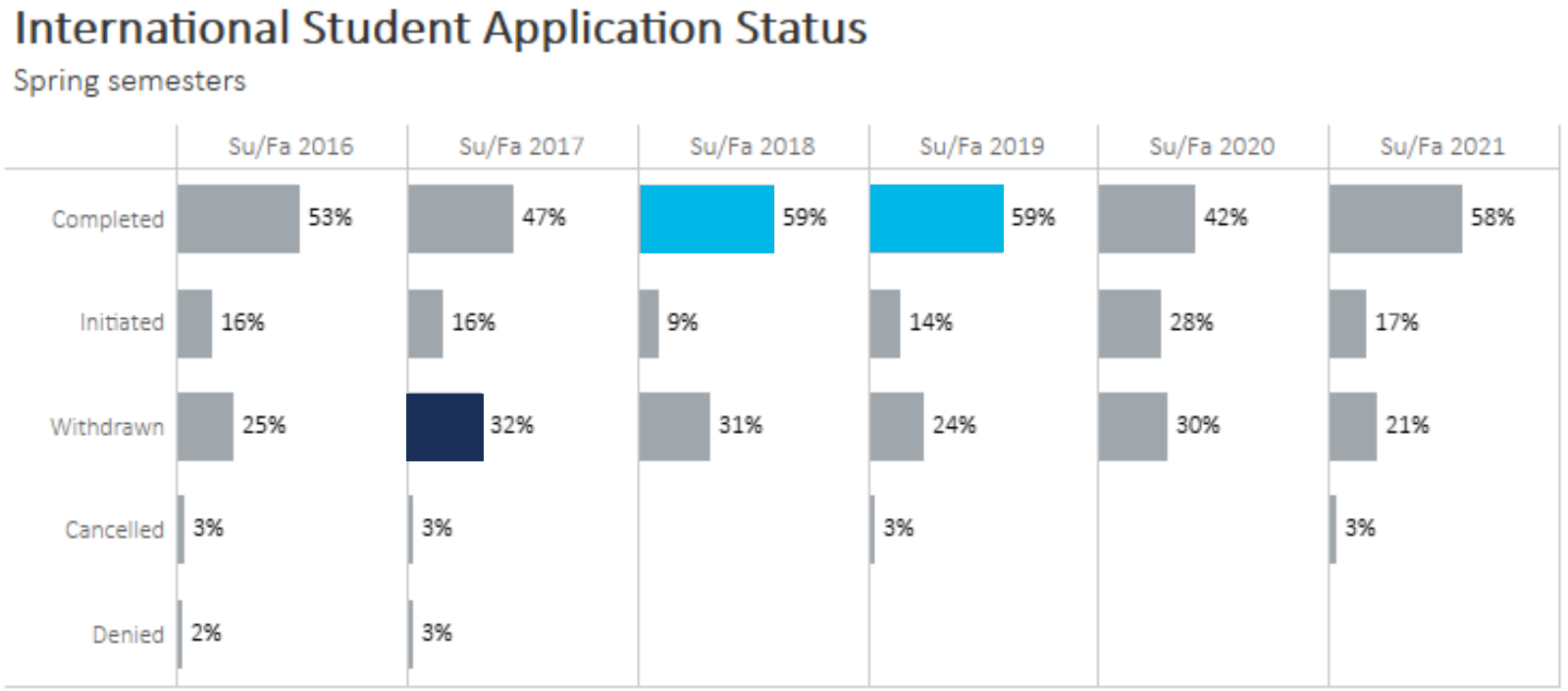
AVOID: STACKED BAR CHARTS

Comparing bars starting at uncommon baselines is difficult



USE INSTEAD OF STACKED BAR CHARTS

Small multiples (bar charts)



