Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Data!

Analysis, Interpretation, and Reporting

Trawsnewid Addysg; Trawsnewid Bywydau
Transforming Education; Transforming Lives

www.uwtsd.ac.uk

What are ‘data’?

- How to talk about your data:
  - Primary vs. Secondary
  - Quantitative vs. Qualitative
  - Population vs. Sample
  - Haphazard vs. Random vs. Selected

Why do we need to analyse data?

What type of data is it…?

- Scale
  - Scale data is normal, numerical data that has a theoretically infinite range and a standard scale system (e.g. height, weight, distance)
- Ordinal
  - Ordinal data is numerical in nature, but is not infinite and/or doesn't use a standard scale system. It is often produced by Likert Scale questions.
- Nominal
  - Nominal data is non-numerical in nature, even though we often code it to a numerical system (e.g. male/female, county of residence)

Quantitative Data

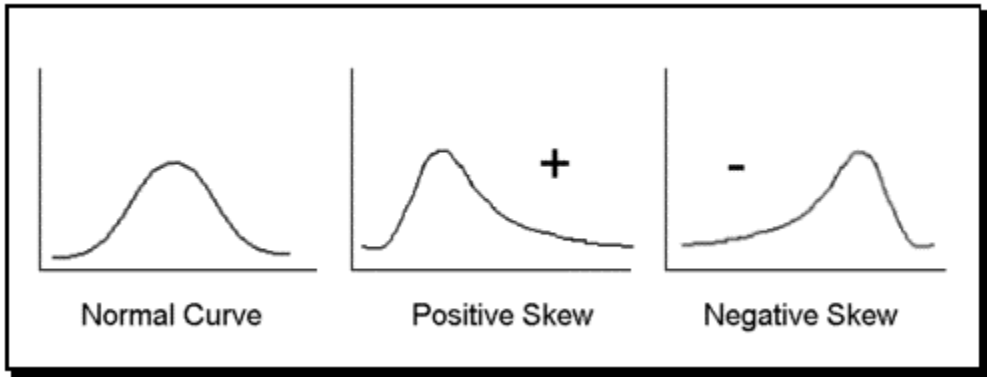
Descriptive Statistics: What do my data look like?

- Clean data is analysable data
- Counting and percentages
- Mean, median, and mode
- Representing quantitative data
  - Charts (graphic representation of data)
    - Pie
    - Bar
  - Graphs (diagram of a mathematical function, can also be called charts)
    - Scatter
    - Line
  - Tables
    - Frequency
    - Results
  - Diagrams
    - Maps
    - ….?

Quantitative Data

Inferential Statistics: What can I do with data?

- Using standard deviation and bell curves
  - Does my data follow a normal distribution?
    - What does that mean?
  - What does it mean for my analysis?
    - Parametric?
    - Non-parametric?



Quantitative Data
What can I do with them?

- Understanding difference using hypothesis-testing and “p”
  - “Null hypothesis” vs. “Alternate hypothesis”
  - “p” - the probability that our null hypothesis is correct
    - What does “p” really mean?
    - Significance and confidence levels: 0.05 (5%), 0.01 (1%), 0.001 (0.1%)
      - How do we decide?

Quantitative Data
What can I do with them?

- Analysing parametric data for difference
  - F-Tests – the difference between variances
  - T-tests – the difference between means
    - Paired/Dependent – two means for the same group
      - Very useful for before/after situations (e.g. reaction time before and after a shot of whiskey)
    - Independent – means from two different groups
      - Very useful for comparing groups (e.g. weight of Year 5 students in Carmarthenshire vs. weight of Year 5 students in Pembrokeshire)
    - We are “p” percent sure that the null hypothesis (“there is no difference”) is correct. *What does this tell us?*
  - ANOVA tests – the difference between means of more than two groups
    - One-way – more than two groups, only one variable
      - Still useful for comparisons, but where many groups are present(e.g. weight of Year 5 students in every county in Wales)
    - Two-way – more than two groups, two variables
      - Useful for more complex comparisons (e.g. weight and height of Year 5 students in every county in Wales)
    - We are “p” percent sure that the null hypothesis (“there is no difference”) is correct. *What does this tell us?*
  - Chi squared tests – the difference between observed and expected numbers
      - Useful for comparisons and non-parametric data (e.g. the actual eye colours of a group vs. the expected eye colours of a group)
    - Our actual values are “p” percent similar to our expected values. *What does this tell us?*

Quantitative Data
What can I do with them?

