# Spreadsheets: Good practice with charts

iT Centre Learning

iT services

UNIVERSITY OF OXFORD

# The small print

## Prerequisites

Time in the workshop is precious – it is an opportunity for you to interact with the workshop leader and other participants through questions and discussions and to share your experiences and concerns. To make the most of this time we sometimes ask you to carry out learning activities ahead of the workshop so that everyone comes into the class with the same basic knowledge. We keep this prior learning to a minimum and often make use of online videos. Online videos provided through LinkedIn Learning can be accessed free of charge by University members anytime, anywhere, through a browser or app.

Your course booking will tell you if any prior learning activity is required. If you don't have an environment where you can do this learning, you can come along to one of our LinkedIn Learning sessions. These are a quiet space where you can work through videos or other workshop resources.

If you arrive for a workshop without having done the prior learning, the workshop leader may suggest that you come back on another session.

## Copyright



## About the workshop designer

Graham Addis started his first technology role in 1978 and has gathered decades of practical experience in industry. He has always been passionate about passing on his knowledge and undertook his first formal teaching position as a Customer Training Specialist for Intel back in 1984. Since that time his career has combined extensive real world experience with teaching and mentoring. In 2017 he joined the academic world at the University of Oxford and currently specialises in teaching spreadsheets, databases and programming.

## Revision history

| Version | Date | Author | Comments |
|---|---|---|---|
| 2.2 | November 2022 | Graham Addis | Update templates |
| 2.1 | November 2021 | Graham Addis | Correct slide sequence. |
| 2.0 | May 2020 | Graham Addis | Convert to online format. |
| 1.2 | October 2019 | Graham Addis | Update workbook references |
| 1.1 | August 2019 | Duncan Young | Small print updates |
| 1.0 | May 2017 | Duncan Young | Initial version |

# About this workshop

This session will give you an insight into some of the techniques and styles that can be used when dealing with spreadsheet charts.

We will include pointers to other workshops and further resources that will help you go on later to analyse and organise your data.

## What you will learn

This session provides guidance on which charts to use in both administrative and research situations and how to use them to convey messages clearly and effectively. You will gain an understanding of the mechanics of creating and formatting charts in Excel and discover which charts are appropriate for various types of data.

## What you need to know

The ideas and techniques covered in this workshop will apply to a range of tools. We will demonstrate using *Excel for Windows*, which is widely available. However, the concepts will be the same, whatever spreadsheet software you decide to use.

I will assume that you are reasonably confident in using the tool you have chosen to use to create your spreadsheets. With your chosen tool, you will need to be able to:

- open and navigate around a workbook using the mouse and scrollbars, save a workbook
- add data to cells, and select and amend such data
- create a formula that calculates using values found in other cells
- Navigate the commands and menus, using Help as necessary

If you need to review these activities, LinkedIn Learning is a great place to get guidance. There is an activity with relevant videos in the IT Learning Portfolio: visit skills.it.ox.ac.uk/it-learning-portfolio and search for "Spreadsheets: Good Practice with Charts activity".

## The resources you need

Sample documents that you can use to experiment with will be made available, but you may like to bring along your own.

Unless you have been told otherwise, in classroom workshops there will be a computer available for you to use with *Excel for Windows* installed.

You can use your own computer with your preferred app installed if you want to – just bear in mind that I am not an expert in every app (although I am sure that between us we will be able to sort out most problems!).

## Learning Objectives

This workshop has the following learning objectives:

**Learning Objective One - Making a Chart**

**Learning Objective Two - Formatting a Chart**

**Learning Objective Three - Column and Bar Charts**

**Learning Objective Four - Line and Area Charts**

**Learning Objective Five - Chart Formatting**

**Learning Objective Six - Scatter / X-Y charts**

**Learning Objective Seven - Pie charts**

**Learning Objective Eight - Charts for research papers**

**Learning Objective Nine - Templates and layouts**

## Learning Objective One - Making a Chart

It's best to select the required data before making a chart in Excel. It is possible to make a blank chart and then add data to it, but this is typically more difficult to get right.

You can start to make a chart from the **Insert** menu on the Excel ribbon by then selecting **Recommended Charts** (or selecting one of the specific chart type buttons if you're sure about what you want). Two keystrokes could also be used to make a chart of the default type (which could then be changed to a different type):

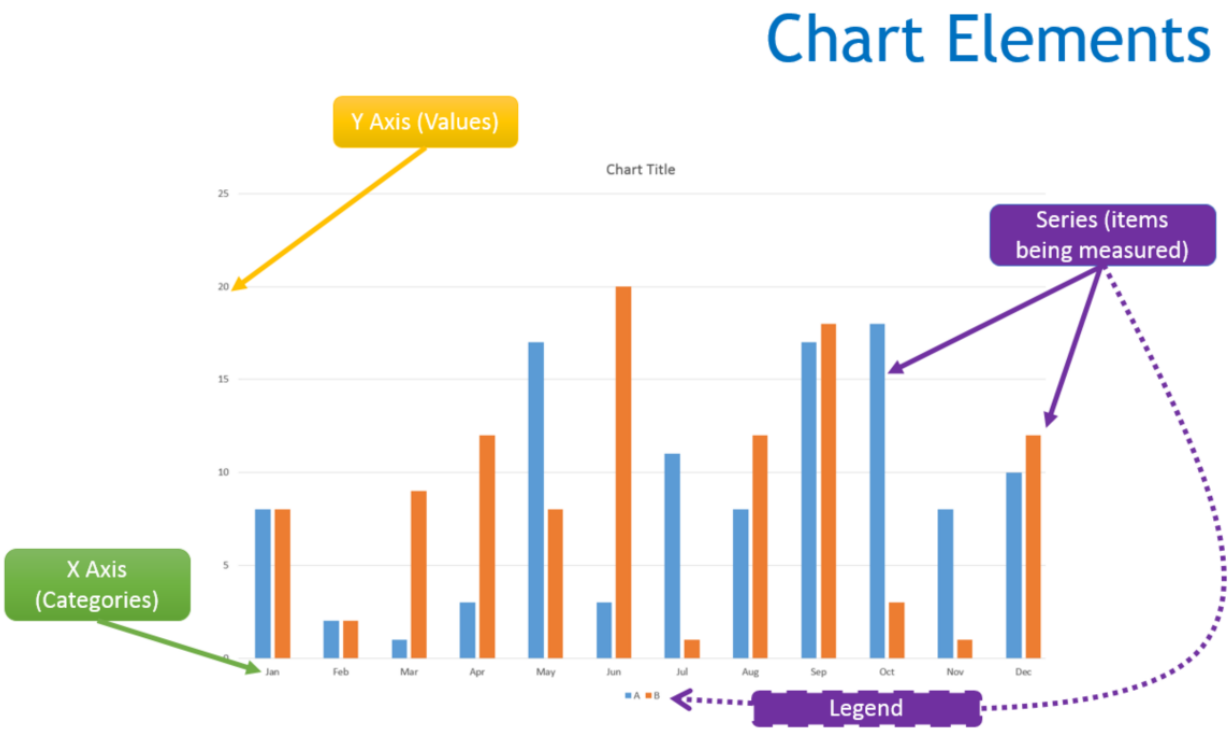
- Alt+F1 makes a chart of the default type on the current worksheet
- F11 makes a chart of the default type on a new chart sheet.

When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook using the worksheet: "**Sets**"

## Learning Objective Two - Formatting a Chart

**Chart type and style can be changed as many times as you like via the buttons on the Chart Tools, Design section of the Excel ribbon.**

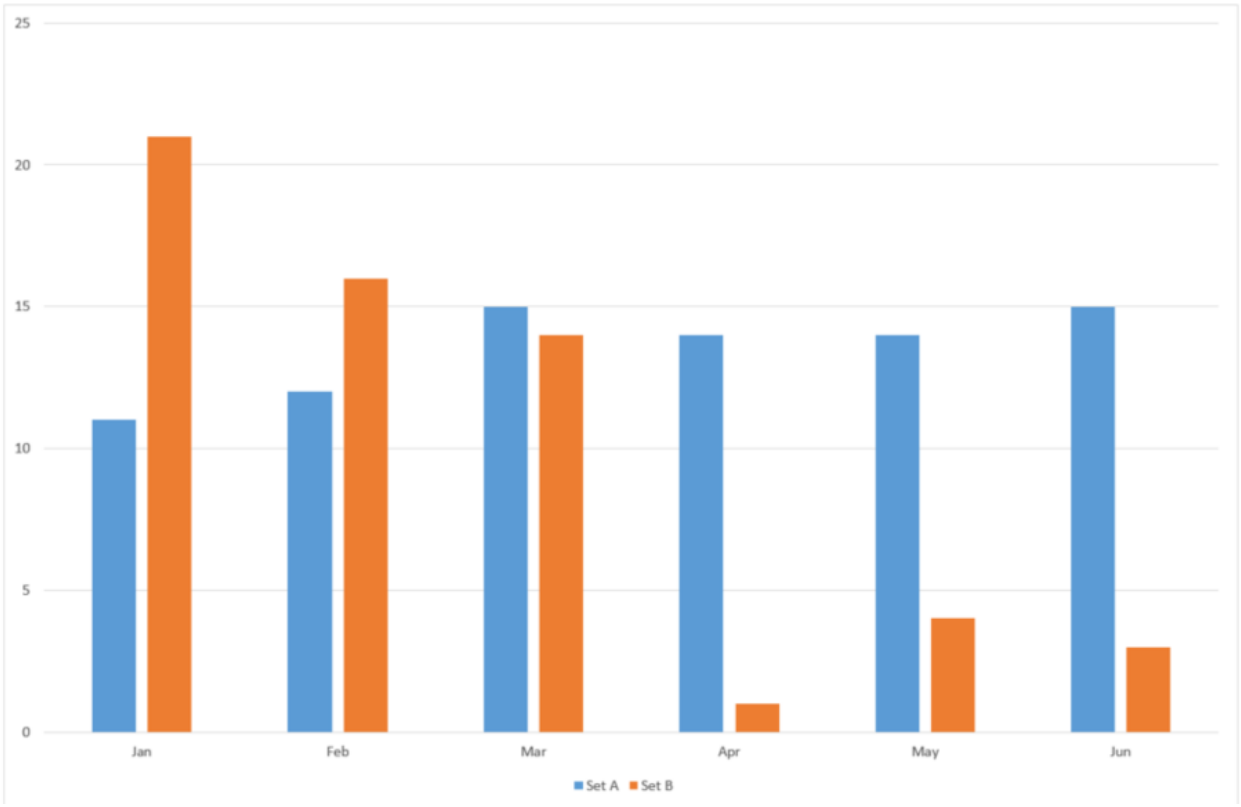
The following essential elements of a chart can be selected and formatted using dedicated menus on the ribbon, buttons on the chart display or context sensitive 'right click' menus:




*When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook using the worksheet: "**West Country**".*

## Learning Objective Three - Column and Bar Charts

Column charts can be very effective in comparing a small number of data series.




However, it is usually best to avoid:

- large series values v small series values
- comparing different measurement units
- more than 4 data series
- truncating the y axis

**Bar charts are better than column charts at displaying data that relies on rankings (1st, 2nd, etc.).**

*When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook using the worksheet: "**School Enrolment**".*

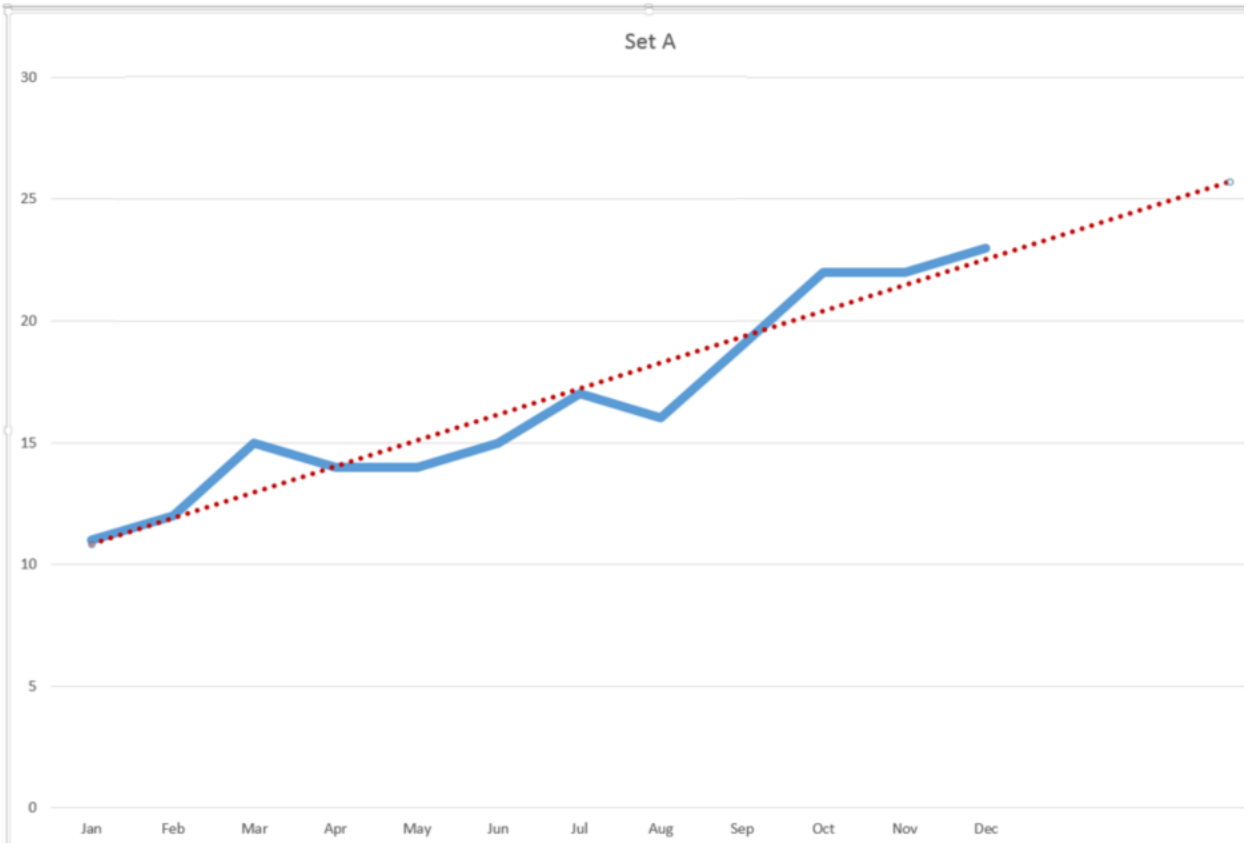
## Learning Objective Four - Line and Area Charts

Line charts can be very effective for:

Showing trends

Visualising forecasts

Comparing more than 4 data series (e.g. instead of a column chart)



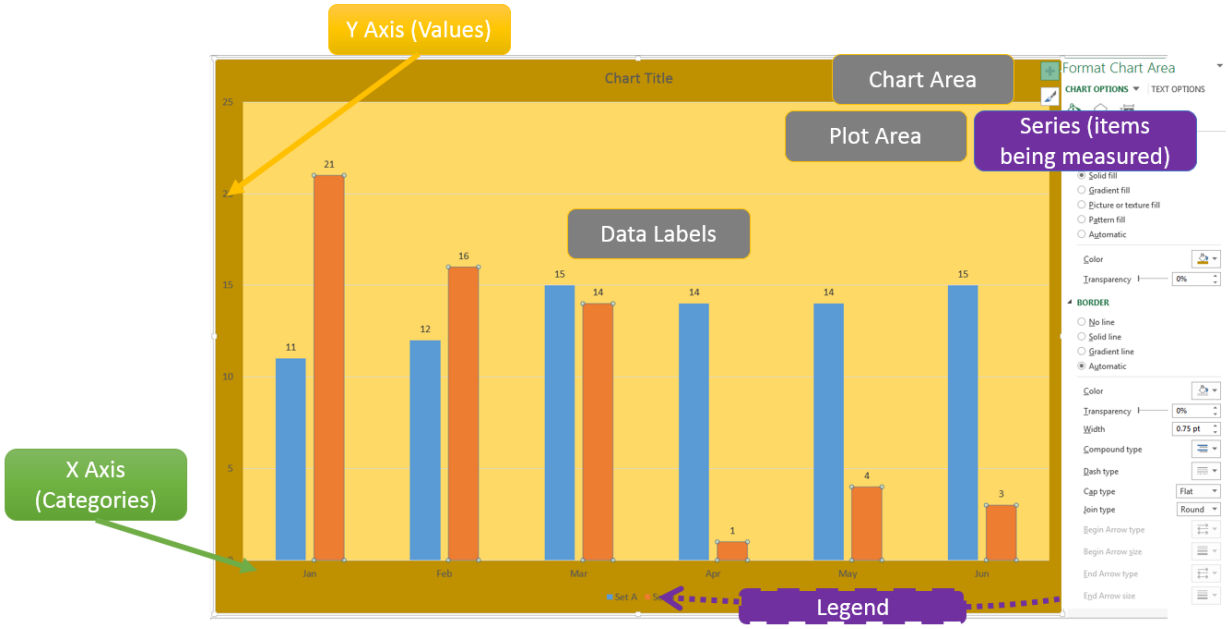

Include as much data as possible to avoid a small amount of data suggesting misleading trends.

