

# Data Visualization

## 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.

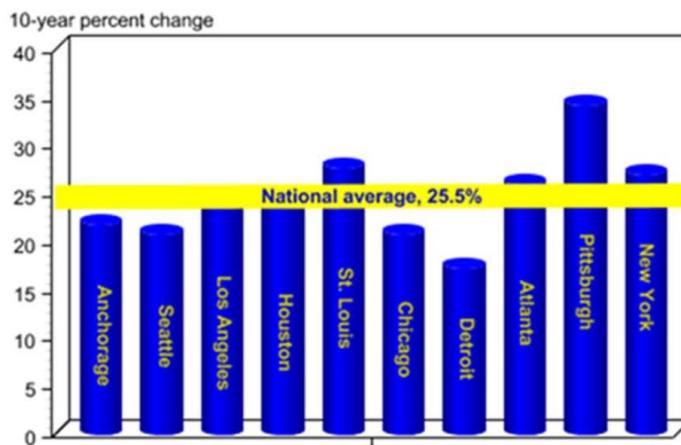
# Clutter

- 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

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## Example

*Retail food price inflation varies across selected Metropolitan Statistical Areas*



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# Gestalt Principles

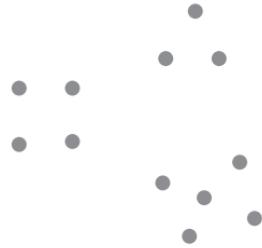
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## Gestalt Principles

- 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

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# Proximity



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## Application of proximity



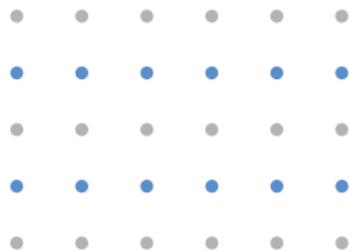
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# Similarity



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## Application of similarity



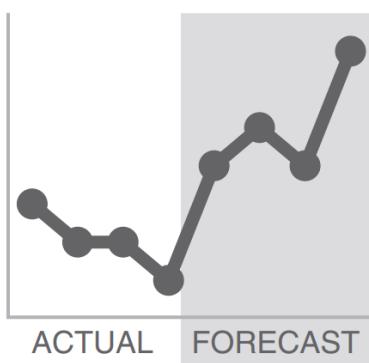
10

# Enclosure



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## Application of enclosure



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# Closure



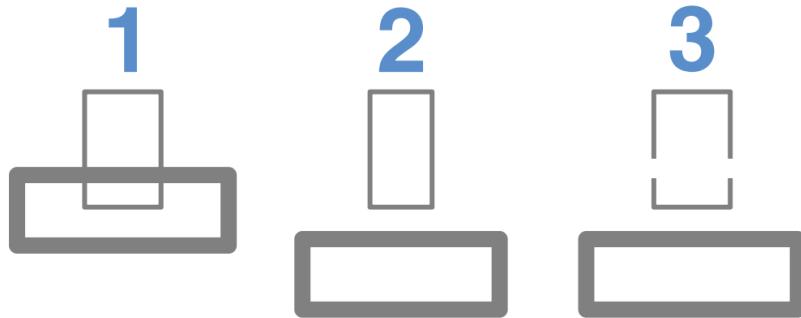
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## Application of closure



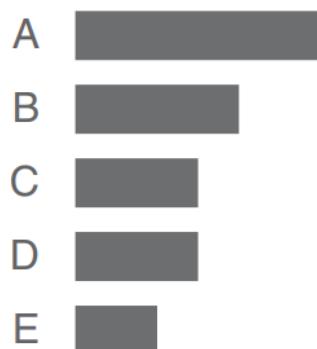
14

# Continuity



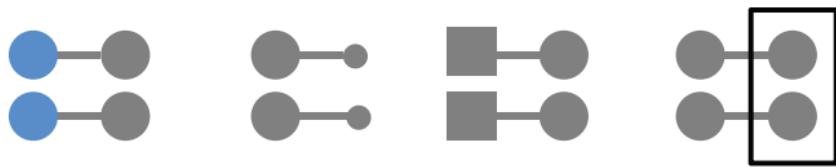
15

## Application of continuity



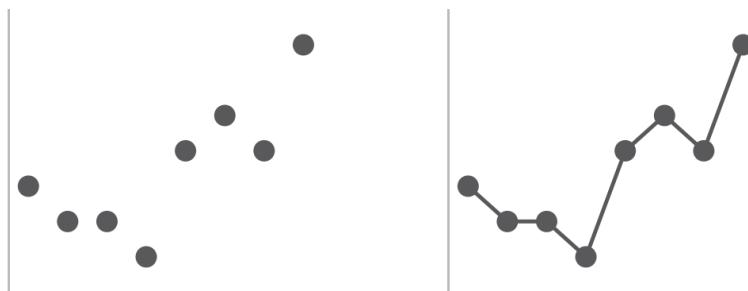
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# Connection



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# Application of connection



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# Which gestalt principles are in play?

