Scientific slide design: mini workbook & resources

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Big Idea

Your slides are not your presentation.

Your slides support your message.

And your message should support your audience.

Good visual communication is not about making things look attractive. It is about helping your audience understand your research.

Principle 1: Audience, Message, Medium

Before opening PowerPoint, ask three questions:

Audience: Who are you communicating with?

Consider:

- Broad audience or specialist audience?
- Students, researchers, practitioners, policy makers?
- What knowledge can they reasonably be expected to have?

Message:

What do you want your audience to:

- Think?
- Understand?
- Remember?
- Do?

Turn your answer into a single sentence that aligns your purpose with what matters to the audience.

This is your key message. (Everything in your slide design and communication should support this message.)

Example:

Audience:	Purpose:	Message:
Behavioural ecologists attending a conference.	Make them aware of exciting new behavioural science/results.	Orchid mantises attract more pollinators than flowers.

Medium: How will your audience consume this information?

Examples:

- Conference presentation
- Lecture
- Poster
- Slide deck sent as a document
- Team meeting
- Social media graphic

Different media require different balances of:

- Text
- Images
- Detail
- Explanation
- Reflection

Ask yourself:

- Who is my audience?
- What do I want them to understand, think, remember or do?
- My key message:

- What is my medium?
- How does this affect my design choices?

Principle 2: Simplicity, Legibility, Consistency

a) Simplicity

Simplicity is a decision about what exists at all.

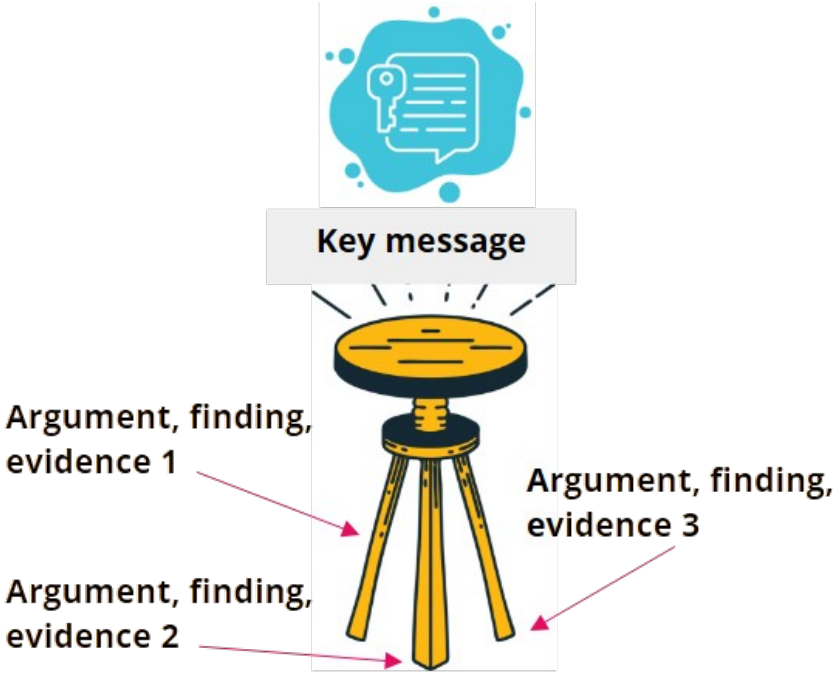
The question:

Given my Audience, Message and Medium, what is the minimum that needs to be here?

Everything must earn its place.

The Three-Legged Stool as a metaphor: Imagine your key message as the seat of a stool. Your evidence forms the legs.

If you remove a piece of evidence and the stool still stands, that evidence may not be necessary.



Simplicity Audit

Remove:

- unnecessary text
- decorative elements
- duplicate information
- irrelevant details

Give Space:

- Allow important content room to breathe.
- Use whitespace intentionally.
- Group Related Items

Use:

- proximity
- alignment
- layout

to show relationships.

Make Your Title Work

Descriptive (usually avoid)	Declarative (usually best)	Interrogative (can be useful)
The Effect of Substance A on Protein B Results Discussion	Substance A Inhibits Production of Protein B We developed a novel method for X Treatment increased survival by 25%	Does Substance A affect Protein B production? Why did we choose method X instead of Y?