AVOID: UNCOMMON, COMPLEX CHARTS

Users won’t take the time to understand them

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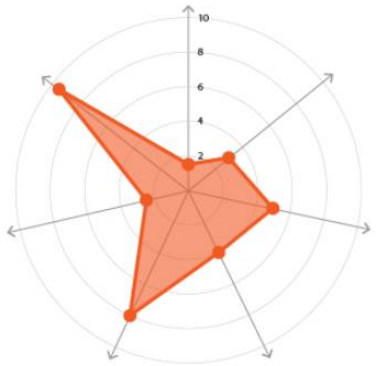
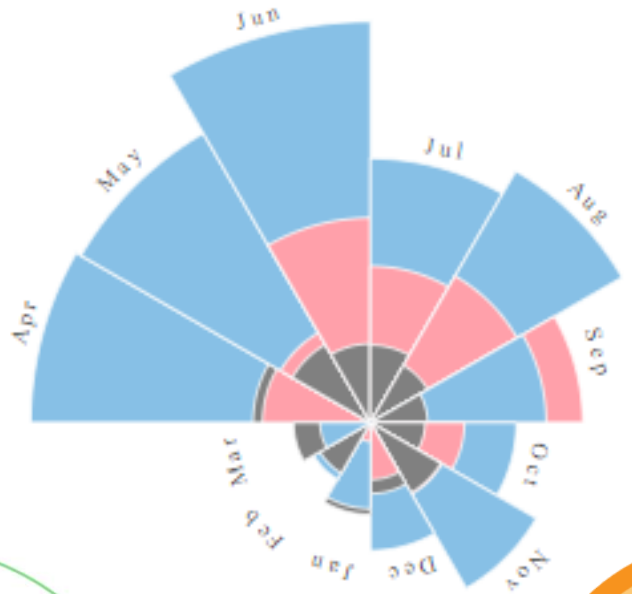
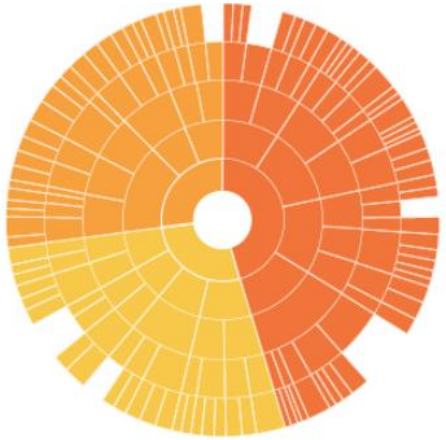
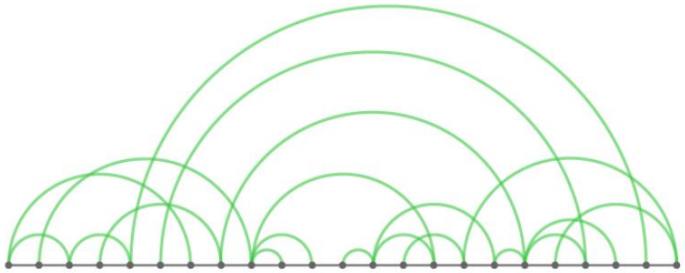
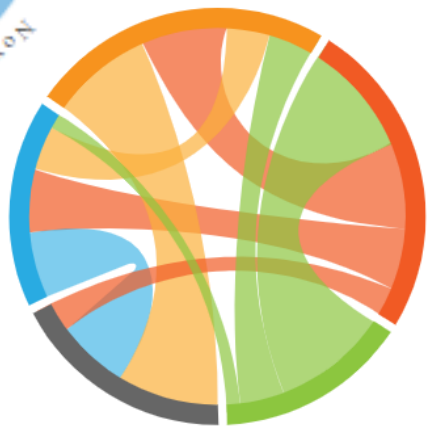
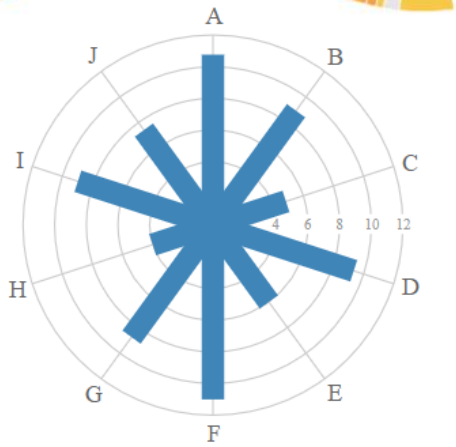












