

Data visualisation style guide

Introduction

This data visualisation style guide has been developed to help TASO, our partners, and the wider sector to create impactful and effective charts. It is designed to provide clear, accessible guidelines that can be applied using the data visualisation tool of your choice.

We welcome your feedback on this guidance. We view this as an iterative document that will evolve as we learn more about which elements are most helpful. Please let us know what you think: luke.arundel@taso.org.uk.

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Why good data visualisation matters

While often overshadowed by other aspects of writing and analysis, data visualisation warrants dedicated attention. At TASO, we recognise its value and are committed to empowering our audience through carefully designed charts.

Good data visualisation is vital because it holds the power to convey complex information succinctly and memorably. By presenting data visually, we simplify patterns, trends and insights. We can tell a story with the data, and design our charts to tell this story compellingly. To do this, we need to carefully consider how we set up our charts, and not rely on the default software settings.

About the guide

How to use the guide

This guide is split into two main sections.

- The [first section](#) is designed for anyone who wants to make their data visualisations more engaging. We present guidelines that serve as effective rules of thumb for creating impactful charts. While we expect our staff and partners to follow these guidelines when creating charts for TASO publications, they are highly flexible according to context.
- The [second section](#) gives more technical details on styling charts for TASO publications. It covers aspects like sizing, font usage and colour schemes. This is to ensure consistency across TASO publications when collaborating with our partners. This section is tailored for TASO staff and partners, so if you are a general audience seeking high-level insights, you may wish to skip over it. However, we hope that general audiences may still find this section helpful if you are interested in developing your own style guide, or in understanding the finer details behind creating charts.

In this document, you will find examples of charts that follow our guidelines. These are either redesigns of existing TASO charts using the new guidance, or in some cases new charts to illustrate the guidelines. These charts are only intended to demonstrate how the style guide can be applied, and so should not be taken and shared outside of this document. As we apply the style guide, we will update this document with real examples taken from TASO publications.

How we made the guide

In developing the guide, we have drawn extensively on existing data visualisation work, notably the key principles outlined by Jonathan Schwabish, and the Government Analysis Function guidance on data visualisation.

Our aim was to distil and accentuate elements from various sources that we thought would be most beneficial for TASO, our partners and the wider sector. This guide, therefore, stands as a curated synthesis, offering tailored and impactful guidance for our specific context, with due credit to the influential work and expertise that inspired it.

We have taken care to strike a balance, ensuring the guide offers practical insights without being overly burdensome. For a comprehensive list of the guides and resources we consulted during this process, please refer to the [References and further resources](#) section.

Principles for good data visualisation

In this section, we present guiding principles to improve your chart design. We encourage TASO partners to implement these principles when designing charts. Applying these principles may vary depending on specific contexts and needs, but keeping them in mind can help make your charts more impactful and communicate your ideas more effectively.

Choosing your chart

When deciding on a chart, remember the core message you intend to convey. If summarising your chart's point takes more than a few sentences, you may need to reconsider your choice.

The [Visual Vocabulary tool](#) by the Financial Times¹ is a valuable resource for selecting the right chart and sparking creative ideas. Consider your audience when making your selection – what works well in a technical report may not resonate as effectively in a webinar or blog post. Remember, charts are more than data points; they are narratives designed to tell a compelling story, prioritising clarity over exhaustive detail.

¹ Financial Times. 2019. Visual vocabulary. <https://ft-interactive.github.io/visual-vocabulary/> [Accessed 21 November 2023]

RAISE principles – summary

These principles are adapted from the key steps for better data visualisation set out by Jonathan Schwabish². Keep them in mind when designing charts to help make them as engaging as possible:

1. **Reduce the clutter:** excessive chart elements, such as dense gridlines, or superfluous tick marks and labels, can reduce the effectiveness of a chart.
2. **Annotate:** consider including explanatory text to help the audience understand how to interpret the visualisation, guiding them through the content.
3. **Integrate the text:** where feasible, incorporate legends directly into the chart and use active titles that capture the primary takeaway. If articulating the key message is challenging, you may need to reassess your choice of chart.
4. **Show the data:** consider highlighting the values that are more important to your argument, particularly if there is a lot of information on the chart. This helps ensure the audience focuses on the most pertinent data points.
5. **Engage the audience:** thoughtfully assess the chart's context and consider how to effectively engage the audience. A chart extracted from a technical report may not translate as effectively in a webinar or blog post, and may demand adaptation.

