

Introduction to Data Science

Visualization Design Principles

Cognitive Load

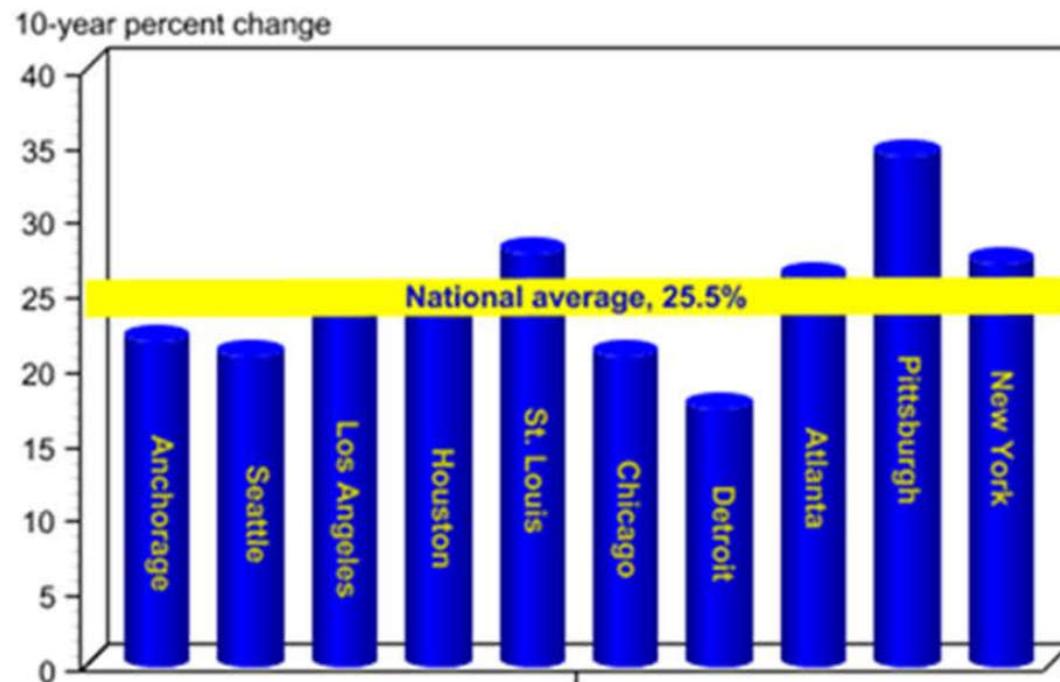
- Cognitive load is the amount of mental effort required to interpret information.
- Every single element you add takes up cognitive load.
- The goal in data visualization is to minimize cognitive load yet accurately communicate your message.

Clutter

- Clutter is all the things you can remove while still preserving key ideas.
- Reduce clutter to minimize user's cognitive load.
- Less clutter = more effective visualizations

Example

Retail food price inflation varies across selected Metropolitan Statistical Areas



Gestalt Principles

Gestalt Principles

- Gestalt Principles of Visual Perception identify which elements in our visuals are signal (the information we want to communicate) and which might be noise (clutter).
 - 1) Proximity
 - 2) Similarity
 - 3) Enclosure
 - 4) Closure
 - 5) Continuity
 - 6) Connection

Proximity



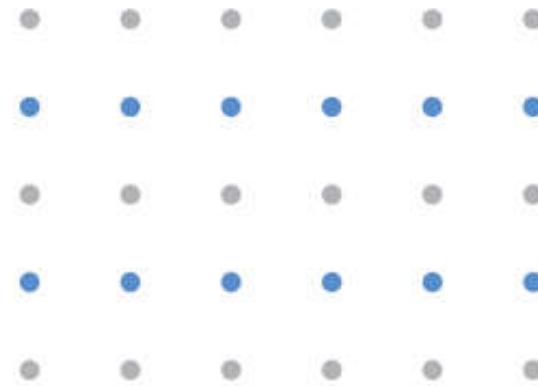
Application of proximity



Similarity



Application of similarity

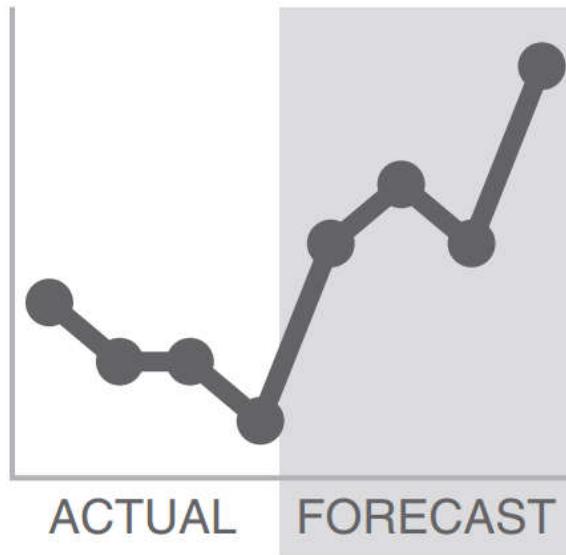


10

Enclosure



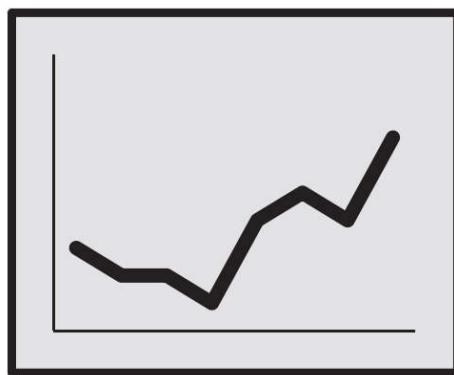
Application of enclosure



Closure



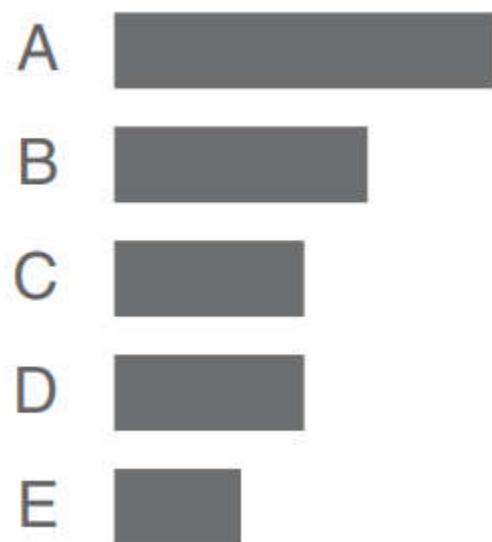
Application of closure



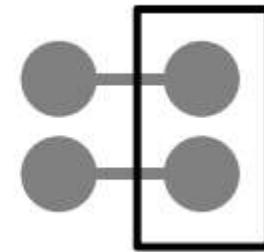
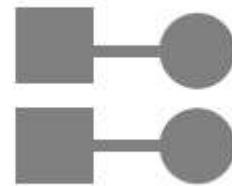
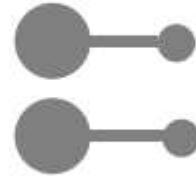
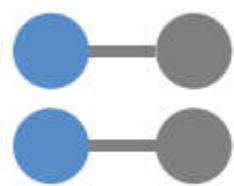
Continuity



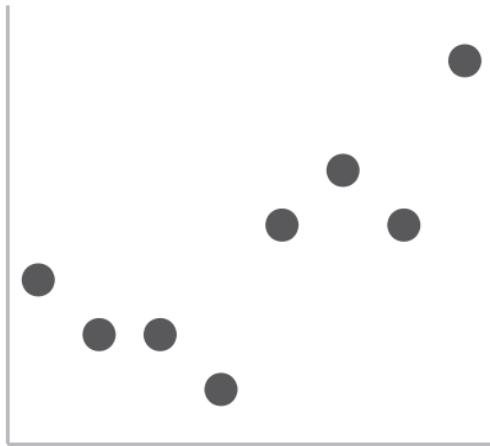
Application of continuity



Connection



Application of connection



Which gestalt principles are in play?

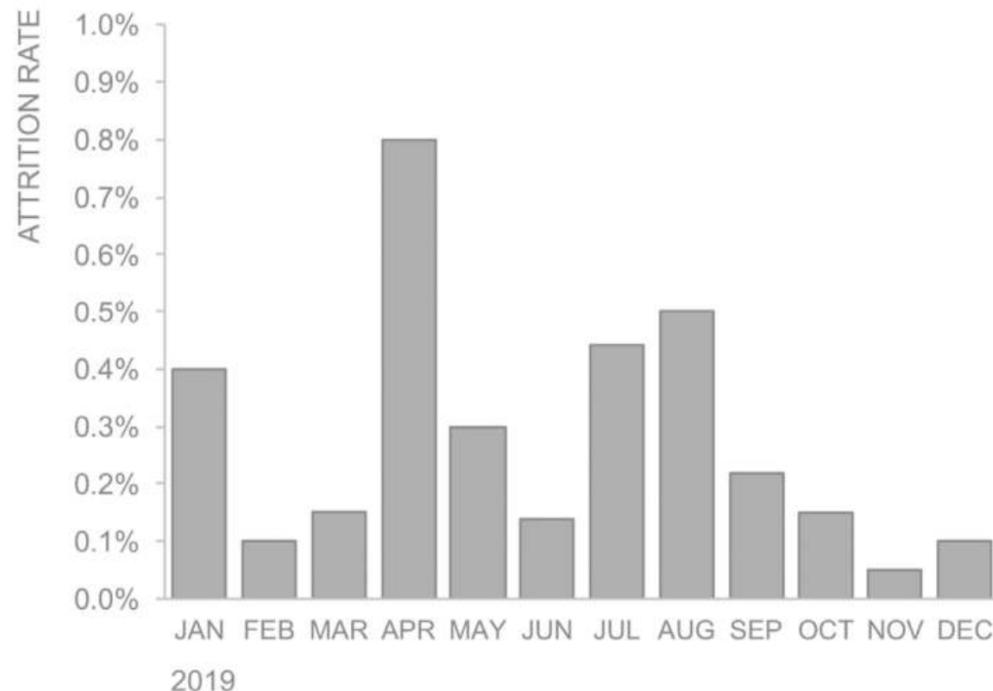
Market size over time



Tying Words to Graph

Visually tie the words to the graph

2019 monthly voluntary attrition rate



Highlights:

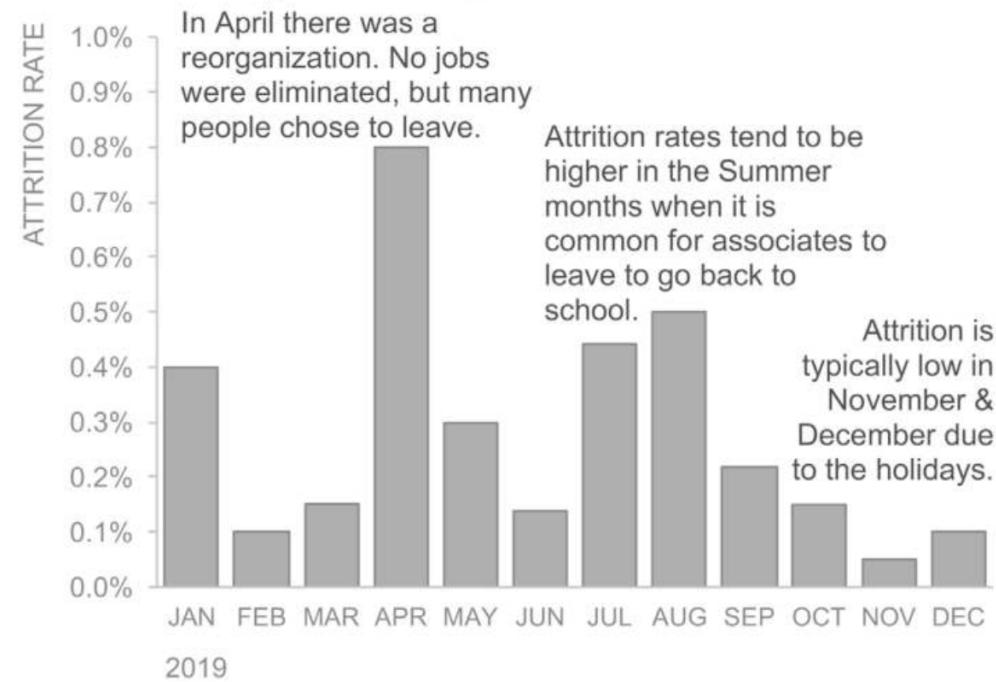
In April there was a reorganization. No jobs were eliminated, but many people chose to leave.

