



Data Visualisation: Styling Plots Using ggplot2

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What's on the agenda?

- What is the National Innovation Centre for Data?
- 3 minute intro

Theory

- Data visualisation definition
- Five key considerations

Practical

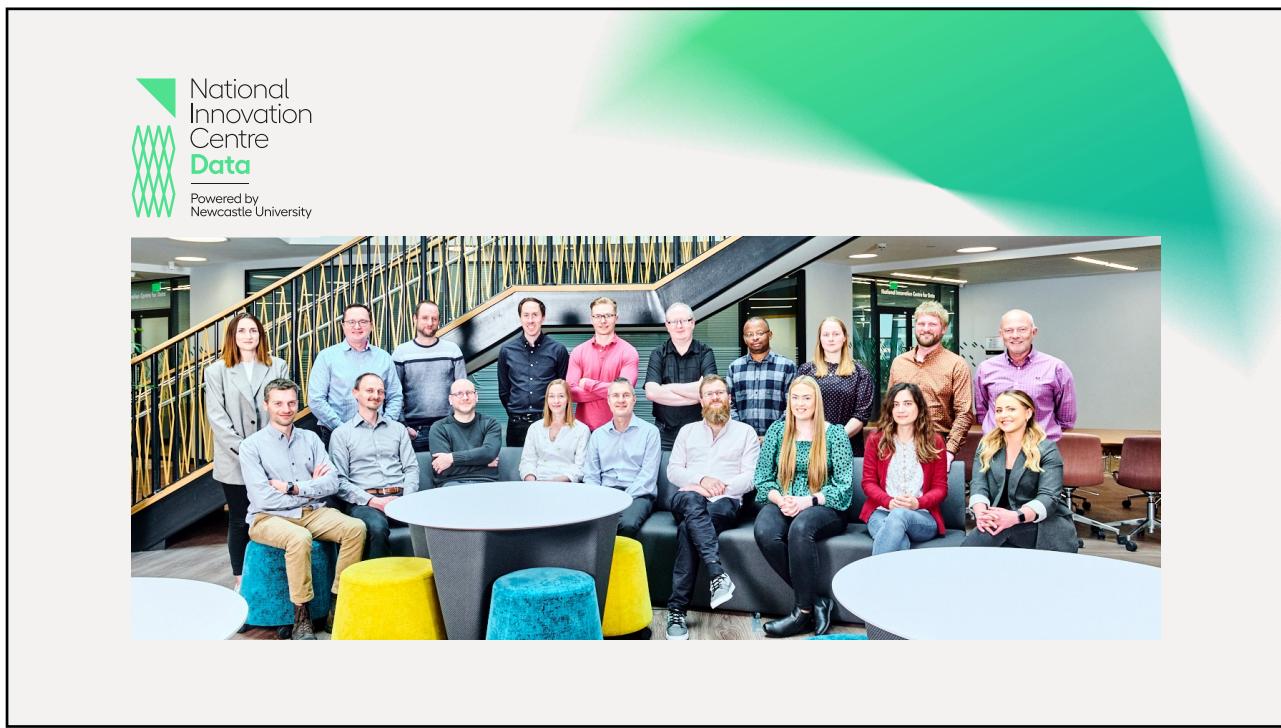
- The Grammar of Graphics (a little more theory) and ggplot2
- Build your own theme() for a consistent design style



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3 minute introductions

Name

First job

Something you learned from it



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Data visualisation definition:

“The visual representation and presentation of data to facilitate understanding”

Andy Kirk (2016)



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Visual Representation: marks and channels

Munzner (2014)

Marks

- Points
- Lines
- Areas

geom()

mapping= aes()

Channels

Position		Colour
Horizontal	Vertical	Both

Size		Shape	Tilt
Length	Area		

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Data visualisation is the visual representation and presentation of data to facilitate understanding

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Visual Representation: marks and channels

Munzner (2014)