Market size over time

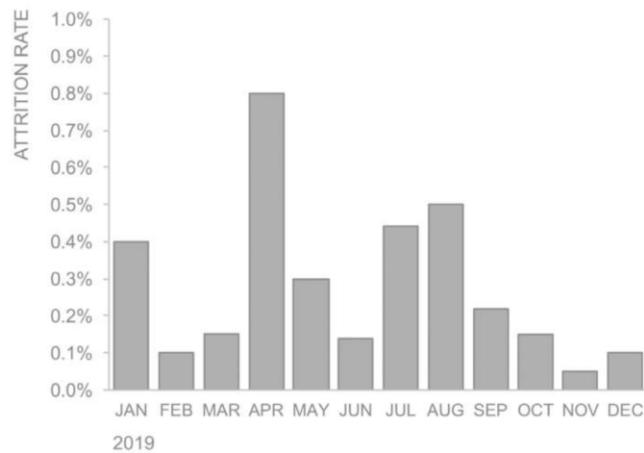


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Tying Words to Graph

# 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.

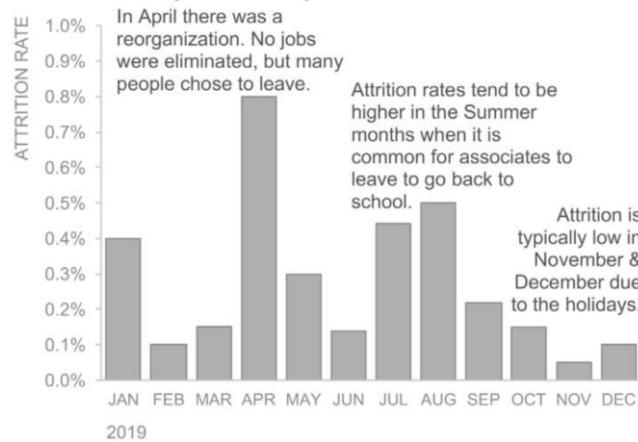
Attrition rates tend to be higher in the Summer months when it is common for associates to leave to go back to school.

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

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# Proximity

2019 monthly voluntary attrition rate



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

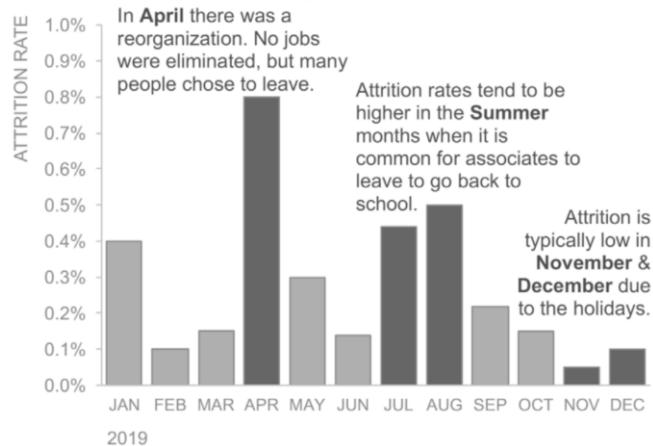
Attrition rates tend to be higher in the Summer months when it is common for associates to leave to go back to school.

