Principles of Effective Data Visualization

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PRINCIPLE OF EFFECTIVE DATA VISUALIZATION

We live in a modern world where we're constantly surrounded by images and visual information. Visual learning has traditionally merged text and images to share information, but recent insights suggest separating text and images to improve clarity. Technological advancements have enhanced visual presentations, making it easier to create and distribute complex visuals digitally. Scientific papers now often include visuals, like graphical abstracts and cover images, as a regular part of their content. Many scientists don't have the design skills needed to make effective visuals, which often leads to mistakes and poor-quality figures. Good visualizations need careful design decisions. Instead, designers need to consider different options to find the "best" way to present the data. The data visualization field has useful guides for better design, such as Wilkinson's breakdown of graphics into parts like data, scales and aesthetics. Knowing these basics helps make information clearer and more engaging.

Starting with the basic principles. Sketch your ideas on paper first. Before creating a visual, focus on the core information and message you want to convey. Prepare yourself to learn new software or expand your skills with existing tools. Pick the right type of chart (like bar plots or dot plots) for your data and what you want to show. Colors are important in visuals and should be used carefully to make information stand out. Using colors that are easy to distinguish for people with colorblindness. Including uncertainty in visuals is crucial because not showing it can be misleading. Common ways to show uncertainty include error bars and shaded areas. Using "small multiples" means showing several similar charts side by side to highlight differences. Raw data and summarized data in visuals are usually straightforward, but models need extra explanation. Simple visuals are important, but detailed captions are equally crucial. Captions should fully explain what the figure shows, even if the figure is viewed alone. Infographics mix text and images to make information more memorable and can be useful for presentations, not every figure needs to be an infographic. To make sure your visuals are effective, get feedback from others who aren't involved in your study.

Use tables for supplementary details but rely on visuals for main points. Using graphs for main visuals and include tables as extra information for those who need specific data. Good design practices help avoid common mistakes and make information clearer. Scientists should learn these practices, and journals should enforce high-quality standards.

REFERENCES

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