**1 categorical
1 quantitative**

2 quantitative

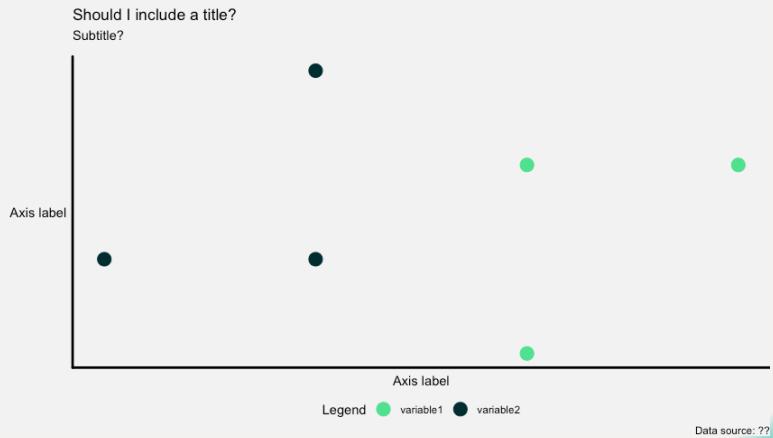
**1 categorical
2 quantitative**

**1 categorical
1 quantitative**

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Presentation

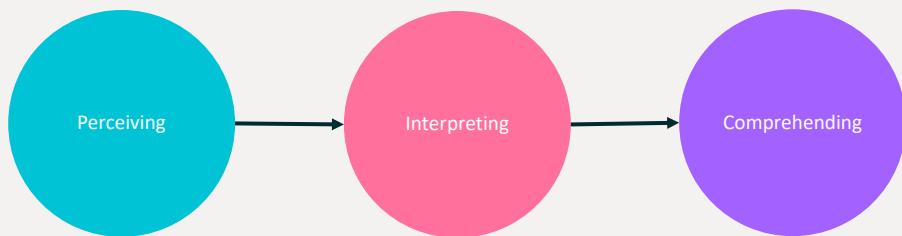


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The Three Stages of Understanding

Andy Kirk (2016)



What does it **show**?
Where is big, medium, small?
How do things compare?
What relationships exist?

What does it **mean**?
What is good and bad?
Is it meaningful or insignificant?
Unusual or expected?

What does it **mean to me**?
What are the main messages?
What have I learnt?
Any actions to take?

Data visualisation is the visual representation and presentation of data to facilitate understanding

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Five Key Considerations

1. Context is key: where and how will your visualisations be viewed?
2. Don't rush chart selection
3. The importance of colour
4. Use Gestalt Psychology: reduce clutter
5. Make use of preattentive attributes



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Context is key: where and how will your visualisations be viewed?

What are the characteristics associated with these spaces:

- Boardroom
- Live presentation
- Air traffic control centre
- Learning environment
- Digital or printed report



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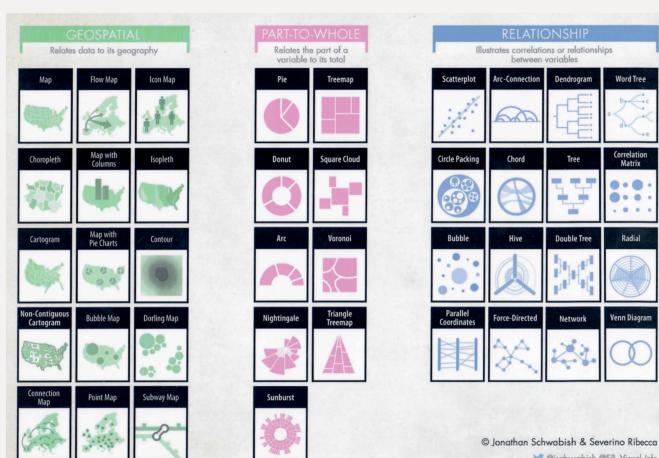
Don't rush chart selection



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Don't rush chart selection



Resources

- [The R Graph Gallery](#)
- [The Python Graph Gallery](#)
- [visualisation types in Power BI](#)
- [Creating a chart in Excel](#)

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The importance of colour

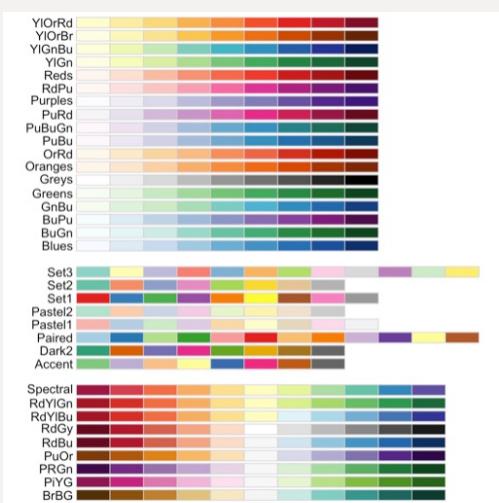


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- There are only around 6-12 very distinct colours
- Red, green, yellow, blue, pink, brown, orange, grey, purple plus black and white
- How aesthetically pleasing is an image covered in an assortment of colours?
- Technically, how easy is it to decode the visualisation?
- Leverage colour selectively as a strategic tool to highlight the important parts of your visualisation.
- Have you considered people with colour deficiencies?