Attrition rates tend to be higher in the Summer months when it is common for associates to leave to go back to school.

Attrition is typically low in November and December due to the holidays.

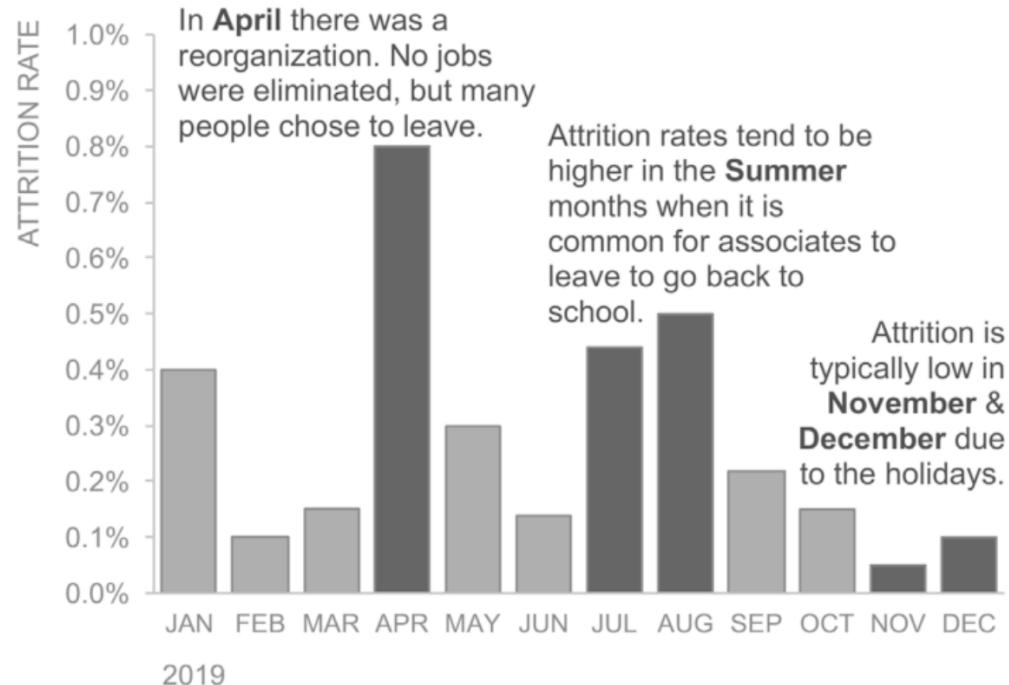
Proximity

2019 monthly voluntary attrition rate



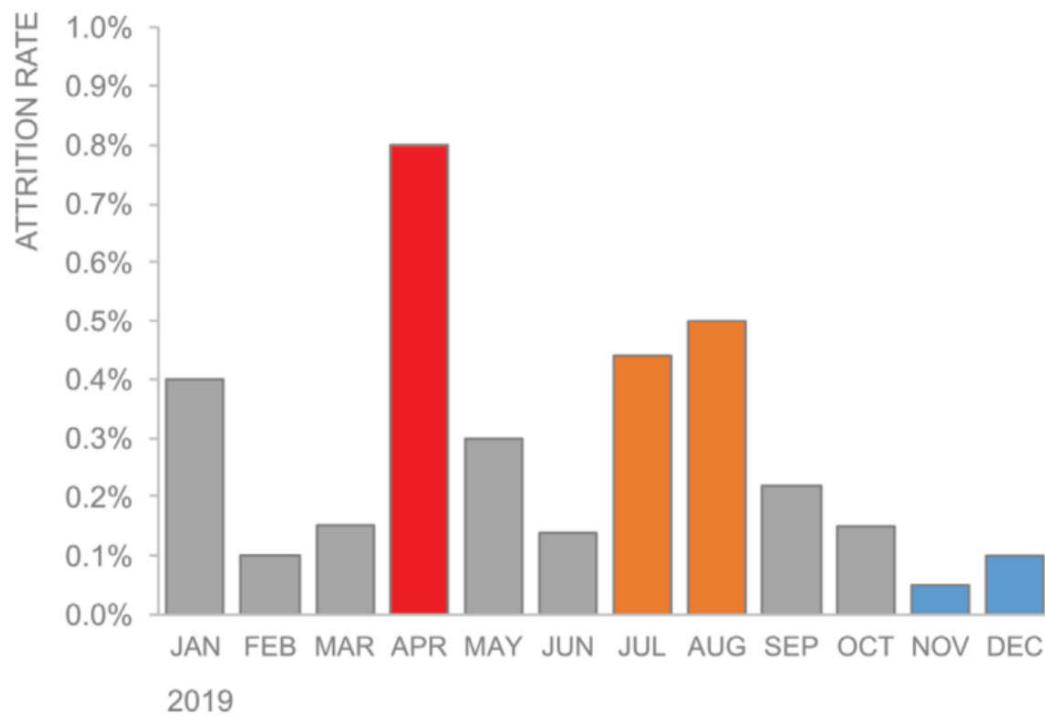
Proximity with emphasis

2019 monthly voluntary attrition rate



Similarity

2019 monthly voluntary attrition rate



Highlights:

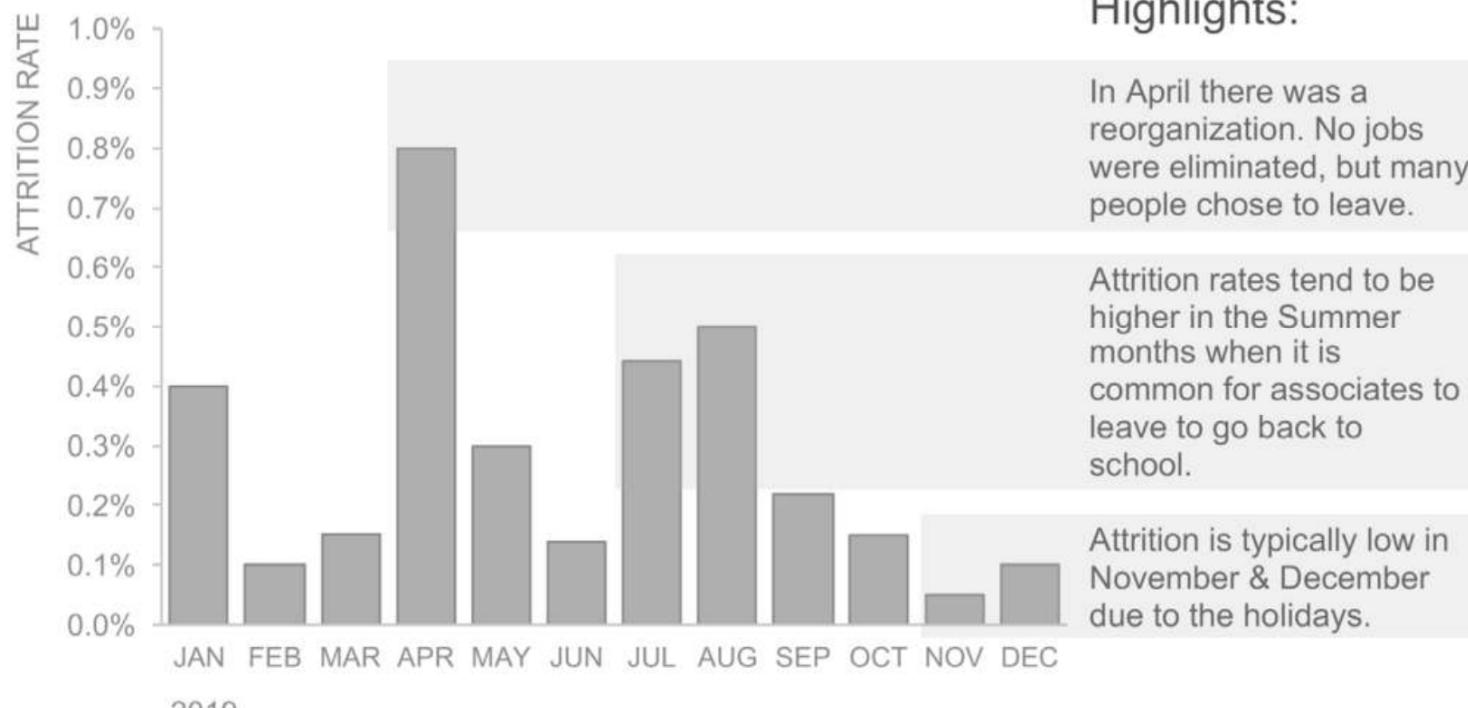
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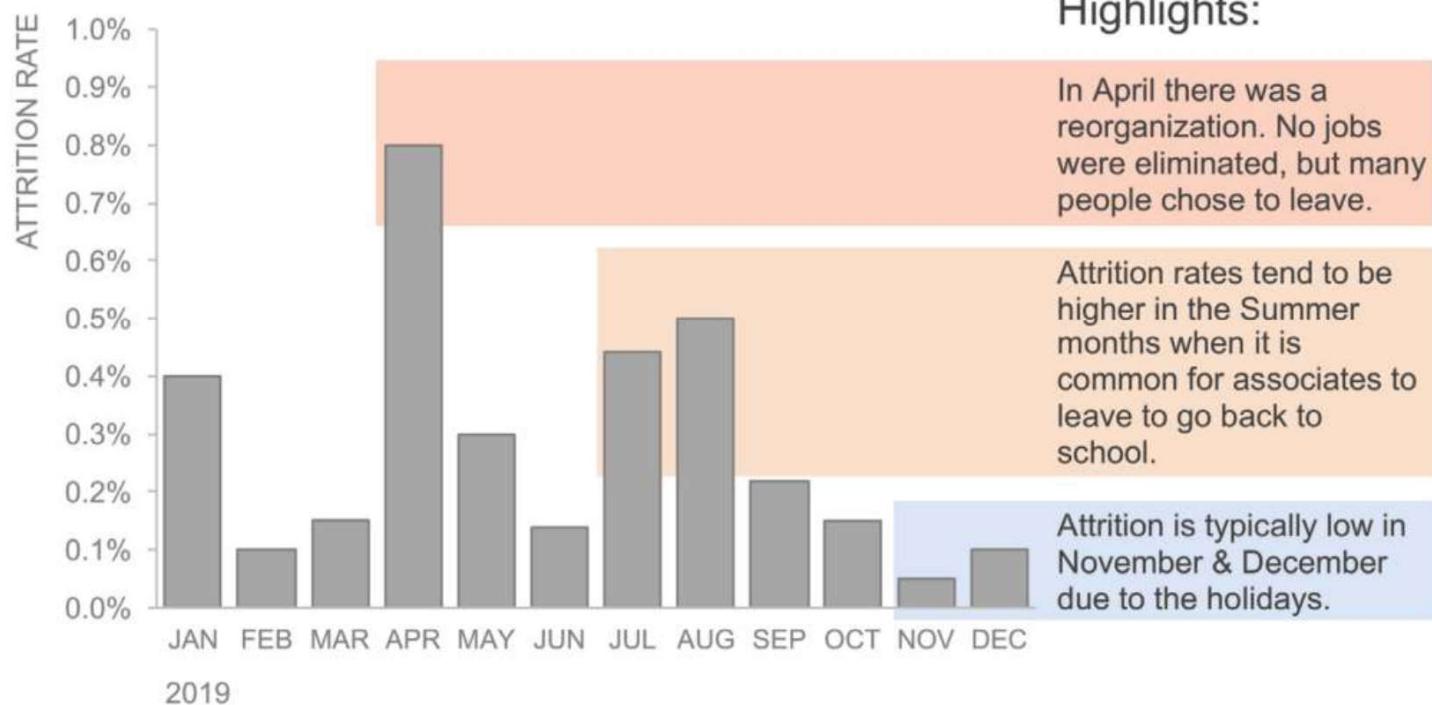
Enclosure