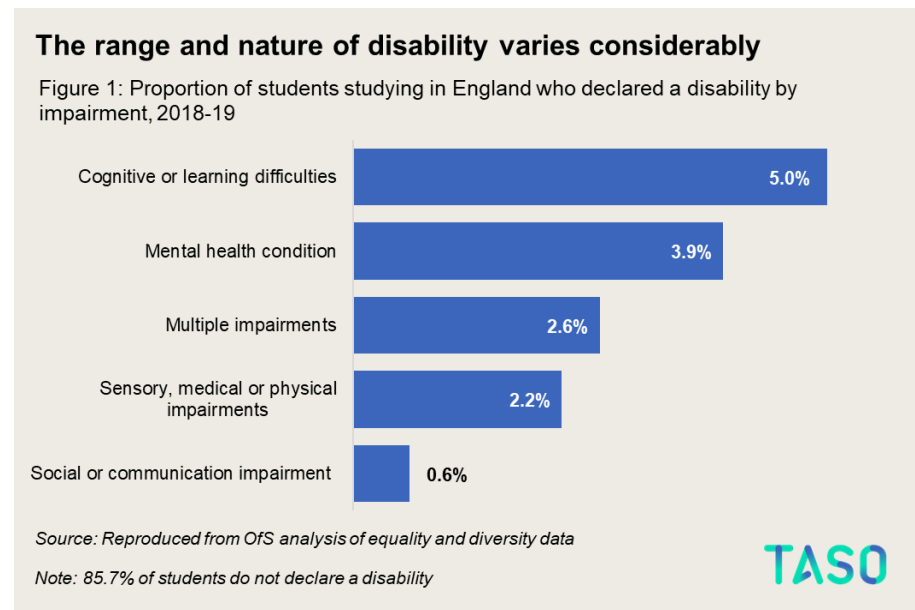
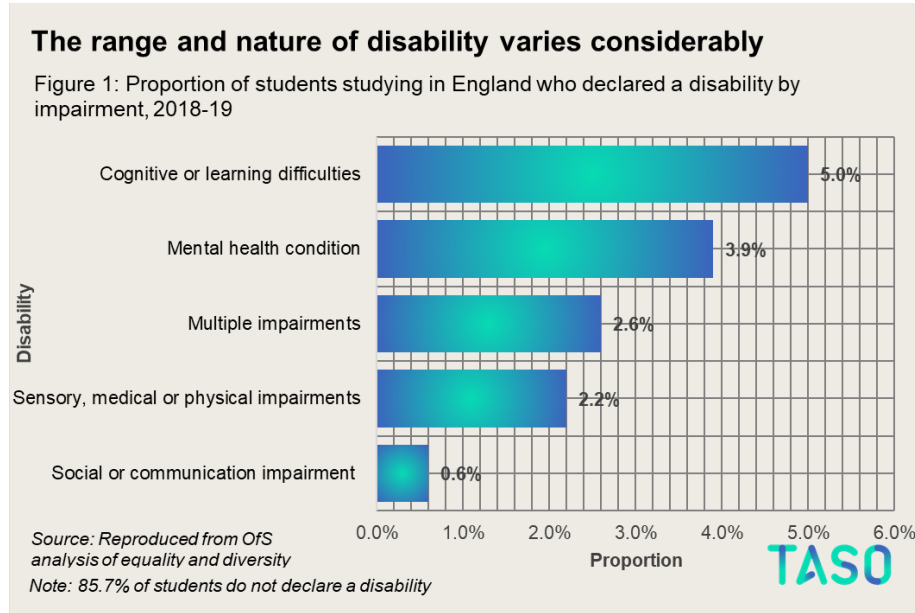
Reduce the clutter

Start with the principle of making charts as simple and stripped back as possible, and gradually incorporate elements as needed. Unnecessary and distracting visual components can compromise the overall effectiveness of your visualisation.

