



FIT3179 Data Visualisation
Course Notes

LAYOUT

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10 August 2024

LAYOUT FOR DATA VISUALISATION

A chart rarely stands alone. Typically, charts and maps are accompanied by a variety of other visual elements, such as headings, subheadings, introductory and explanatory text, figures, captions, legends, and metadata about sources, authors, and copyright. It is crucial to carefully position, size, and design these elements to help the reader easily find relevant information and effectively communicate the intended message.

Layout refers to the arrangement of visual elements according to principles of composition. The layout principles discussed in this lecture note apply to a variety of media that can contain data visualisations, such as webpages, electronic dashboards, presentation slides, conference posters, reports, etc.

A successful layout applies visual hierarchy. It presents important information with more visual emphasis and less important information with less emphasis. This can be achieved by adjusting the size and colour of individual elements and by carefully positioning elements relative to one another.

For text elements, the principles of typography play a key role in creating a visual hierarchy, from headings and subheadings to main text and figure captions. These principles are an important tool in layout design. Refer to the lecture notes on typography for a detailed discussion on the visual hierarchy of text.

This lecture note focuses on a set of basic layout principles that are easy to understand and simple to apply. Despite their simplicity,

these principles are crucial for communicating effectively and efficiently through data visualization. Applying these principles leads to aesthetically pleasing layouts, which is an important aspect of any type of visual communication. If readers do not find your visuals aesthetically appealing, they are less likely to trust the information presented and they may spend less time with your visuals. This, in turn, reduces the likelihood that they will be able to recall the information conveyed in your visualisation.

The layout principles are:

- Viewing path
- Visual centre
- Sight-lines
- Symmetry
- Balance
- White space
- Layout in columns

SOURCE

Some figures, some text, and the layout principles in this lecture note are from this book:

Krygier, J. and Wood, D. 2016. *Making Maps, A Visual Guide to Map Design for GIS*. 3rd ed. The Guilford Press.

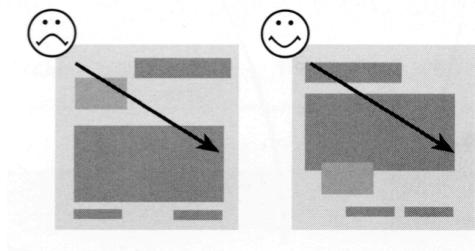
The figure illustrating sight-lines on maps is by Heinz Stoll, the atlas page illustrating white space is from the Atlas of Oregon, the sequoia map is from the National Geographic Magazine, December 2012.

LAYOUT PRINCIPLES

VIEWING PATH

The first principle is to align elements along a path that starts at the top left and moves toward the bottom right. This follows our natural reading direction: from left to right and top to bottom. Since we begin reading at the top left, the element you want readers to notice first should be placed there. Often, this is the title or heading that introduces the content.

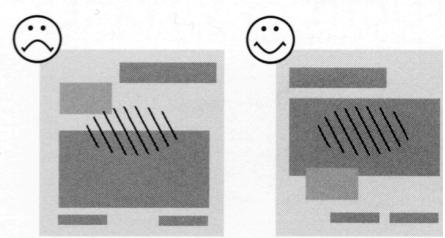
We assume that reading a page follows a *viewing path*, from the upper left to the lower right.



VISUAL CENTRE

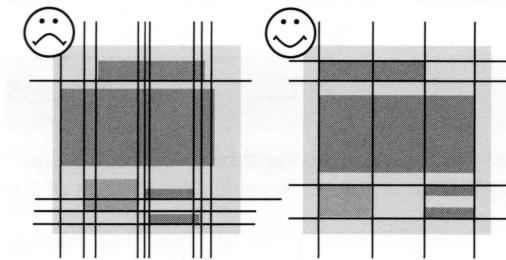
The next layout principle is that the *visual centre* is not the same as the geometric centre. The visual center is slightly above the geometric center.

Centering implies importance; readers tend to assume that elements placed at the center are the most significant. Therefore, the most important visual element should be positioned at the visual center.

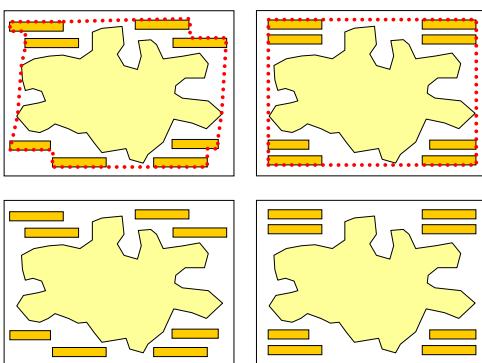


SIGHT-LINES

Sight-lines are invisible horizontal and vertical lines that align with the top, bottom, or sides of visual elements. To create a neat layout, all visual elements should be aligned along these sight-lines. Minimizing the number of sight-lines reduces disjointedness and stabilizes the layout.

