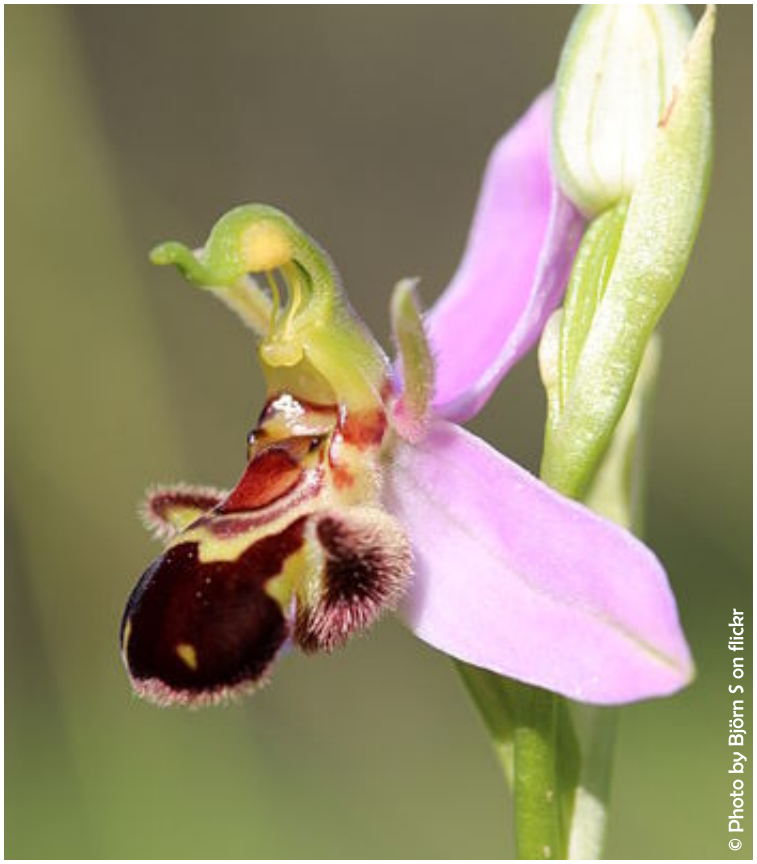
figures from scientific articles



tips to make them clear & attractive

figures from scientific articles : make them clear & attractive

1 MAKE CHOICES

Reviewers and editors often look at your figures before reading your paper. It is essential to make sure this first impression is a good one.

What is the key message of your figure?

Each figure must convey only one message, answer only one question. Choose carefully the key message that you want to communicate with your figure. Only include data that are related to this key message/question.

Who is the audience of your figure?

Are you preparing a figure for a highly specialised journal or a more generalist one? Use this to determine the level of detail you present.

2 MASTER THE TOOLS

What is the minimum resolution required?

To avoid blurred figures, always double-check guidelines for resolution. If nothing is specified, 600 dpi should be sufficient.

When working with images, avoid saving them in .jpg. This degrades the resolution of the image.

Do you need to make photo adjustements?

Use a specific software such as ImageJ, Gimp or Photoshop. Make the same changes in all images being compared. Note any post-capture adjustements and always keep the original files.

DPI is used only for bitmap files, but not for vector files. You can check the DPI by right clicking on your image (Windows) or with the Preview application (macOS).

Do you need to create graphs?

There are many different tools. You may decide on an easy-to-use tool such as GraphPrism, but you will gain in reproductibility by using R.

What type of data do you want to represent?

Depending on the type of data, the number of variables and what you want to show, choose the most appropriate type of graph.

www.data-to-viz.com is a dynamic decision tree that leads you to the most appropriate graph for your data.

Do you need to build diagrams or schemes?

They are time-consuning, but worth the investment. Be aware that not all online "free" photos or illustrations can be used for publication.

In which software will you gather elements?

While Powerpoint can work for simple figures, opting for a professionnal graphics editor (Inkscape or Illustrator) saves you time for complex figures.

3 SHOW THE TRUTH

To learn more about the misuse of colour reads the instructive paper from Crameri et al. Nat Commun 2020.