2019 monthly voluntary attrition rate



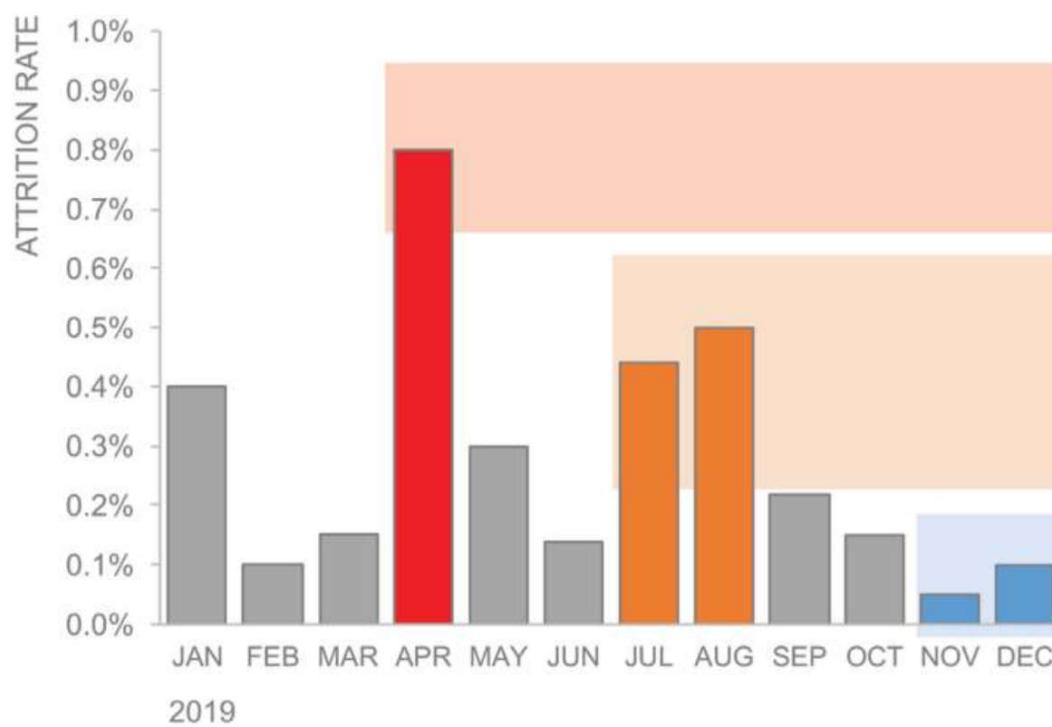
Enclosure with color differentiation

2019 monthly voluntary attrition rate



Enclosure + similarity

2019 monthly voluntary attrition rate



Highlights:

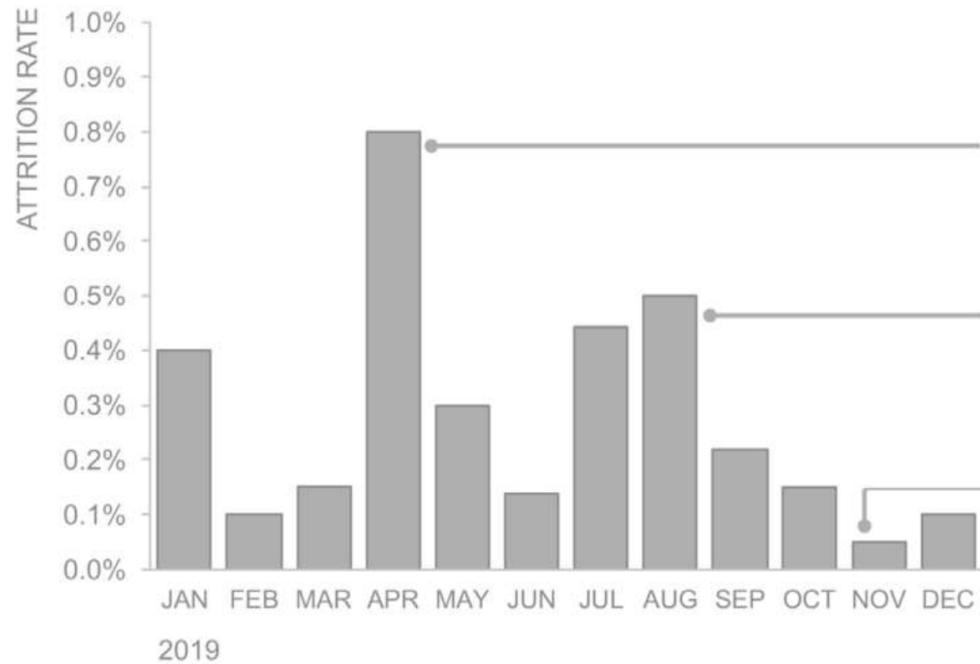
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Connection

2019 monthly voluntary attrition rate



Highlights:

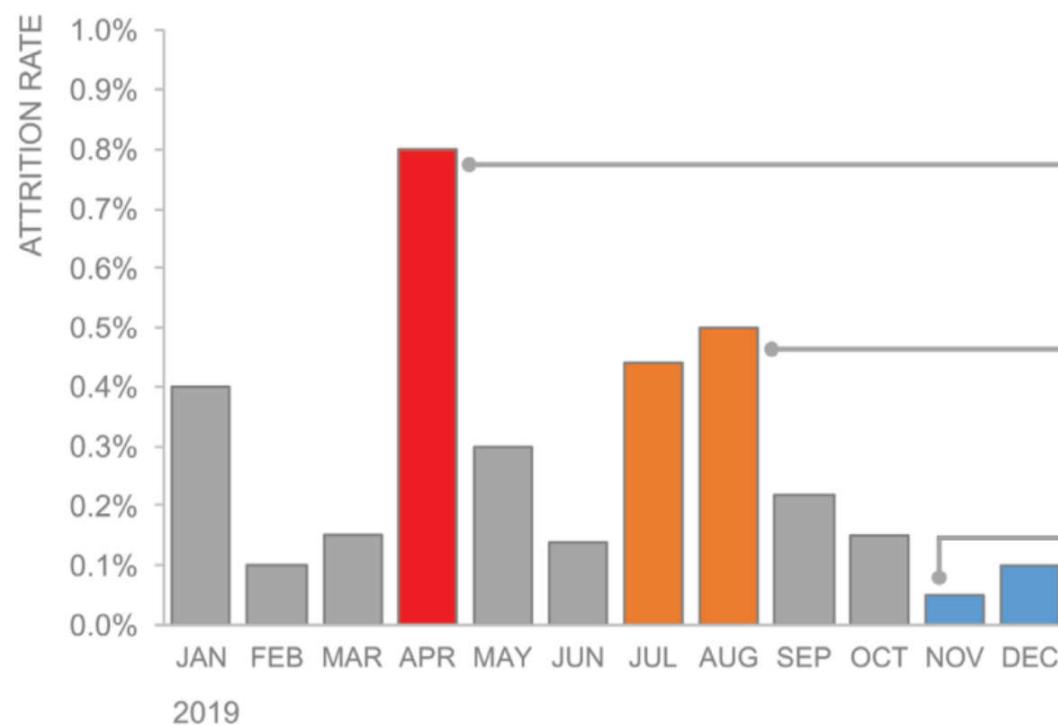
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Connection + Similarity

2019 monthly voluntary attrition rate



Highlights:

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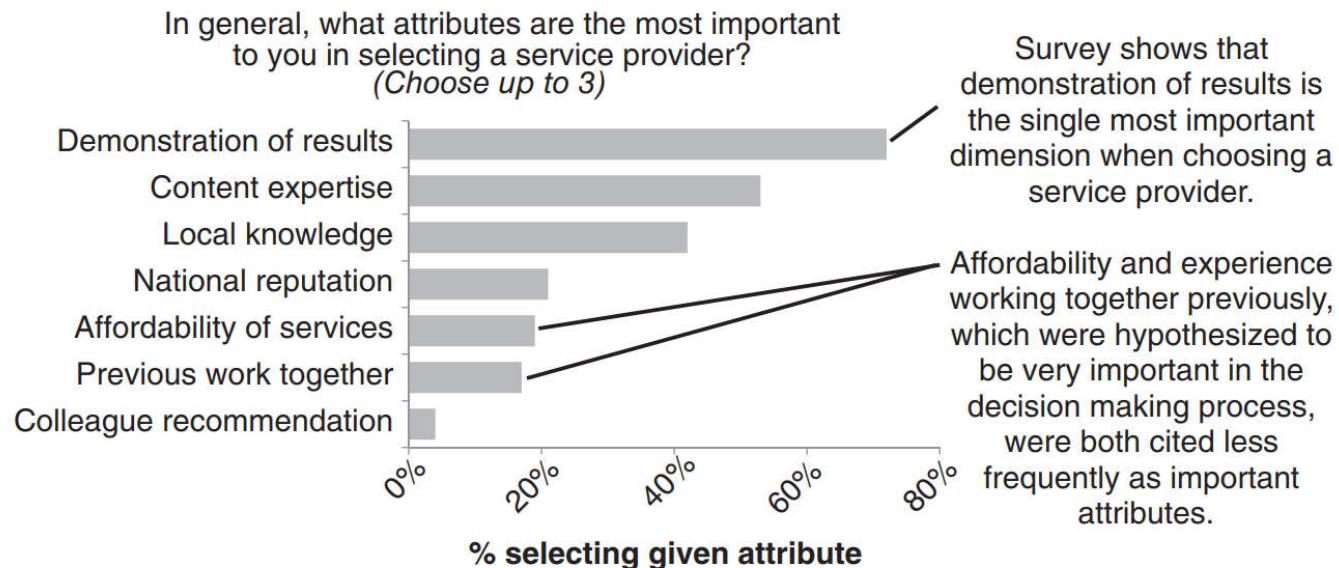
Attrition rates tend to be higher in the **Summer** months when it is common for associates to leave to go back to school.

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Other Types of Visual Clutter

Lack of visual order

Demonstrating effectiveness is most important consideration when selecting a provider

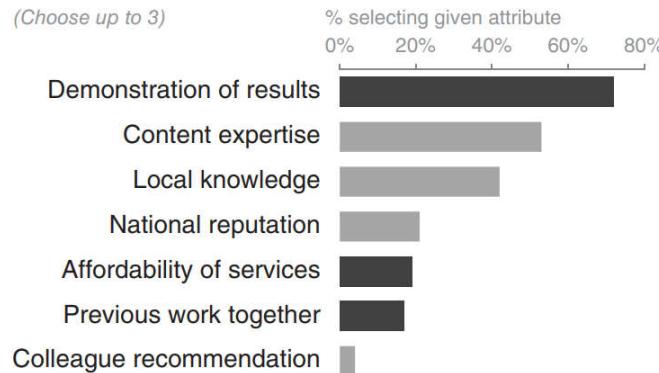


Data source: xyz; includes N number of survey respondents. Note that respondents were able to choose up to 3 options.

Creating visual order

Demonstrating effectiveness is most important consideration when selecting a provider

In general, **what attributes are the most important** to you in selecting a service provider?