- Analysing parametric data for relationships
  - Pearson correlation analysis
    - Does a relationship exist?
      - Is there a relationship between the height and weight of Year 5 students in Wales?
        - » *What does this tell us?*
  - Regression analysis
    - To what extent can factor “y” be explained by factor “x”?
      - To what extent can the height of Year 5 students in Wales explain their weight?
        - » *What does this tell us?*

Quantitative Data
What can I do with them?

- Analysing non-parametric data
  - For difference:
    - Mann-Whitney Test (equivalent of an Independent T-Test, comparing means from two different, independent groups)
    - Wilcoxon Test (equivalent of a Paired/Dependent T-Test, comparing means from the same group in two different trials)
    - Kruskal-Wallis Test (equivalent of ANOVA Test, comparing the means from more than two groups)
    - Chi-Squared Test (can be used for both parametric AND non-parametric data)
  - For relationships:
    - Spearman Correlation (equivalent of a Pearson Correlation, indicating a relationship between two groups)

Qualitative Data

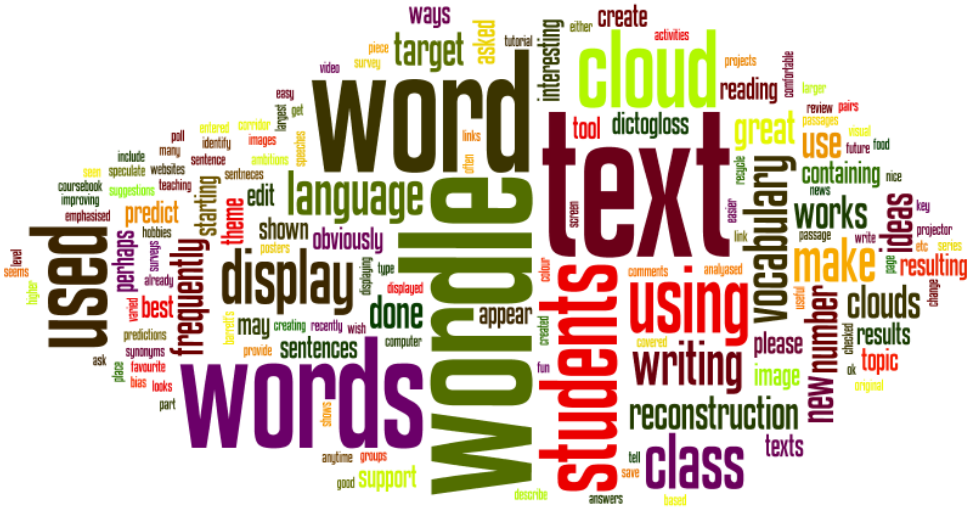
What do my data look like, and what can I do with them?

- Descriptive
  - Coding
  - Themes
  - Characteristics
- Inferential
  - Interpretation
    - Deductive
    - Inductive
  - Points of focus
    - Content
    - Attitude
    - Actual vs. hypothetical
    - Individual vs. shared

How do we represent qualitative data?

- Wordle/Tagxedo
- Highlighted quotations
- Images
- Maps
- Diagrams

Wordle/Tagxedo



Very useful for illustrating words extracted from interviews, content analysis, or observation

Highlighted Quotations

PERSON OF INTEREST

Cereal Entrepreneur

David Bahre combines traits of a serial entrepreneur and wheat nerd to open Wichita's first legal distillery since Prohibition

BY MELINDA SCHNYDER
PHOTOGRAPHY BY JAMES BANNY

David Bahre picked up a bottle of his Wheat State Distilling Wheat Vodka and pointed to the handwritten numbers next to his signature on the label.

"You take the batch and the bottle number and you type it into my website," he explained. "You can trace all the way back to the Kansas farms where we bought the grains. This system will also tell you who distilled it, what day, what proof it was distilled to, what kind of barrel it went into, the toast and char on the barrel, how long it was in the barrel, what the mash recipe was, all the way down to the kind of yeast strain we used to ferment the batch. We're calling that field to bottle."

There are thousands of bottles of spirits on liquor store shelves but only one brand that is produced in Wichita. Bahre and his wife, Kim, cranked up the still in November 2015 in the first legal distillery in Wichita since Prohibition. They started selling their first product – wheat vodka – on Jan. 7 and in the first three months had sold about 2,500 bottles.

"You've probably heard the term localvore. People really want locally sourced products. It's all over agriculture, whether it's honey or liquor," Bahre said.

The Bahres are betting that the localvore movement will help change the statistics showing Kansans are among the lowest consumers of spirits in the United States and some of the tightest spenders on alcohol.

"The average person who comes through here doesn't know the difference between vodka and rum, or a single-malt scotch versus a Kentucky straight bourbon," Bahre said. "They know there's a taste difference but they have no idea how they are made or why they are different. So part of my mission with field to bottle is to educate the consumer about artisan spirits."