Source: https://datavizcatalogue.com/

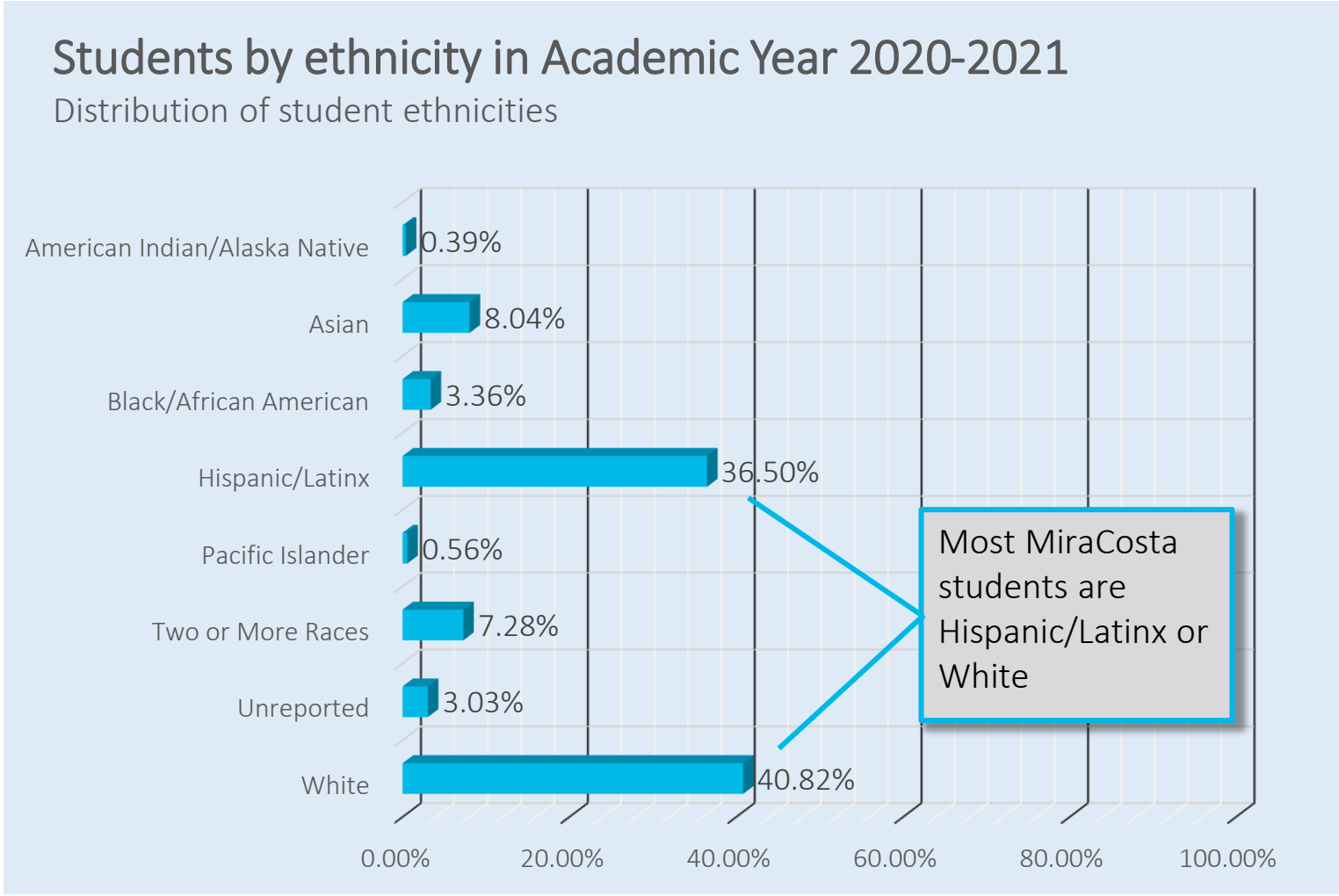
CLUTTER

A large share of the ink on a graphic should present data-information, the ink changing as the data changes. Data-ink is the non-erasable core of a graphic, the non-redundant ink arranged in response to variation in the number represented