Use the options in the “Hidden and Empty Cells” dialog to best account for missing data.

**Area charts are a variation on line charts that emphasise proportion of contribution to a whole.**

*When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook using the worksheet: “**North Britain**”.*

## Learning Objective Five - Chart Formatting



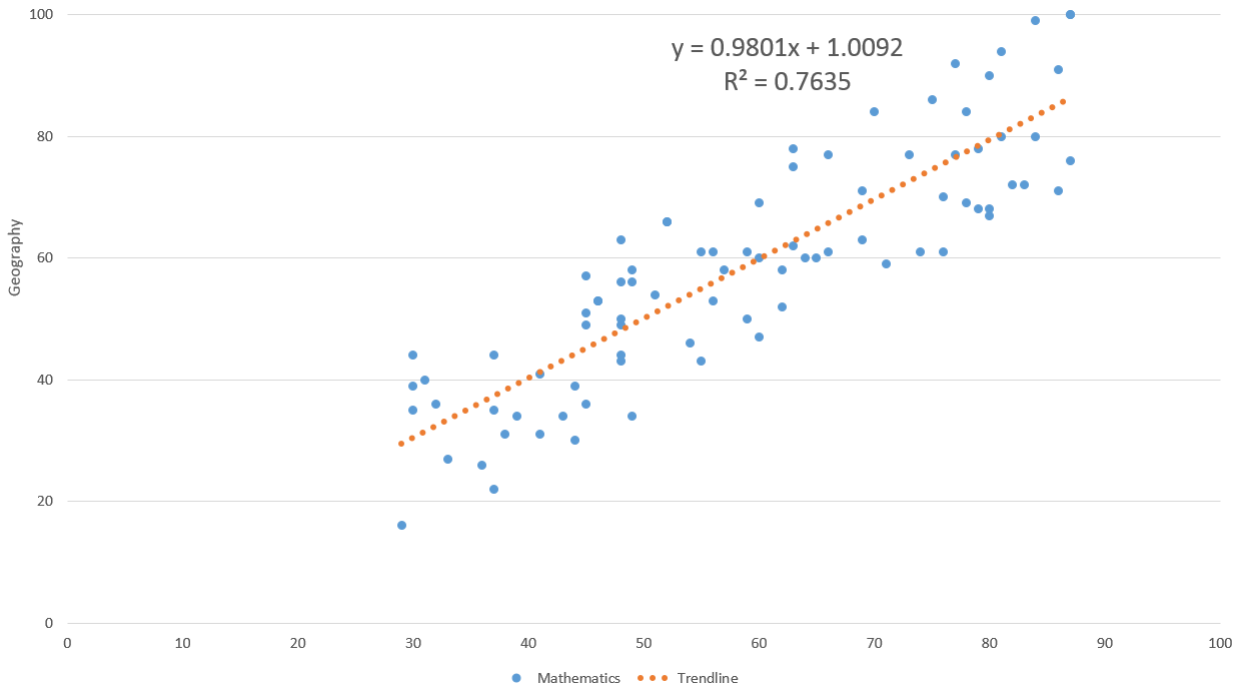

As well as the essential elements of a chart mentioned in Learning Objective Two, some additional elements can be selected and formatted using dedicated menus on the ribbon, buttons on the chart display or context sensitive 'right click' menus:

- Plot Area
- Chart Area
- Data Labels

*When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook using one or more of the charts created during this learning exercise.*

## Learning Objective Six - Scatter / X-Y charts

Scatter, or X-Y, charts can be effective in analysing correlations of paired data. As with line charts (Learning Objective Four) it can be valuable to add a trendline.




*When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook using the worksheet: "**Test Scores**".*

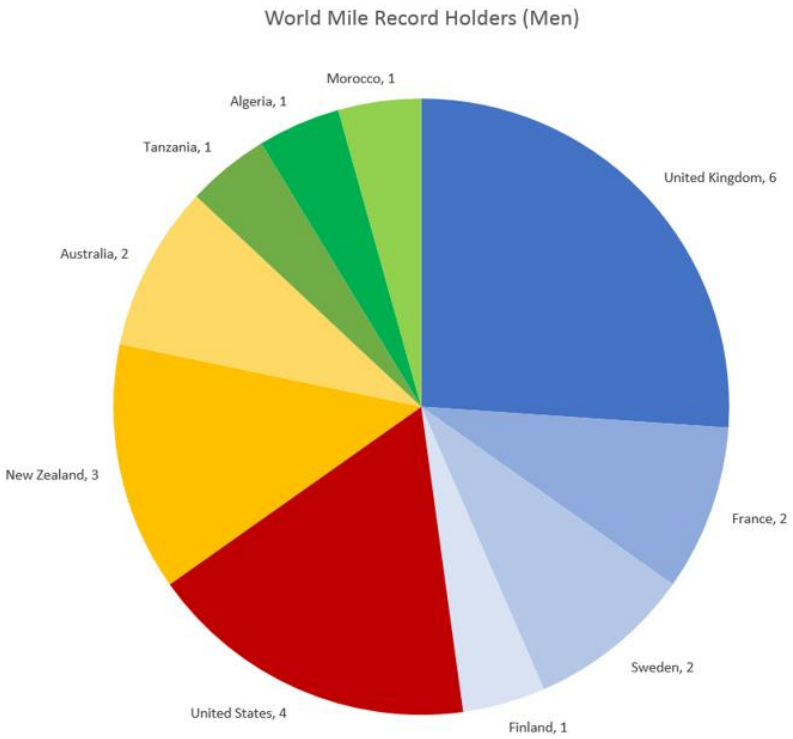
## Learning Objective Seven - Pie charts

Pie charts can be effective in illustrating proportional data of parts of a whole. They are effectively stacked column charts 'bent round'.

If using pie charts, it is usually best to avoid:

- more than 6 or 7 items (overcrowding dilutes the message)
- 3D charts (distorts the data)
- exploded segments (viewers rely on angles at the centre)

If multiple items can be colour coded and clearly arranged a pie chart can still be effective.



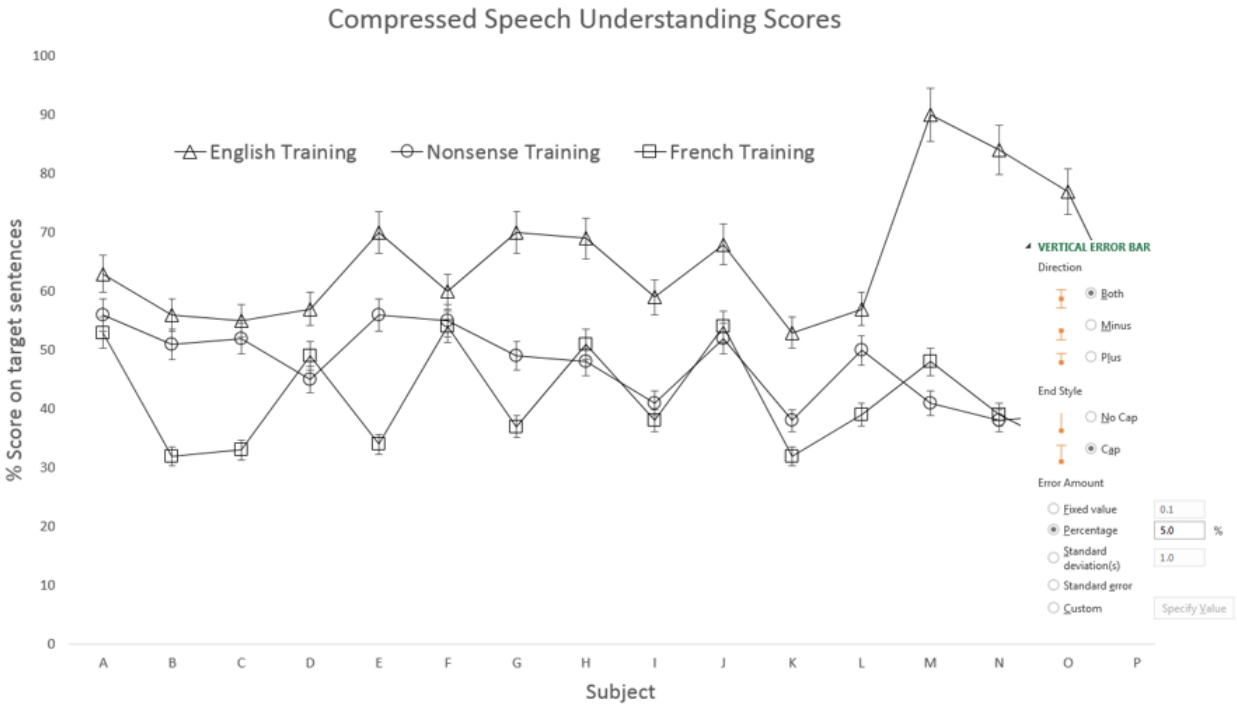

*When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook using the worksheet: "**1500 WR**".*

## Learning Objective Eight - Charts for research papers

When preparing a chart for publication in an academic paper the following guidelines may be useful:

- Use only black and white (more effective when printed)
- Remove borders and gridlines
- Use a line size of 0.75 pts (an increase in size doesn't seem to make a large difference)
- Use Excel's in-built shape markers at maximum size (8 pts) with no fill

http://data-mining.philippe-fournier-viger.com/how-make-charts-for-presenting-results-in-research-papers/




*When directed by the trainer, use the information in this learning objective to develop charts in the* ***Chart Exercises (Student).xlsx*** *workbook using the worksheet: "****Speech****".*

## Learning Objective Nine - Templates and layouts

If you made customisations to a chart that you would like to save as a template and use again with other data, select the following from the Excel ribbon:

Chart Tools > Design > Type > Save As Template

You can apply this template to other charts by selecting the following from the Excel ribbon:

Insert > Charts > Other Charts > All Chart Types

The following general advice may also be useful:

- If you must include gridlines or shading, keep these items faint and unobtrusive
- Shading in particular can look bad when printed or copied
- Insert charts into your main document text rather than printing them on separate pages
- Consider using two titles: the first giving your overall message, the second a more literal description

*When directed by the trainer, use the information in this learning objective to develop charts in the **Chart Exercises (Student).xlsx** workbook e.g. use the chart created in Learning Exercise Eight.*

# Further information

## Learning Objective Ten - Getting extra help

The IT Learning Centre offers bookable clinics where you can get pre- or post-course advice. Contact us using courses@it.ox.ac.uk.

## Learning Objective Eleven - Study Videos from LinkedIn Learning

On our website, you will find our collection of self-service courses and resources. This includes providing LinkedIn Learning video-based courses free to all members of the University. Visit skills.it.ox.ac.uk/linkedin-learning and sign in with your Single Sign-On (SSO) credentials.

Some courses recommend pre- and/or post-course activities to support your learning. You can watch the online videos anywhere, anytime, and even download them onto a tablet or smartphone for off-line viewing.

## Learning Objective Twelve - About the IT Learning Portfolio online

Many of the resources used in the IT Learning Centre courses and workshops are made available as Open Educational Resources (OER) via our Portfolio website at skills.it.ox.ac.uk/it-learning-portfolio.

Find the pre-course activity for this course in the IT Learning Portfolio: visit skills.it.ox.ac.uk/it-learning-portfolio and search for “Good Practice with Charts (Activity)”.

## Learning Objective Thirteen - About the IT Learning Centre

The IT Learning Centre delivers over 100 IT-related teacher-led courses, which are provided in our teaching rooms and online, and we give you access to thousands of on-line self-service courses through LinkedIn Learning.

Our team of teachers have backgrounds in academia, research, business and education and are supported by other experts from around the University and beyond.

Our courses are open to all members of the University at a small charge. Where resources allow, we can deliver private courses to departments and colleges, which can be more cost-effective than signing up individually. We can also customize courses to suit your needs.

Our fully equipped suite of seven teaching and training rooms are usually available for hire for your own events and courses.

For more information, contact us at courses@it.ox.ac.uk.

## Learning Objective Fourteen - About IT Customer Services

The IT Learning Centre is part of the Customer Services Group. The group provides the main user support services for the department, assisting all staff and students within the University as well as retired staff and other users of University IT services. It supports all the services offered by IT Services plus general IT support queries from any user, working in collaboration with local IT support units.

The Customer Services Group also offers a data back-up service; an online shop; and a computer maintenance scheme. Customer Services is further responsible for desktop computing services – for staff and in public/shared areas – throughout UAS and the Bodleian Libraries.

# Spreadsheets:
# Good Practice with Charts

Graham Addis

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# Resources for your learning

## Activities for you to practice today

- In the coursebook
- Work at your own pace!
- Be selective

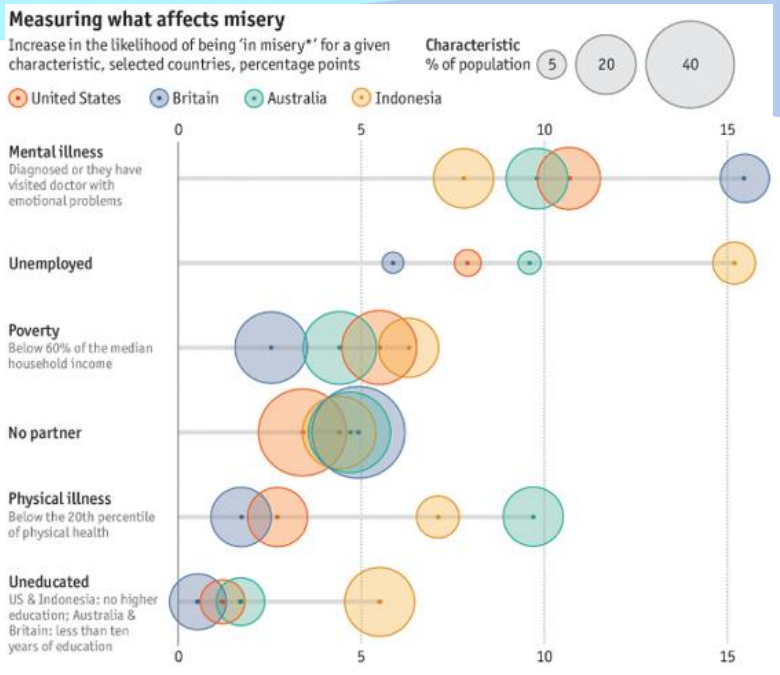

## Videos with today's topics in

LinkedIn Learning

## Follow-up work

- Continue with exercises after the session
- Bookable Course Clinics later

# Example Chart




Is the chart pleasing to look at?

What conclusions can you draw from it?

Are there any barriers to understanding the data?

# Data Visualisation

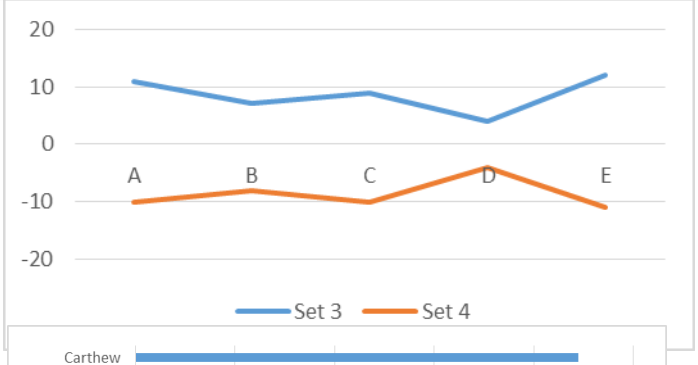
"Any effort to help people
understand
the significance of data
by placing it in a visual context."