- Text should almost always be horizontal. Sometimes it may be worth considering the format of the chart to incorporate this, such as horizontal bars instead of vertical.
- Consider if you can label data points directly – if you can label all data points, you may be able to drop axis labels.
- Consider if axis titles need to be included. For example, if the X-axis shows '2013, 2014, 2015', there is no need to add 'Year' as the X-axis title.

² Schwabish, J., 2021. Better data visualizations: A guide for scholars, researchers, and wonks. Columbia University Press.

- Consider how many gridlines are helpful – too few can mean they are not useful, and too many can make the chart cluttered.
- Do not use unnecessary elements like colour gradients or 3D effects.



In the above example we can see multiple forms of clutter that should be removed:

- Labelling the data points and including the X-axis labels – if all your data points are labelled, including the X-axis may not be necessary.

- Gridlines – similarly, if all data points are labelled, gridlines are also redundant. If you are including gridlines, do not use too many – the above is an example of an excessive amount of gridlines.
- X and Y axis titles – what the X and Y axis are showing is clear in this case from the subtitle, so there is no need for X and Y axis titles.

Annotate

Consider using annotations if they will help tell the story of the data. They can be used to highlight key information and support your analysis, bridging the gap between raw data and interpretation, and guiding the reader’s thinking process. They can also add context, if there are outliers, peaks or troughs, or if the chart type is unfamiliar to the reader.

- Relevance is key – ensure that annotations directly contribute to the narrative of the data. Avoid unnecessary or excessive annotations that could confuse the reader. Use them selectively to emphasise key insights.
- Make annotations concise, and place them near the relevant data points.
- Ensure they are distinct from other elements of the chart, such as through font size or weight.

Integrate the text

Active titles

The choice of a chart title is often contextual, influenced by factors such as the nature of the content and any constraints posed by technical reports or academic papers. In general, opt for an active title that succinctly captures the key takeaway, complemented by a formal statistical subtitle. Titling charts in this way can make them more memorable and easier to digest. For more on why we think this is a more effective way to title charts, please see [this blog post](#) from the Office for National Statistics³.

X	Title: Fig. 18: Average anxiety level over time by disability type
✓	Title: Students with mental health difficulties consistently have the highest anxiety

³ Donnarumma, F. 2019. Say what you see - the way we write chart titles is changing. <https://digitalblog.ons.gov.uk/2019/01/28/say-what-you-see-the-way-we-write-chart-titles-is-changing/> [Accessed 21 November 2023]