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

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# Proximity with emphasis

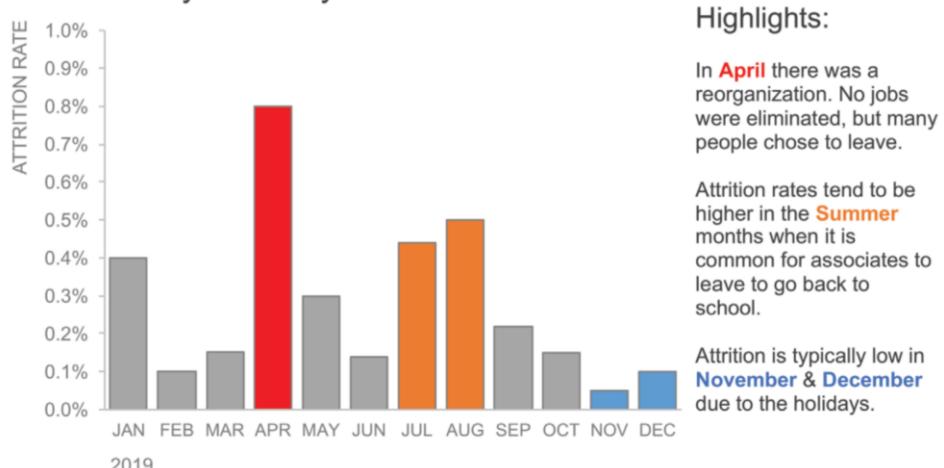
2019 monthly voluntary attrition rate



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# Similarity

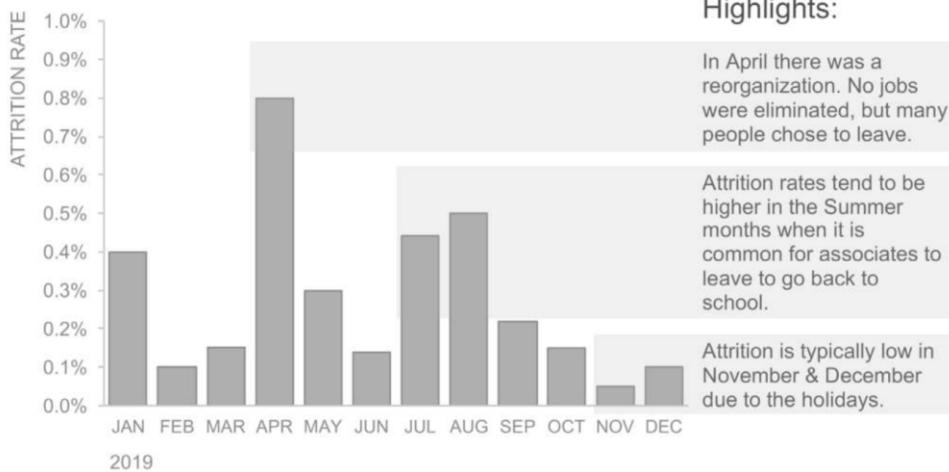
2019 monthly voluntary attrition rate



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# Enclosure

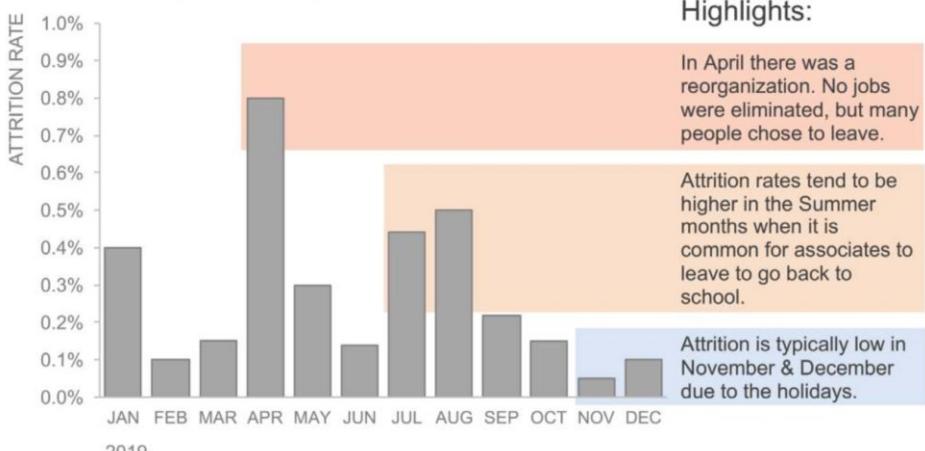
2019 monthly voluntary attrition rate



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# Enclosure with color differentiation

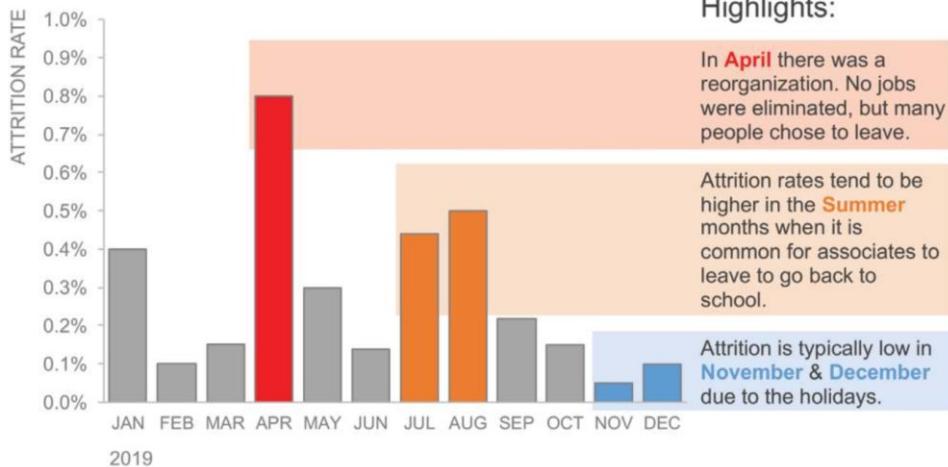
2019 monthly voluntary attrition rate



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# Enclosure + similarity

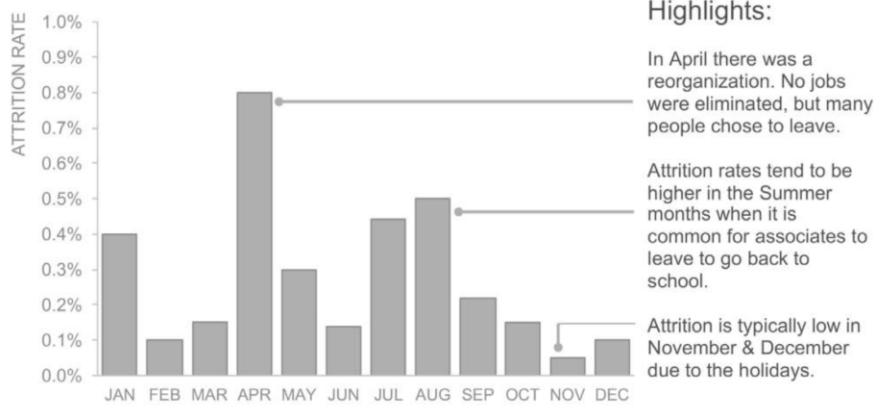
2019 monthly voluntary attrition rate



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# Connection

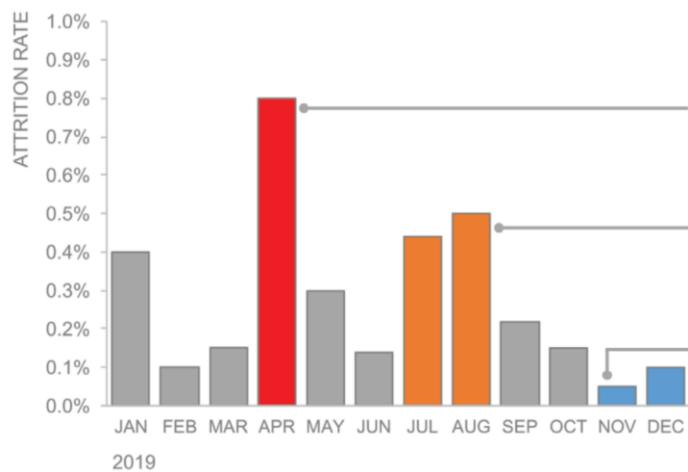
2019 monthly voluntary attrition rate



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# Connection + Similarity

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.