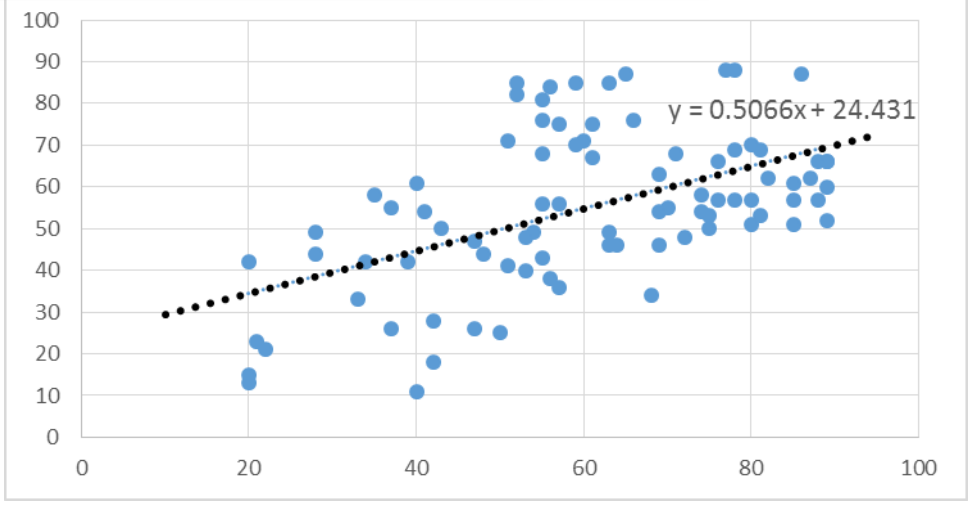
A top 10 skill to get a job

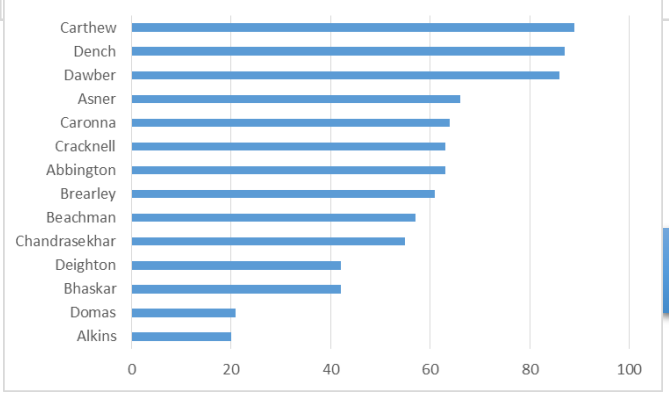
https://blog.linkedin.com/2016/10/20/top-skills-2016-week-of-learning-linkedin

# Why have a chart?

To be effective charts should clearly illustrate patterns, trends outliers




Graphs often showing big picture, not fine detail

# Making a Chart

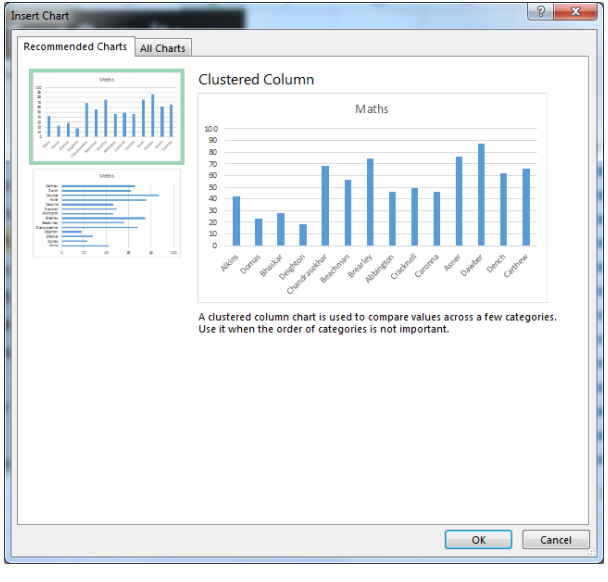
Best to select data first

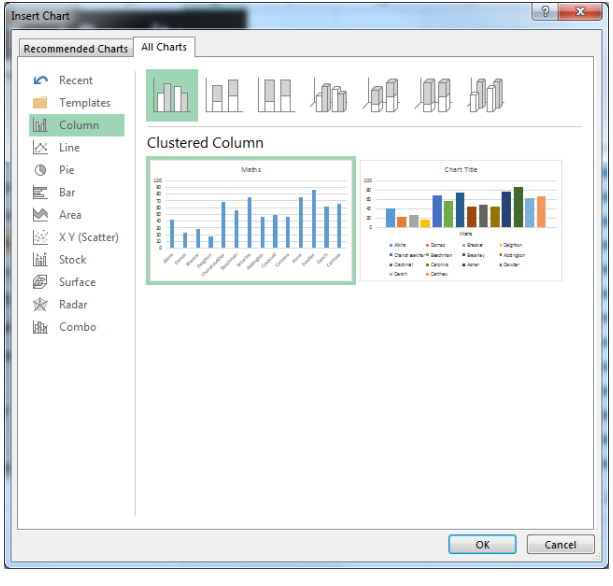
| | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|
| Set A | 11 | 12 | 15 | 14 | 14 | 15 |
| Set B | 20 | 16 | 14 | 1 | 4 | 3 |
| Set C | 9 | 9 | 1 | 12 | 9 | 17 |

Data need not be in one block if selected with care

Data can be added to a chart by copy and paste

Insert, Recommended Charts

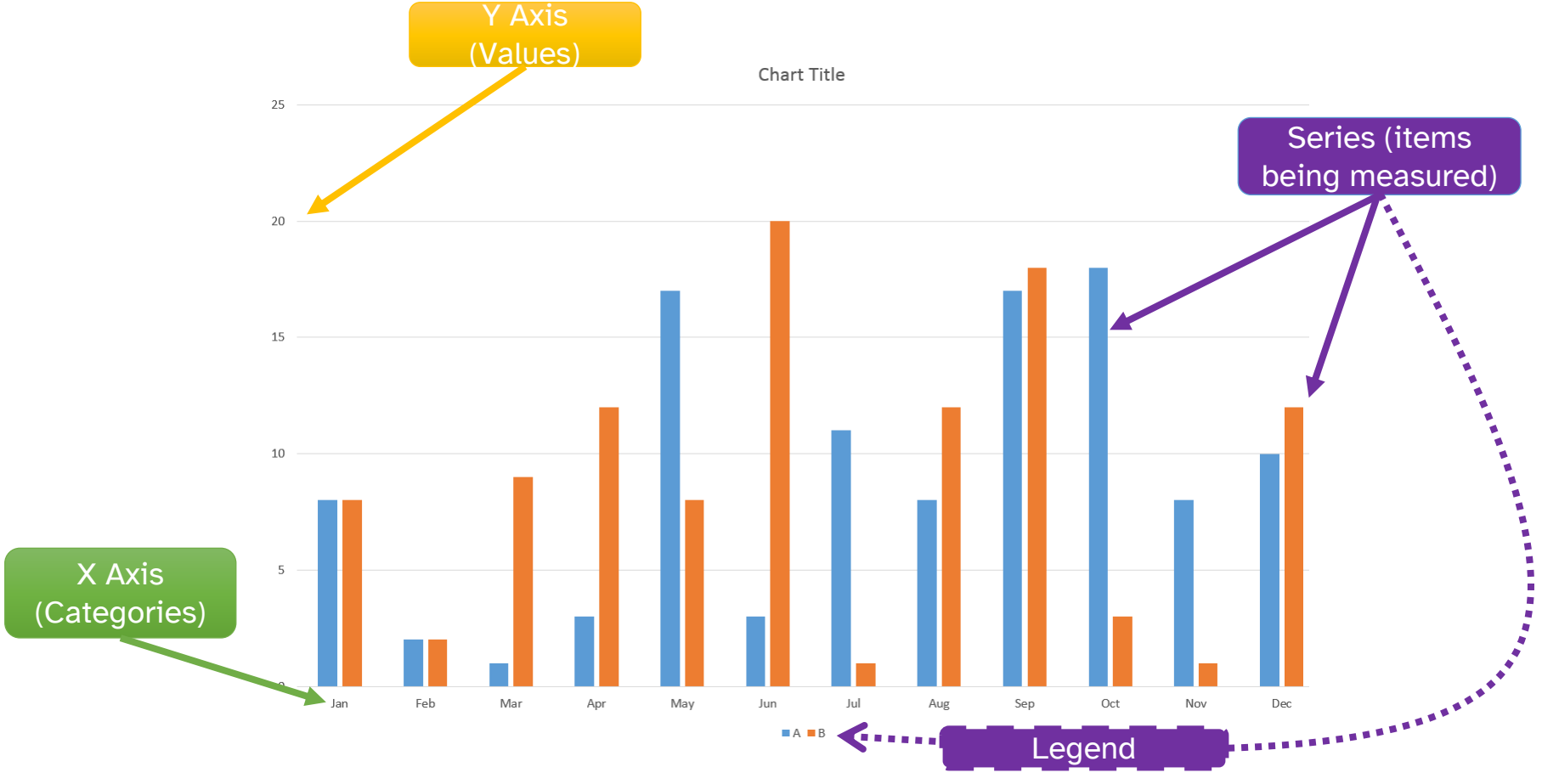



Alt+F1 for default chart on worksheet

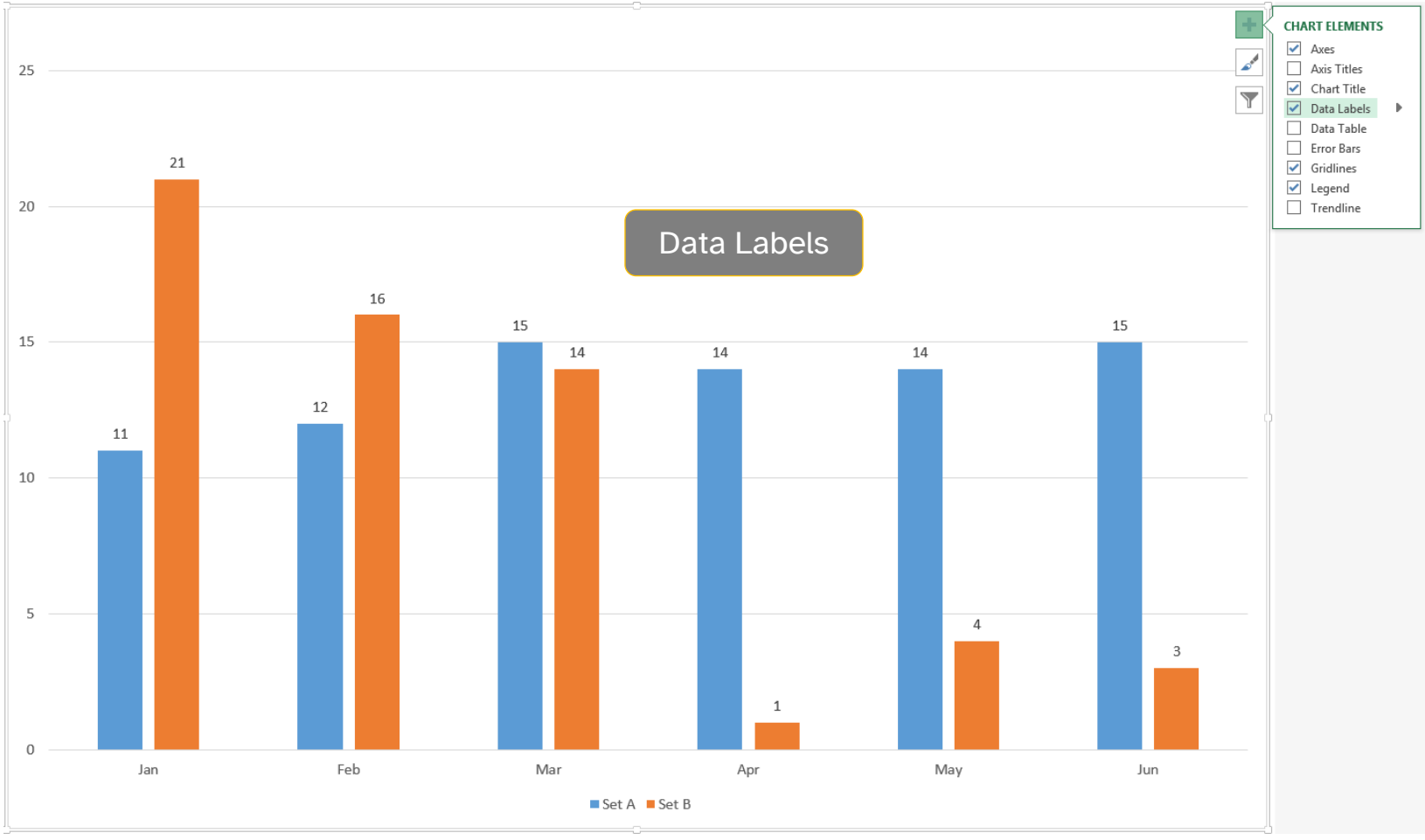
F11 for default chart on a separate sheet