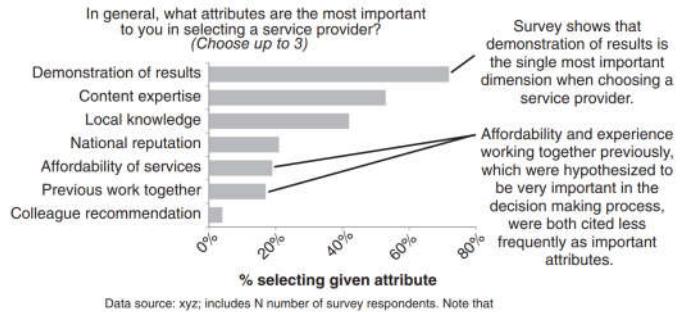


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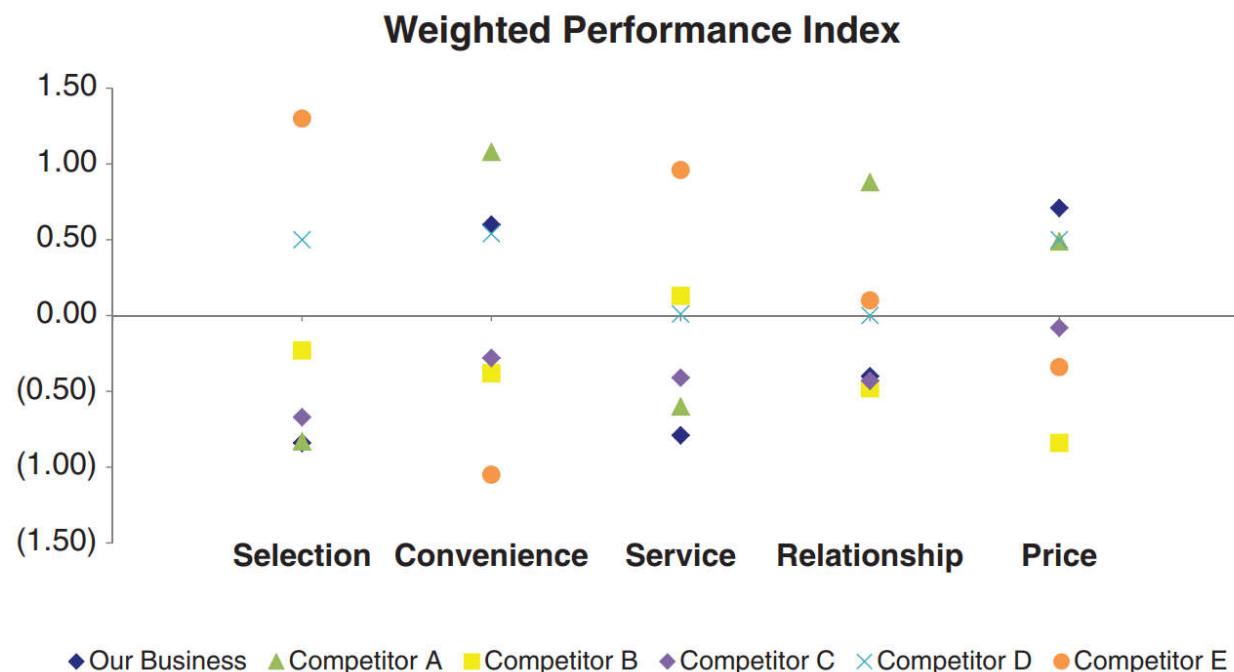
Survey shows that **demonstration of results** is the single most important dimension when choosing a service provider.

Affordability and experience working together previously, which were hypothesized to be very important in the decision making process, were both cited less frequently as important attributes.

Demonstrating effectiveness is most important consideration when selecting a provider



Non-strategic use of contrast



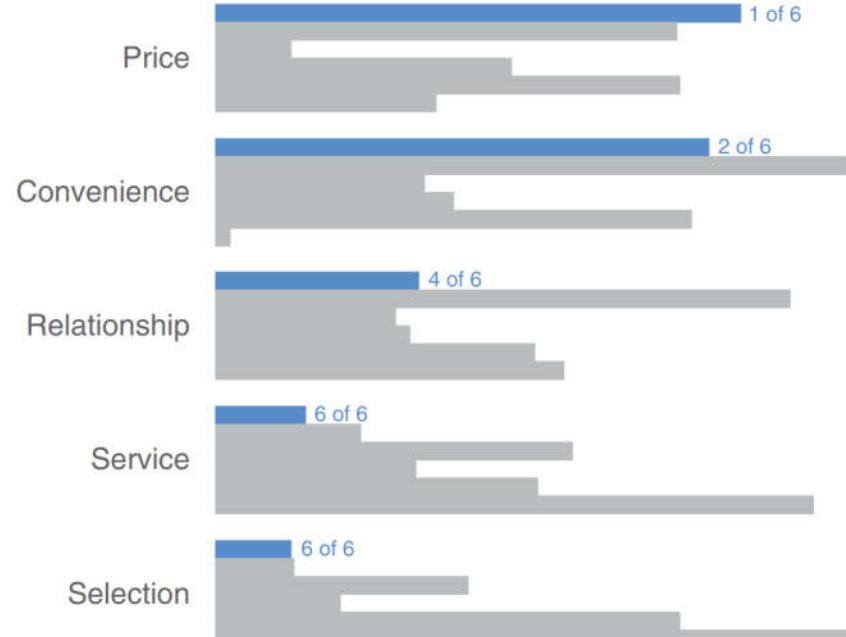
Strategic use of contrast

Performance overview

■ Our business

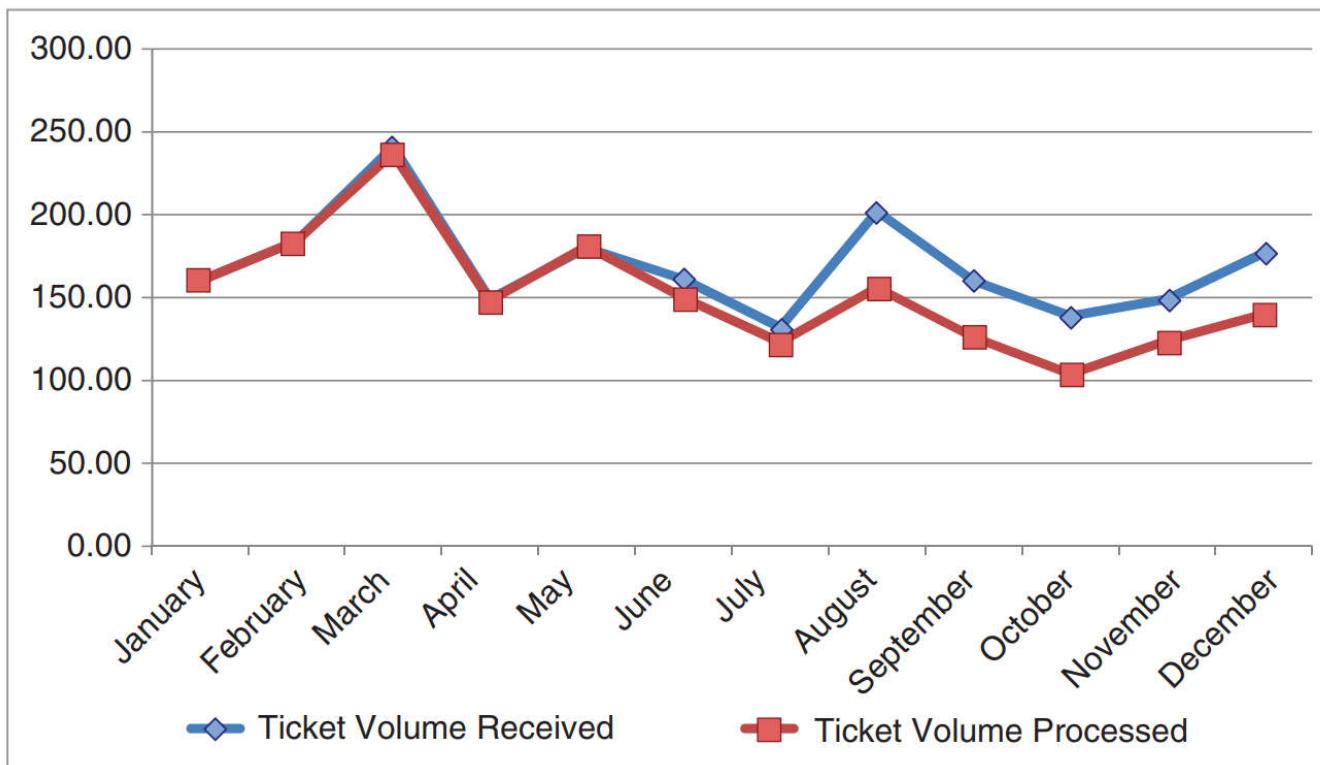
- Competitor A
- Competitor B
- Competitor C
- Competitor D
- Competitor E

Weighted performance index | relative rank

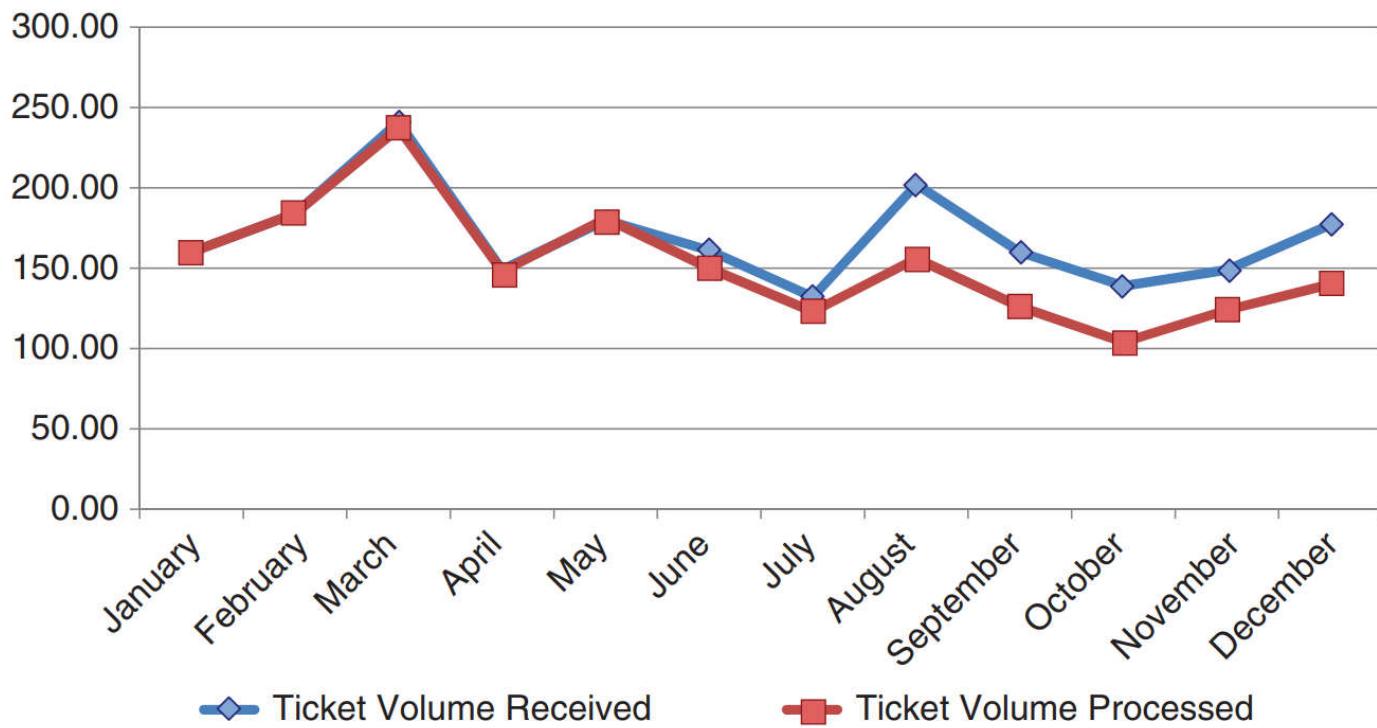


Decluttering: step-by-step (Example 1)