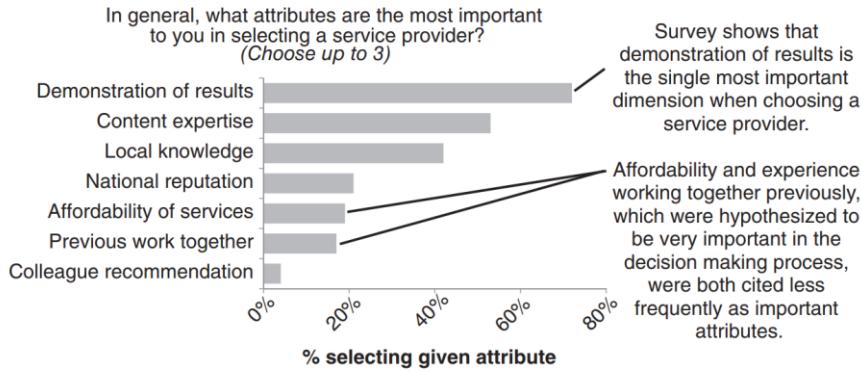
Attrition is typically low in **November & December** due to the holidays.

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## Other Types of Visual Clutter

# Lack of visual order

**Demonstrating effectiveness is most important consideration when selecting a provider**



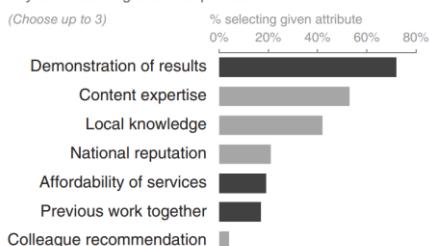
Data source: xyz; includes N number of survey respondents. Note that respondents were able to choose up to 3 options.

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# Creating visual order

**Demonstrating effectiveness** is most important consideration when selecting a provider

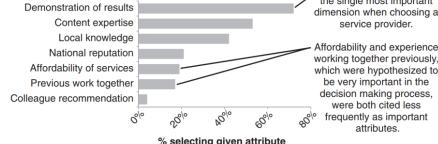
In general, **what attributes are the most important** to you in selecting a service provider?



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

**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?  
(Choose up to 3)

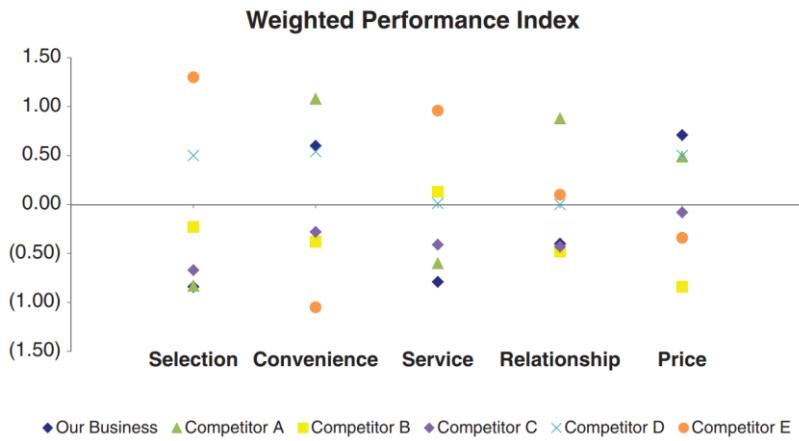


Data source: xyz; includes N number of survey respondents. Note that respondents were able to choose up to 3 options.

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# Non-strategic use of contrast



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# Strategic use of contrast

## Performance overview

### ■ Our business

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

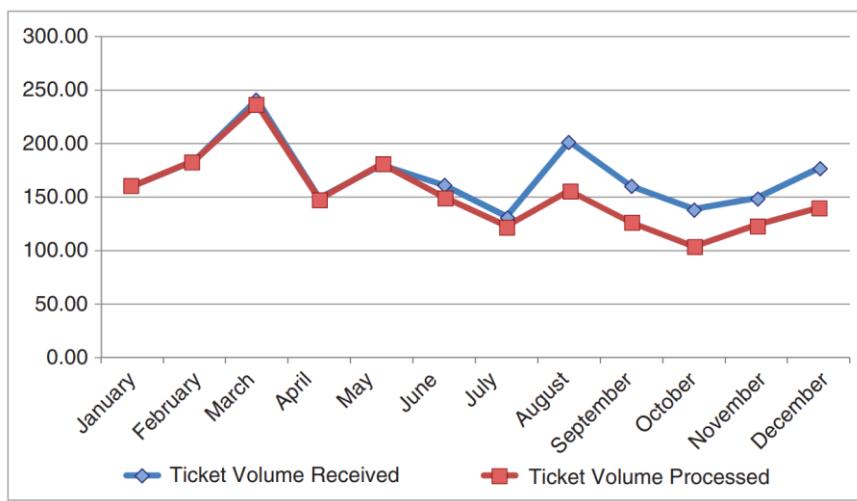


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# Decluttering: step-by-step (Example 1)

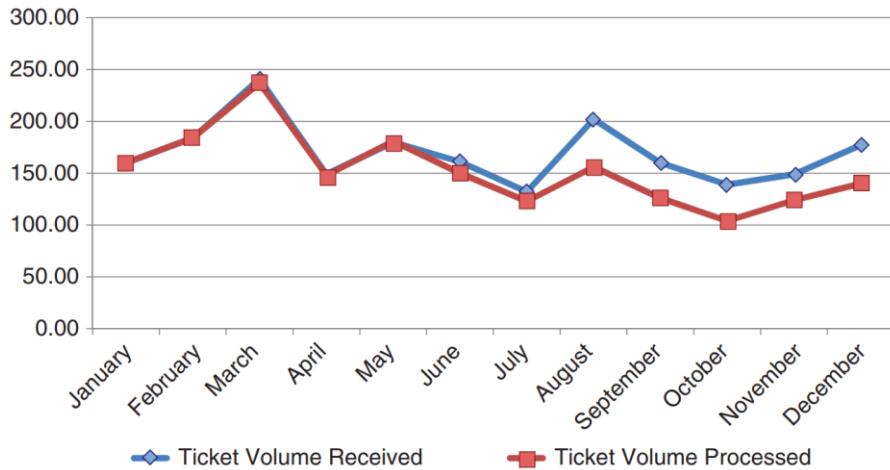
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## Example