Subtitle: Figure 18: Average anxiety level over time by disability type

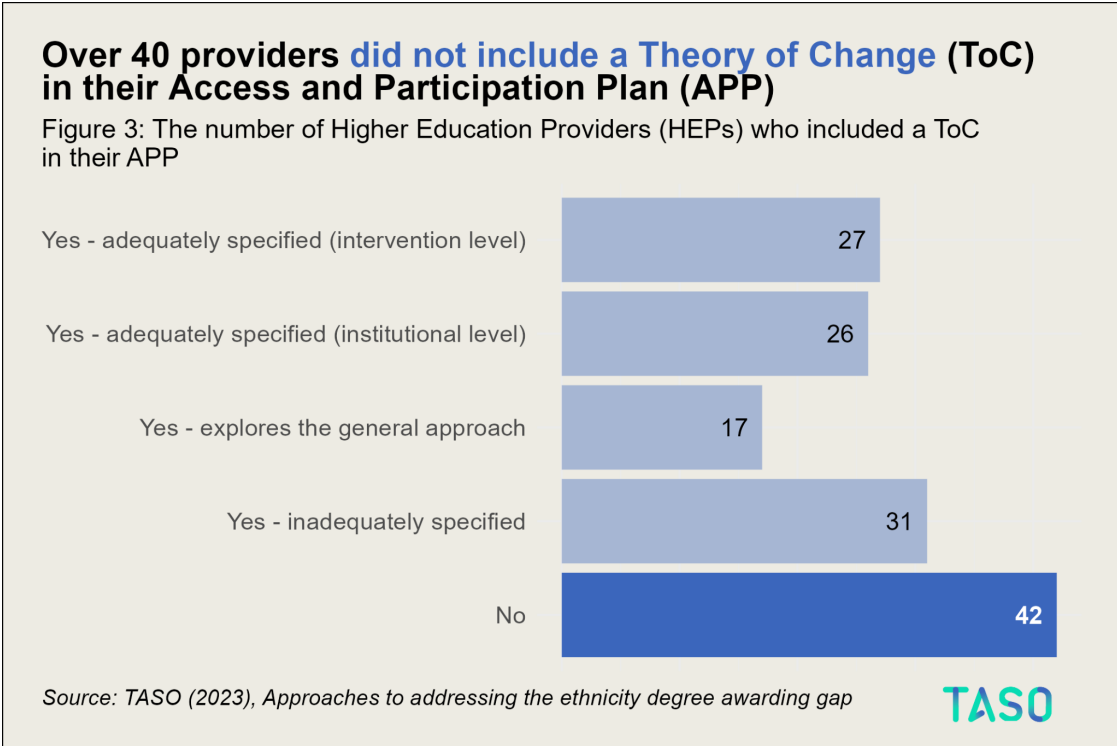
Integrate the legend

Integrating the legend into the chart aids reader interpretation, creating a smoother, more intuitive experience. With an integrated legend, viewers do not need to shift their focus between the visualisation and a separate legend, which can be particularly difficult when there are multiple, similar colours involved.

Show the data

Consider highlighting the values that are most important to your argument. You don't need to show all the data all of the time, as this can make it hard to see the data that matters most. For example, for line charts, try to have no more than four or five different colours.

You can change the properties of parts of the chart – such as by selectively using colour, shape and saturation – to guide a reader's attention and make parts of a chart stand out.



Engage the audience

Strive to make your visualisation as engaging as possible. Capturing the reader's attention ensures that your message is not only seen but also comprehended and remembered. Engaging visuals spark curiosity, encouraging a deeper exploration and analysis of the data. This connection leads to a more profound understanding of the insights you are sharing.

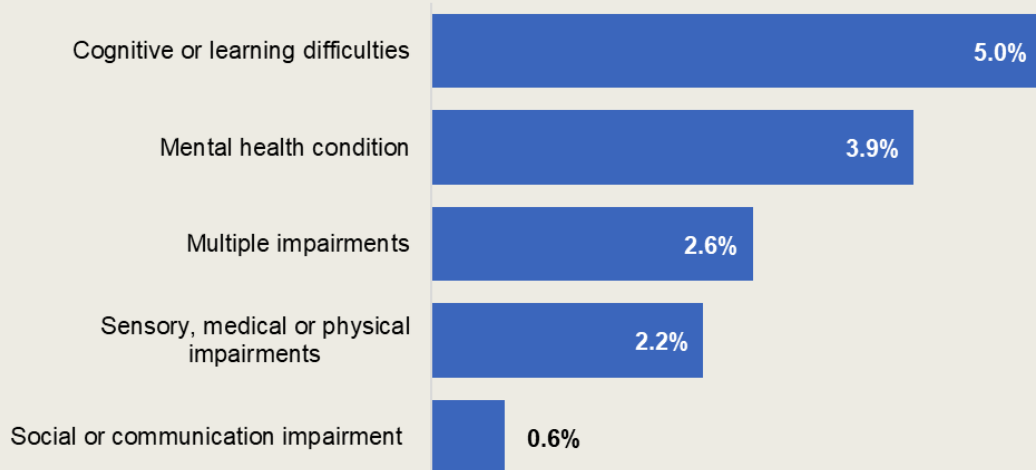
Guidance for common chart types

Bar charts

- Bar charts should always start at zero.
- Order bars by their values, unless there is a logical order, such as level of qualification or date.
- Consider directly labelling data points and removing gridlines if there are only a few bars in your chart.
- As text should be horizontal, a horizontal bar chart may be more appropriate when your axis labels are long.