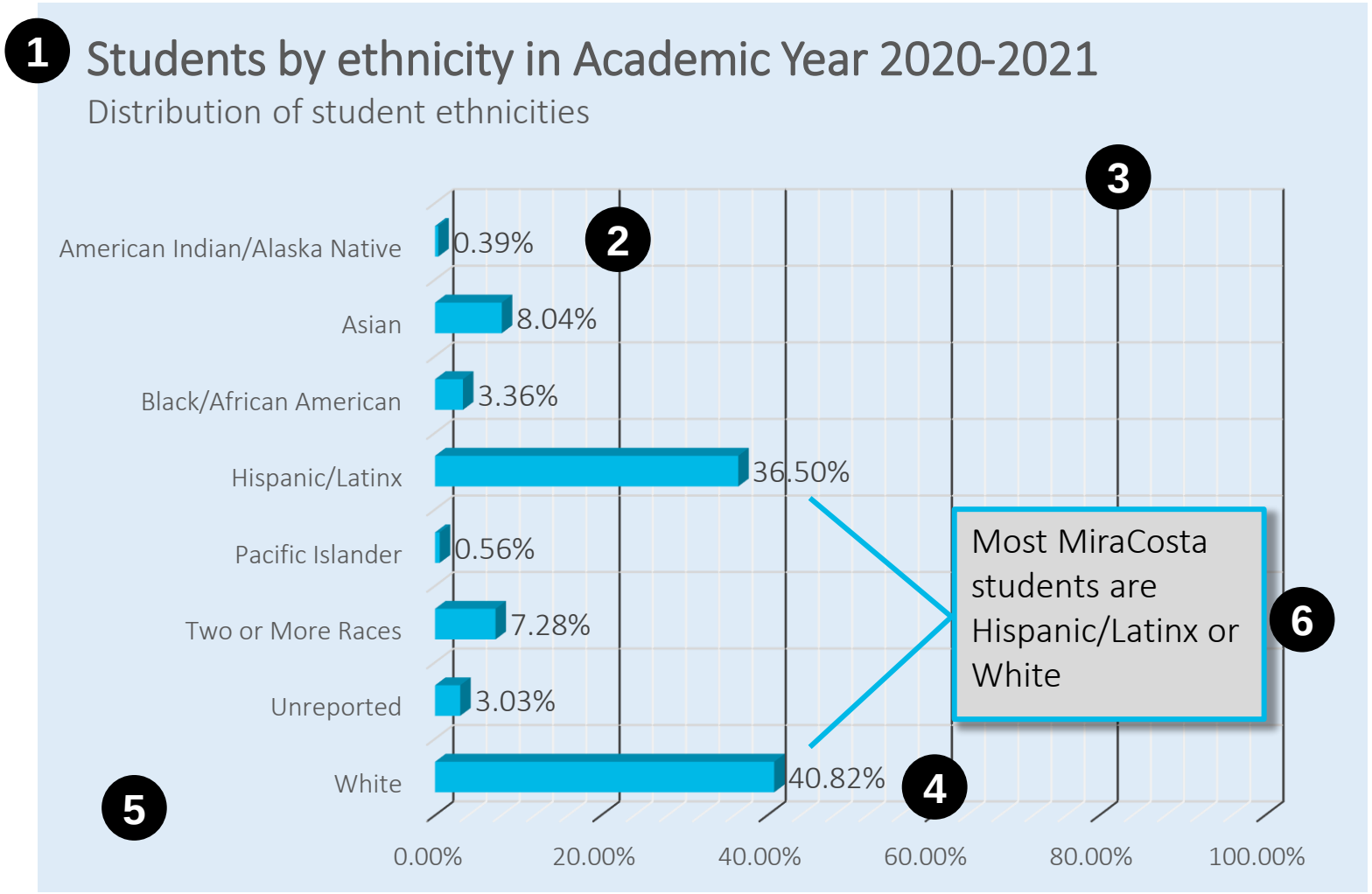
- Edward Tufte

Chartjunk

Anything that takes up space on a visualization, but is not necessary for understanding the chart