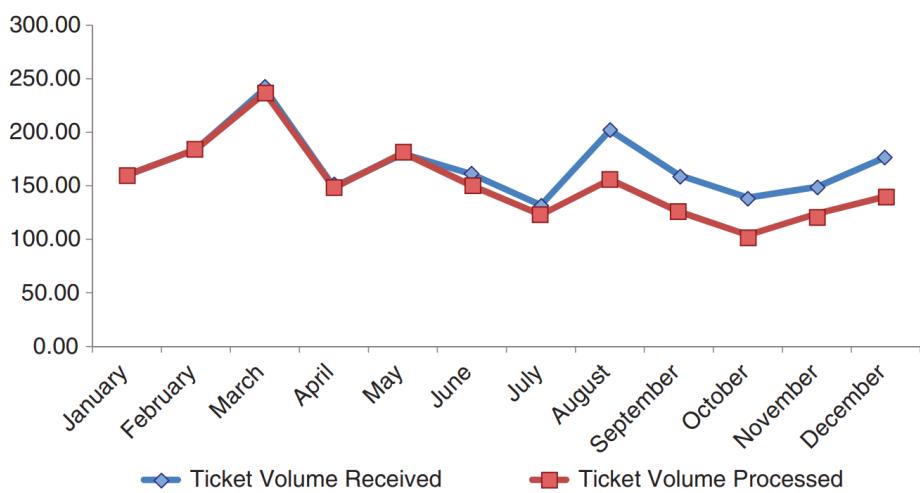
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## 1. Remove chart border



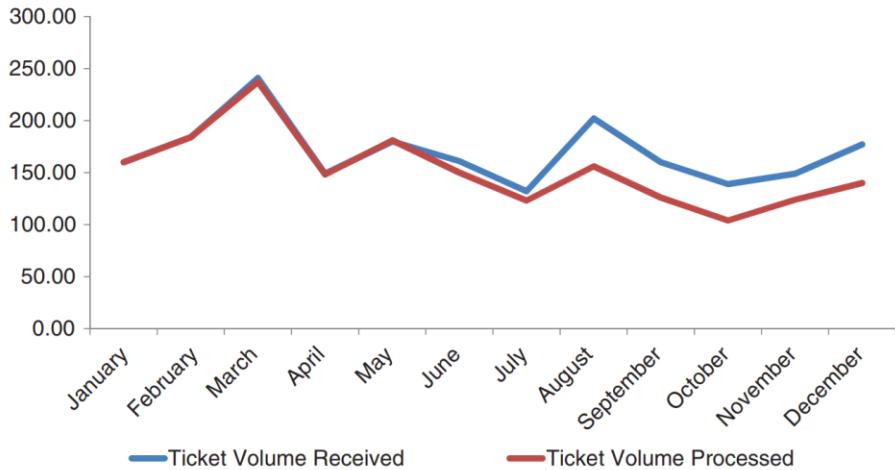
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## 2. Remove gridlines



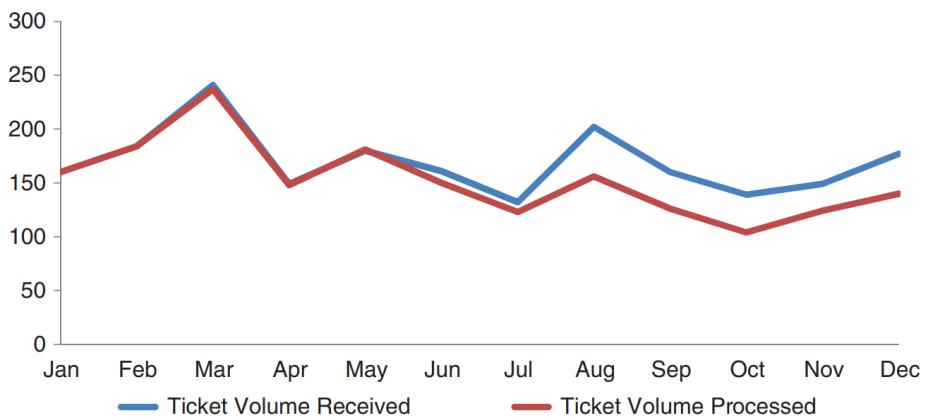
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### 3. Remove data markers



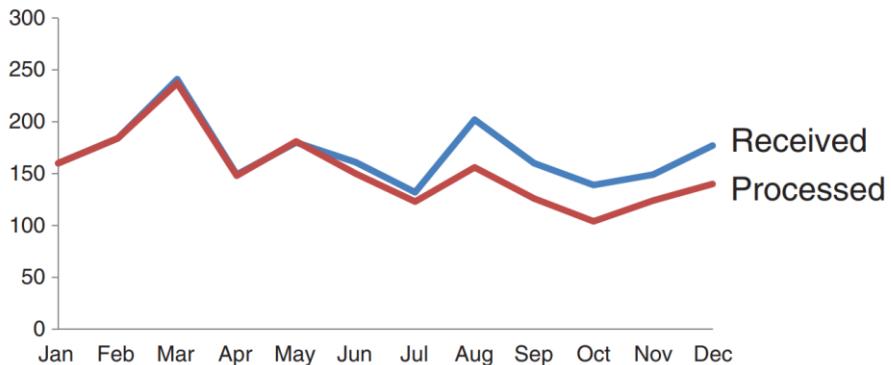
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### 4. Clean up axis labels