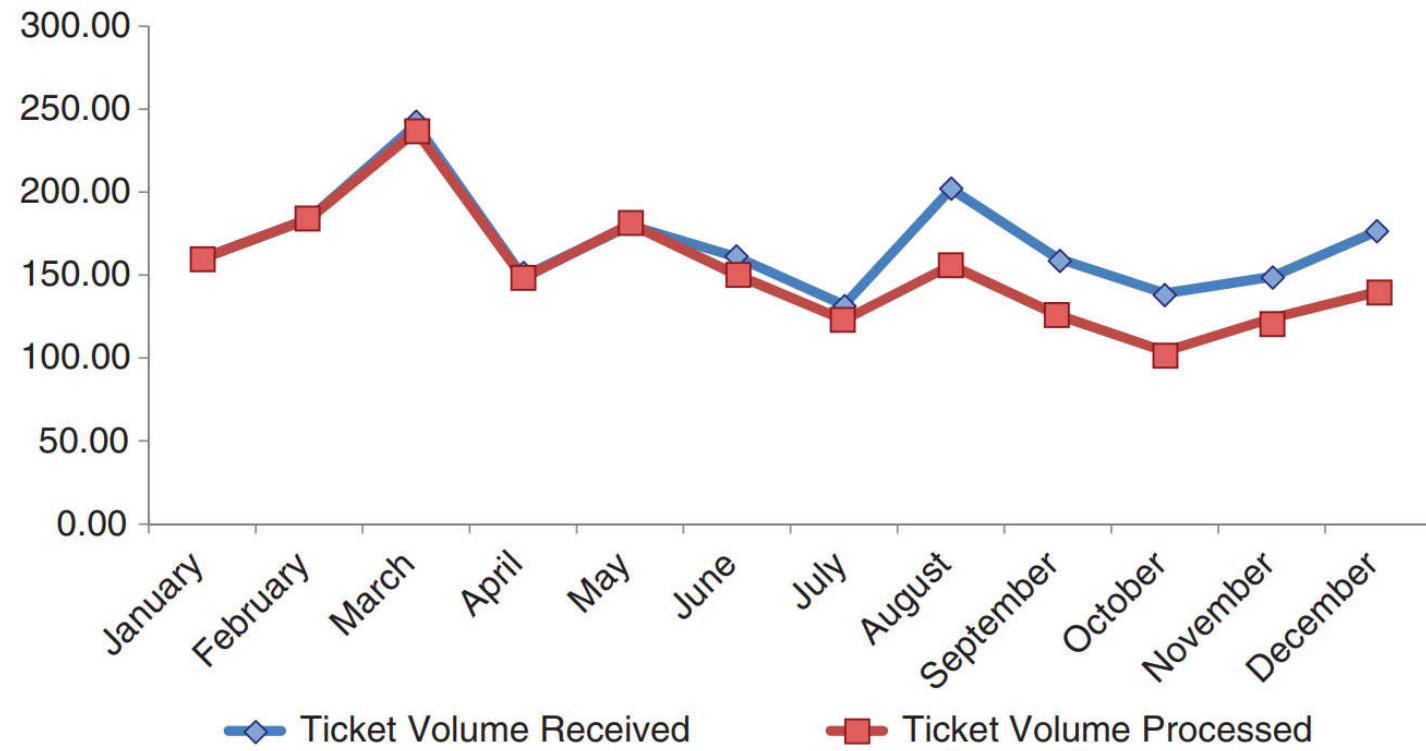
Example



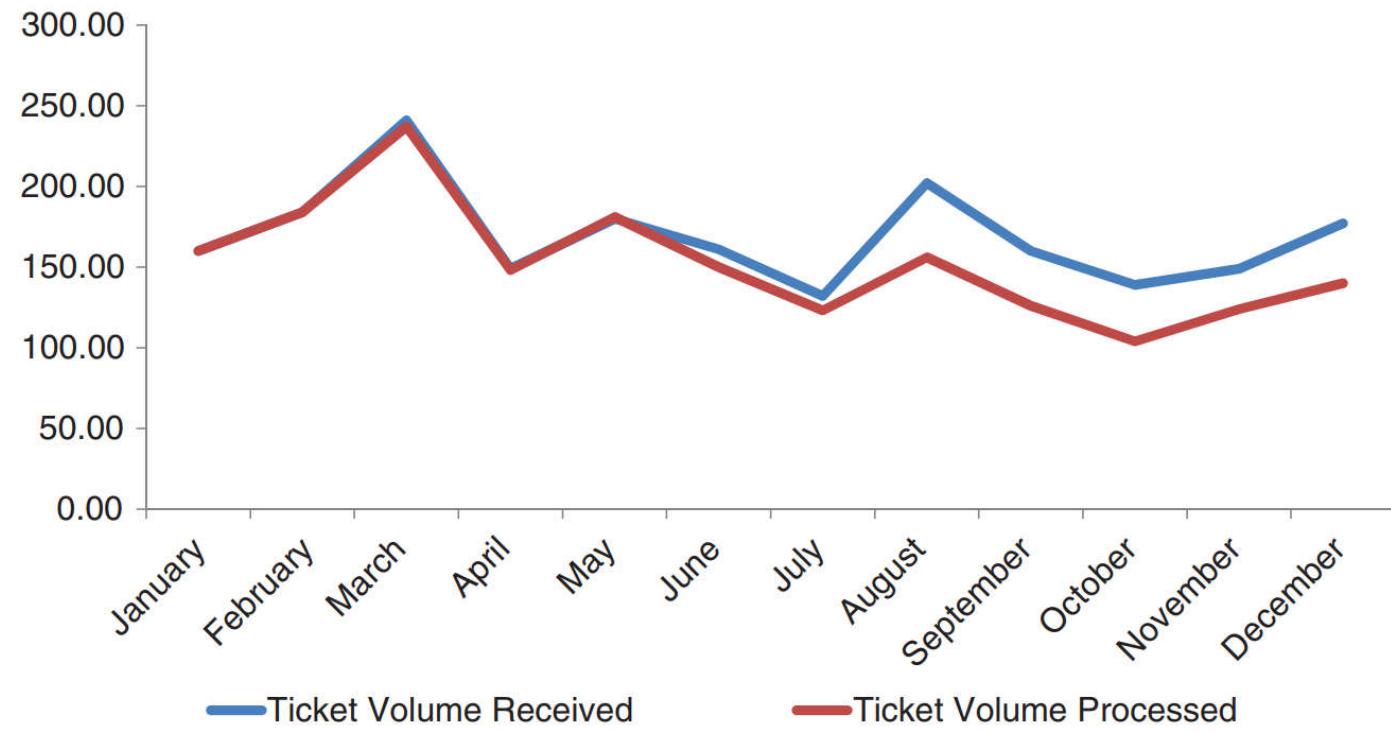
1. Remove chart border



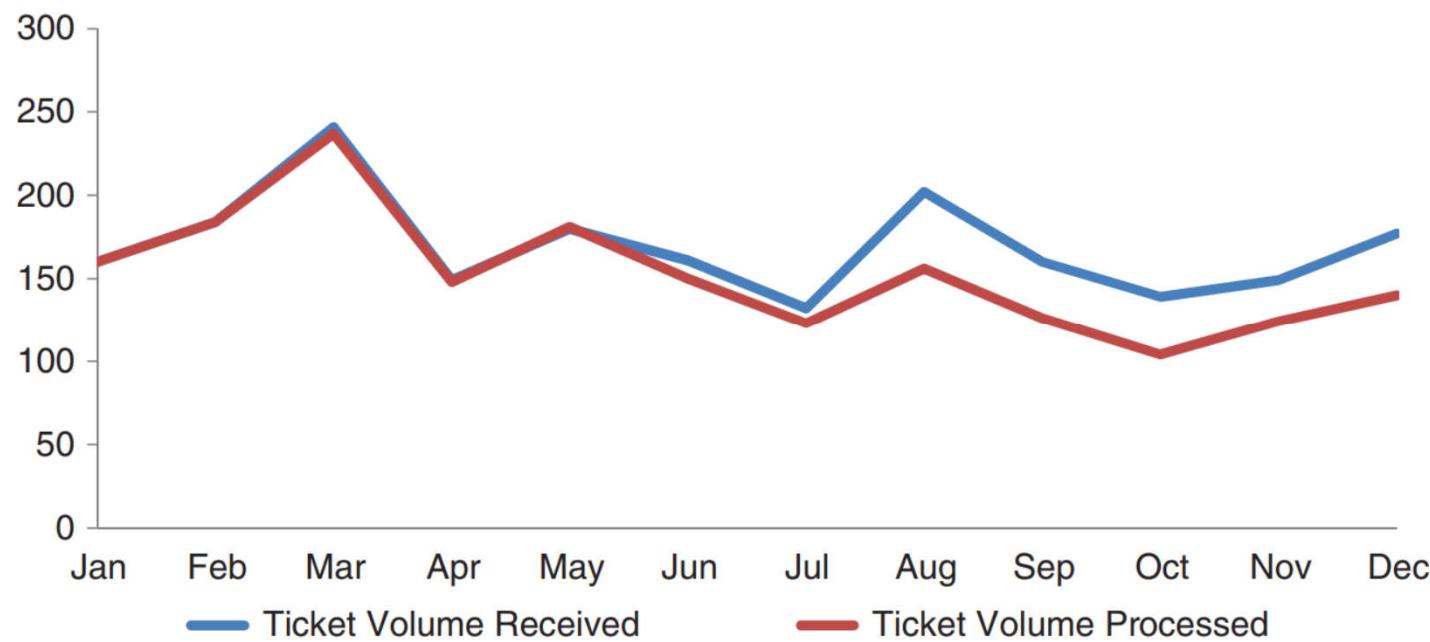
2. Remove gridlines



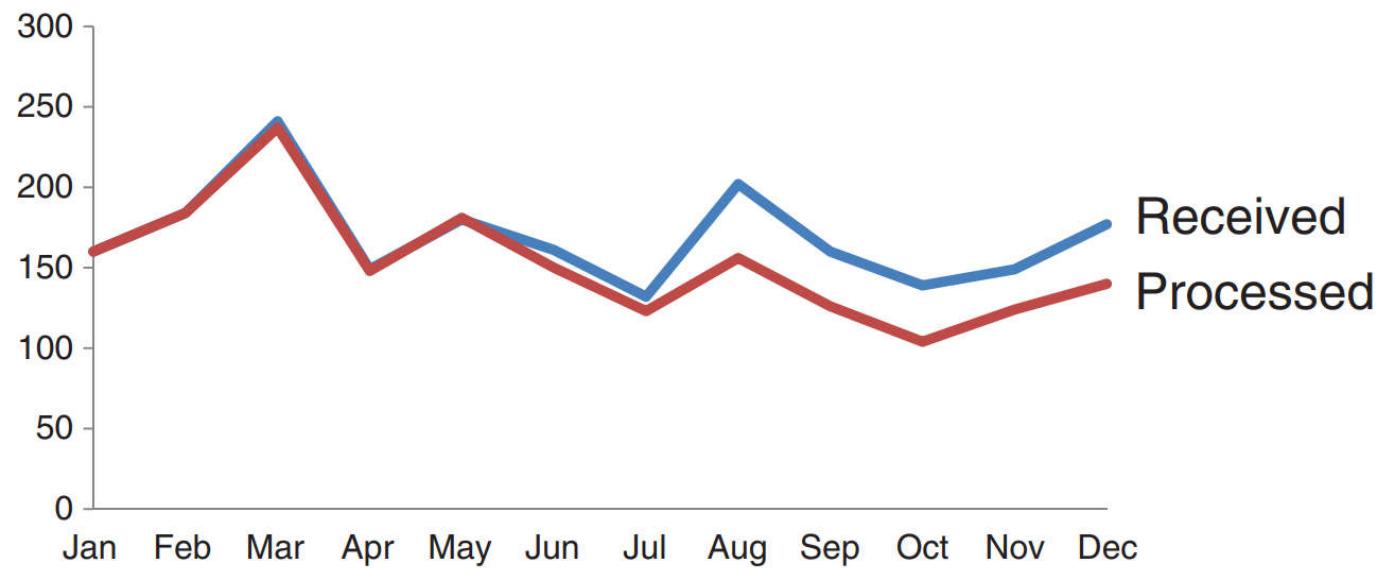
3. Remove data markers



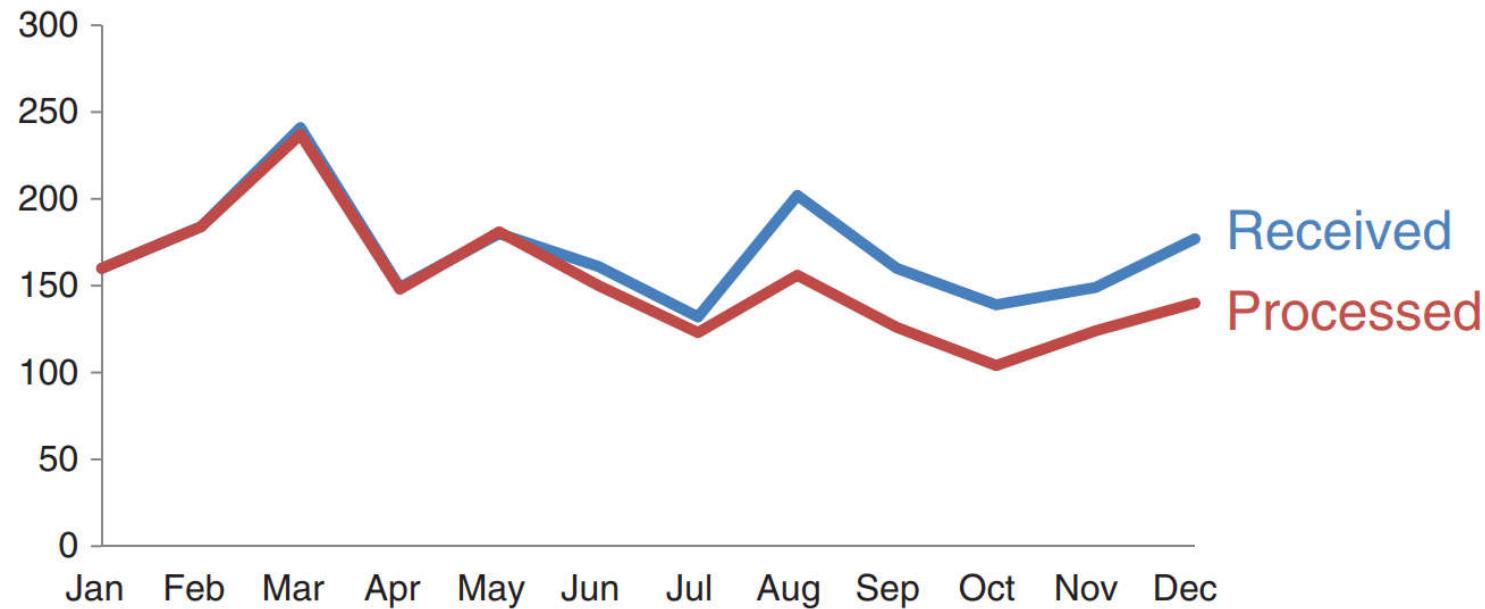
4. Clean up axis labels



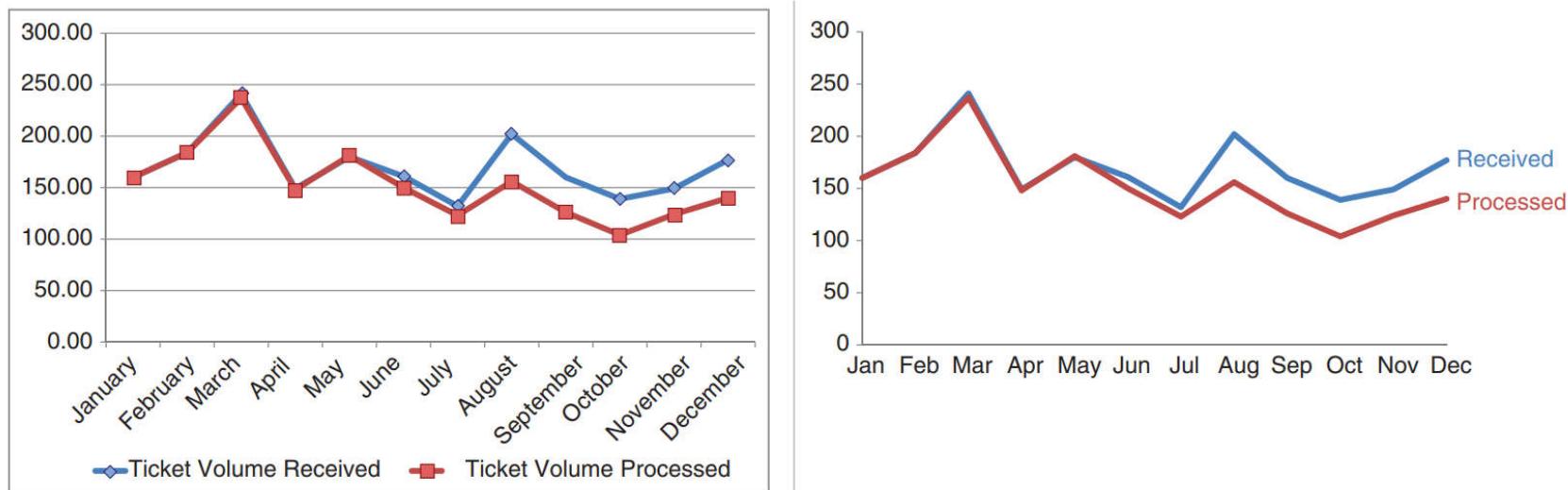
5. Label data directly



6. Leverage consistent color



Decluttered Graph