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The importance of colour



- There are plenty of palette packages out there for you to use, such as RcolorBrewer.
- This package contains three types of palettes
 - Sequential (light colours for low values and dark colours for high values)
 - Qualitative (categorical data that does not need to imply magnitudes difference)
 - Diverging (low and high extremes emphasized with dark colours with contrasting hues)

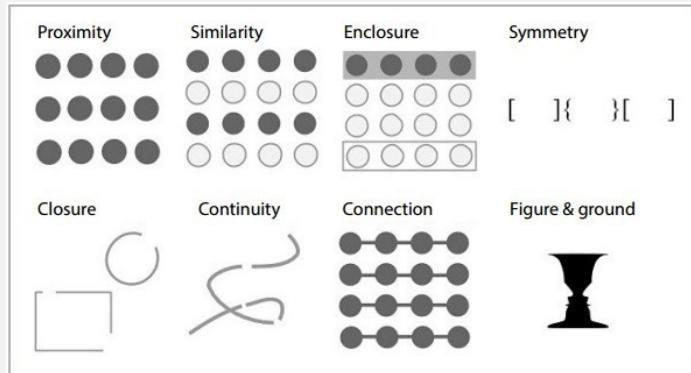
Image from <https://r-graph-gallery.com/38-rcolorbrewers-palettes.html>

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Use Gestalt Psychology

- Gestalt psychology introduced the idea that humans naturally perceive visual elements as organised patterns and objects.
- The Gestalt principles of visual perception
 - Proximity
 - Similarity
 - Enclosure
 - Closure
 - Continuity
 - Connection



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Make use of preattentive attributes

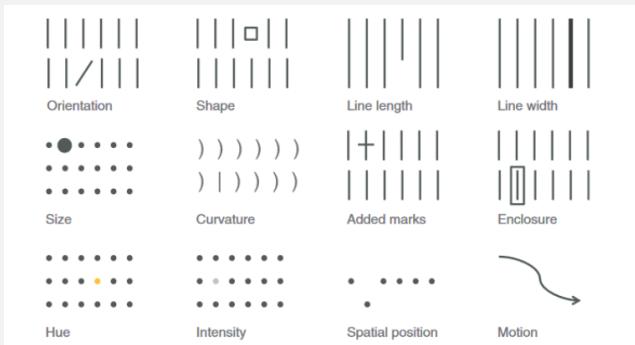
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9245074235604756047
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Make use of preattentive attributes

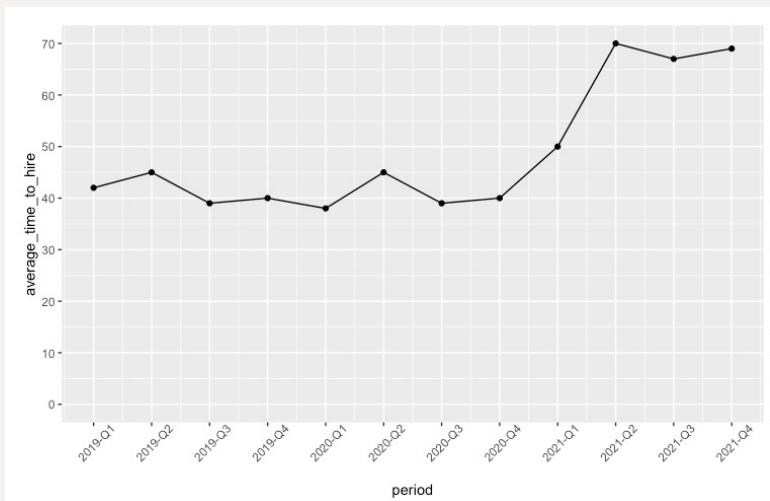


- Use preattentive attributes to focus your audience's attention on specific parts of your visualisation.