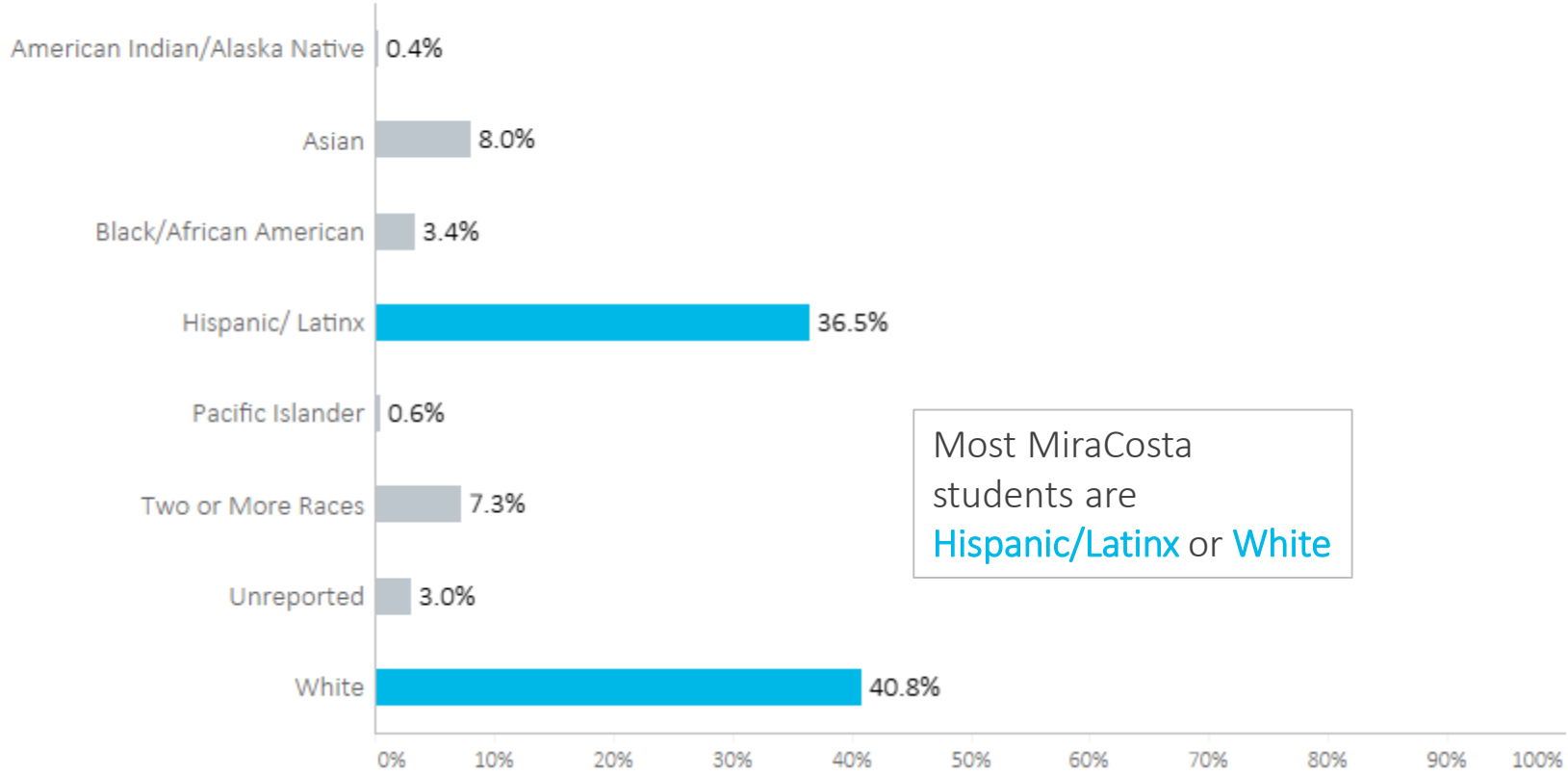


1. Redundant Titles
2. 3D charts
3. Intense grid lines
4. Extra decimal places
5. Background color
6. Call out



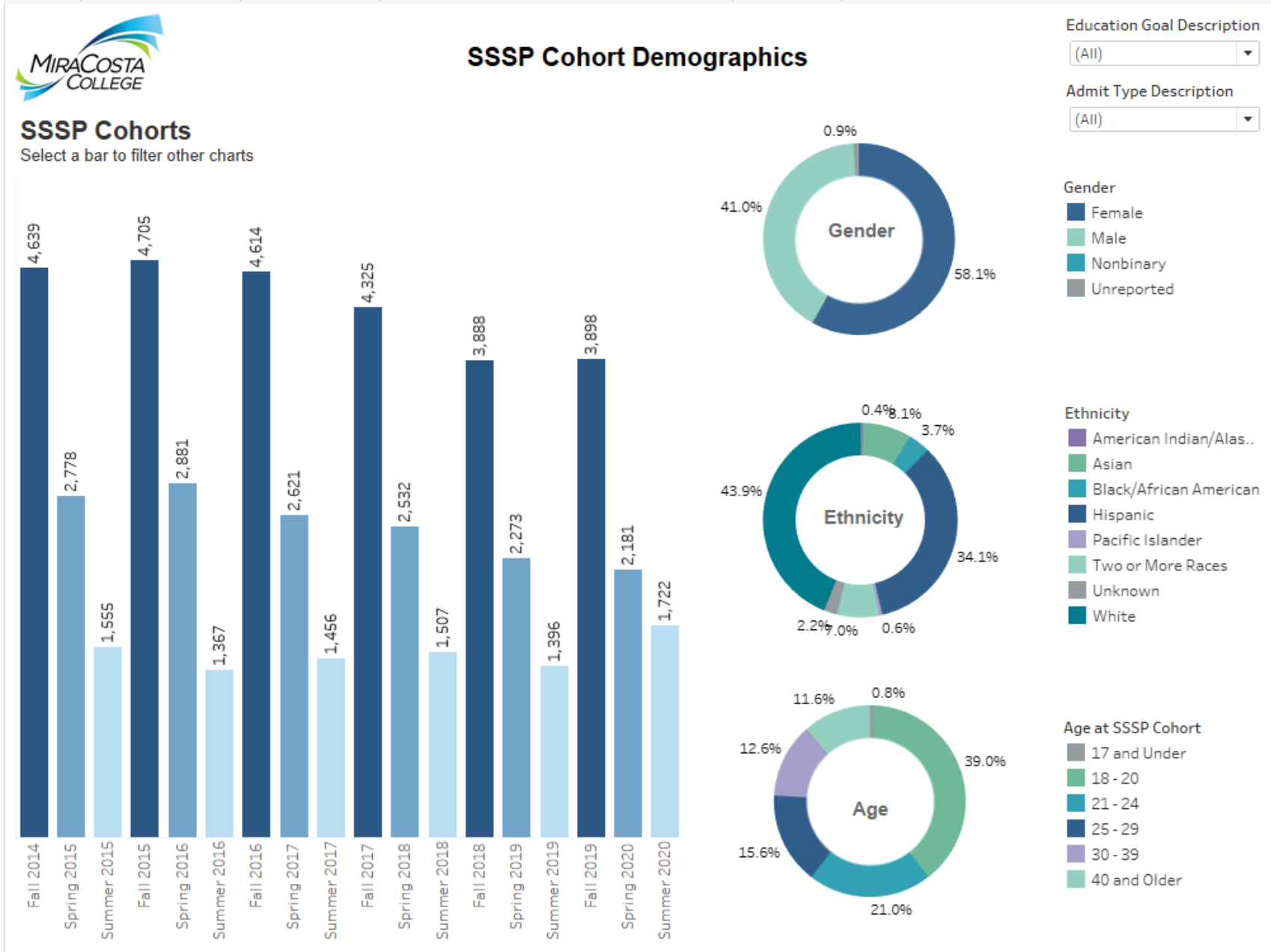
Students by Ethnicity

2020-2021



Most MiraCosta students are Hispanic/Latinx or White

PUTTING IT ALL TOGETHER



SSSP Cohorts include first-time students to MiraCosta College. Students must be enrolled in at least 1 credit course. Students may enter a new cohort if they return to MiraCosta after 6 consecutive terms (including summers) of non-enrollment.

1. Color isn't meaningful
2. Too much color
3. Not colorblind safe
4. Chart selection
5. Clutter
6. Text alignment

SSSP COHORT OVERVIEW

Key Performance Indicators (KPI)