Part of that education is opening up the distillery to the public, offering free tours and tastings on Saturday afternoons.

"People really want locally sourced products. It's all over agriculture, whether it's honey or liquor."

- DAVID BAHRE

The front of the 3,200-square-foot space Bahre leases at 37th and Hydraulic in north Wichita is a small retail space where the public can buy Wheat State's products – including colorful wax-dipped bottles – 99-your-own-whiskey home barrel kits and other merchandise. The tour takes visitors into a warehouse area housing custom equipment built in Germany: a copper pot still, two 18-foot column stills and a 825-gallon mash tun. Bahre shares the history of alcohol and its influence on the politics and culture of the U.S. (George Washington was a distiller). He discusses the steps involved in making premium spirits while visitors can see and smell the process.

That process starts with choosing the best grain, something Bahre knows a little about. A Wichita-native, he earned a bachelor's

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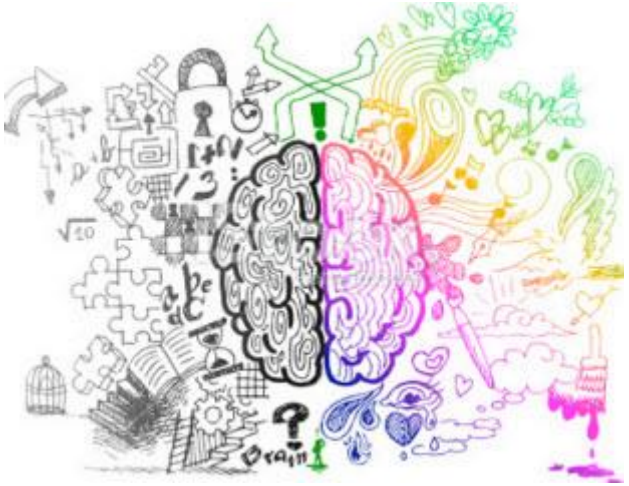
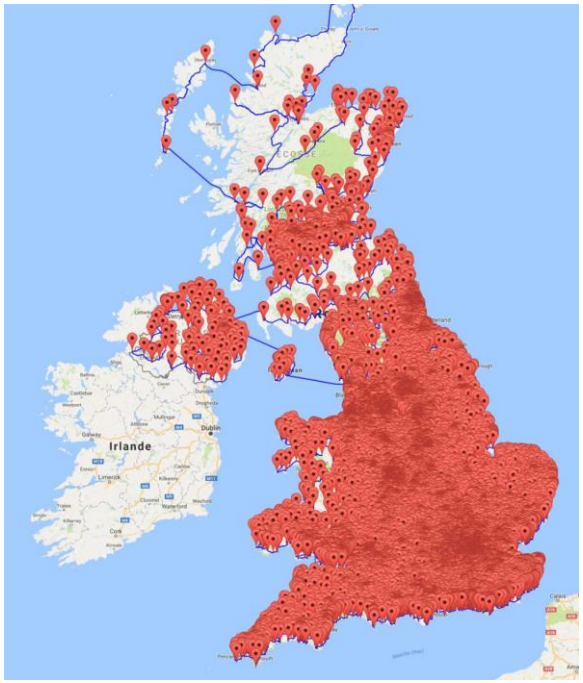
This is a great tool for drawing a reader's attention to items that are particularly relevant or meaningful, or that capture the overall tone of what you are trying to convey

Images

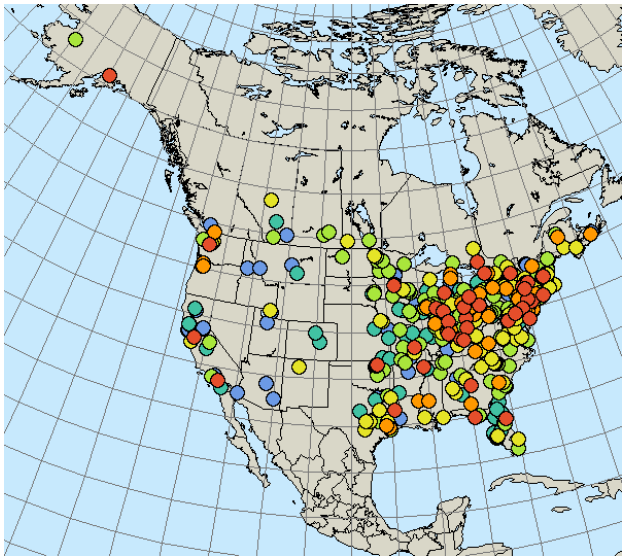


These will often come from your participants, and may be a more visceral way for their thoughts, perceptions, or feelings to be represented