Decluttering: step-by-step (Example 2)

Example



Remove heavy lines



Remove gridlines



Drop trailing zeros from y-axis labels



Eliminate diagonal text on x-axis



Thicken the bars



Pull data labels into ends of bars



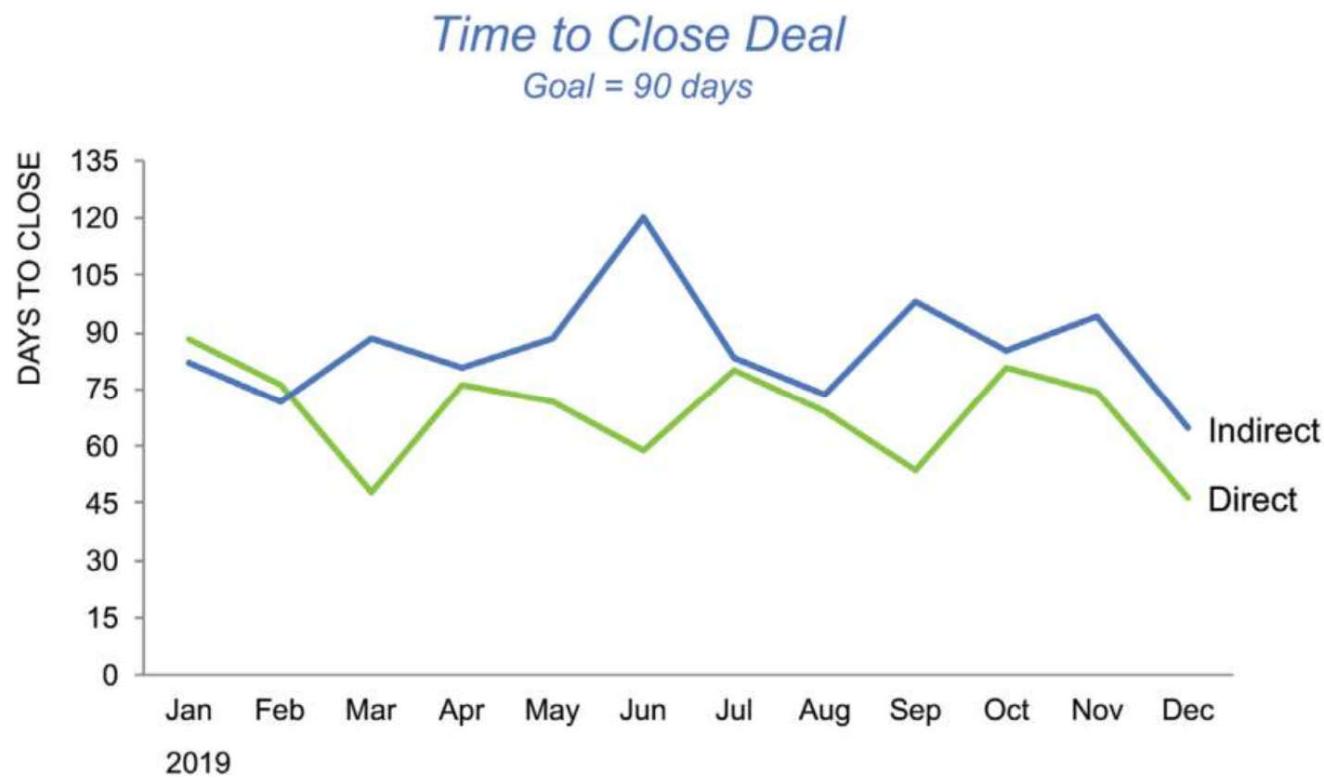
Eliminate data labels



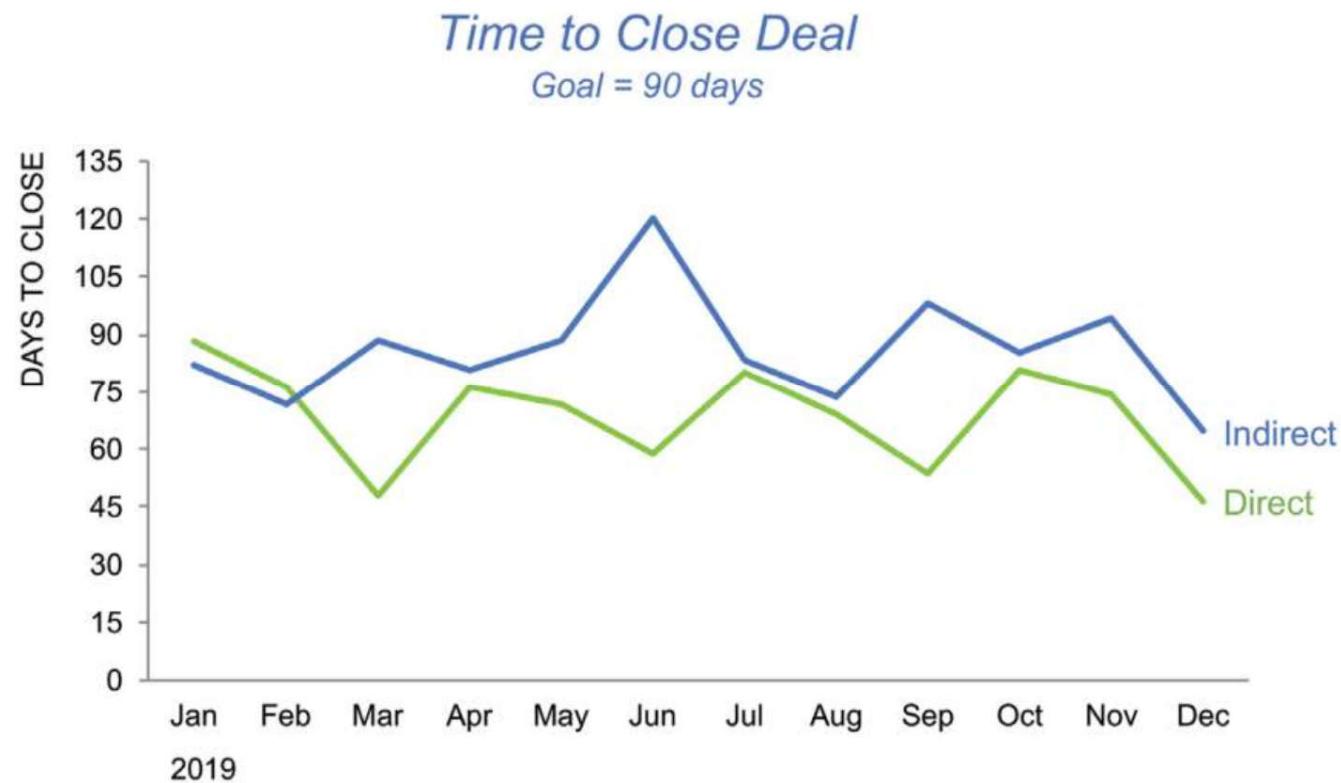
Make it a line graph



Label the data directly



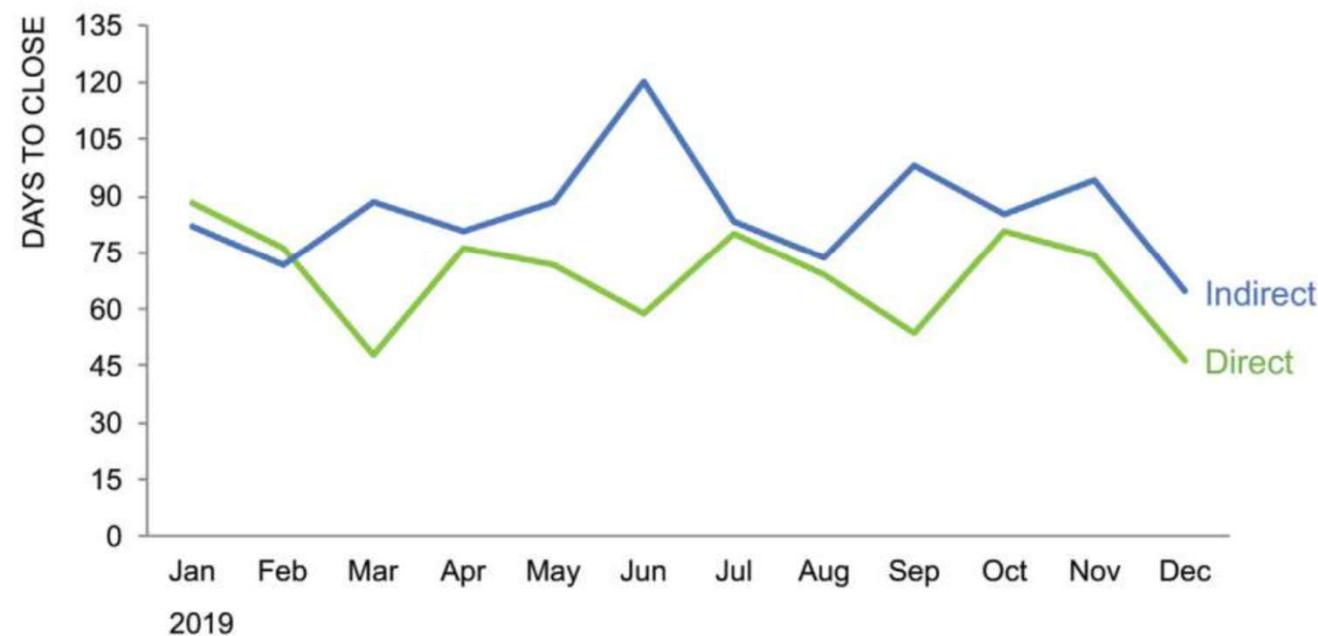
Make data labels the same color as the data