COHORT | **Fall 2020**

STUDENT COUNT

3,332

ORIENTATION

67%

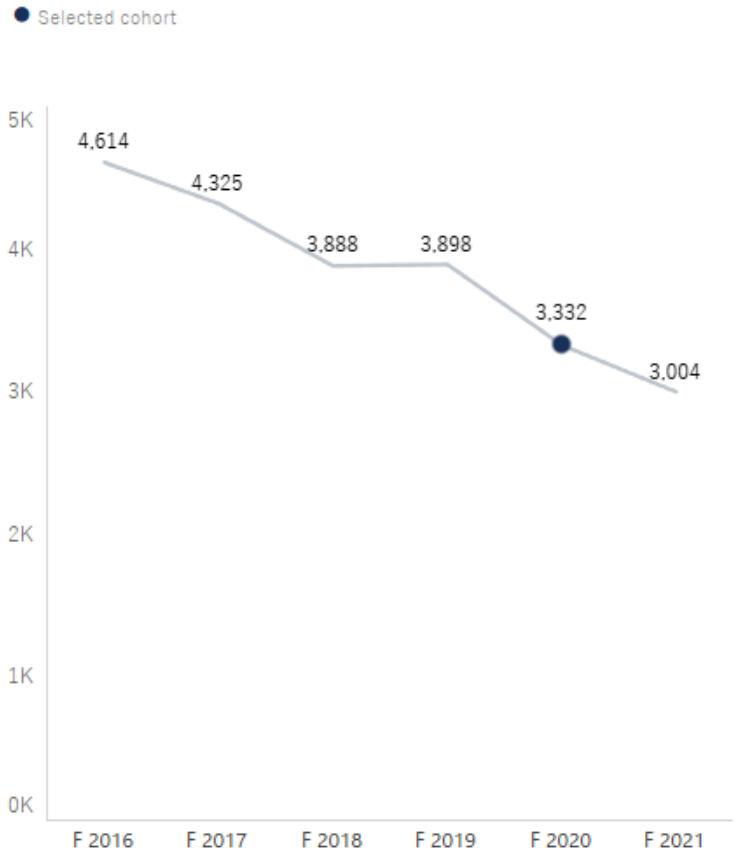
MATRICULATION

64%

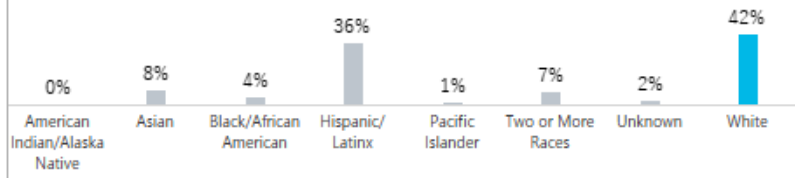
ED PLANS

16%

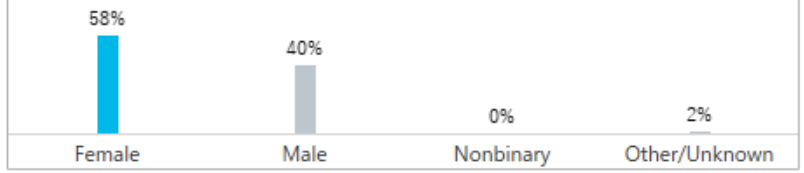
STUDENT COUNT | by Fall cohorts



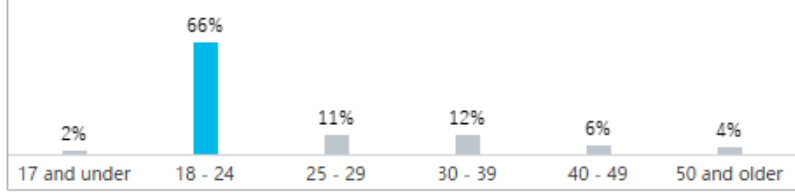
ETHNICITY | Fall 2020 cohort



GENDER | Fall 2020 cohort



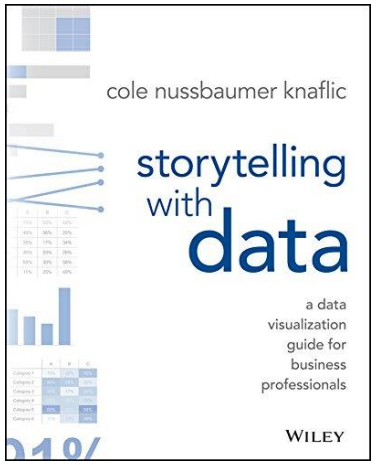
AGE | Fall 2020 cohort



RESOURCES

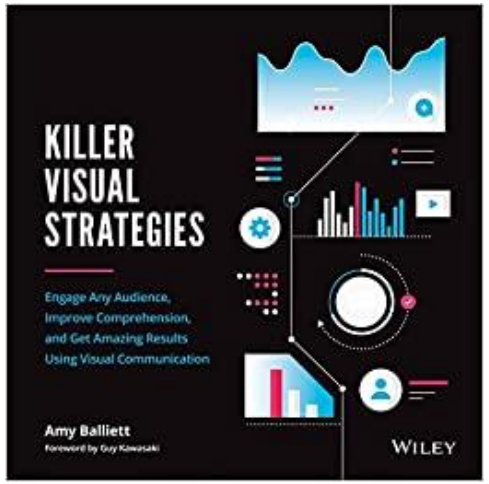
Storytelling with Data

Cole Nussbaum Knaflic



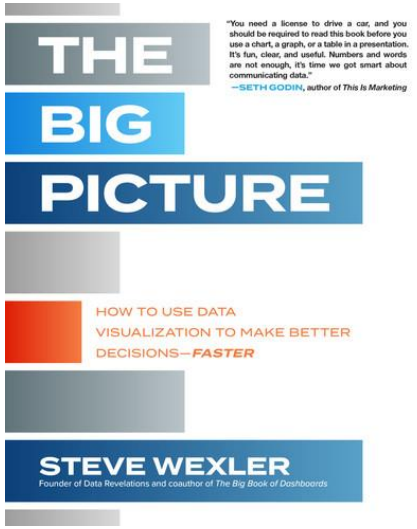
Killer Visual Strategies

Amy Balliett



The Big Picture

Steve Wexler



RESOURCES

Colorblind Palette Checker | https://davidmathlogic.com/colorblind/
Coblis – Colorblind Simulator | https://www.color-blindness.com/coblis-color-blindness-simulator/
Using Color Effectively | https://blog.datawrapper.de/beautifulcolors/

From Data to Viz | https://www.data-to-viz.com/
Data Viz Project | https://datavizproject.com/
Question to ask when creating charts | https://blog.datawrapper.de/better-charts/

Questions?

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