The range and nature of disability varies considerably

Figure 1: Proportion of students studying in England who declared a disability by impairment, 2018-19

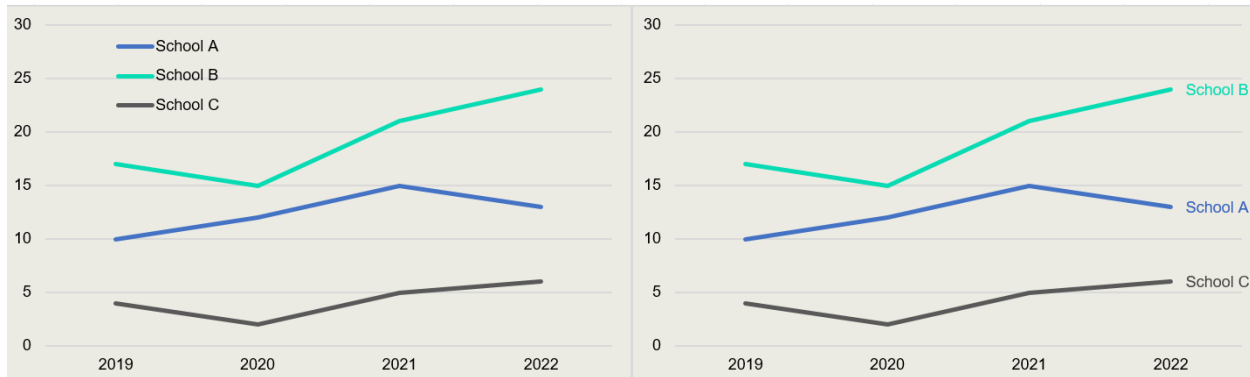


Source: Reproduced from OfS analysis of equality and diversity data

Note: 85.7% of students do not declare a disability

Line charts

- Try not to use more than five lines on a single chart. Including too many lines can make the chart confusing, particularly when they cross over at multiple points.
 - If you need to include more than this, consider splitting your chart into small multiples (also known as faceting or panel charts).
 - Alternatively, consider highlighting selected lines of interest and greying the rest out. This makes clear the line of interest while still enabling readers to easily see how it compares to other lines.
- Try to integrate the legend and label lines directly, so readers do not have to match the colours from the line to the legend, as in the example on the right below.



Pie charts

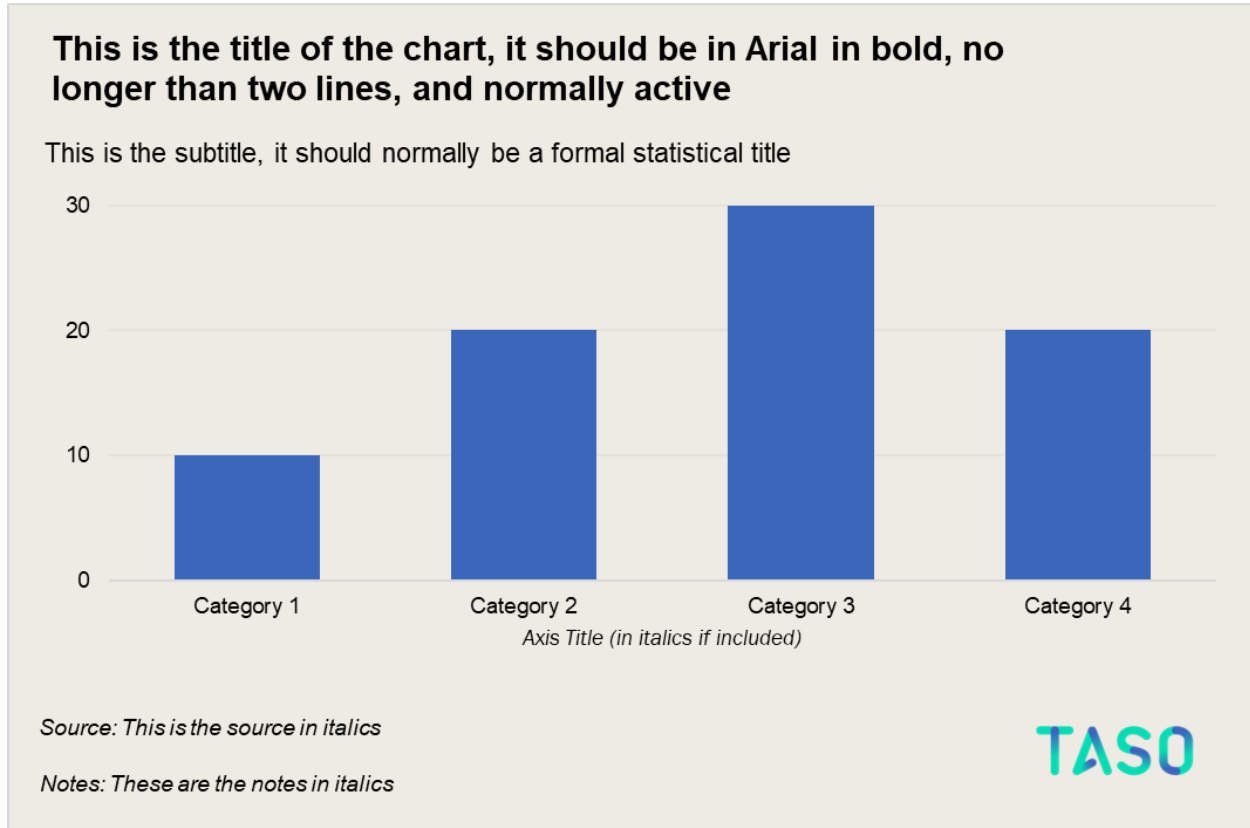
- Generally, we find that bar charts are more effective than pie charts, as it can be hard to discern the difference in size between different segments.
- Pie charts can be particularly difficult to read when values are close, or if there are multiple segments.
- Consider whether another chart type may be more appropriate. However, this is a rule of thumb and pie charts can be used, but do so with caution.