Upper-left-most orient graph title

Time to Close Deal

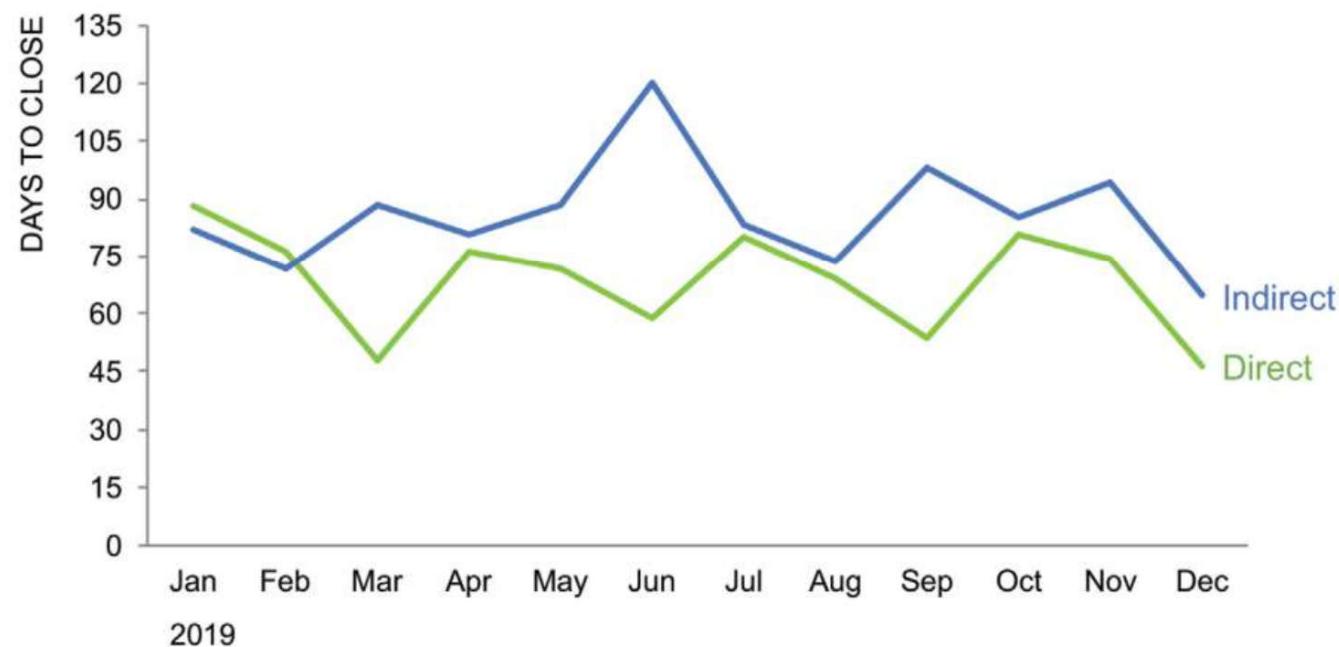
Goal = 90 days



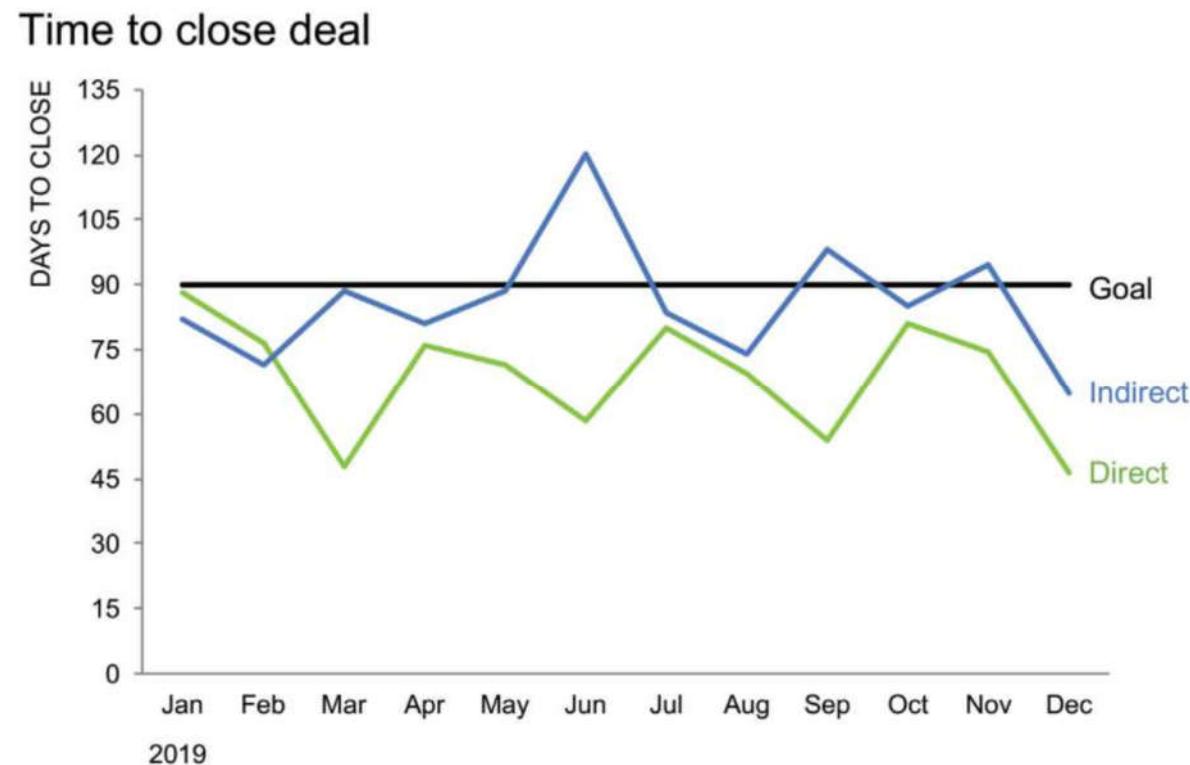
Remove title color

Time to close deal

Goal = 90 days

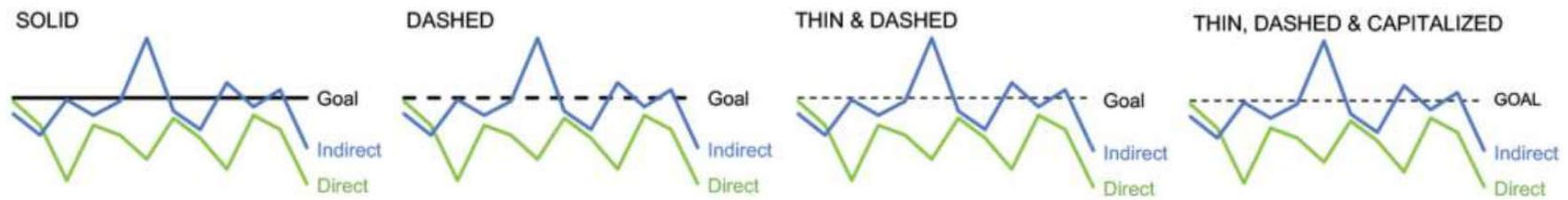


Put the goal in the graph

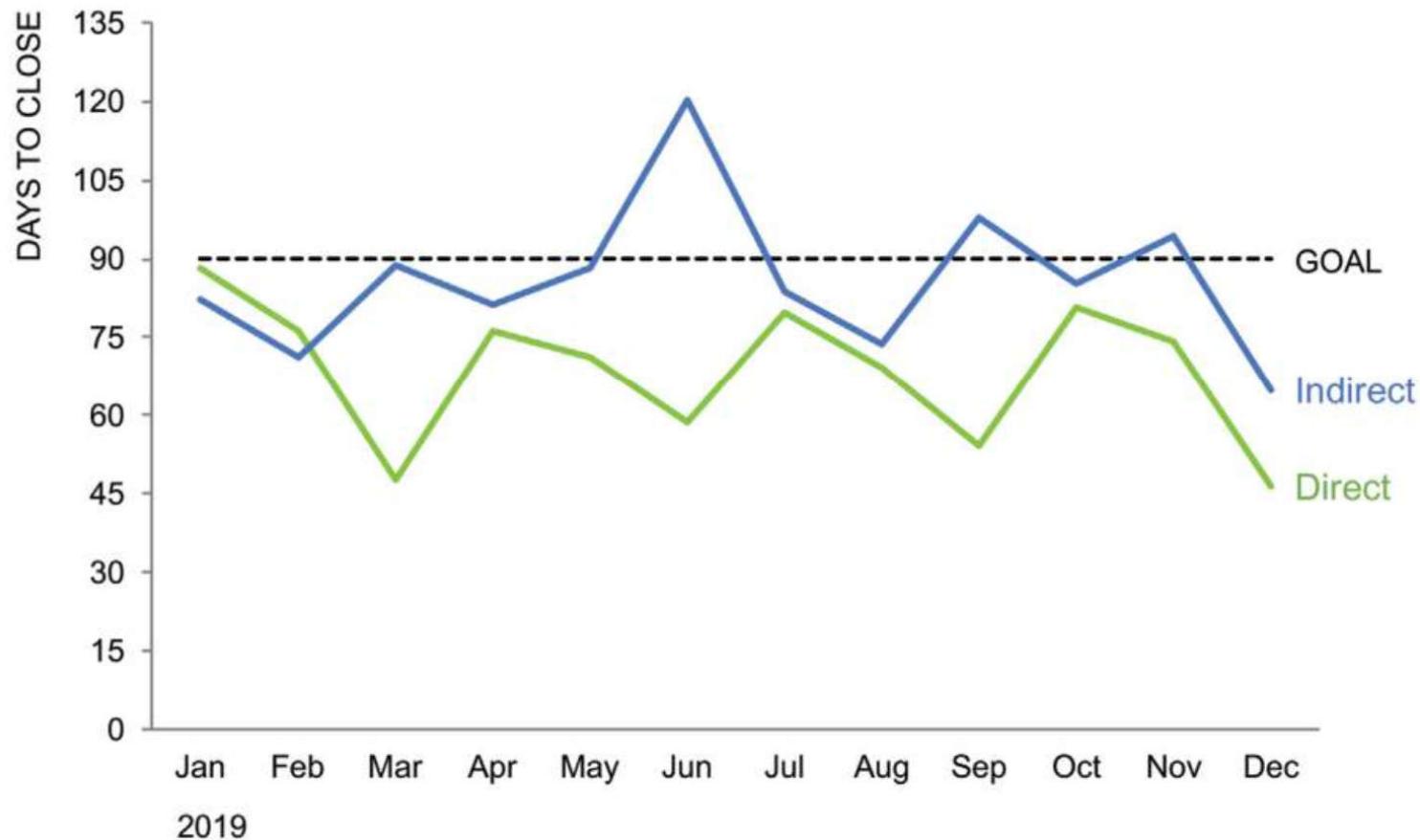


Iterate to best visualize *Goal*

Iterating on **goal** line

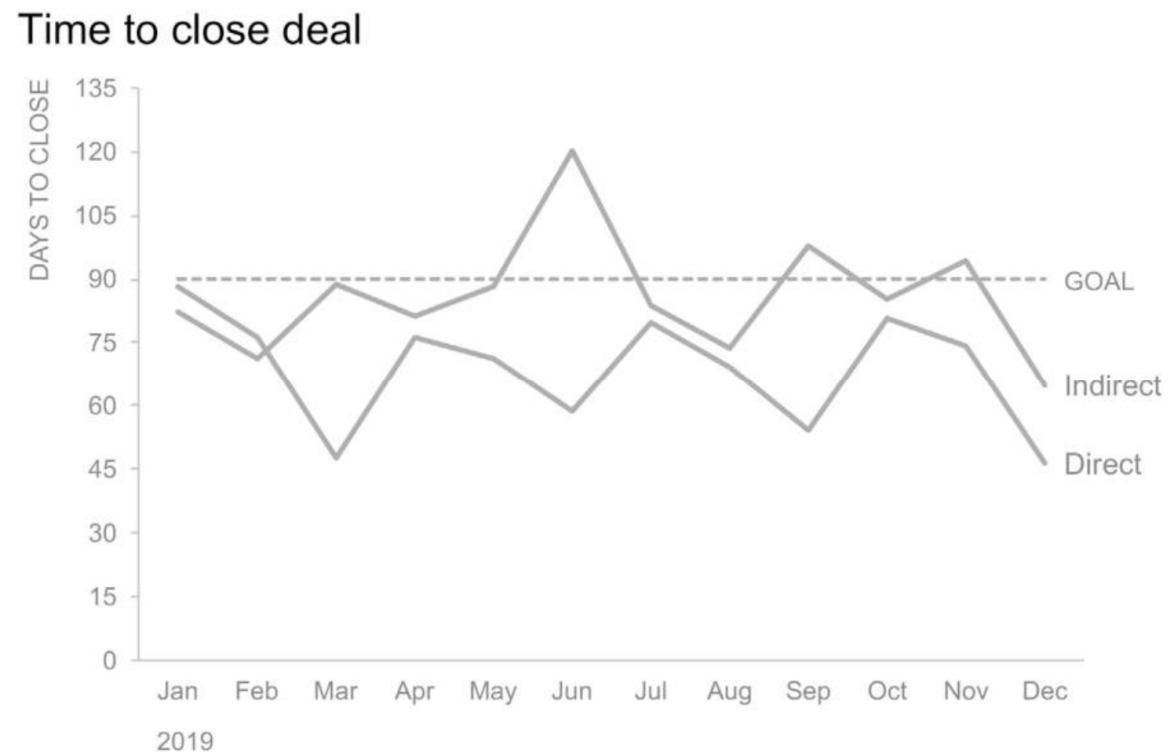


Time to close deal



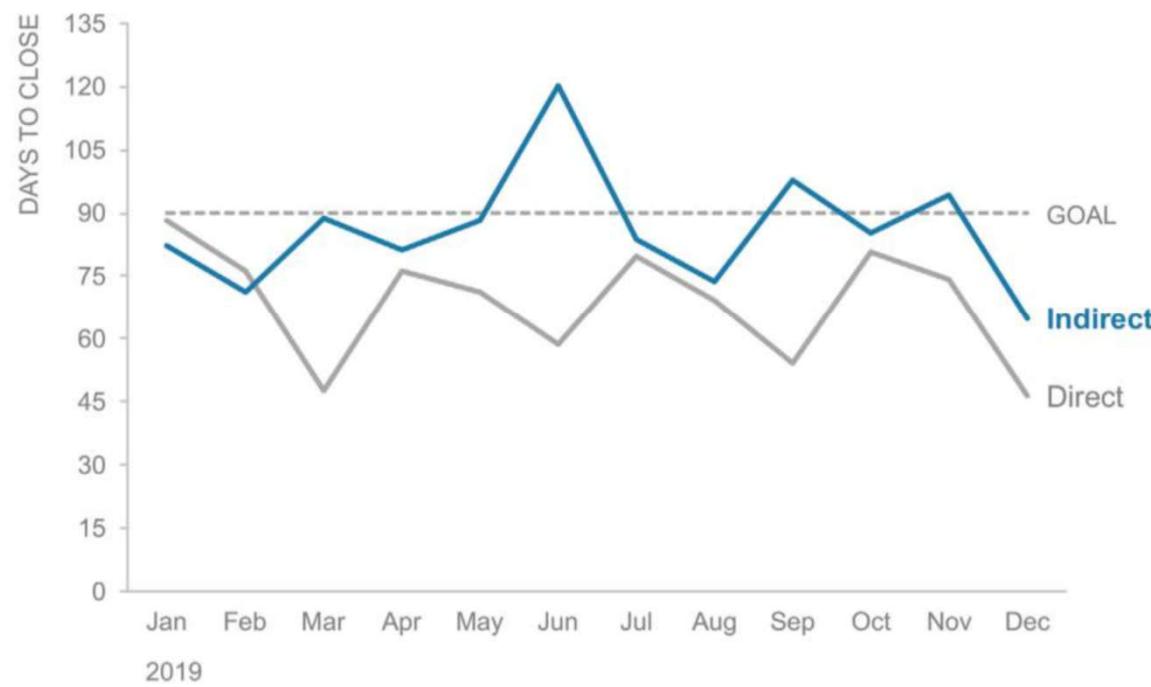
60