Map



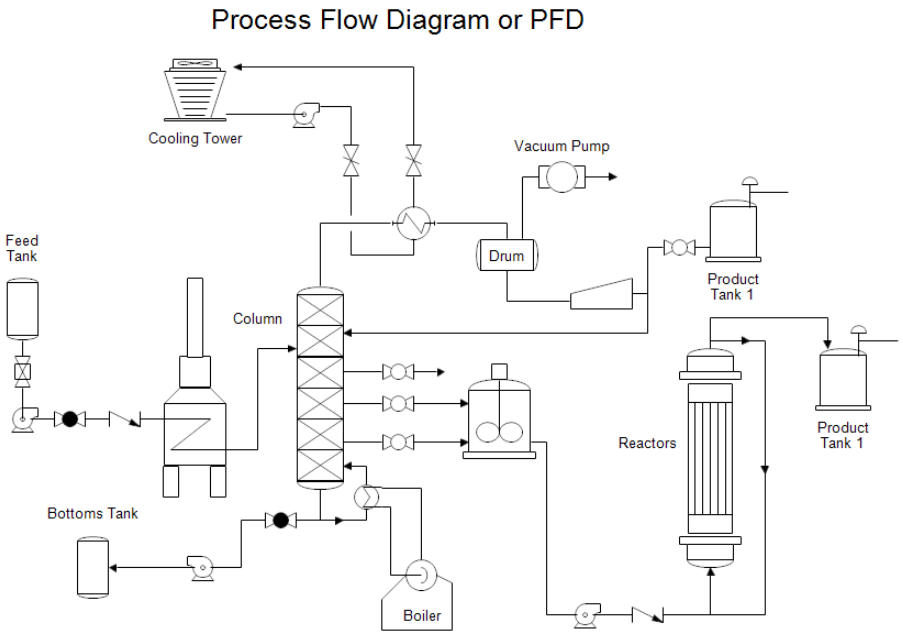
Pubs in UK



Bald Eagle Sightings

Maps are a great tool for helping readers to visualise distance, density, etc. and can partner well with written text and/or charts and tables

Diagram



Sometimes we have to explain processes that are complex and/or complicated in writing, but that can be much more easily understood with an image

Data Analysis

A note on programmes

- Excel
  - Purely for quantitative analysis
  - Lower functionality, higher availability
- SPSS
  - Purely for quantitative analysis
  - Higher functionality, lower availability
  - Available on all UWTSD PCs, training sessions available periodically throughout the year
- Nvivo
  - Almost exclusively for qualitative analysis, with some basic quantitative functionality
  - Available on all UWTSD PCs, training sessions available periodically throughout the year

How do we interpret data?

- What types of information can we take away from our data analysis?
- What types of information can we NOT take away from our data analysis?
- Remember: “are the data saying this, or am I?”

How do we draw conclusions from data?

- In order to draw effective conclusions from data, we must be:
  - Practical
  - Realistic
  - Honest
- Focus on the context in which your data have been gathered – remember that just like research design, research results always come from within a specific context

How do we connect data to theory?

- There's a reason we tend to do a review of literature and research context before we begin a project
  - Most research is too small to be independently meaningful (and your project DEFINITELY will be) but almost all research links in a meaningful and relevant way to a wider body of research, knowledge, and theory
  - Connect results to theory, combined with independent critical thinking, to reach conclusions

Data Analysis – Assessment Component 2

- Don't forget to make it very clear both **why** and **how** you've done your analysis
  - Feel free to explain how using different sheets in an Excel workbook, a footnote system, etc.
  - You should be explaining why (and giving some overview of how) in your write up
- Remember that I'm looking for you to think broadly
  - i.e. talk about ANY method that might have generated this data set, select the one you think most likely, and explain why
- Don't forget ethics and insider research – these are crucial components to explaining the data
  - Think about what considerations are relevant to the data, and how the collection process should be ethically conducted. Don't forget to pay particular attention to considerations of gathering information like this from a workplace!
- I'm not going to tell you what to search for
  - Think about the data you've been given, and start asking questions of it
  - Use your analysis tools and techniques to look for patterns, answer questions, identify relationships, etc.
    - Remember that failing to identify relationships doesn't necessarily mean bad data OR bad analysis. Sometimes showing a lack of connection is just as interesting as showing connection.
  - Remember to ask questions in a variety of ways – your analysis should include a mix of analyses discussed in class (t-tests, correlations, percentages, counts, etc.) and a mix of representation methods discussed in class (pie charts, scatter graphs, etc.)