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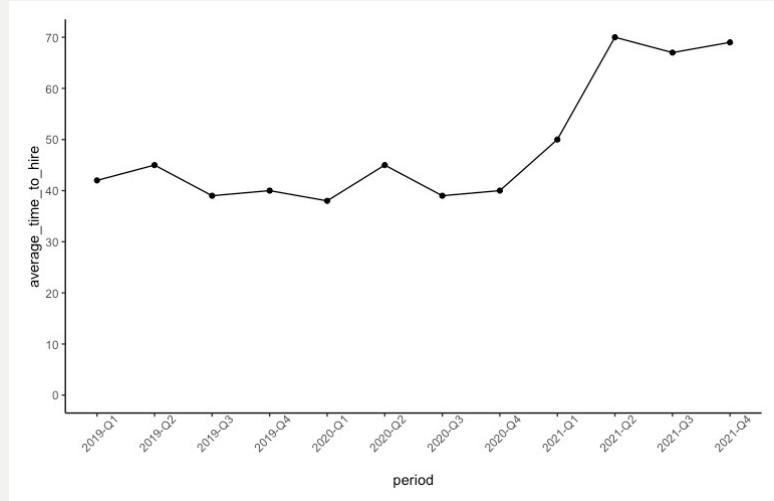
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Example: report on the impact of a new hiring policy