# Chart Elements



# Column Charts

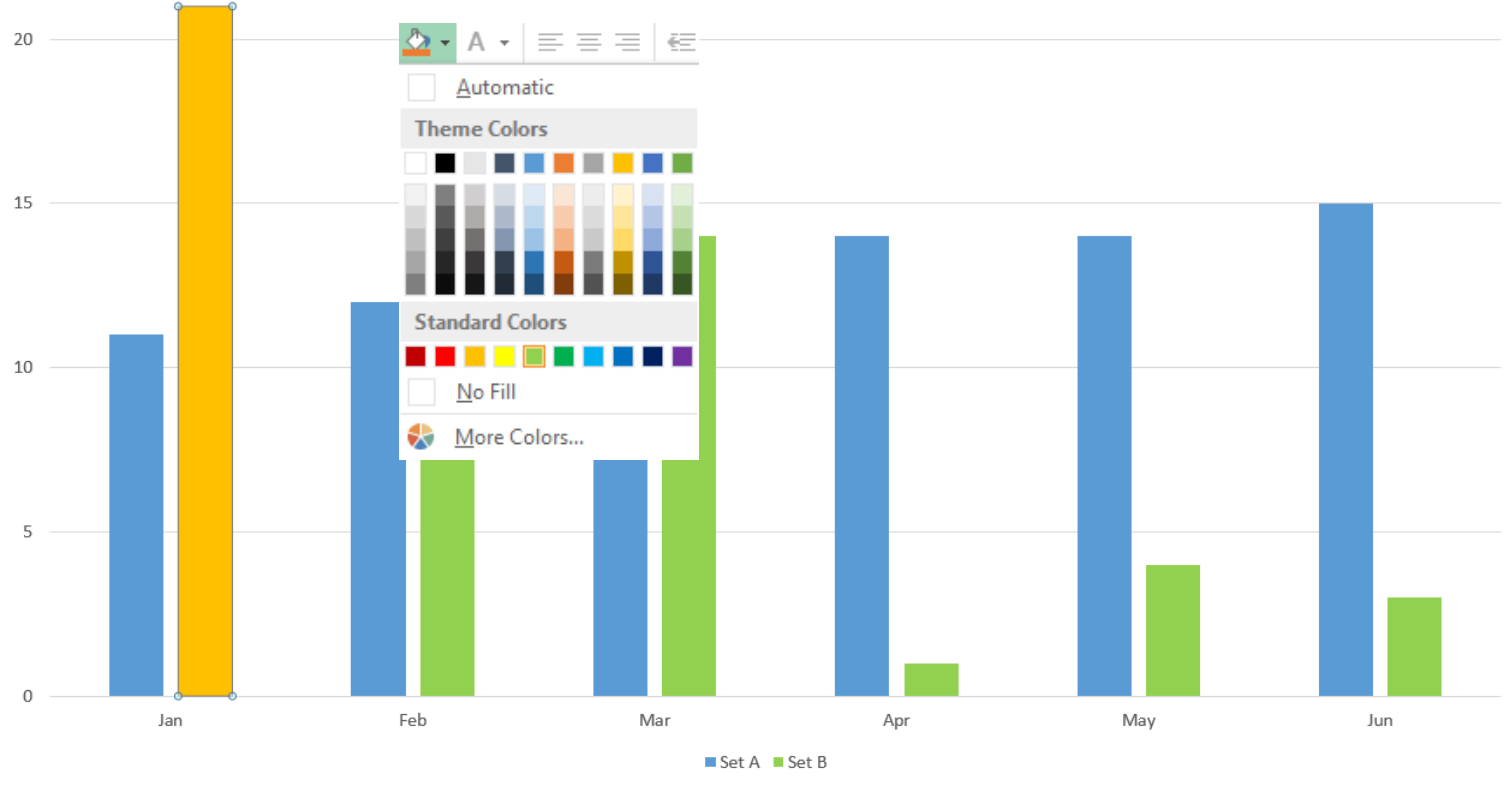
Good for comparisons between series



# Column Charts

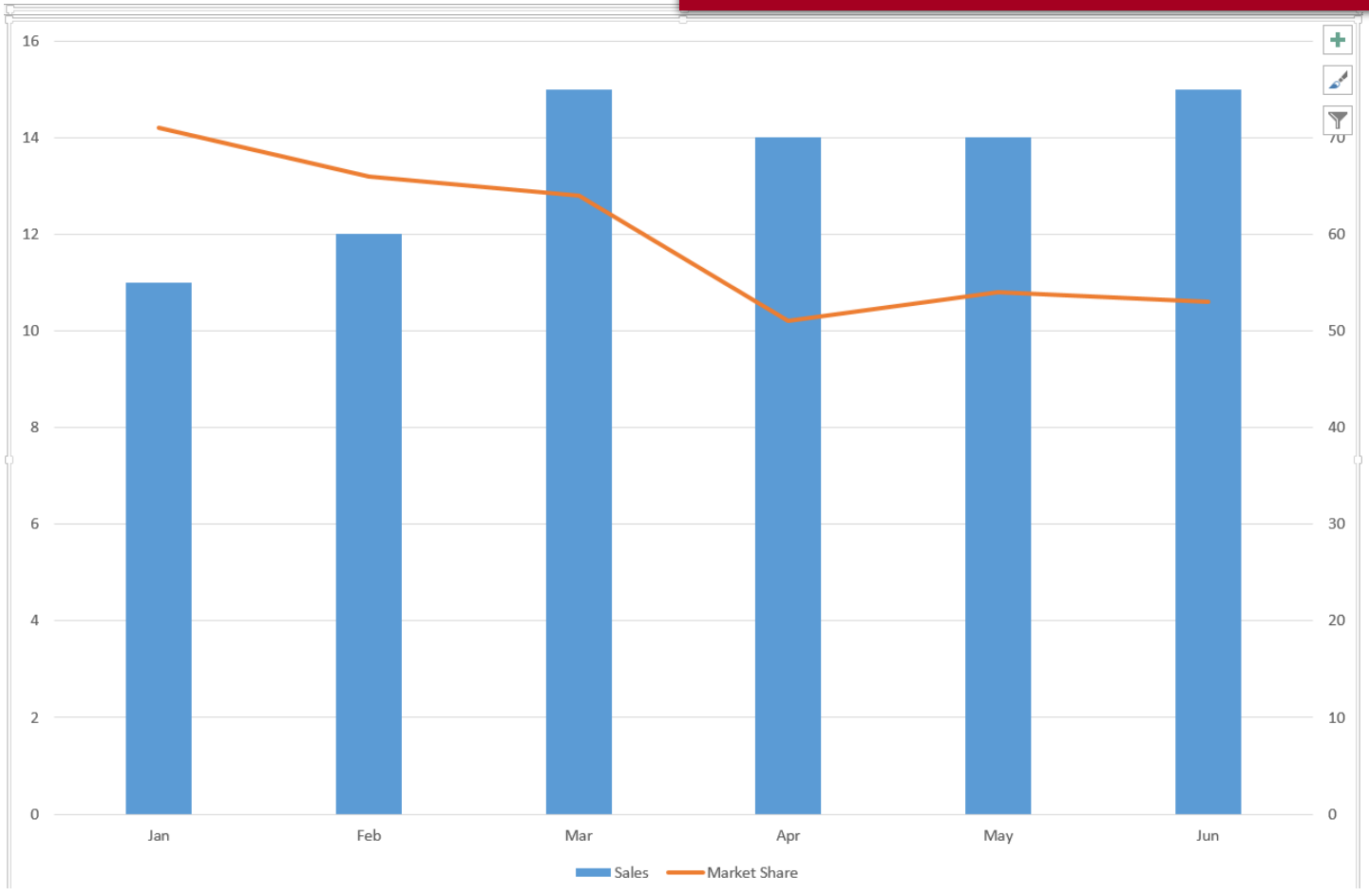
Click a Series to change its format

Then click an Item to change its format



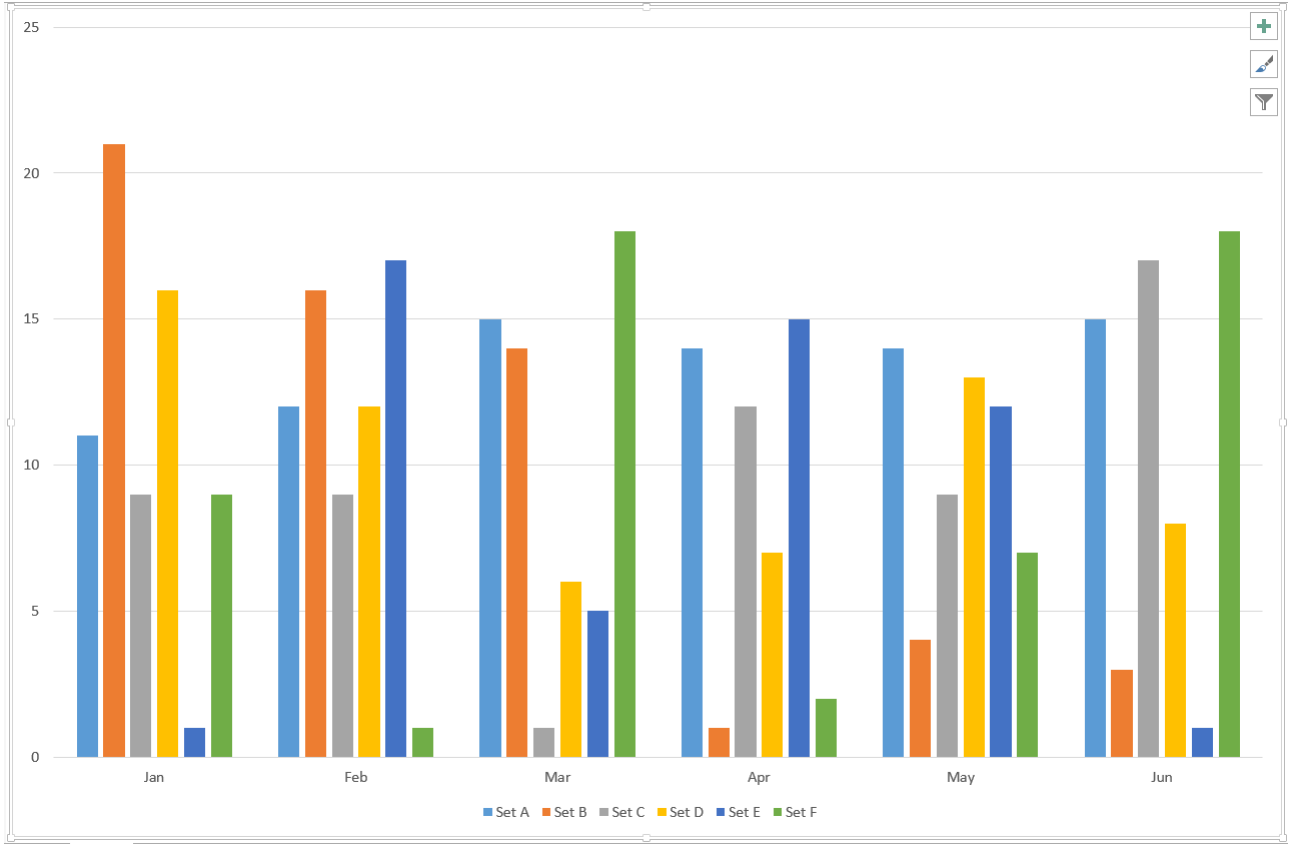
# Column Charts

Avoid large series values vs small series values or comparing different measurement units



# Column charts

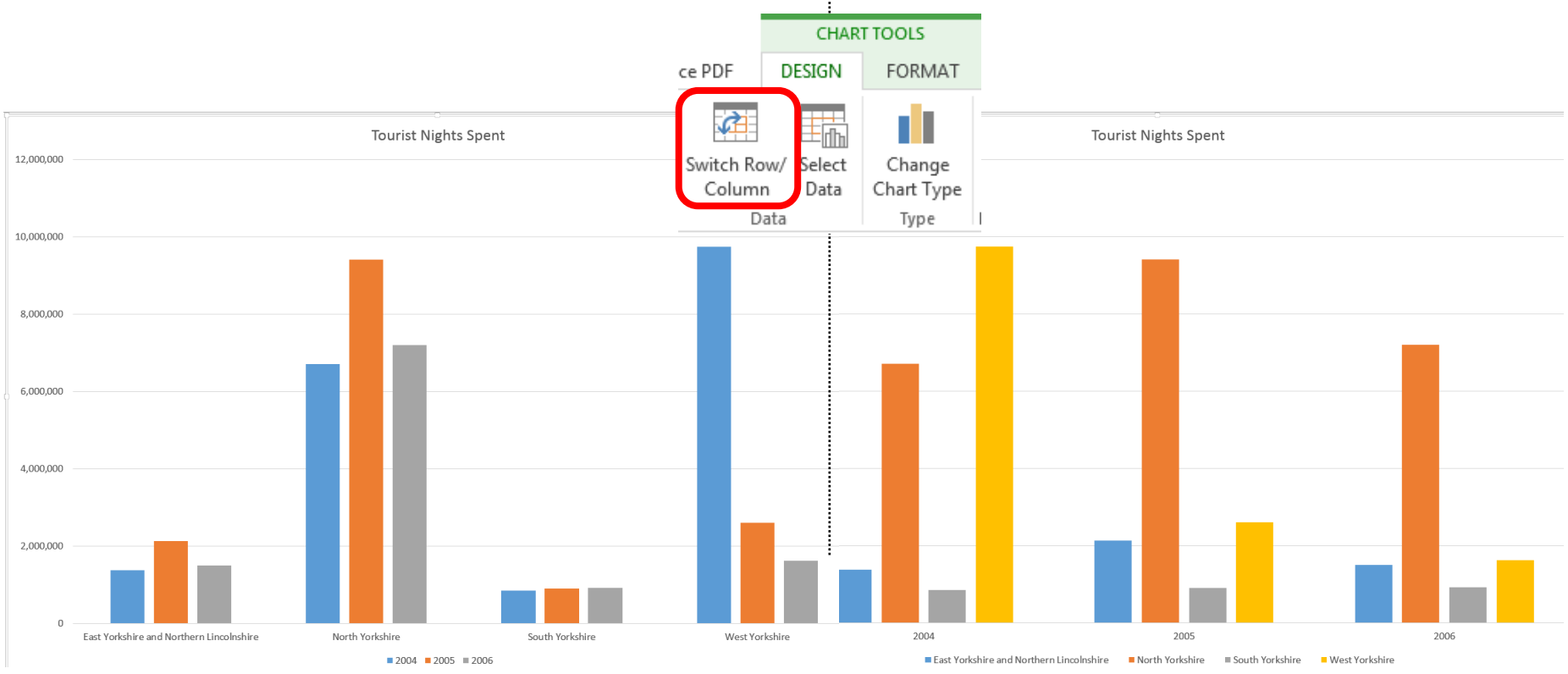
More than 4 series starts to look crowded...



# Column charts

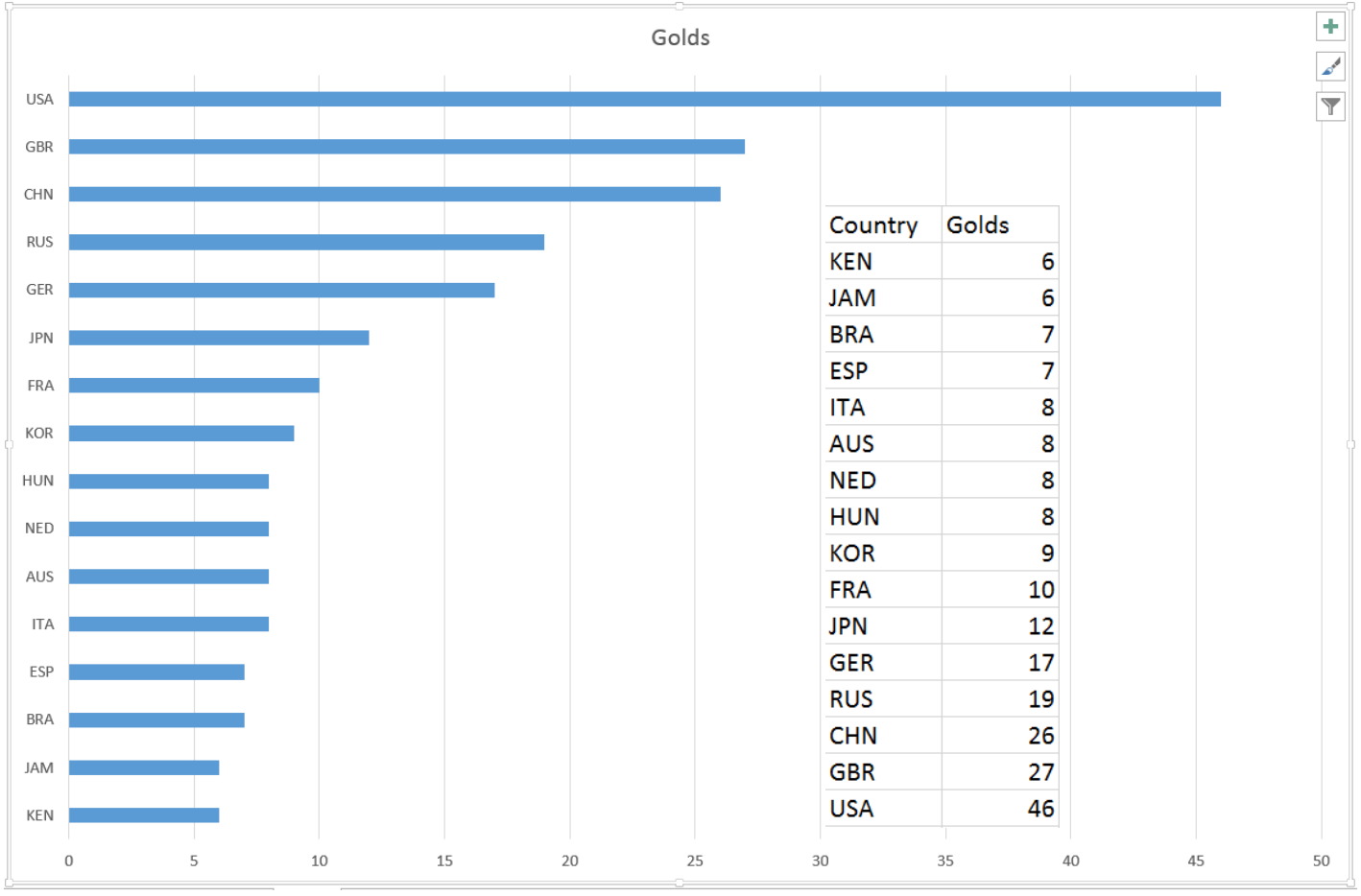
Careful with changing start value of Y-axis

# Series and Categories



# Bar Charts

Good for showing **ranking** data of one series

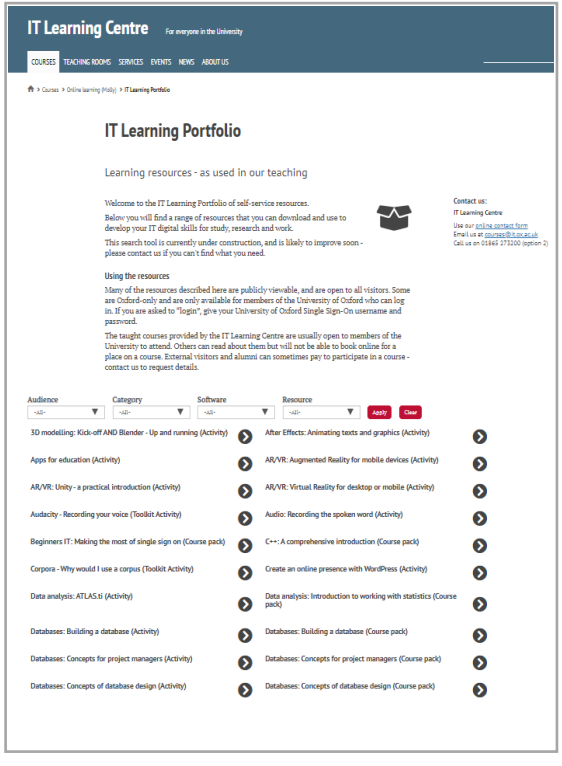



| Country | Golds |
|---|---|
| KEN | 6 |
| JAM | 6 |
| BRA | 7 |
| ESP | 7 |
| ITA | 8 |
| AUS | 8 |
| NED | 8 |
| HUN | 8 |
| KOR | 9 |
| FRA | 10 |
| JPN | 12 |
| GER | 17 |
| RUS | 19 |
| CHN | 26 |
| GBR | 27 |
| USA | 46 |