PREVIEW: Assertion-Evidence

- Each slide should communicate one message.
- The title should state the message.
- The content should provide evidence.

Ask yourself:

- What is the message of this slide?
- What can I remove?
- What evidence is essential?
- Can I rewrite the title as a declarative statement?

b) Legibility

Legibility is about ensuring that what exists can be perceived.

The question:

Can this audience read and understand what I am showing them?

Important: Legibility is not only about seeing.

It is also about understanding.

A graph can be easy to read but difficult to interpret.

Legibility Audit

- Check colours to ensure sufficient contrast
  Check contrast & accessibility → select palette → check again → apply
- Review fonts to ensure that they are sufficiently large and "unfussy" to be legible
  Choose font(s) → define suitable sizes for medium →apply
- Review images for quality and sharpness
  Choose vectors over rasters, high res over low res.
- Check if anything is obstructed or cut off
  Correct as needed.

Colour:

Check:

- contrast
- accessibility
- colour blindness considerations

Useful tools:

WebAIM Contrast Checker:
https://webaim.org/resources/contrastchecker/

Coblis Colour Blindness Simulator:
https://www.color-blindness.com/coblis-color-blindness-simulator/

Scientific Colour Maps:
https://www.fabiocrameri.ch/colourmaps/

Palette generators:

- Coolors (www.coolors.co)
- Material palette (www.materialpalette.com)

Fonts

Keep it simple.

Maximum: two fonts.

Most researchers prefer sans serif fonts:

- Arial
- Calibri
- Tahoma
- Aptos

I recommend: Open Sans.

Suggested Conference Sizes

- Slide title: 36–44 pt
- Major statement: 50–80 pt
- Body text: 24–32 pt
- Figure labels: 20–28 pt
- Axis labels: 20–24 pt
- Captions: 18–22 pt
- References: 14–18 pt

Tip: If text is smaller than 24 pt, ask whether it needs to be there.

Images

Use:

- vectors where possible
- high-resolution images
- sharp figures

Avoid:

- pixelated graphics
- screenshots of screenshots

Ask yourself:

- What is difficult to read?
- What is difficult to understand?
- How could I improve readability?

c) Consistency (and Strategic Breaking)

Consistency helps audiences recognise patterns.

Consistency, and breaking it, can create meaning.

The question:

- Is my design consistent enough that a deliberate break carries meaning?

Consistency Audit

Review:

- fonts
- colours
- sizes
- title styles
- figure styles
- layouts

Tip: Create a simple personal style guide. This saves time and improves coherence across:

- presentations

- posters
- figures
- infographics
- teaching materials

Reader Flow

Most audiences read:

- Z pattern
- Reverse-N pattern

Build on this to keep cognitive overload to a minimum.

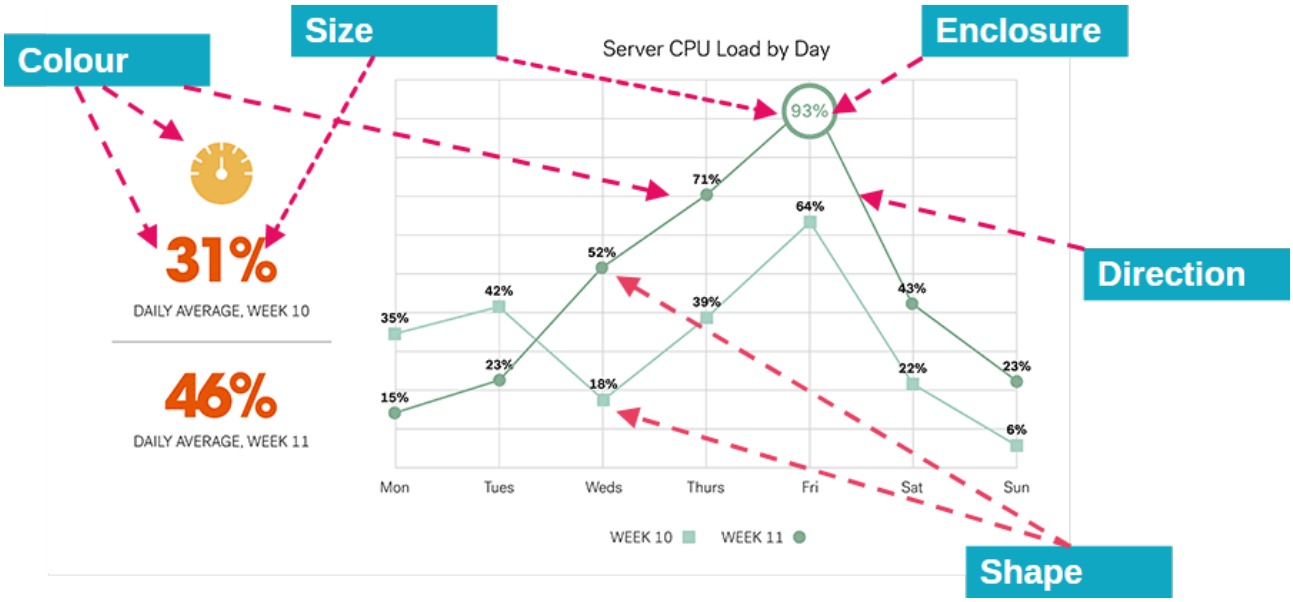
Guide attention using:

