

Using figures (and images) to present information

Studying in the Sciences

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Figures include graphs, charts, maps, drawings/illustrations, diagrams and photographs. They are used most commonly to illustrate theories and concepts, provide visual images or present data. While this guide focuses on examples of figures that present numeric information, many of the concepts can be applied when using figures to present text based information (e.g. flow chart of scientific method) and images.

Because schools in the science disciplines at SCU typically use the APA 6th style guide, information in this document is based around APA 6th style.

Why use figures?

- To help organise and simplify the presentation of numerical data.
- Provide visual clarity of complex information that, if expressed in words, is difficult to understand.
- To supplement the text of your assignment and help communicate the information being presented.
- To present essential information, adding to, and not just repeating identical material already in the text.

Note: In many types of assignments, such as academic essays, the use of figures is discouraged, whereas other types of assignment, such as reports and proposals, their use is encouraged. It is important to check the requirements of your assignment task to determine if it is OK to use figures in your assignment.

General guidelines: What to consider

Consider the following to determining if a figure should be included and how to present it.

Is the figure necessary?

First, decide if the information is better delivered in writing in the body of the document or if a figure will **contribute to the readers understanding** without just repeating what has been said in the text.

The key thing is that the figure should add information and further the readers understanding, not just repeat what is in the text. Likewise, do not duplicate the content of the figure in the text.

Can you understand the figure without reference to the text?

A good figure can be interpreted and understood independent of the text in the body of the document. The following tips will help you to develop a figure that is easy to understand:

- Present the figure so it is easy to read and understand.
- The title/ caption of the figure should be clear and tell the reader what information the figure is providing.
- All elements of the figure, including abbreviations or symbols, should be clearly labelled or defined in the figure caption (or included in a legend).
- For figures with data, include the appropriate unit of measurement where relevant, written in standard scientific notation. Make sure that data points in the figure are clear enough so that their values can be determined.

What if the figure (or information in it) is from someone else's work?

You need to reference the work of others. Like any academic work, if you have taken the entire figure or information for your figure, including data, from another source you need to correctly reference this information according to your School's referencing style (e.g. [APA 6th](#)). For undergraduate assignments, this typically involves citing the author/s, date and page where the material appears and then include the full citation in the reference list. For more information visit the [University of Waikato's page on APA referencing examples](#) under the **Figures (including images) and Tables link (see for undergraduates)** found at the bottom of the page.

Let the reader know when to look at the information in the figure

Because the figure is either supporting the information in the text or the text is summarising or interpreting the information in the figure, to help the reader's understanding, you need to refer them to the figure wherever it is appropriate. This requires more than you just saying for example, see the figure for more information. Explain to the reader what they should look for when they read the figure: what should be their focus.

Presentation: be clear and consistent

- Organise the information presented in the figure in a meaningful way that helps the reader's understanding.
- Present the information within a figure or in similar types of figures throughout the document consistently.
- Do not repeat the same information in multiple figures, or likewise, do not use a figure to just duplicate information in the text.
- Label each figure in your document in the same order as it is referred to in the text. This method needs to be consistent for example, Figure 1; Figure 2; Figure 3.
- Provided a concise descriptive title and any further explanations, including definitions of all your abbreviations and symbols. This is to allow the figure to be understood independently of the text. This can be done as part of the figure's caption, or for the purpose of symbols and abbreviations, a legend can be provided within the figure itself.

What to include

General:

(for examples see figures of a [graph](#) and an [image](#) below)

- Provide a figure label below the figure, numbered according to the order it occurs in the text in relation to any other figures.
- Provide a title/ caption for the figure below the figure (following the figure label).
 - A caption should provide a brief descriptive phrase to serve as the title of the figure, and then any further information to explain the details of the figure should be added.
 - Alternatively, for defining any symbols used, a legend can be provided as part of the figure.
- Refer to the figure in the text of the document.

Specific to graphs:

- Clearly label axes and identify units of measurement (use SI units – International system of units)
- Scales should be uniform

For example:

0 10 20 30 40; 0 25 50 75 100

NOT

0 5 12 16 23; 0 0.9 2.1 2.6 3.8

- You must be able to see plotted data points clearly so that the reader can determine their values
- Identify each data set (series) clearly, with a different symbol or marking, where two or more data sets are used
- Refer to the graph in the text of the document as a figure

Tips For tips on **what type of graphs to use to display different types of information** see Australian Bureau of Statistics (n.d.) *What graph to display to use when by clicking this link.*

General layout of a figure

Example of a figure: Graph (APA 6th style)