Styling charts for TASO publications

This section is designed with TASO partners and staff in mind, providing rules on chart formatting to ensure consistency across TASO outputs. That said, we anticipate that the insights provided may also be beneficial to anyone interested in developing their own

data visualisation style guide, or understanding the technical details behind creating consistently formatted charts.

Formatting rules



You can find an example R script for creating charts with TASO styling on [our GitHub](#). R is a widely used statistical software among researchers and data analysis. You can also find useful resources for data visualisation in R in the [R resources](#) section.

- The font for the charts is Arial. Ensure that font sizes always remain readable. If there is text you must include but you are finding it is too small, consider how you can redesign the chart. For annotations and data labels, if you are to use bolding or italics, use them with purpose.
- The title should normally be an active title that conveys the key takeaway, and should always be the largest text on the page. The title should be in bold, size 16.
- The subtitle should be a formal statistical title (as you might traditionally title a chart). The subtitle should be size 12.

- The caption should be in the bottom left of the chart. It should be in italics and size 10.
- Text sizes can have some flexibility. But ensure that the title is the largest text on the page, followed by the subtitle. Ensure all other text is smaller than the title and subtitle.
- Colours
 - The text should be black, but adjust as appropriate for readability. For example, sometimes data labels will need to be white to stand out against colours.
 - Background should be #EDEBE3 (putty).
 - Gridlines should generally be #E4E2D9 (darker than the background but lighter than text and lines). Gridline shade can be adjusted if it aids readability, but it should be a shade of grey.
- Format
 - 180mm (width) x 120mm (height) is the default standard chart size for A4 PDF reports. 180mm is the maximum width, however, the height is flexible depending on the chart. For example if your chart needs to be tall rather than wide.
 - Save as a PNG or a JPEG to avoid losing quality through copy and pasting or screenshots.
- If you are including the logo, it should be in the bottom right corner, with sufficient space around it as per the brand guidelines. The logo is not needed in PDF reports that already contain TASO branding. However, consider including the logo for web/social media versions of charts, where the chart is taken outside of the context of the report.

Brand colours

Main brand colours

#07dbb3	#3b66bc	#e4e2d9	#edebe3	#f9466c	#485866
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Generating further colours

You can use RColourBrewer to generate gradients in R. Alternatively, you can use [this website](#) to modify the brightness and colour intensity, and choose the number of colours you want to generate.

Accessibility

Ensure foreground and background colours contrast enough to pass the WCAG AA standard. You can [check the colour contrast here](#).

For more in-depth guidance on accessibility, we recommend the accessibility sections of the [Government Analysis Function data visualisation guidance](#) and the [Royal Statistical Society data visualisation guide](#).

At TASO, we will be looking further into how we can improve the accessibility of our charts, particularly around the use of accessible colour palettes.

For alt text, [Amy Cesal](#)⁴ provides some useful guidance on how to write alt text for charts, including the following formula to help:

alt="Chart type of type of data where reason for including chart"

For example - Bar chart of the average earnings of students by highest qualification, where students who went to a top third university earn the most.