# Find the resources for the workshop in our IT Learning Portfolio

Download the files (and more) from the IT Learning Portfolio at

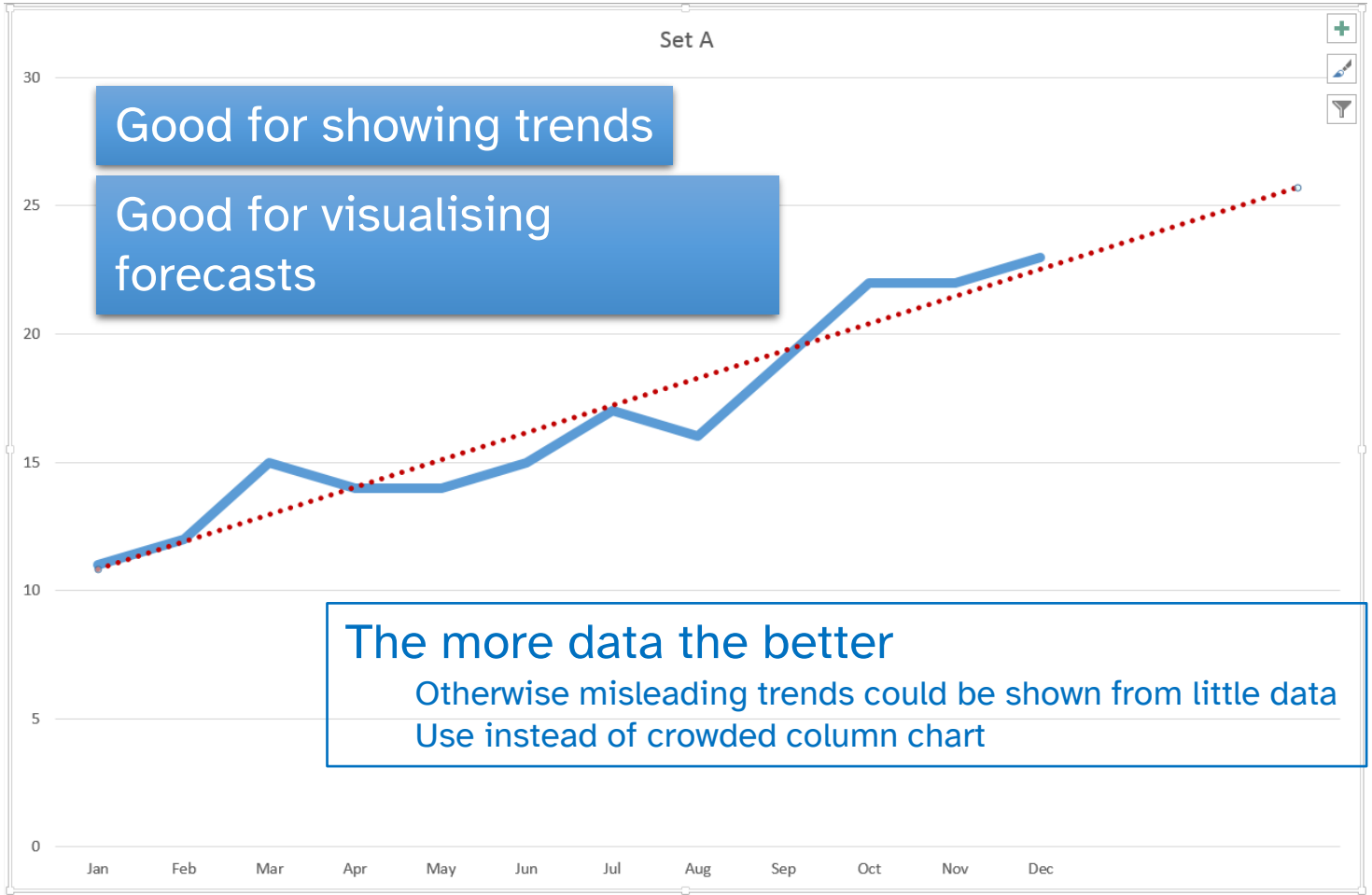
https://skills.it.ox.ac.uk/it-learning-portfolio



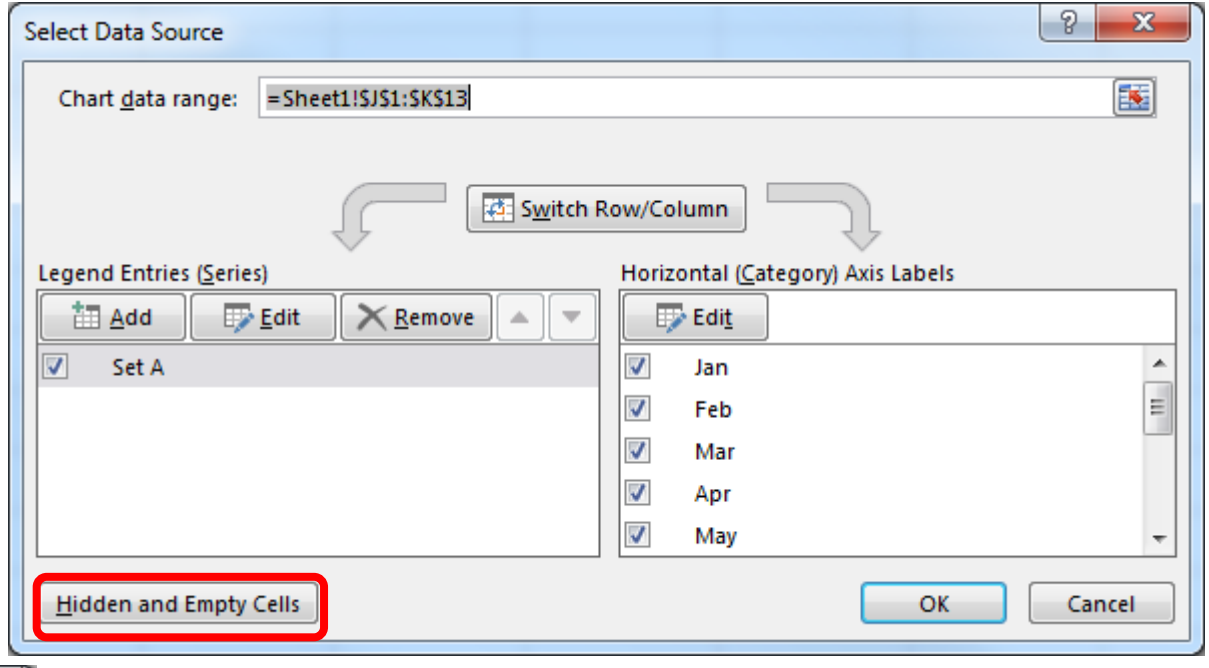
# Practical Session 1

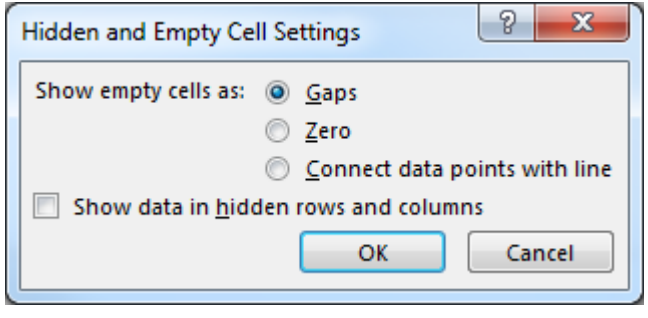
| Learning Objective | Workbook | Worksheet |
|---|---|---|
| One | **Chart Exercises (Student).xlsx** | **Sets** |
| Two | **Chart Exercises (Student).xlsx** | **West Country** |
| Three | **Chart Exercises (Student).xlsx** | **School Enrolment** |

# Line charts

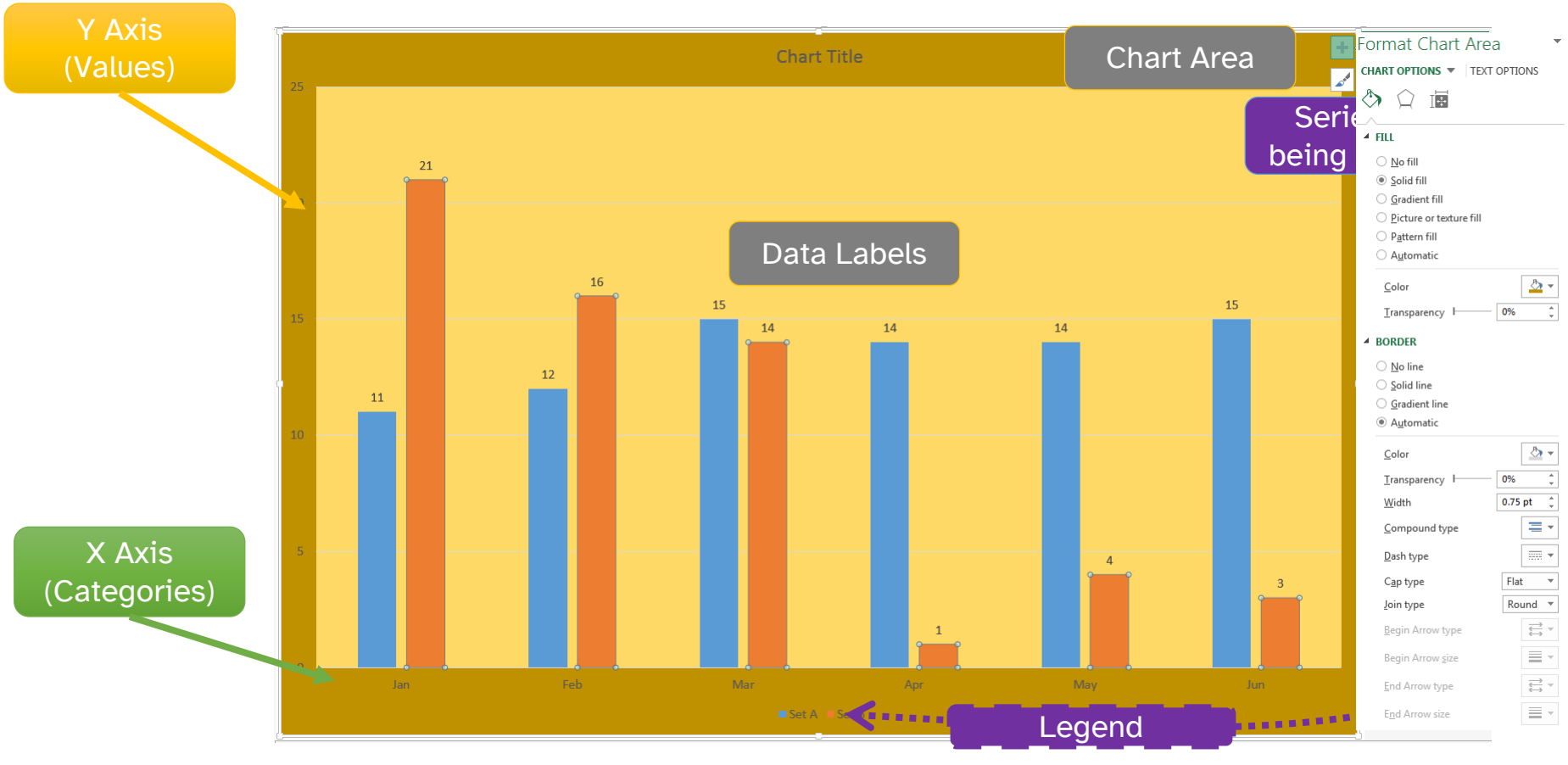

Set A
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Good for showing trends
Good for visualising forecasts
The more data the better
Otherwise misleading trends could be shown from little data
Use instead of crowded column chart

# Missing Data



# Which chart items can be formatted?



# Charts for Research Papers

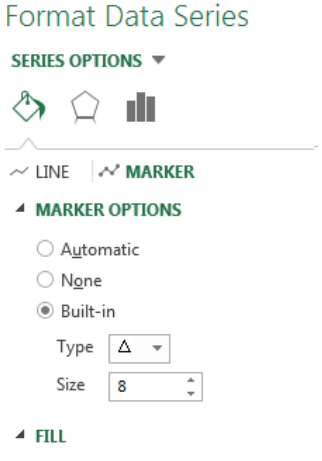
Everything in black and white

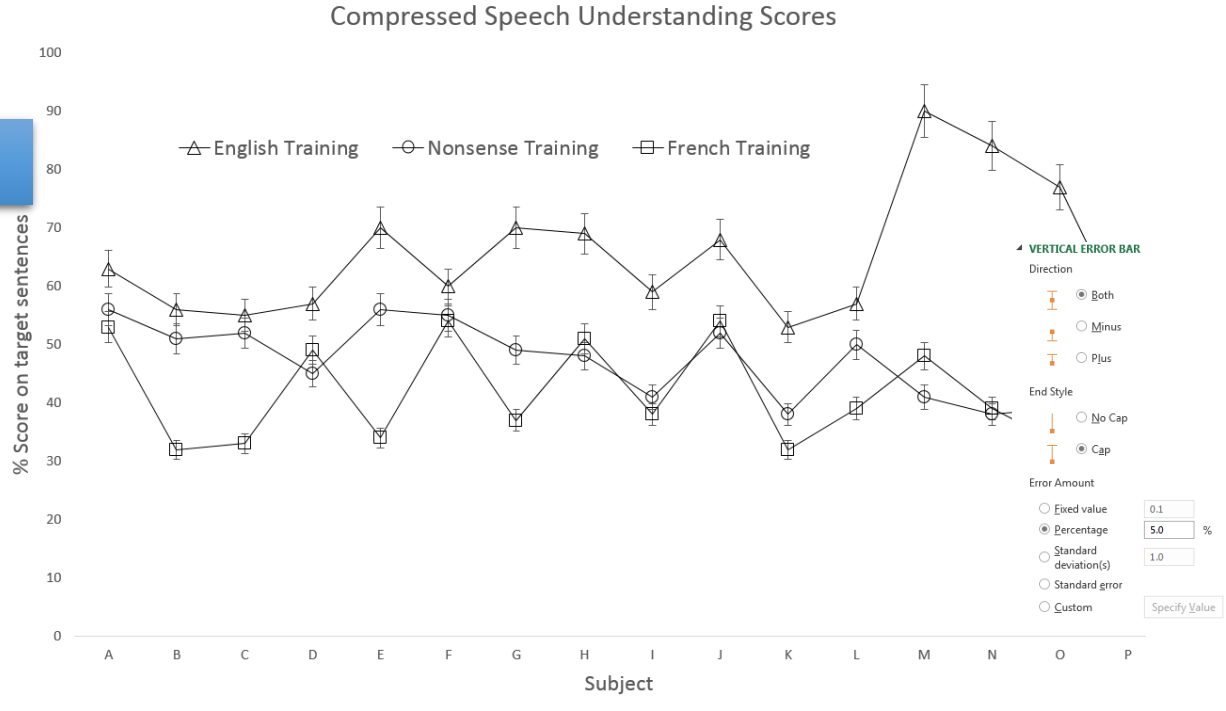
No border or gridlines

Line size = 0.75 pts

Marker size to 8 pts, no fill

Looks better when printed




http://data-mining.philippe-fournier-viger.com/how-make-charts-for-presenting-results-in-research-papers/