- layout
- arrows
- numbering
- spacing
- colour
- size

Break Consistency Intentionally

Examples:

- one coloured bar among grey bars
- one large number among smaller numbers
- one highlighted result



Consistency creates the pattern. Breaking consistency creates emphasis.

Avoid Accidental Meaning

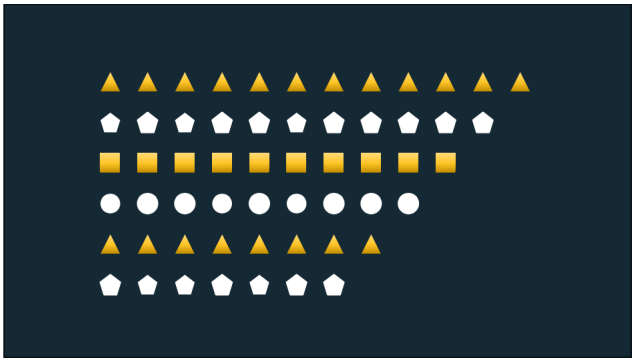
Check:

- colours
- symbols
- size differences

Could your design unintentionally imply importance, danger or relationships? For example:

Colour:
Red often means "warning", whilst green signals "good" in many parts of the world. If you use red to highlight text that is important, might the audience associate that as "negative"?

Groupings, shapes, form:



Does this grouping and colouring mean something? Or does it just look nice?

Ask yourself:

- What patterns have I established?
- What do I want my audience to notice first?
- How can I highlight that intentionally?

Principle 3: Assertion-Evidence

(Adapted from the work of Michael Alley.)

Each slide should contain:

- An assertion
- Evidence

Assertion

The title states the message.

Avoid:

- Results
- Discussion
- Experiment 1

Use (see Simplicity → Titles):

- Orchid mantises attract more pollinators than flowers
- Treatment increased survival by 25%
- Urban trees reduced local temperatures

Evidence

The slide body should support the assertion.

Examples:

- graphs
- images
- diagrams
- tables

- videos

Keep text to a minimum.

The presenter provides the explanation.

The slide provides the evidence.

Beyond Ordinary Slides

Opening Slide:

Avoid descriptive titles:

- Pollinator Deception in the Orchid Mantis

Prefer declarative titles:

- Orchid mantises attract more pollinators than flowers

Include a relevant image.

Closing Slide

Do not end with:

Thank You

Instead:

- State your conclusion again.
- Then add: Questions? (on the same slide)

This keeps your key finding visible throughout discussion.

Ask yourself:

- Can I understand the message of each slide from the titles alone?
- Does every slide contain evidence that supports the title?
- Could I reduce the amount of text?

Resource: Final Checklist

Before presenting, ask:

- Who is my audience?
- What is my message?
- Is my message expressed in one sentence?
- Does every slide support that message?
- Does the medium affect how much text and detail I need?
- Have I removed non-essential content?
- Can everything be read?
- Can everything be understood?
- Are colours accessible?
- Are fonts large enough?
- Are images sharp?
- Is the design consistent?
- Have I highlighted important information intentionally?
- Does each slide communicate one message?
- Do my titles state the takeaway for each slide?
- Does my evidence support the title?
- Does my opening slide communicate the topic clearly?
- Does my closing slide reinforce the key message?