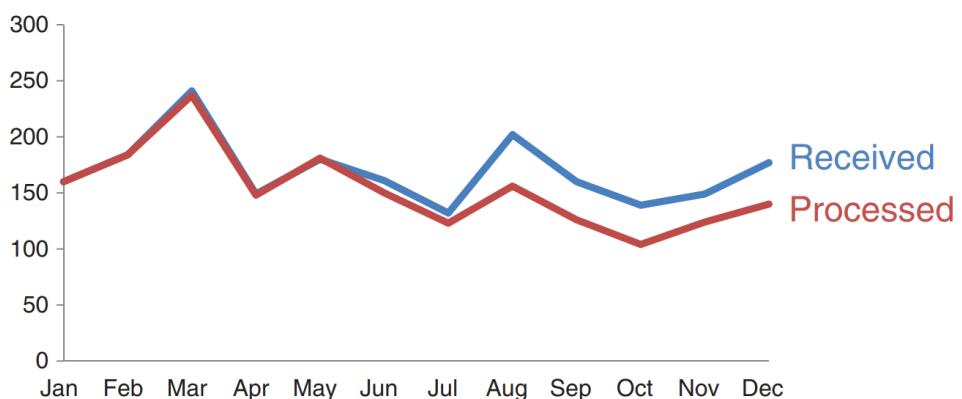
40

## 5. Label data directly



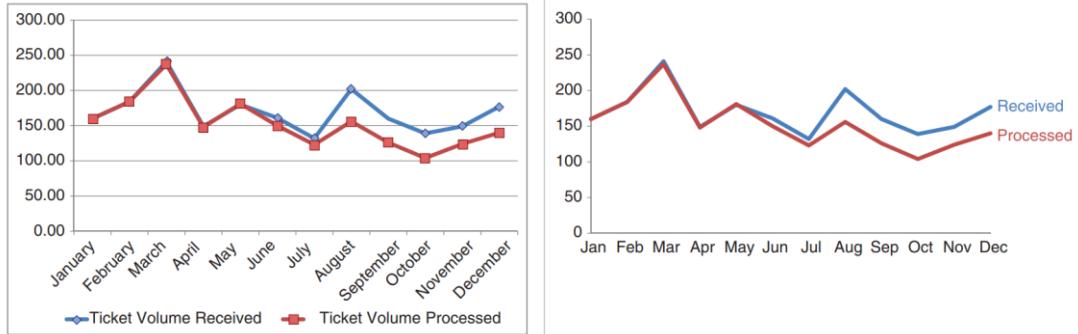
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## 6. Leverage consistent color



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# Decluttered Graph



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Decluttering: step-by-step  
(Example 2)

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# Example



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# Remove heavy lines



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# Remove gridlines



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# Drop trailing zeros from y-axis labels



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# Eliminate diagonal text on x-axis



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# Thicken the bars



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# Pull data labels into ends of bars