# Practical Session 2

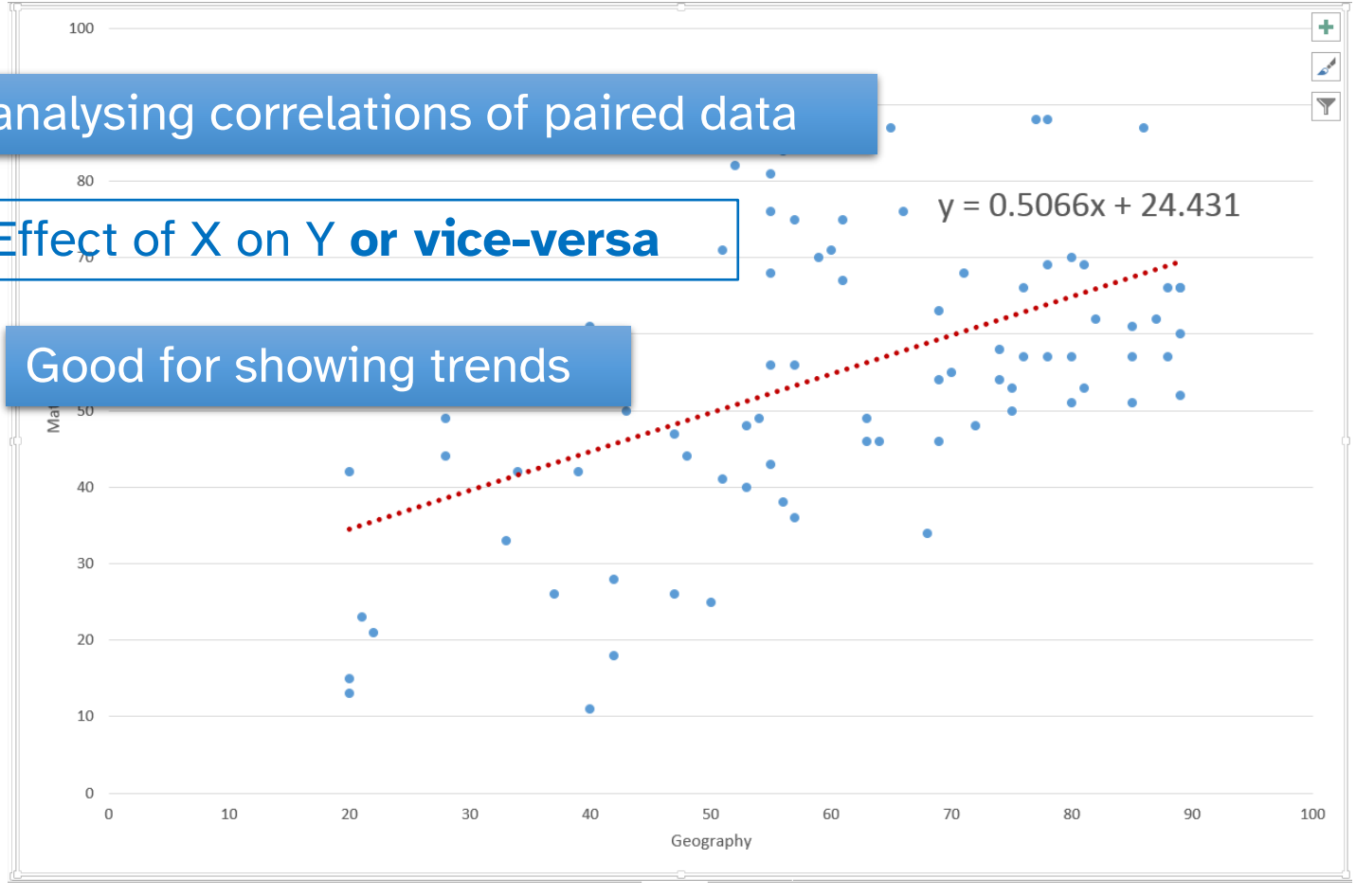
| Learning Objective | Workbook | Worksheet |
|---|---|---|
| Four | **Chart Exercises (Student).xlsx** | **North Britain** |
| Five | **Chart Exercises (Student).xlsx** | **(Previously created chart)** |

# Scatter / X-Y Charts

Good for analysing correlations of paired data

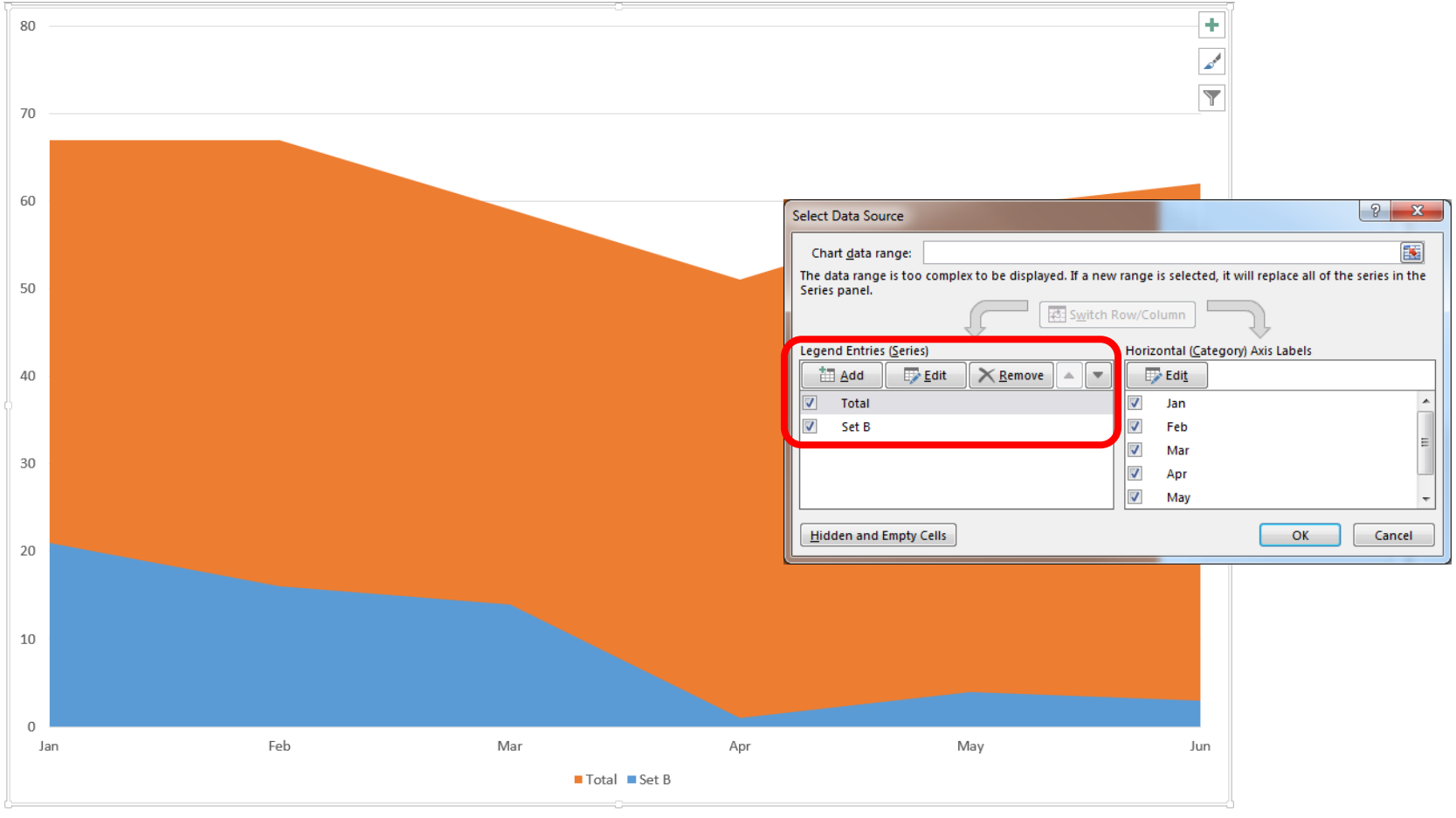
Effect of X on Y **or vice-versa**

Good for showing trends



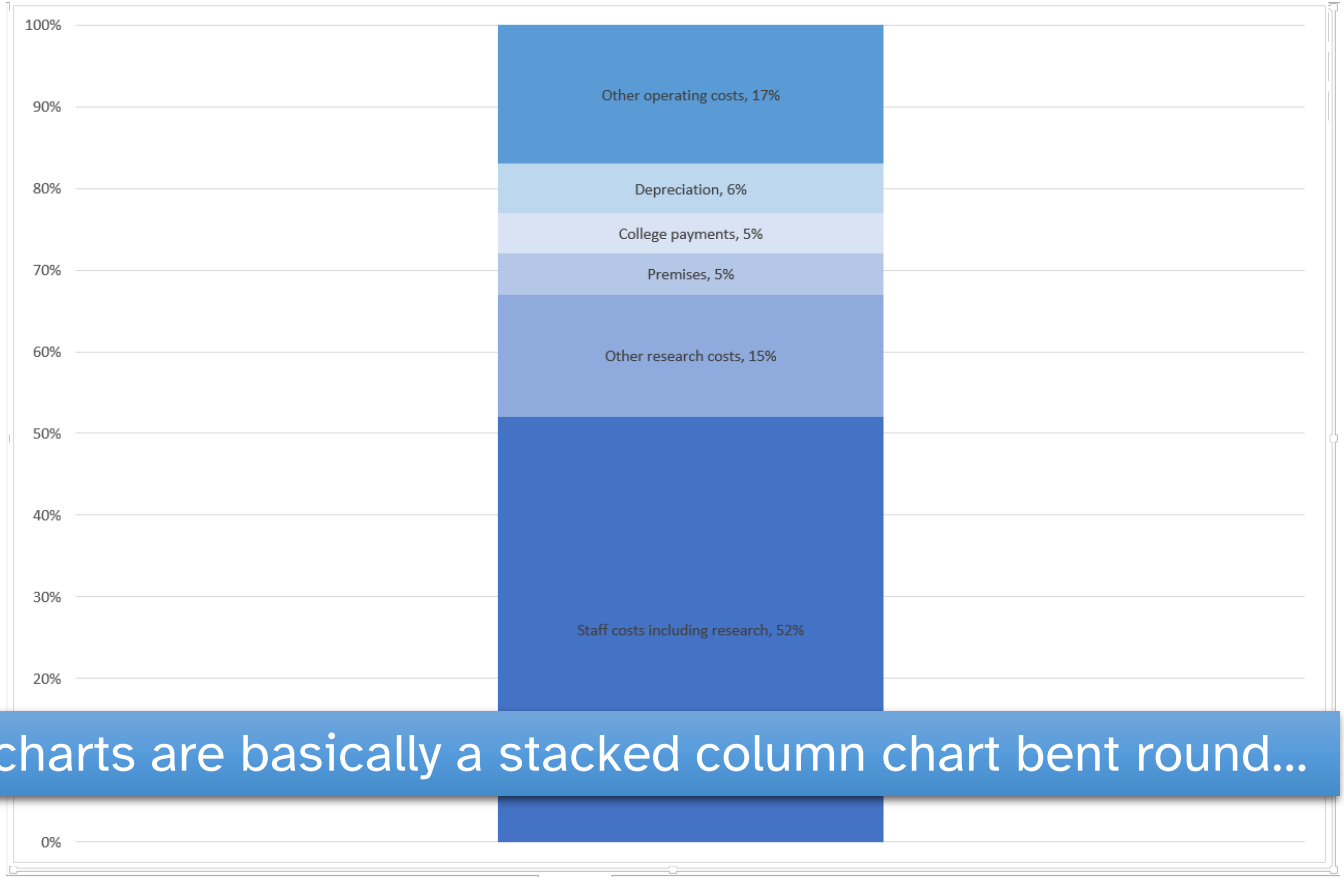
# Area Charts

Line charts emphasising proportion of contribution



# Stacked charts

Emphasis on proportion of contribution ***to a total***

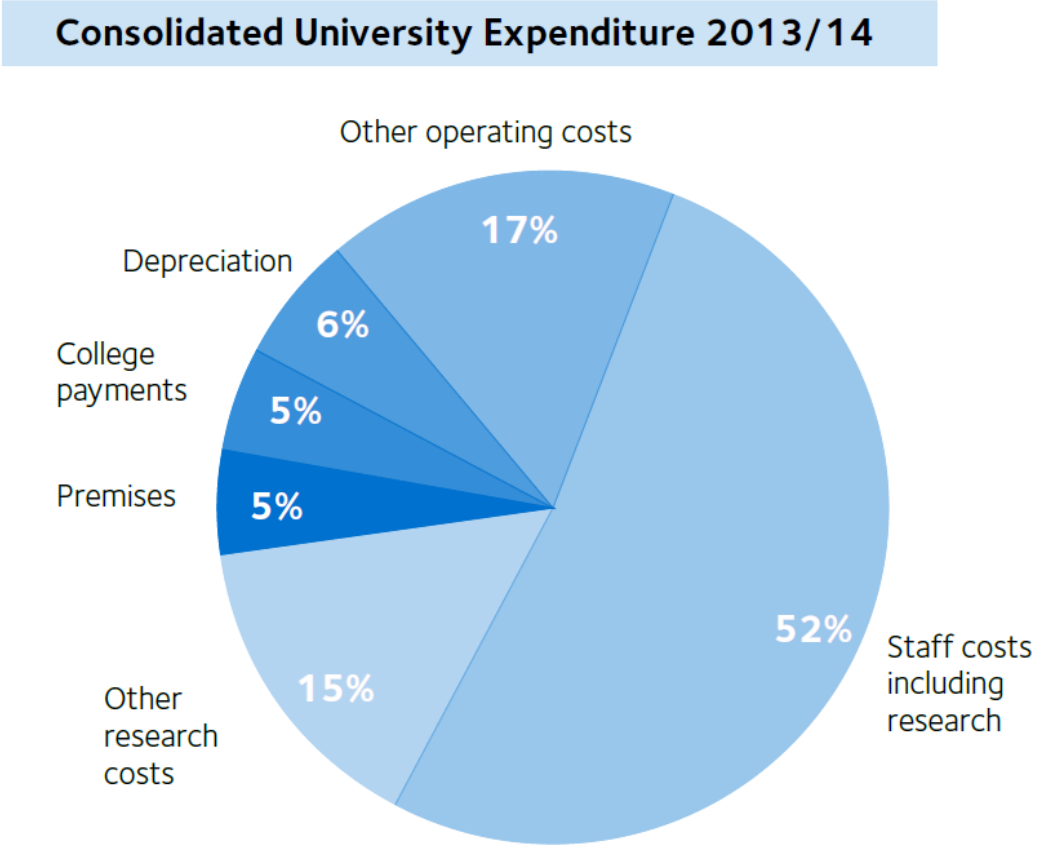



Pie charts are basically a stacked column chart bent round...