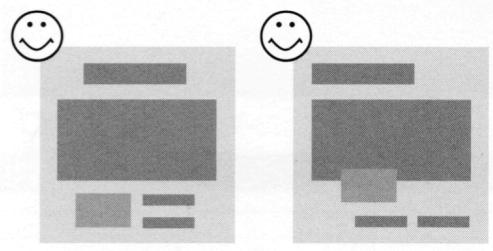


In the example below, the left layout does not align elements along sight-lines, which are indicated by the dotted lines in the top row. The layout on the right aligns elements along sight-lines placed along the border of the visualization, resulting in a much neater and more visually pleasing arrangement.

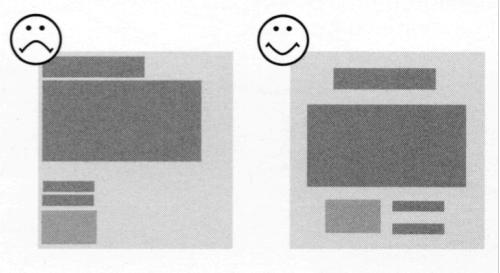


SYMMETRY AND BALANCE

Symmetry can be understood as balance around a central vertical axis. A strictly symmetrical arrangement (left) feels traditional and solid. Alternatively, symmetry can be broken with an asymmetric layout (right), where elements are positioned off-axis, yet the overall distribution still feels balanced. An asymmetric layout is more challenging to achieve, but it can convey a modern and creative feel.



Balance is assessed once all visual elements are in place. Visual elements vary in weight; some appear heavier, while others seem lighter. Their weight affects the balance of the layout. An unbalanced arrangement should be avoided.

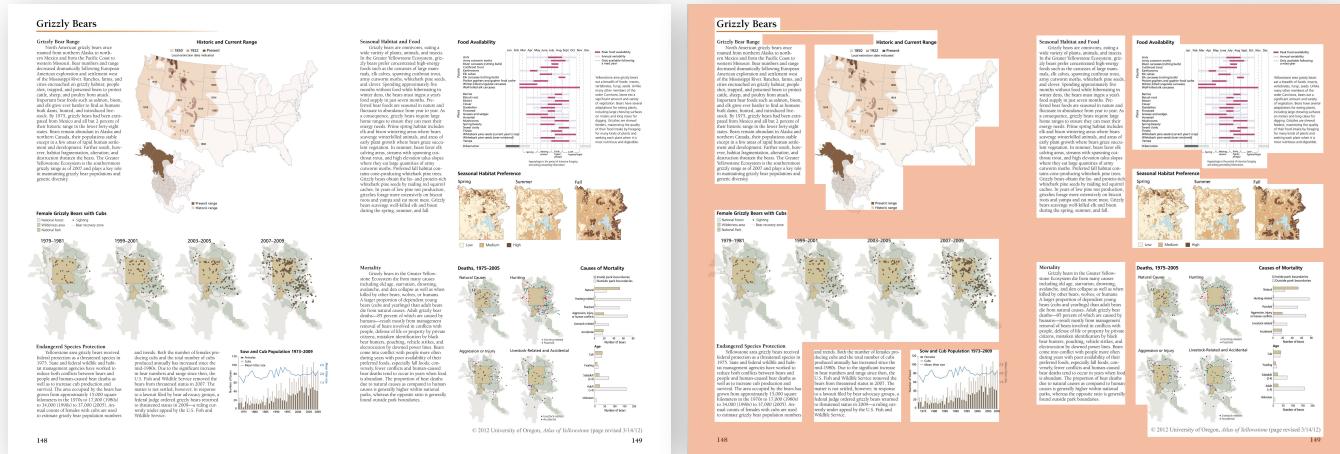


WHITE SPACE

White space is the empty space between visual elements. White space is an important design tool that helps to achieve symmetry and balance, and groups and separates visual elements.

Below is a double-page from an atlas. These pages contain a wealth of information, including multiple detailed maps, complex diagrams and explanatory text. The atlas effectively uses a lot of white space, which is indicated in pink in the second figure.

The use of white space creates a clear structure. Despite the large number of elements, it is easy to see which items belong together, helping the reader to navigate the pages and preventing them from getting lost.





LAYOUT IN COLUMNS

Columns are effective for grouping elements and aiding navigation within a visualisation. A good example is the Bureau of Meteorology (BOM) webpage, which uses a four-column layout. When necessary, the four-column layout is simplified to two columns at the top of the page or divided into height columns in the center

For most visualisation dashboards, a good starting point is a layout with either two or three columns. These columns can be combined into a single column when embedding a large visualization, or divided into four or six columns to place small multiple visualizations.

Making all columns the same width is a good starting point, as indicated by the horizontal arrows added to the BOM webpage.

As mentioned when discussing typographic readability principles, a column of text should not contain more than approximately 60 characters or seven to ten words.



On the four-column layout of the National Geographic Magazine page, observe how visual elements – such as text annotations, headings, small maps, and captions – are neatly aligned with columns to group related items.