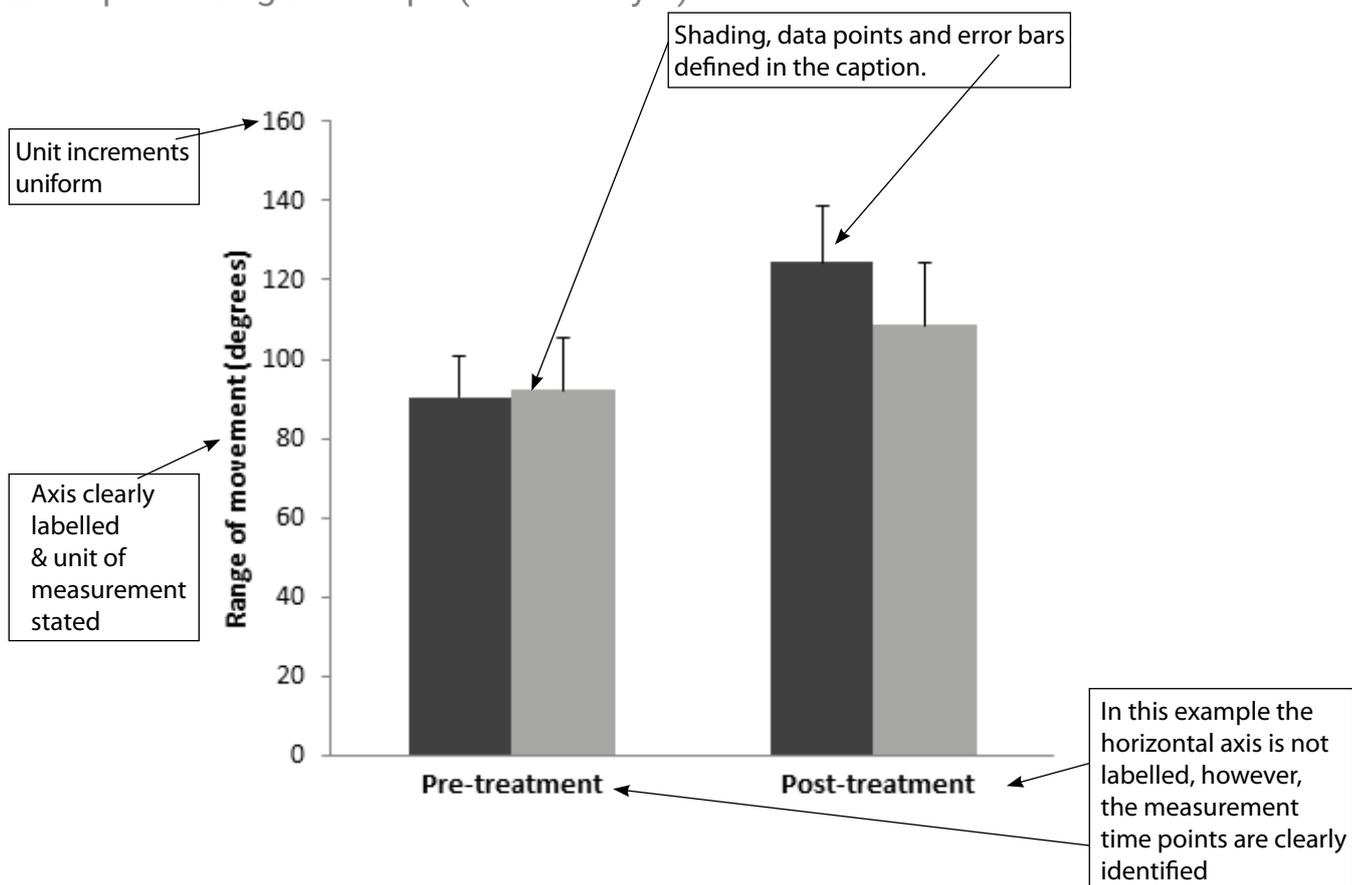


Figure 1 Comparison of knee range of movement pre- and post-treatment. Participants received either land-based (■) or hydrotherapy (■) exercise interventions. Values represent group means; vertical bars represent standard deviations.

A figure label is provided and should be numbered according to the order it appears in the document.

A figure title/ caption provides a clear description of the figures content descriptive of the. A caption follows providing further information on elements of the figure, by defining the two different plots represented by the different shading and what the vertical (error) bars represent.

Referring to the table in the text part of the document

You can refer to the table in the text using either of the following two ways.

Example 1

As shown in Figure 1, knee range of movement increased from baseline for participants in both treatment groups, with those receiving exercise showing greater improvements than hydrotherapy recipients.