# Pie charts

Good for showing proportional data

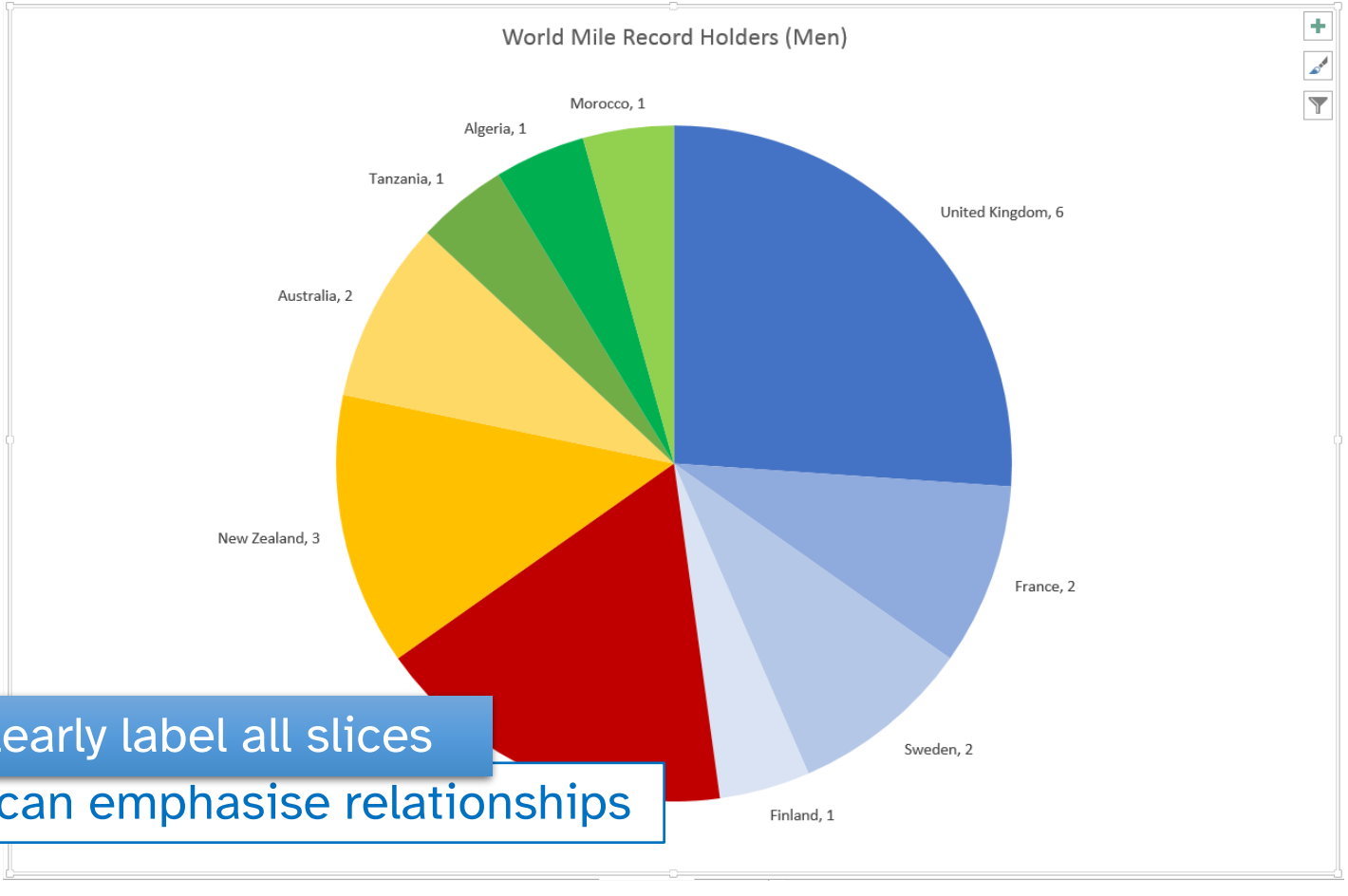
Very much about parts of a whole



# Pie charts

Overcrowded charts dilute the message

Default colour schemes don't help



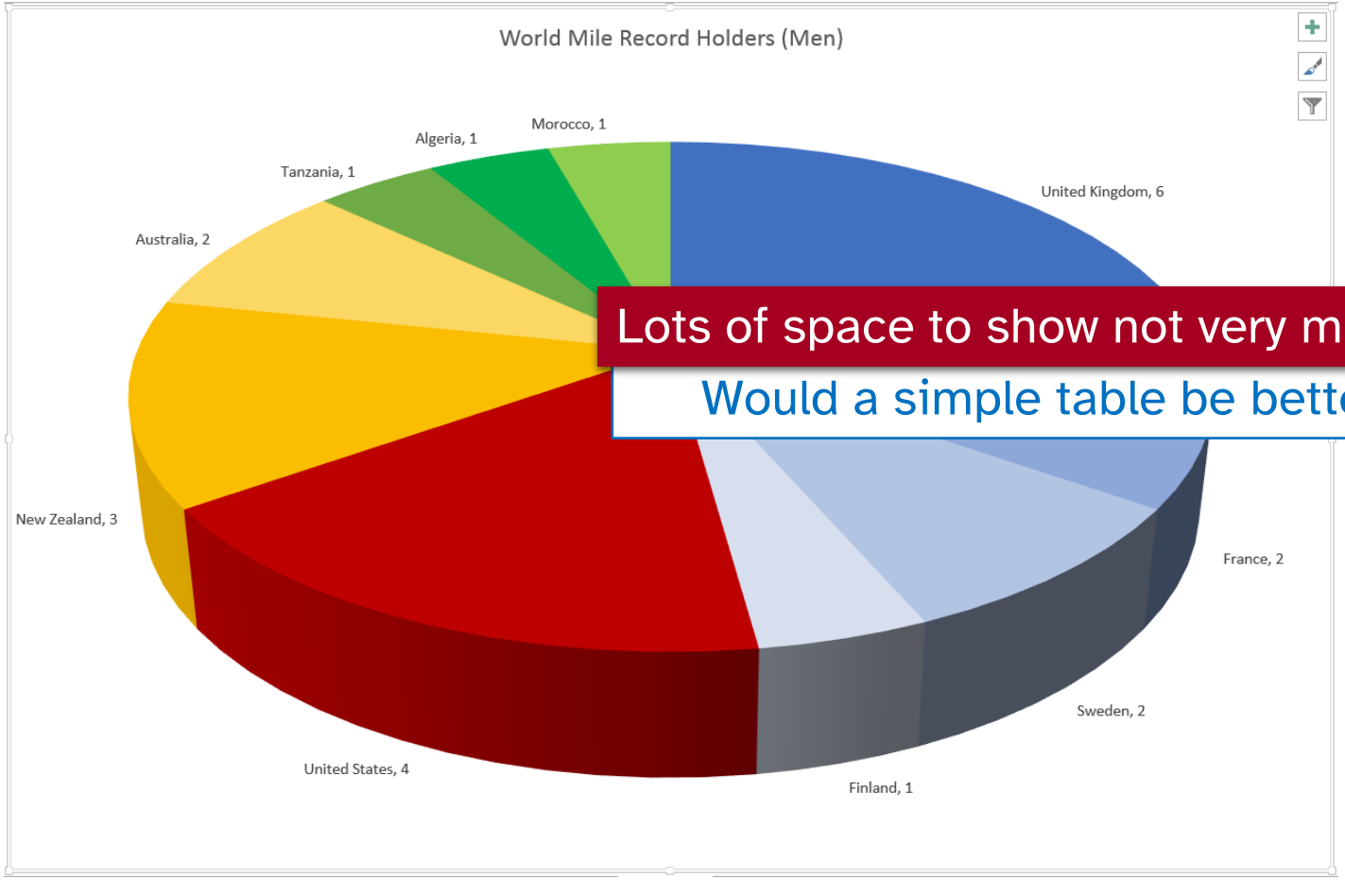

Arrange and clearly label all slices

Colours can emphasise relationships

# 3-D Pie charts

People are poor at measuring the angles

Parallax effect distorts proportions



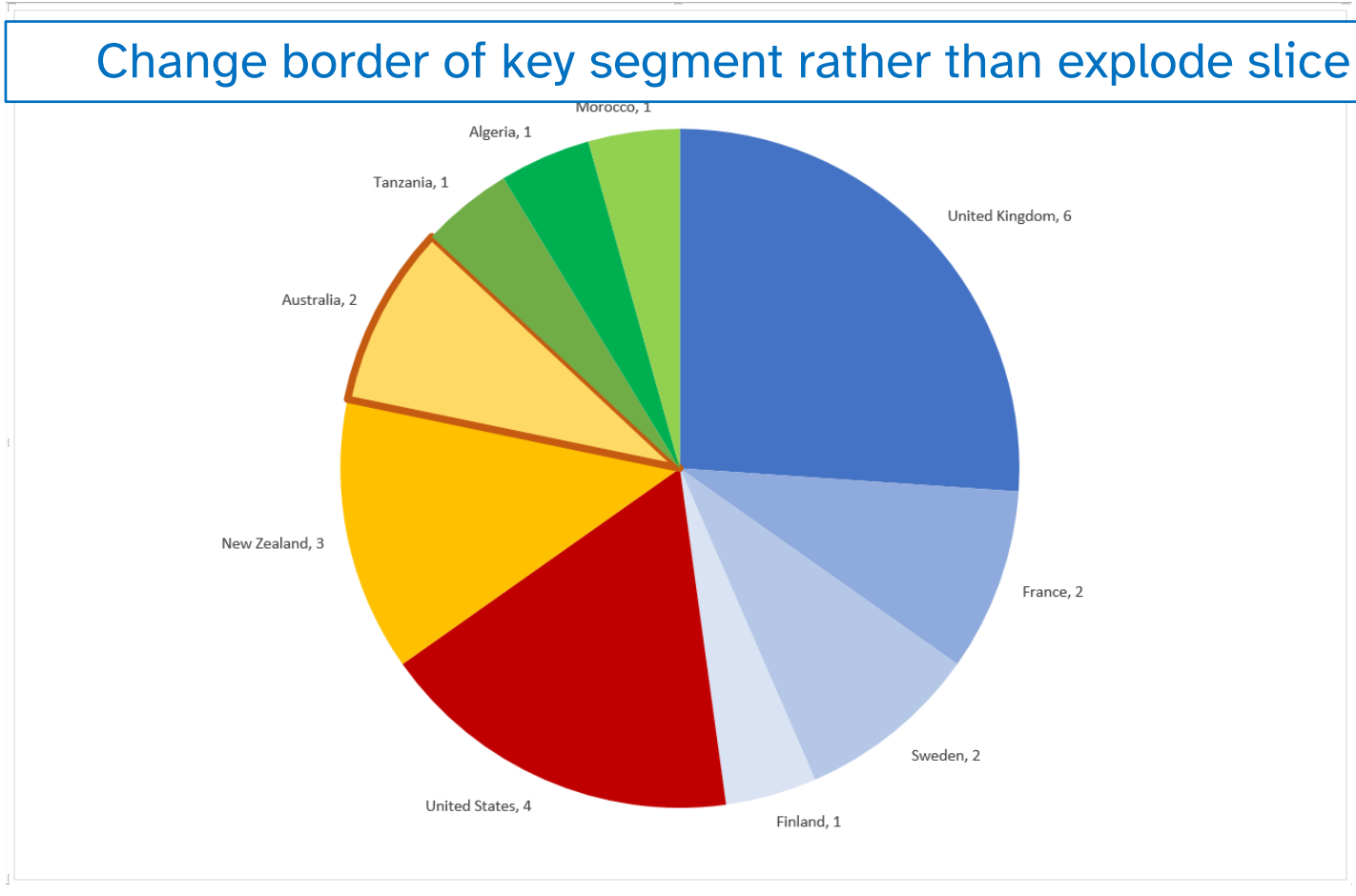

Lots of space to show not very much

Would a simple table be better?

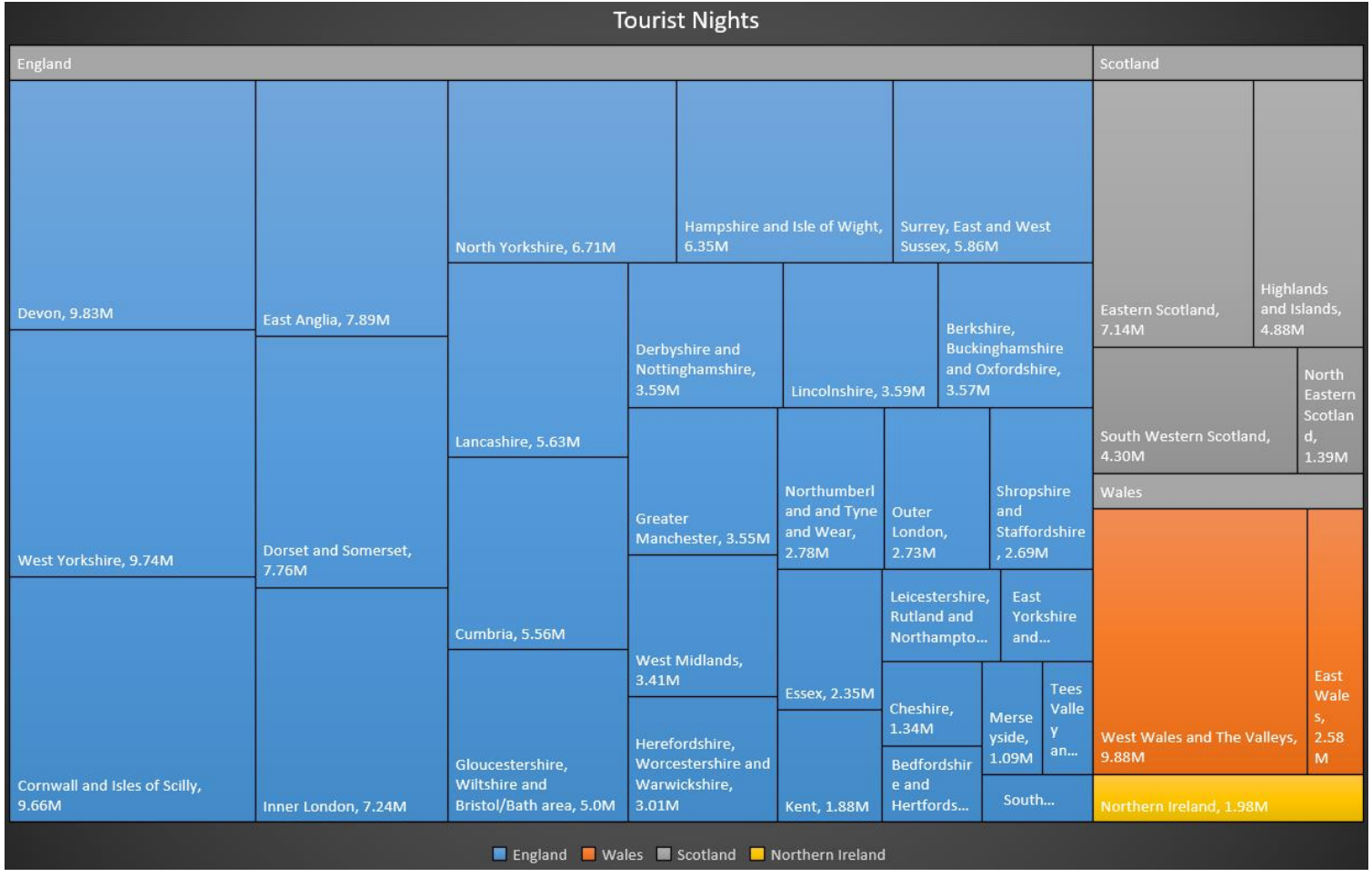
# “Exploded” Pie Charts

Viewers rely on angles at the centre

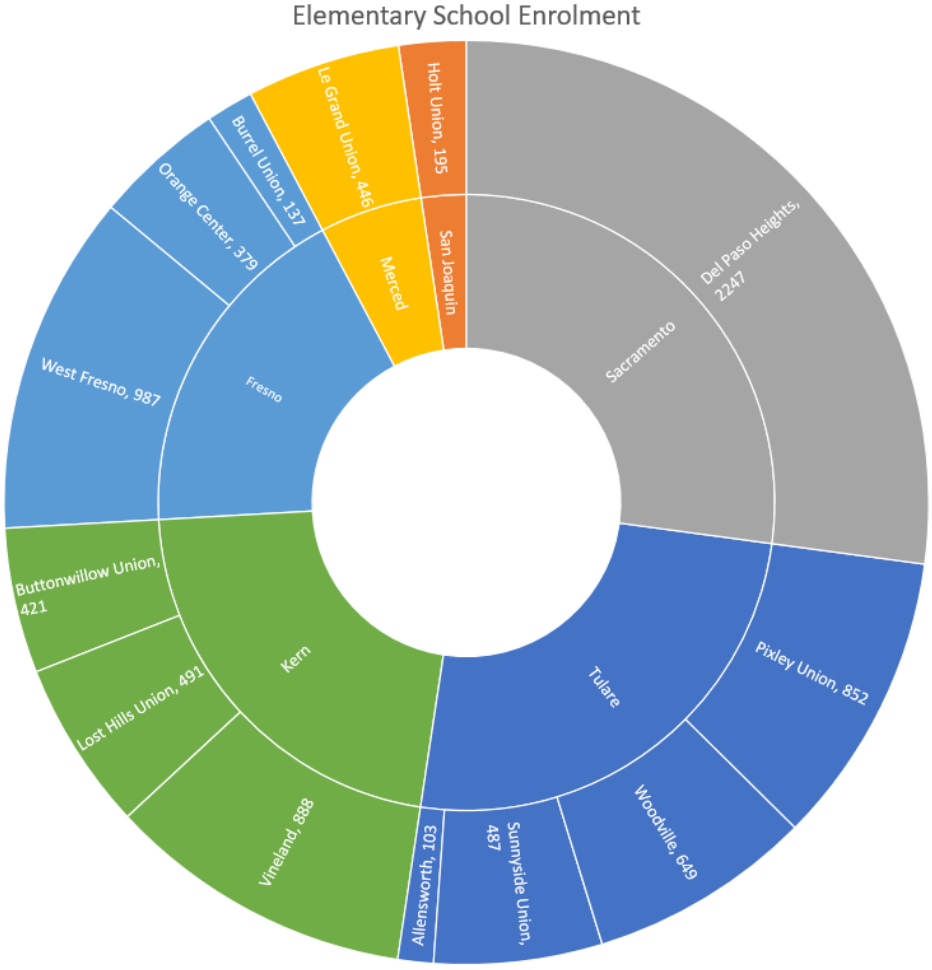
Change border of key segment rather than explode slice