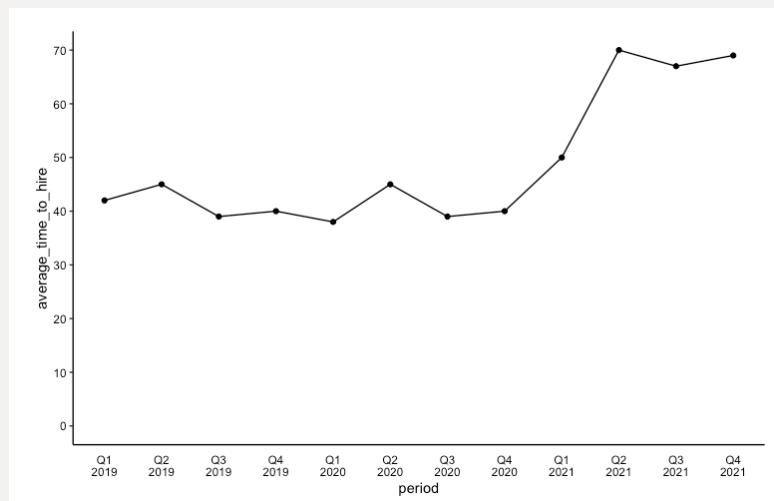
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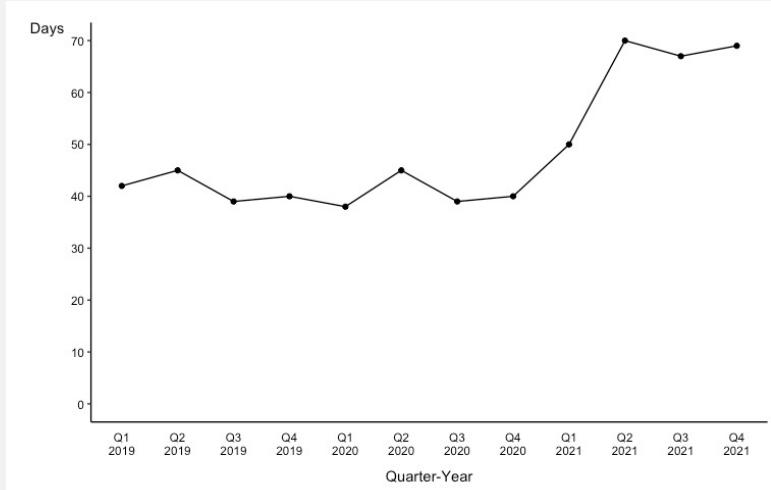
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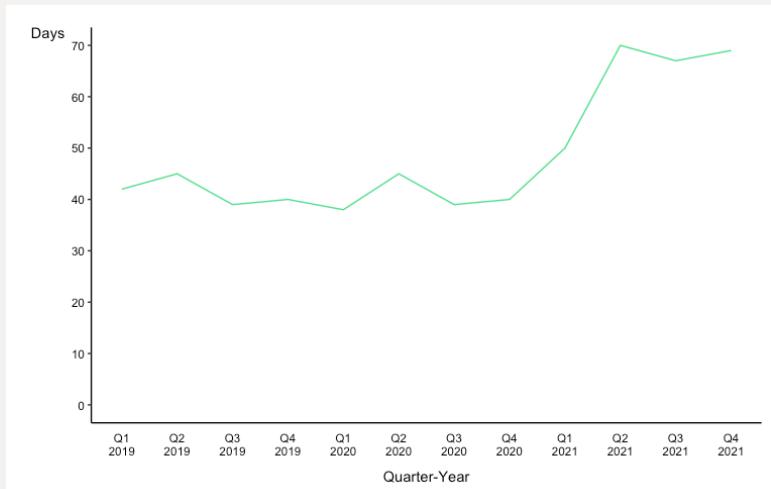
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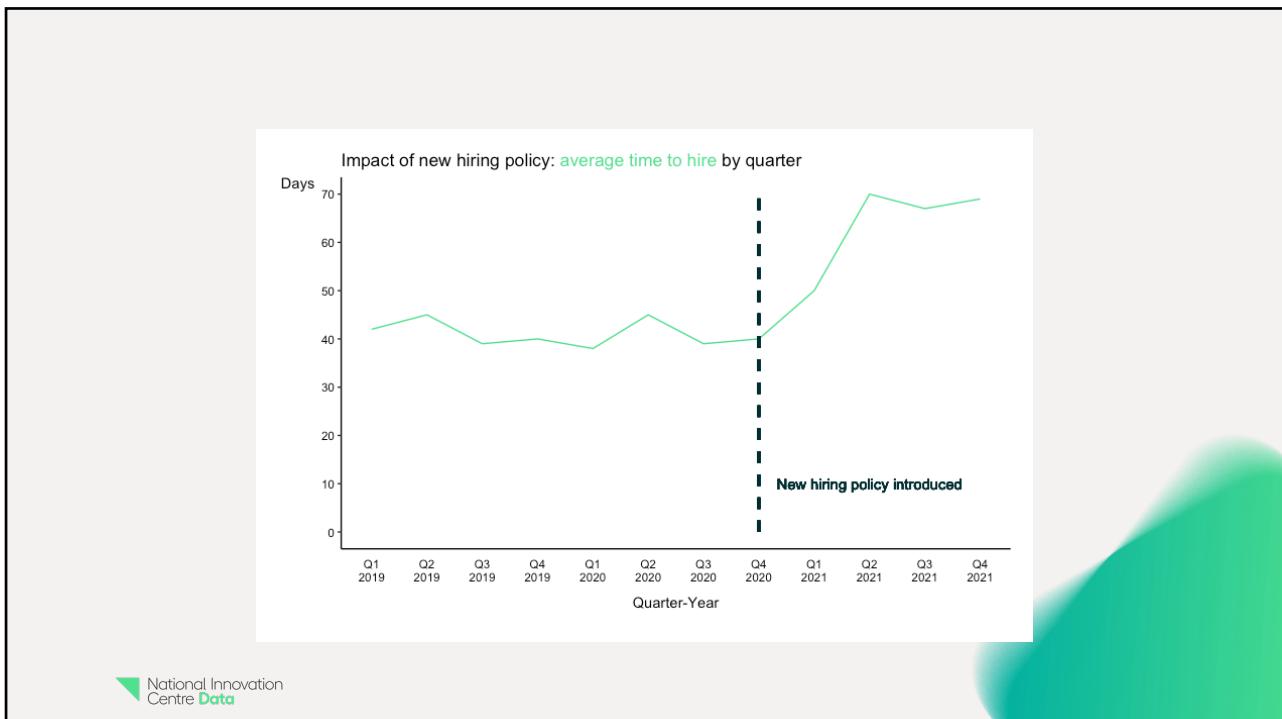
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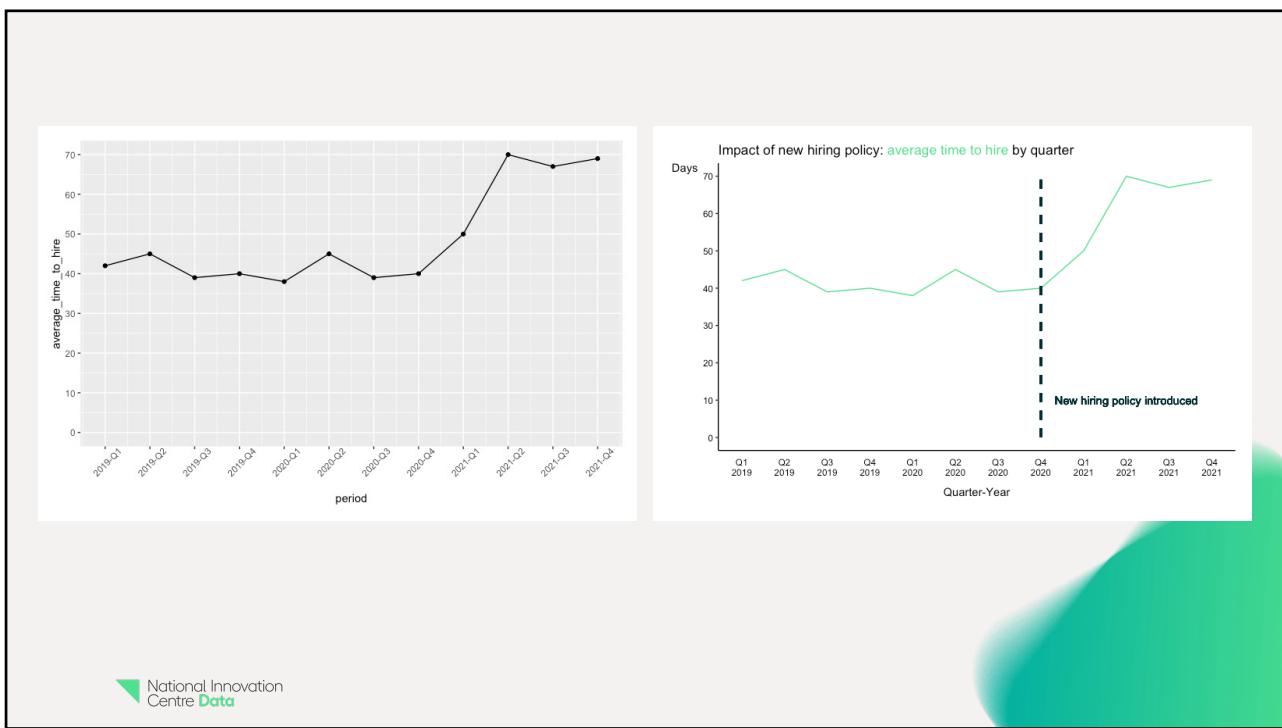