Is your figure a honest and true reflection of the data?
If a reader seeing the raw data would come to the same conclusion, your figure is not cheating. So, do not choose the "most representative" image, do not over adjust contrast or do not deliberatly remove data points.

What visualisation elements do you use?
Humans can quantify certain visualisation elements better than others. Favor marker position and marker length rather than angle, colour or area.

See the article by Rossner & Yamada 2004 JCB for more info on incorrect image manipulation.

Are the colours misleading?
Deliberately assign colours to data points and stick to it. Use a limited number of colours that are easy to distinguish, even for color-blind people. Sometimes black & white is more effective than any set of colours.

Which axis limits best capture your message?
Select meaningful axis limits. Whenever possible, include zero on the y-axis. If you adjust the axis limits, always take care not to distort the data.

Have you double-checked everything?
Always double-check the values written on your graph. Do your percents sum to 100% ? Do your visuals match your values?

4 MAKE IT CLEAR

Does the figure stand on its own?
People should not have to skim the paper to understand your figure. Use as few abbreviations as possible, provide clear axis titles and explain all the important experimental details in the caption.

Choose a legible font, preferably a Sans-serif font. Make sure that the font size is large enough.

Is the figure more complex than the data it represents?
Find the simplest way to present your often complex data. It is up to you to make the effort to be clear, not the reader to make the effort to understand.

Does your figure follow the usual style in your lab?
Each lab has its own style. Browse previous scientific articles from your lab and use their design as a basis for your own.

Do not trust defaults of Excel, GraphPrism or R. Always rework your graphs.

Is there anything you could rule out?
Simplicity means effectiveness in communicating a message. The default options are full of clutter. Remove distracting decorations : excessive backgrounds grids, 3D effects, excessive tick marks, frames or shadows.

5 COMPOSE

Let your figure breath. Ensure enough white space between the different elements composing the panel.

Have you sketched out a rough draft

Do not start building your panel straight away. Start by drawing a rough draft of the layout of the elements you want to combine. Think about how each element contributes to the overall message. Keep only the essentials.

Is there a visual flow starting at the top left?

Create a specific composition starting from top left. Related elements should be close.

Is the order in the figure the same than in the manuscript?

The elements of your figure should be in the same order as in the manuscript. Do not fill a blank space in your panel with any element.

Is the attention attracted by the most important elements?

How much an element in the panel attracts and retains the attention of the viewer should match the relevance of the information.

6 COMBINE

Use a graphical editor software

Do not use Gimp or Photoshop to create your panel, as you will lose the advantage of having graphs in vector files. Prefer Inkscape or Illustrator.

Set the dimensions of your panel figure

Your figure should not be bigger than a A4 page. For smaller sizes, you can create a layer with a grey rectangle the size of the figure that can guide you.

Import all individual elements

Import only images in bitmap files (600 dpi resolution) and all other elements in vector files (pdf or eps). Use an Insert tool to place the figures. Drag/drop or copy/paste often results in a lower resolution.

Are all elements aligned?

Use grids to help you organise elements. Do not align by eye, but with align and distribute buttons.

Are all elements consistent?

Use the same size and scale for comparable graphs. Use the same colour and shape for identical groups. Stick to your own rules.

You have seen your data too often to get an unbiased view. Ask other people which elements they see first and what key message they understand from your figure. And then adapt it.

your bookmark checklist

Print, cut on the black line and fold on the dotted line, then keep close by.

- ☐ what is the key message of my figure?
- ☐ who is my audience?

- ☐ is the resolution high enough?
- ☐ am I using appropriate tools?

- ☐ does my figure show the truth?
- ☐ are the colours or visualisation elements misleading?
- ☐ are my axis limits meaningful?
- ☐ is the text readable?
- ☐ have I checked everything twice?

- ☐ does my figure stand on its own?
- ☐ does it follow the style of my lab?
- ☐ does my caption match my figure?
- ☐ is there anything I could rule out?

- ☐ is there a visual flow starting at the top left?
- ☐ is the order in my figure the same than in the manuscript?
- ☐ is the attention attracted by the most important elements?

- ☐ are all elements aligned?
- ☐ are all elements consistent?

"A picture is worth a thousand words."