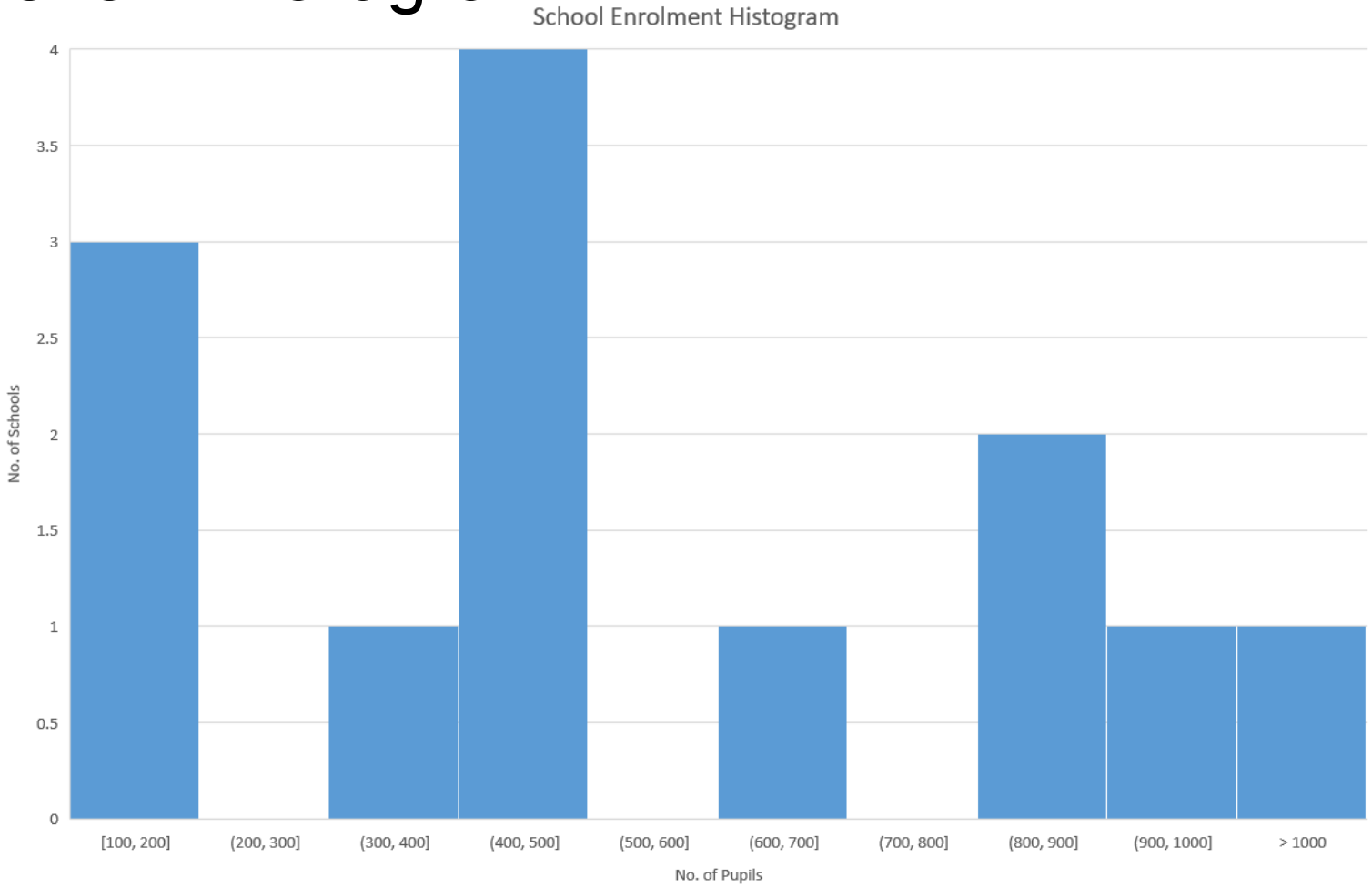
# Excel 2016 - Treemap



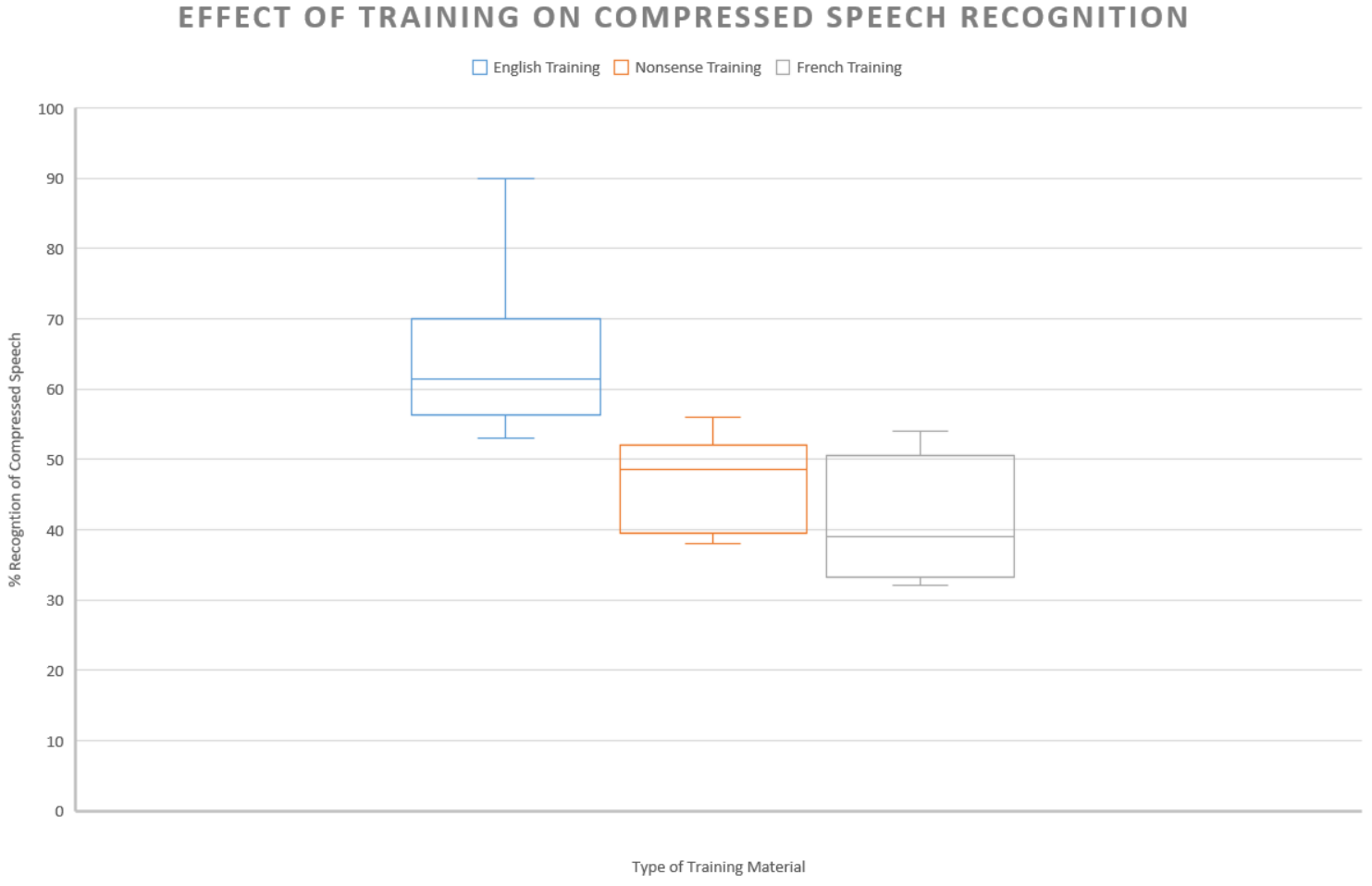
# Excel 2016 - Sunburst



# Excel 2016 - Histogram



# Excel 2016 – Box & Whisker



# Data Table with Chart

Works well with smaller tables

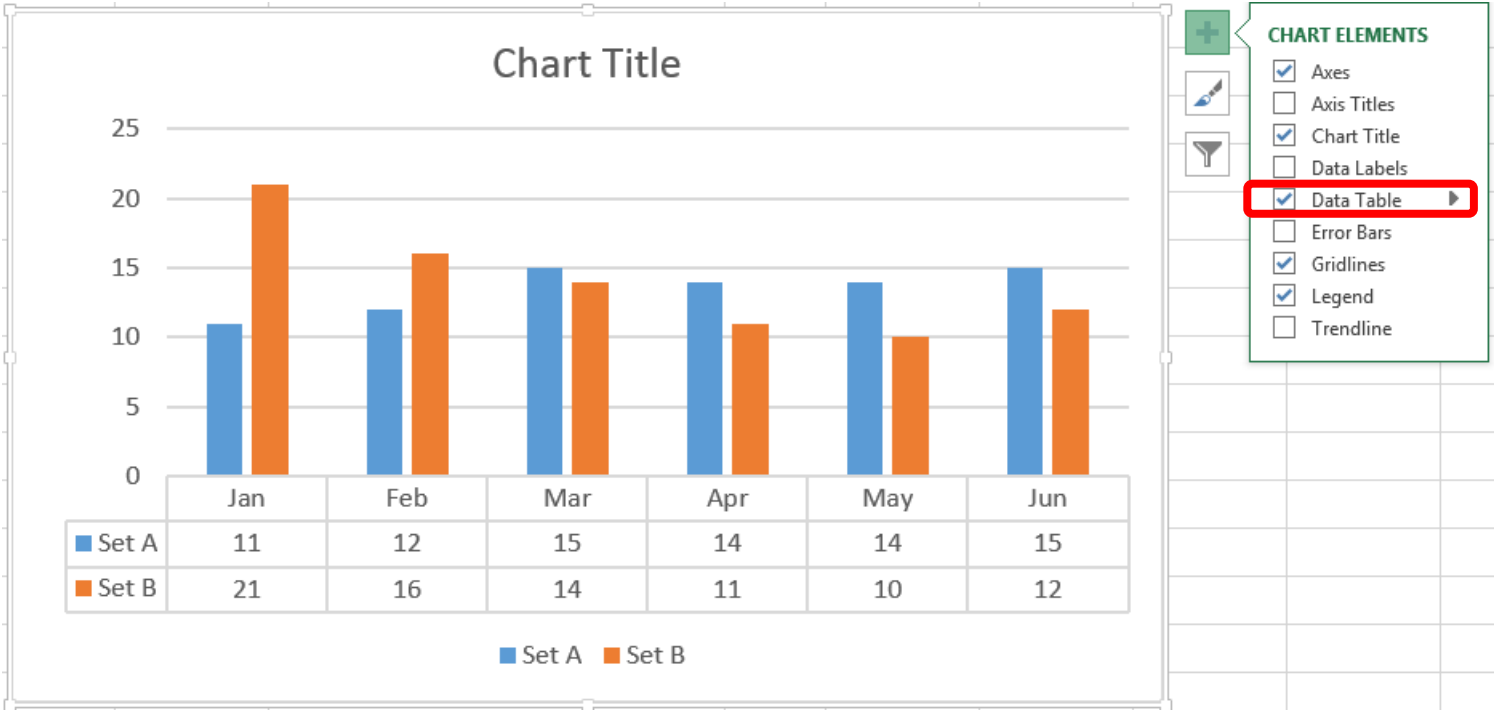
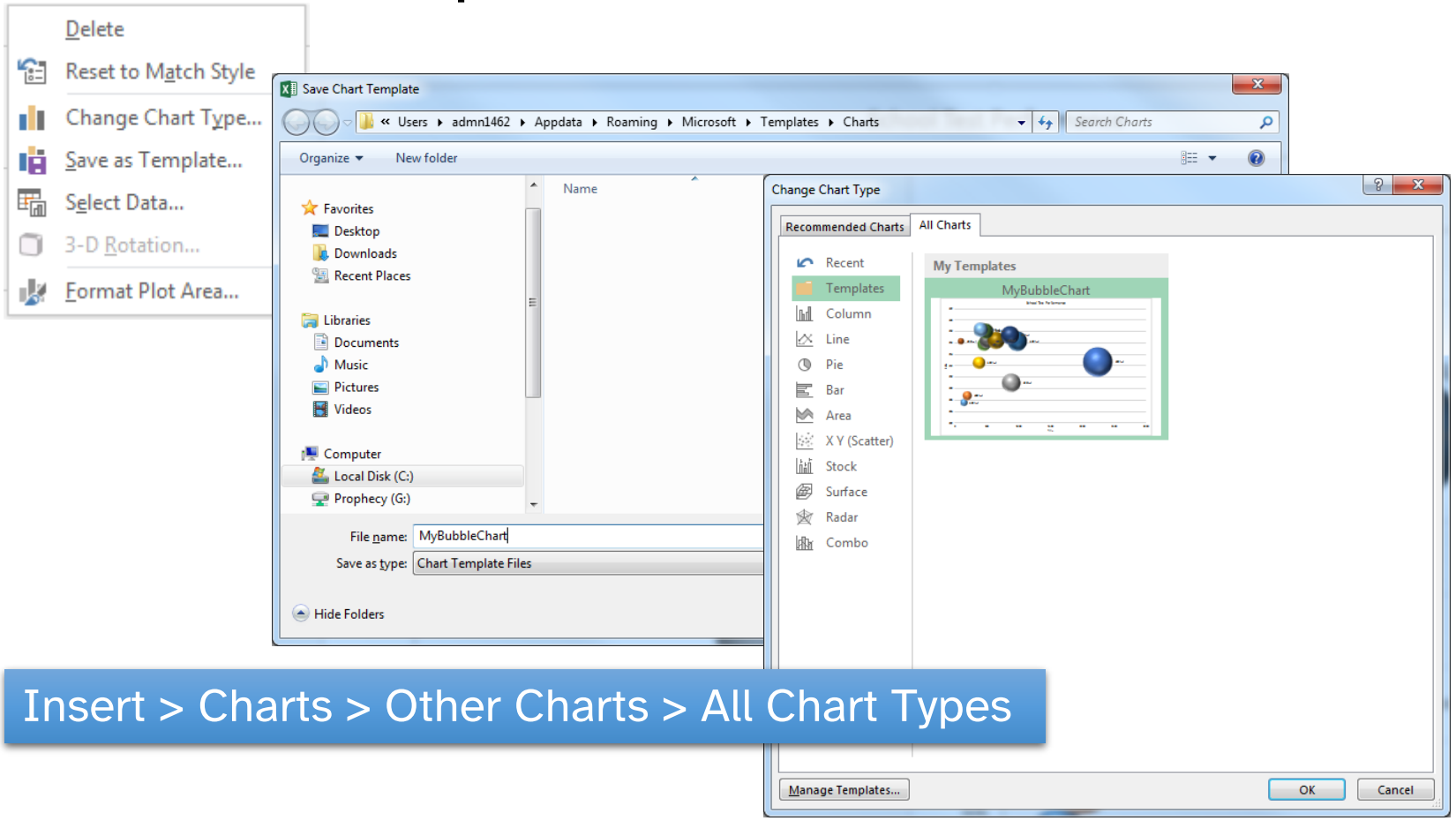


Chart Tools > Design > Type > Save As Template

# Chart Templates




Insert > Charts > Other Charts > All Chart Types

# Practical Session 3

| Learning Objective | Workbook | Worksheet |
|---|---|---|
| Six | **Chart Exercises (Student).xlsx** | **Test Scores** |
| Seven | **Chart Exercises (Student).xlsx** | **1500 WR** |
| Eight | **Chart Exercises (Student).xlsx** | **Speech** |
| Nine | **Chart Exercises (Student).xlsx** | **Speech (chart created in Learning Objective Eight)** |

# Resources for your learning

## Activities for you to practice today

- In the coursebook
- Work at your own pace!
- Be selective


## Videos with today's topics in

LinkedIn Learning

## Follow-up work

- Continue with exercises after the session
- Bookable Course Clinics later