If the answer to these questions is “yes”, your visual communication is probably helping rather than hindering your audience.

Additional resources

Tools, websites, useful places to find images and fonts etc.

There are thousands of tools that you can choose to help you improve your visual communication. Some are useful to add simplicity (like grid tutorials), others can help your visual communication become more legible (font, colour, and images), and others still are useful when thinking about consistency and how to break it.

Other tools are useful for producing your visual communication: turning ideas into documents, slides, graphical abstracts, videos, and more.

I've (tried to) narrow these down to a selection that we use and value.

My favourites at a glance

- **For free (and premium) stock images that are also royalty-free:**
    - *Unsplash - www.unsplash.com*
- **For a wide variety of editable icons and vector images** (as well as photos but the photos are mostly AI-generated):
    - *Vecteezy - www.vecteezy.com*
- **For icons:**
    - *The Noun Project - www.thenounproject.com*
    - *Vecteezy | Free vectors and icons | www.vecteezy.com*
- **For accessible palettes for scientific maps** (These are good inspiration for accessible colour palettes, full stop).
    - → *(Fabio Crameri) - https://www.fabiocrameri.ch/colourmaps/*
    - → *ColorBrewer – www.colorbrewer2.org*
- **For grammar checking:**
    - → *Language Tool - www.languagetool.org/*
    - → *Grammarly - www.grammarly.com*
- **For contrast checking (colour, accessibility):**
    - → Adobe Contrast Analyzer- https://color.adobe.com/create/color-contrast-analyzer
- **For working with images, designing vectors, and creating professional layouts:**

- ➔ Affinity Designer - www.affinity.serif.com (an easier option for non-designers is Canva)

- **Image compression (for digital visual communication):**
  - ➔ Tiny PNG- https://tinypng.com/
- **QR Code creator:**
  - ➔ QR Code Monkey - www.qrcode-monkey.com
- **Favourite fonts:**
  - ➔ *Open Sans - https://fonts.google.com/specimen/Open+Sans*
  - ➔ *PT Sans (and Serif) - https://fonts.google.com/specimen/PT+Sans and https://fonts.google.com/specimen/PT+Serif*
  - ➔ *Poppins - https://fonts.google.com/specimen/Poppins*
  - ➔ *Lato - https://fonts.google.com/specimen/Lato*

Free Stock Photography & Images

High-quality images to support your research visuals and add visual interest.

My favourites:

- Unsplash | Curated high-res photos | www.unsplash.com
- Vecteezy | Vectors and photos | www.vecteezy.com

Also recommended:

- Pexels | www.pexels.com
- Pixabay | www.pixabay.com
- Stocksnap.io | www.stocksnap.io
- Flickr | www.flickr.com
- Free Images | www.freeimages.com
- Wikimedia Commons | www.commons.wikimedia.org
- Gratisography | www.gratisography.com
- Life of Pix | www.lifeofpix.com
- Picjumbo | www.picjumbo.com
- PxHere | www.pxhere.com
- Splashbase | www.splashbase.co
- Kaboompics | www.kaboompics.com
- Splitshire | www.splitshire.com
- Burst by Shopify | www.burst.shopify.com
- Little Visuals | www.littlevisuals.co

- Coverr (video) | www.coverr.co

Specialised collections:

- New York Public Library | www.digitalcollections.nypl.org
- Library of Congress | www.loc.gov/free-to-use
- The State Library of New South Wales | www.sl.nsw.gov.au
- National Library of Ireland | www.nli.ie
- Smithsonian's National Museum of Asian Art | www.asia.si.edu
- The Met | www.metmuseum.org
- The Art Institute of Chicago | www.artic.edu
- CDC Public Health Image Library | www.phil.cdc.gov
- National Park Service Open Parks Network | www.nps.gov

Paid stock photography

Since everyone uses free images, paid stock offers more unique visuals for branding.