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# Eliminate data labels

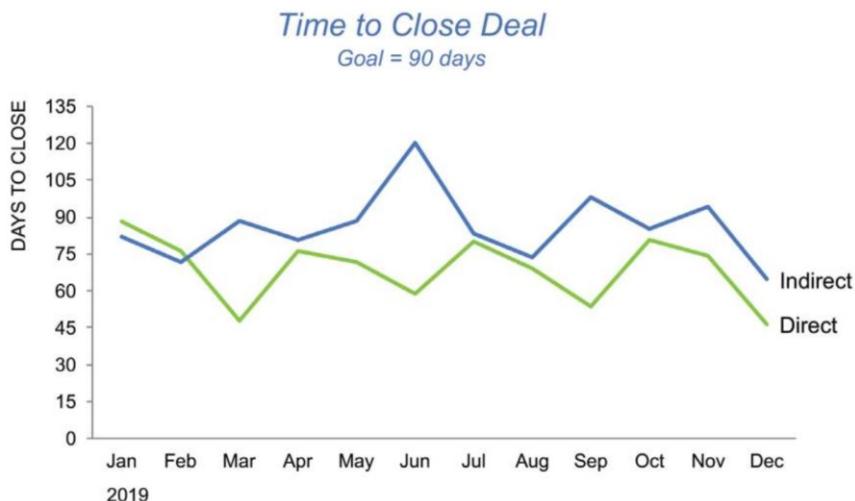


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# Make it a line graph



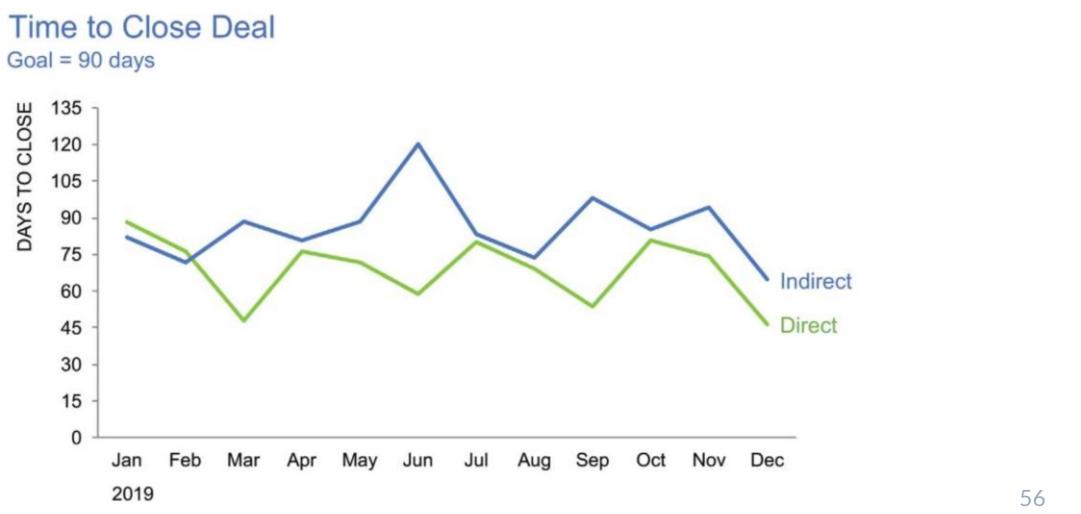
# Label the data directly



## Make data labels the same color as the data



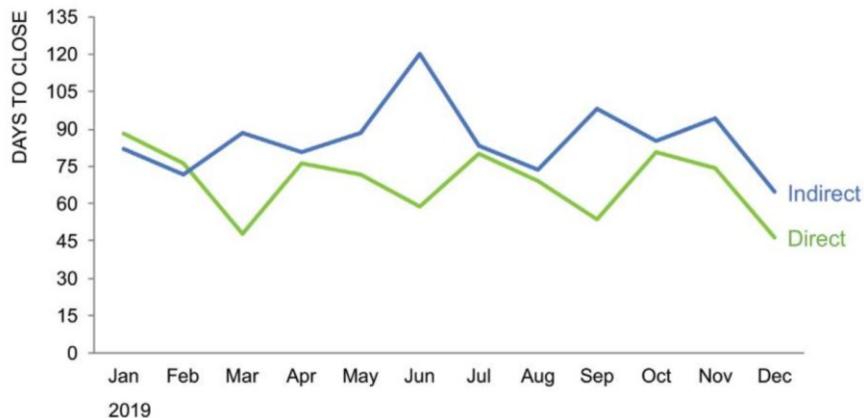
## Upper-left-most orient graph title



# Remove title color

Time to close deal

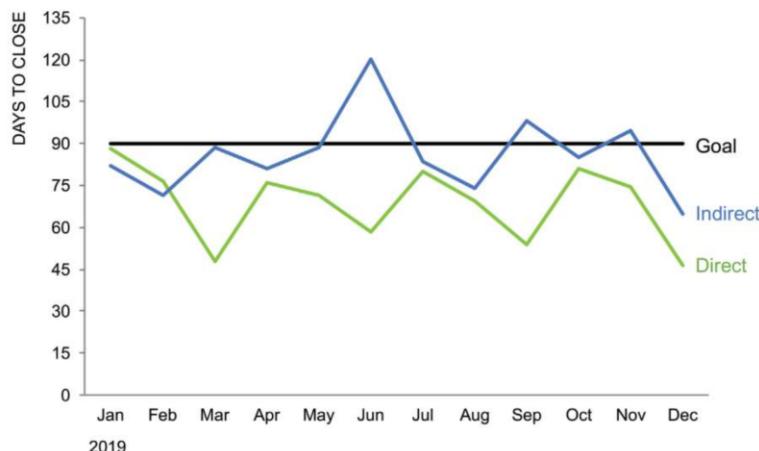
Goal = 90 days



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# Put the goal in the graph

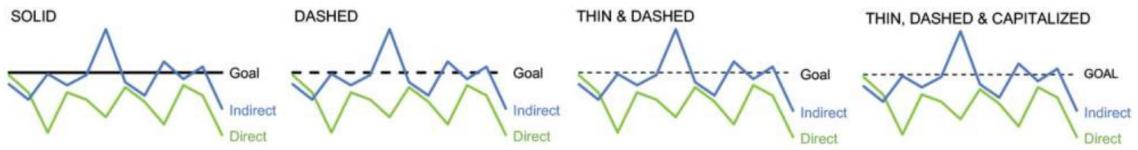
Time to close deal



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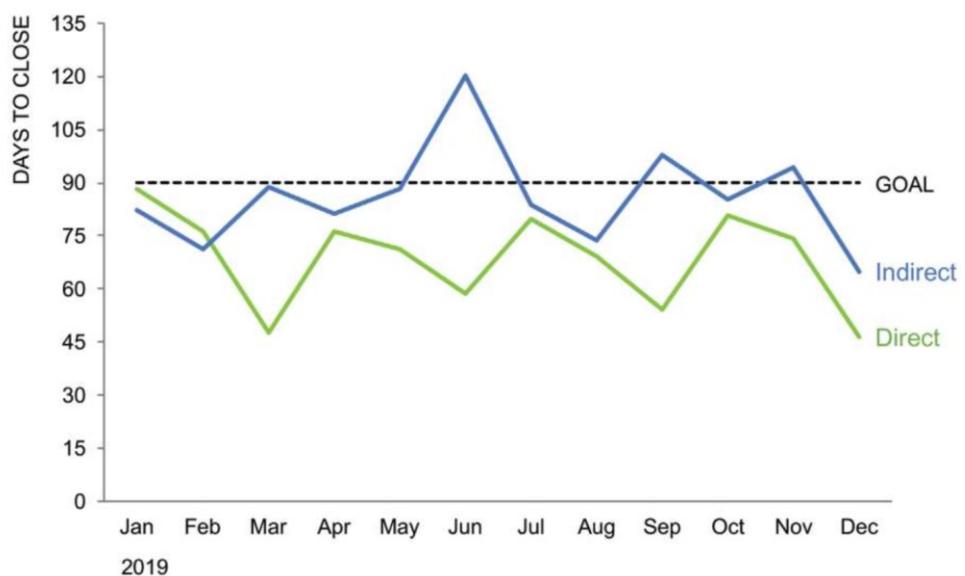
# Iterate to best visualize *Goal*