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What is missing?

Context?

What have they learnt?

A call to action?



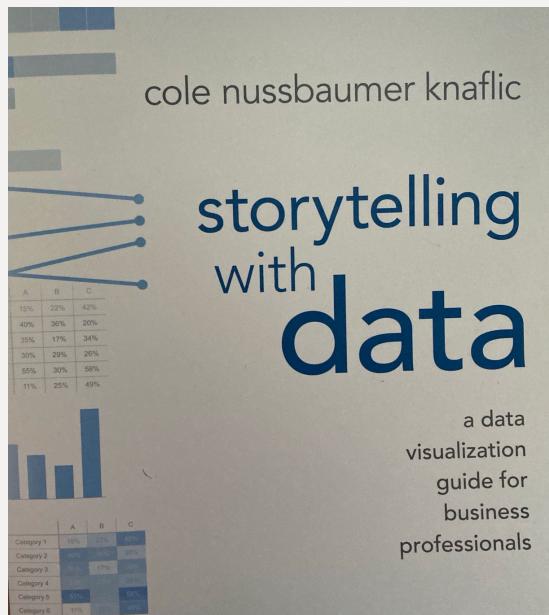
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Recommended Reading

Data visualisation

- [Storytelling with Data, Cole Nussbaumer Knaflic](#) [online access via NCL library]
- [Visualisation Analysis & Design, Tamara Munzner](#) [online access via NCL library]
- Data Visualisation: A Handbook for Data Driven Design, Andy Kirk [book available in Philip Robinson Library]



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