- Bigstock | Paid tool | www.bigstockphoto.com
- Pond5 | Paid tool | www.pond5.com
- 123RF | Paid tool | www.123rf.com
- Dreamstime | Paid tool | www.dreamstime.com
- iStock Photo | Paid tool | www.istockphoto.com
- Shutterstock | Paid tool | www.shutterstock.com

Stock video:

- Mixkit | Free | www.mixkit.co
- Coverr | Free | www.coverr.co

Icons & vector graphics

Build a consistent visual vocabulary for schematics, process diagrams, and graphical abstracts.

My favourites:

- The Noun Project | Millions of icons, customisable colours | Paid tool | www.thenounproject.com
- Vecteezy | Free vectors and icons | www.vecteezy.com

General icons:

- Phosphor Icons | Clean, modern icons | Free | www.phosphoricons.com
- Flaticon | Huge library | Paid tool | www.flaticon.com

Scientific icons:

- BioRender | Lab, cells, molecules | Paid tool | www.biorender.com
- SciDraw | Neurons, lab animals, equipment | Free | www.scidraw.io
- BioIcons | Cells, medicine, physiology | Free | www.bioicons.com

Mockups:

- LS Graphics | Mock-ups, illustrations, UI tools | Paid tool | www.lsgraphics.net
- Ceacl | Mock-ups | Paid tool | www.ceacl.com

Realistic humans & faces:

- Generated Photos | AI-generated diverse human faces | www.generated.photos
- Generated Faces | www.generated.photos/faces

All-in-one asset libraries

Subscription services with images, icons, templates, fonts, video, 3D, and more. Usually excellent value.

- Envato Elements | Comprehensive library | Paid tool | www.elements.envato.com
- Storytale.io | Illustrations, 3D, mock-ups | Paid tool | www.storytale.io
- Creative Market | Graphics, fonts, templates, photos, themes | Paid tool | www.creativemarket.com
- Storyblocks | Videos, audio, images | Paid tool | www.storyblocks.com
- Monster One | Images, video, 3D, WordPress templates | Paid tool | www.templatemonster.com/monsterone

All-in-one design software

Create posters, figures, and graphics without specialised training.

Our favourites:

- Affinity Suite (Designer, Photo, Publisher) | Professional-grade, now free | www.affinity.serif.com
- Canva | Beginner-friendly, templates, easy to learn | Paid tool | www.canva.com

Also recommended:

- Visme | Infographics, graphs, video | Paid tool | www.visme.co
- Mind the Graph | Built for scientists, detailed scientific graphics | Paid tool | www.mindthegraph.com
- Piktochart | Reports, infographics | Paid tool | www.piktochart.com
- Easel.ly | Reports and infographics | Paid tool | www.easel.ly
- Infogram | Graphs and data visualisation focus | Paid tool | www.infogram.com
- Snappa | Simple graphics for social media, ads, blogs | Paid tool | www.snappa.com

- BioRender | Scientific diagrams | Paid tool | www.biorender.com
- Venngage | Infographics | Paid tool | www.venngage.com

Data visualisation tools

Turn complex data into clear, accessible visuals.

- Datawrapper | Fast, clean charts | www.datawrapper.de
- Tableau | Interactive dashboards | www.tableau.com
- RAWGraphs | Open-source, custom visualisations | www.rawgraphs.io
- Microsoft Power BI | Business intelligence and visualisation | www.powerbi.microsoft.com
- Matplotlib (Python) | Static, animated, interactive visualisations | Free, open-source | www.matplotlib.org
- ggplot2 (R) | Quality and aesthetics for statistical graphics | Free, open-source | www.ggplot2.tidyverse.org
- Seaborn (Python) | Statistical data visualisation | Free, open-source | www.seaborn.pydata.org

Colour tools & accessibility

Choose accessible, professional colour palettes designed for scientific visualisation.