## Iterating on goal line



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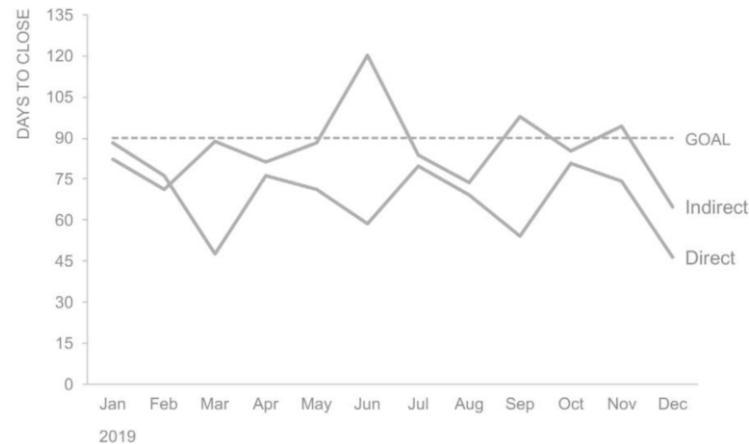
## Time to close deal



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# Remove color

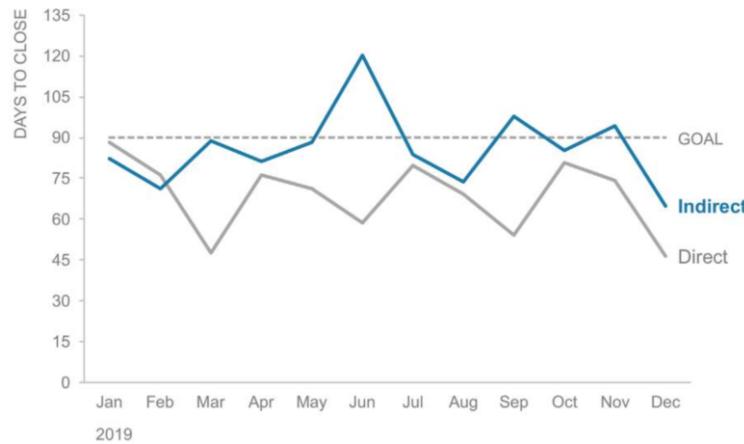
Time to close deal



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# Focus attention

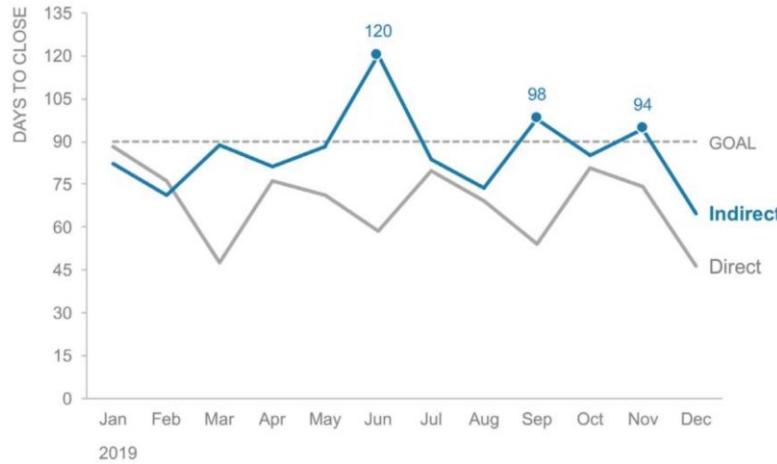
Time to close deal: indirect varies over time



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# Focus attention elsewhere

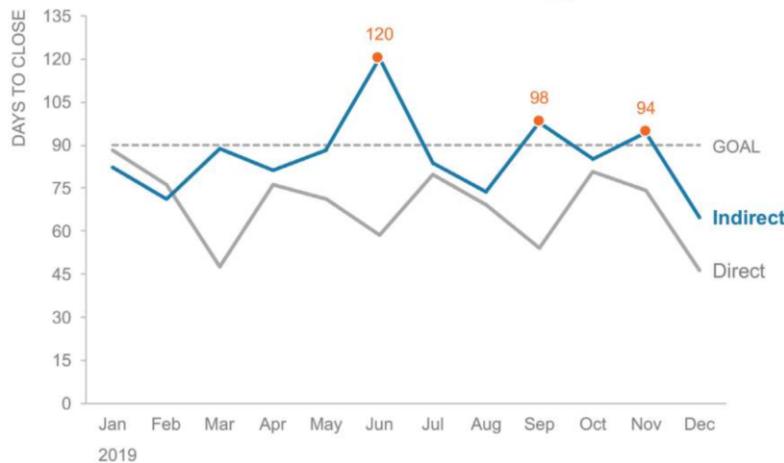
Time to close deal: **indirect sales missed goal 3 times**



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# Introduce more color to direct attention

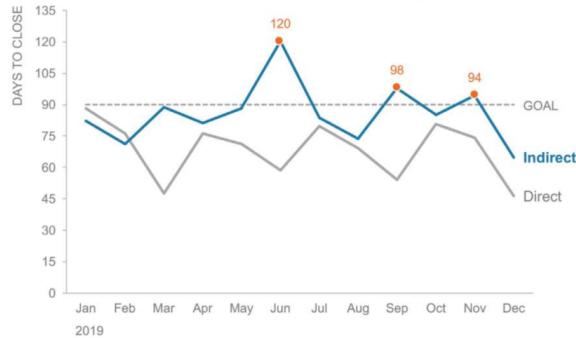
Time to close deal: **indirect sales missed goal 3 times**



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# Compare!

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



Time to Close Deal

Goal = 90 days



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