References and further resources

Resources referenced and linked to in the text (in order of appearance)

Financial Times. 2019. Visual vocabulary. <https://ft-interactive.github.io/visual-vocabulary/> [Accessed 21 November 2023]

Schwabish, J. 2021. Better data visualizations: A guide for scholars, researchers, and wonks. Columbia University Press.

⁴ Cesal, A. 2020. Writing Alt Text for Data Visualization. <https://medium.com/nightingale/writing-alt-text-for-data-visualization-2a218ef43f81> [Accessed 21 November 2023]

Donnarumma, F. 2019. Say what you see - the way we write chart titles is changing. <https://digitalblog.ons.gov.uk/2019/01/28/say-what-you-see-the-way-we-write-chart-titles-is-changing/> [Accessed 21 November 2023]

Learn UI Design. 2023. Data color picker. <https://www.learnui.design/tools/data-color-picker.html#single> [Accessed 21 November 2023]

Government Analysis Function. 2022. Data visualisation: charts. <https://analysisfunction.civilservice.gov.uk/policy-store/data-visualisation-charts/> [Accessed 21 November 2023]

Royal Statistical Society. 2023. Best Practices for Data Visualisation: <https://royal-statistical-society.github.io/datavisguide/> [Accessed 21 November 2023]

Cesal, A. 2020. Writing Alt Text for Data Visualization. <https://medium.com/nightingale/writing-alt-text-for-data-visualization-2a218ef43f81> [Accessed 21 November 2023]

Further data visualisation resources

This style guide draws on existing style guides. Some key sources of inspiration include:

- [Government Analysis Function style guide](#)
- [Urban Institute Data Visualisation style guide](#)
- [Royal Statistical Society style guide](#)

We have endeavoured to keep this guide as concise as possible, meaning we do not cover the same ground that more extensive style guides do. If you have further questions on data visualisation, the above guides may be able to help. In particular, we found the Government Analysis Function valuable as an extensive but readable style guide.

Our principles for effective data visualisation are rooted in the insights of Jonathan Schwabish, showcased in his contributions through PolicyViz. Sources include:

- Better Data Visualisations: A Guide for Scholars, Researchers and Wonks
- Better Presentations: A Guide for Scholars, Researchers and Wonks
- [Data viz cheat sheet](#)
- [List of style guides](#)
- [An Economist's Guide to Visualising Data](#)

For excellent examples of data visualisation, we also found the Financial Times (FT) and The Economist very helpful, particularly the work of John Burn-Murdoch:

- You can [find the work of John Burn-Murdoch here](#), or on X (formerly Twitter) [@jburnmurdoch](#). [This presentation](#) is also insightful.
- The Economist's data visualisation newsletter Off The Charts is a helpful resource for learning how their data journalism team create visualisations and tackles problems. Its '[Graphic Detail](#)' section showcases its charts.

Organisations that focus on data visualisation also have helpful blogs. These include [Flourish](#), [Datawrapper](#) and [Visualisingdata](#).

R resources

You can find example R code for creating charts with TASO stylings on [our GitHub](#).

If you are using R to create your plots, you may also find the following resources helpful.

- [ggplot Wizardry Hands-On](#) – some helpful tips and tricks from Cédric Scherer
- [Tips and Tricks for ggplot2](#) – more helpful tips and tricks from Erik Gahner Larsen
- [Modern Data Visualisation with R](#) – an open-access textbook by Robert Kabacoff
- [R for Data Science](#) – an open-access textbook by Hadley Wickham, if you are using ggplot for the first time the data visualisation chapter provides a great introduction to how ggplot works.
- [R graph gallery](#) – a collection of charts made with R. The creator [Yan Holtz](#) provides useful insight on X (formerly Twitter).

Contact point

We view this guide as an iterative resource, and want to emphasise the valuable role feedback plays in its improvement. Your insights are crucial to refining and enhancing this resource. We encourage you to share your thoughts, suggestions and experiences with us, to ensure the ongoing relevance and effectiveness of this guide. For any inquiries, comments, or feedback, you can contact Luke Arundel at luke.arundel@taso.org.uk.