Scientifically designed palettes:

- Okabe-Ito Palette | Gold standard for colourblind-friendly categorical colors | Free | www.cookbook-r.com/Graphs/Colors_(ggplot2)
- Viridis Family | Perceptually uniform, colourblind-friendly, print-safe | Free | www.cran.r-project.org/web/packages/viridis
- Scientific Colour Maps (Fabio Crameri) | 50+ perceptually uniform, colourblind-safe maps | Free | https://www.fabiocrameri.ch/colourmaps/ (A favourite)
- ColorBrewer | Cartography-based, field-tested, interactive tool | Free | www.colorbrewer2.org (A favourite)

Palette generators:

- Adobe Color | Explore and create colour schemes | https://color.adobe.com/explore (A favourite)
- Coolors | Generate palettes quickly | www.coolors.co
- Material Palette | Material Design colours | www.materialpalette.com (A favourite)

Browser extensions:

- ColorZilla | Pick colors from any website | www.colorzilla.com

Pattern generators:

- Stripe Generator | Create striped patterns | www.stripegenerator.com

Accessibility & Contrast Checkers: (I use all of these)

- WebAIM Contrast Checker | WCAG compliance | www.webaim.org/resources/contrastchecker
- Adobe Contrast Analyzer | Color contrast analysis | https://color.adobe.com/create/color-contrast-analyzer
- Accessible Web Contrast Checker | www.accessibleweb.com/color-contrast-checker
- ColorKit Contrast Checker | www.colorkit.co/contrast-checker

Accessibility tools for R and ArcGIS:

- Accessibility Toolbox | Tools for spatial accessibility analysis | www.github.com/higgicd/Accessibility_Toolbox

Typography

Professional, legible fonts for scientific posters.

- Google Fonts | Free, open-source fonts, huge library | www.fonts.google.com (Open Sans lives here – my favourite!)
- DaFont | Free fonts (check legibility carefully) | www.dafont.com

Font sizing tools:

- Type Scale | Create harmonious font size ratios | www.type-scale.com

Quick design utilities

Small tools that solve specific design problems.

Image manipulation:

- Remove.bg | Background removal | Our favorite | www.remove.bg
- Cleanup Pictures | Remove objects, defects, people, text from images | www.cleanup.pictures
- ClipDrop | Background removal | www.clipdrop.co
- SVG to 3D | Convert SVG to 3D | www.studio.morflax.com/shift

File optimisation:

- Image Compressor | Reduce file size without quality loss | www.imagecompressor.com
- Image Resizer | Resize and crop online | www.imageresizer.com
- Tiny PNG | Smart image compression | https://tinypng.com/ (My favourite – and also built into Affinity Suite)

Maps:

- MapChart | Create custom maps | www.mapchart.net

Text tools:

- Remove Line Breaks | Clean text copied from PDFs | www.textfixer.com/tools/remove-line-breaks.php

Interactive elements:

- QR Code Monkey | Generate QR codes | My favourite | www.qrcode-monkey.com

Image editing software

Professional editing for figures and photos.

My favourite:

- Affinity Designer | Professional-grade, now free | www.affinity.serif.com

Professional (paid):

- Adobe Creative Cloud | Photoshop, Illustrator, InDesign | Industry standard | Paid tool | www.adobe.com

Free alternatives:

- Photopea | Online editor, supports PSD files | www.photopea.com
- GIMP | Free, open-source image editor | www.gimp.org
- Inkscape | Free vector graphics editor | www.inkscape.org
- Edit.photo | Free online photo editor | www.edit.photo

3D design in browser:

- Spline | Free online 3D design tool | www.spline.design
- Vectary | Build 3D worlds in browser | www.vectary.com

Design tool directory: For even more tools: www.tinytools.directory

Writing & editing tools

Improve clarity, grammar, and readability.

- Language Tool | www.languagetool.org/ (my favourite)
- Grammarly | Grammar and style checking (with browser extension) | www.grammarly.com (our other favourite)
- QuillBot | Paraphrasing tool | www.quillbot.com
- Hemingway App | Readability and style checker | www.hemingwayapp.com
- Jasper.ai | AI-powered writing assistant | Paid tool | www.jasper.ai

Books, tutorials, guides:

How to set up a grid in PowerPoint

https://support.microsoft.com/en-us/office/work-with-gridlines-and-use-snap-to-grid-in-powerpoint-84ed7394-5b37-4326-b13d-60fbc845e096

Accessible design

Human Standards:

Human factors research translated into design standards, code examples, and an MCP server for AI-assisted validation.

https://www.humanstandards.org/