Tip Focus the reader on what they should look for in the figure. In these examples the figure adds to the text by providing data for both groups at each measurement time point (pre/post treatment). The figure is a concise way of presenting this information rather than presenting the details in written form.

Example 2

Participants' knee range of movement improved in both the hydrotherapy and exercise groups following treatment, however, these increases were superior for those receiving exercise (see Figure 1).

Example of a figure: image (from another source)

Figure 1 *Petromyzon marinus* (sea lamprey). The circular mouth and rows of teeth of this parasite, used to attach to the host organism, are shown here. (Source: USA Environmental Protection Agency, 2006)

A numbered figure label is provided.

The figure title/caption identifies what the image is of using correct scientific terminology and provides a brief explanation of what the figure is emphasising.

The source is cited in the caption. Full details of the citation would appear in the reference list.

Figure checklist

(Adapted, in part, from American Psychology Association, 2010, p. 167)

- Is the figure necessary?
- Does the figure contribute further details or understanding to information in the text?
- Is the figure simple and clear without unnecessary details?
- Is the size of the figure adequate so that it can be read easily?
- Is the title (caption) clear, and explanatory of the figures content?
- Can you understand the figure without reference to the text in the document?
- Are all elements of the figure clearly labelled and, where relevant, symbols and abbreviations defined?
- If the figure (or its information/data) are from another source, is the source properly cited?
- Are all figures referred to in the text with cross reference to the correct figure label (i.e. labelled and numbered in the order they appear in the document)?
- Is the formatting and organisation of information within a figure consistent?
- Are all comparable figures in the document presented consistently?

Learning activity

Data from (McDowell et al., 2008) has been plotted in a graph and presented as a figure. View the figure, using the [checklist](#) above and applying what you have learnt, evaluate the figure. After you have done this, view the receive feedback on the learning activity that follows.

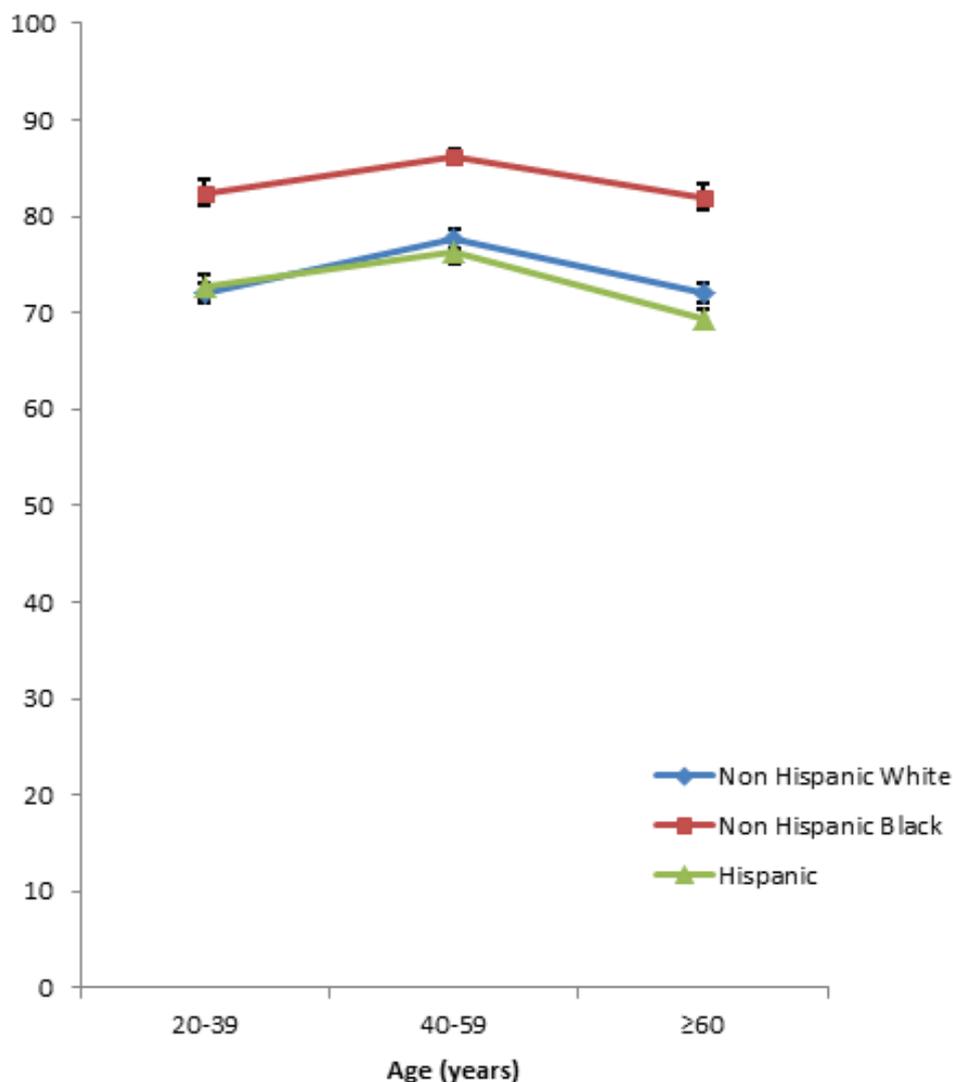


Figure Weight of females.