Remove color



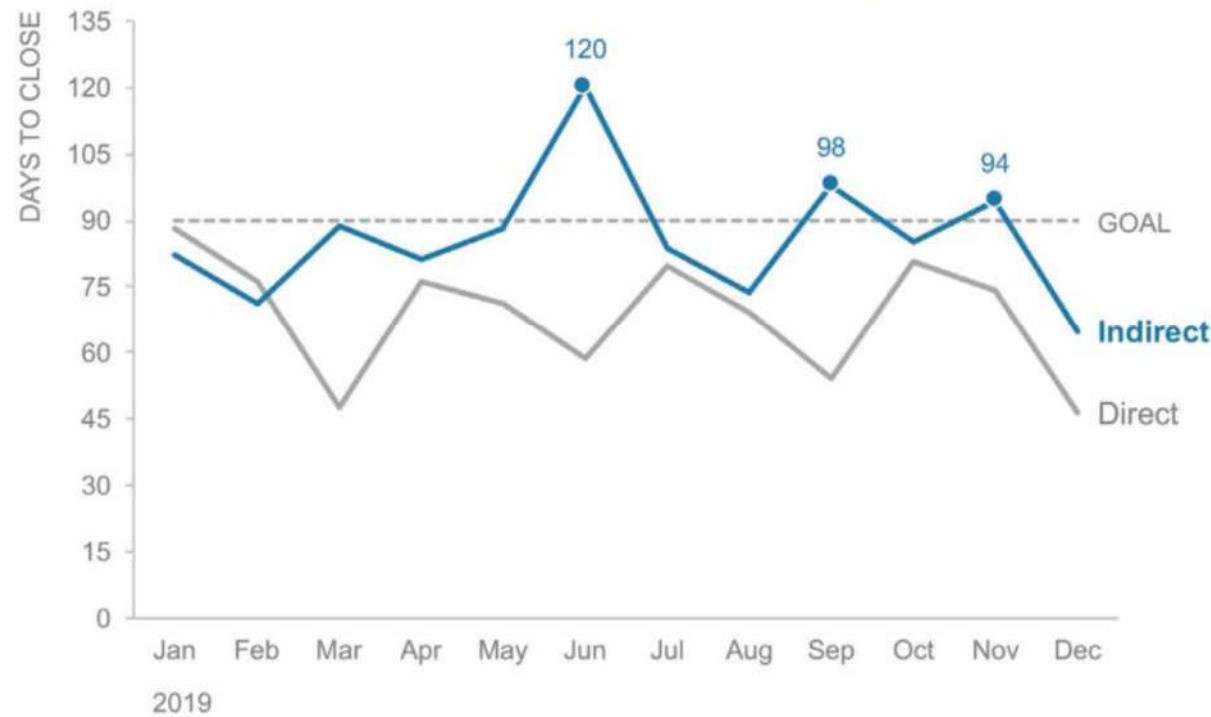
Focus attention

Time to close deal: **indirect varies over time**



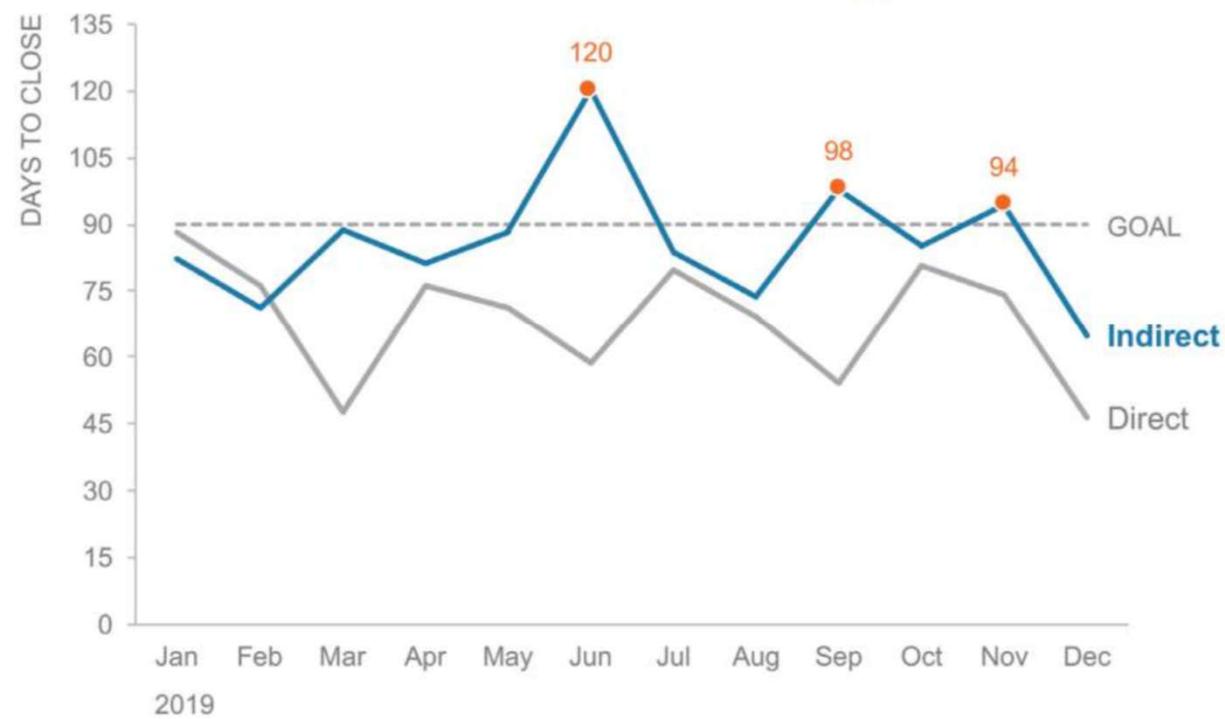
Focus attention elsewhere

Time to close deal: **indirect sales missed goal 3 times**



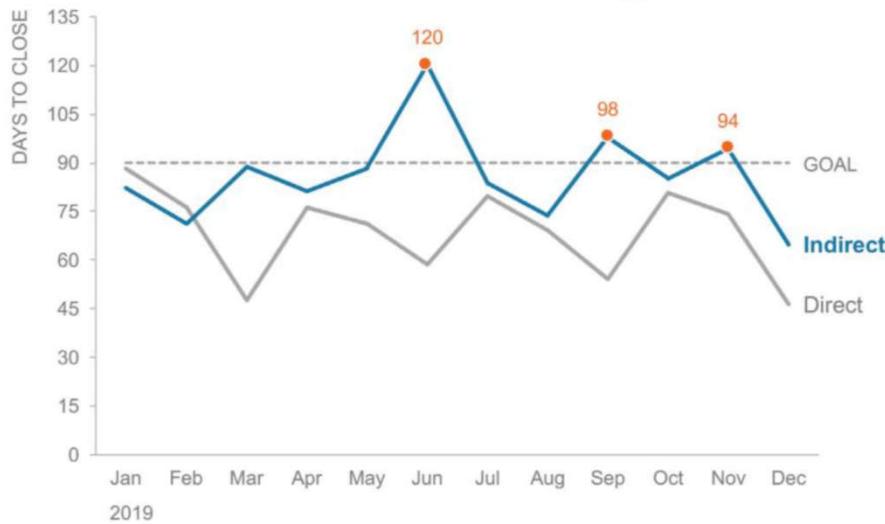
Introduce more color to direct attention

Time to close deal: **indirect sales missed goal 3 times**



Compare!

Time to close deal: **indirect sales missed goal 3 times**



Time to Close Deal

Goal = 90 days