Feedback on learning activity

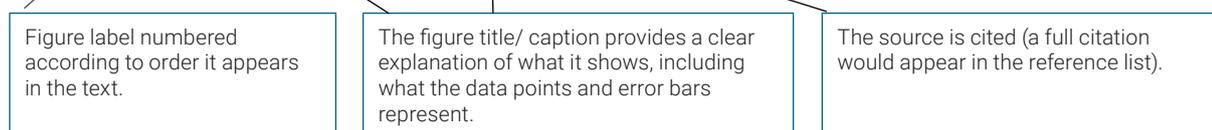
From the checklist evaluation:

- Is the figure necessary? *Without knowing the context of the text, it is hard to say.*
- Does the figure contribute further details or understanding to information in the text? *The figure provides details of variation in body weight (mass) based on race across three different age spans. It is likely to add information but details in this figure are lacking.*
- Is the figure simple and clear without unnecessary details? *The figure is reasonable clear with the exception of clarity of the error bars. The legend appropriately identifies the three different data series. Some details are lacking – further explanations below.*
- Is the size of the figure adequate so that it can be read easily? *The figure is quite large relative to the page but because the bottom of the scale is not necessary (below 60) details of the error bars are not clear – you cannot accurately interpret their values.*
- Is the title (caption) clear, and explanatory of the figures content? *This does not provide enough detail; there are elements of the figure that are uncertain. This data is actually body mass of USA females. This is not detailed anywhere in the figure. Error bars are presented but what these refer to (e.g. SD, ranges, confidence intervals, standard errors) has not been defined.*

- Can you understand the figure without reference to the text in the document? *You can see, to some extent, what the figure is showing but details are omitted (see above).*
- Are all elements of the figure clearly labelled and, where relevant, symbols and abbreviations defined? *No not entirely. The horizontal axis is appropriately labelled but the vertical one has no axis title or unit. We do not know what the data values represent or what the error bars are. The symbols for the three data series have been defined in a figure legend.*
- If the figure (or its information/ data) are from another source, is the source properly cited? *No. The data source is not provided at the end of the figure caption and we know from the start of the activity that it comes from McDowell et al. (2008).*
- Are all figures referred to in the text with cross reference to the correct figure label (i.e. labelled and numbered in the order they appear in the document)? *The figure is labelled 'Figure' at the bottom of the graph but it is not numbered. It should be numbered according to the order (with reference to other figures) it appears in the document.*
- Is the formatting and organisation of information within a figure consistent? *Yes, each of the data series (Hispanic, Non-Hispanic Black, and Non-Hispanic White) are presented in a similar format.*
- Are all comparable figures in the document presented consistently? *Not applicable, no other figures to compare with.*

The following provides a better example of how to present a figure to convey the information. Compare the original with this improved version.

Figure 1 Body mass of adult females from the USA according to age and ethnicity. Data points represent mean values; vertical error bars represent standard errors (SE). (Data source: McDowell, et al., 2008, p. 7).



Other related guides

- Studying in the sciences: Using table to present information
- Studying in the sciences: Organising data and creating figures (in Excel)
- CTL Numeracy resources: [Graphs](#)

References

- American Psychological Association. (2010). *Publication manual of the American Psychological Association*. (6th ed.). Washington DC: American Psychological Association.
- Purdue Online Writing Lab (OWL). (n.d.). APA tables and figures 1. Retrieved from <https://owl.english.purdue.edu/owl/resource/560/19/>
- McDowell, M. A., Fryar, C. D., Ogden, C. L., & Flegal, K. M. (2008). Anthropometric reference data for children and adults: United States, 2003–2006. *National Health Statistics Reports*, 10 (October 22). Retrieved from <http://www.cdc.gov/nchs/data/nhsr/nhsr010.pdf>
- USA Environmental Protection Agency. (2006). *Sea lamprey, unknown location*. Retrieved from <http://www.epa.gov/greatlakes/image/vbig/229.jpg>