

# EGM101 – Skills Toolbox

Week 5, Part 1: Introduction to Quantitative Skills

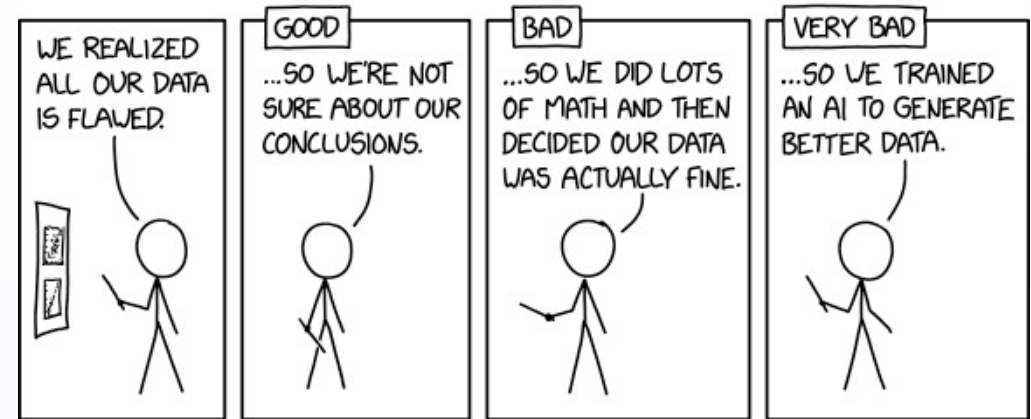
1. Introduction to quantitative skills
2. Presenting data
3. Collecting data
4. Frequency
5. Descriptive statistics
6. Data distributions

# Aims of Quantitative Skills Section

- Introduce you to basic **statistical** methods for data analysis
- Introduce you to Research Data management
- Introduce you to selected software for data manipulation, analysis, and presentation

# Why Statistics?

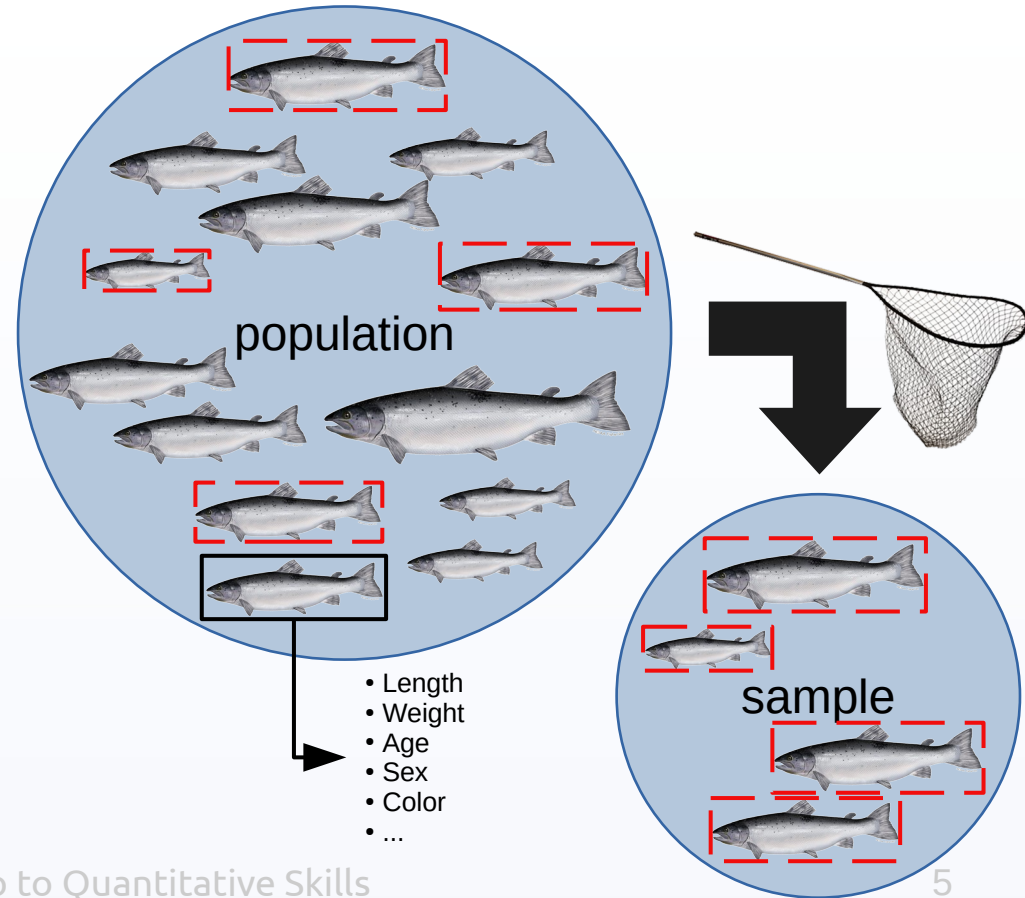
- Numerical data are *everywhere* (and it keeps coming)
- The “real world” is noisy/messy:
  - natural variation
  - uncertainty/error
  - deception (intentional/otherwise)
- Statistics (quantitative skills) helps cut through the noise



[xkcd.com/2494](https://xkcd.com/2494)

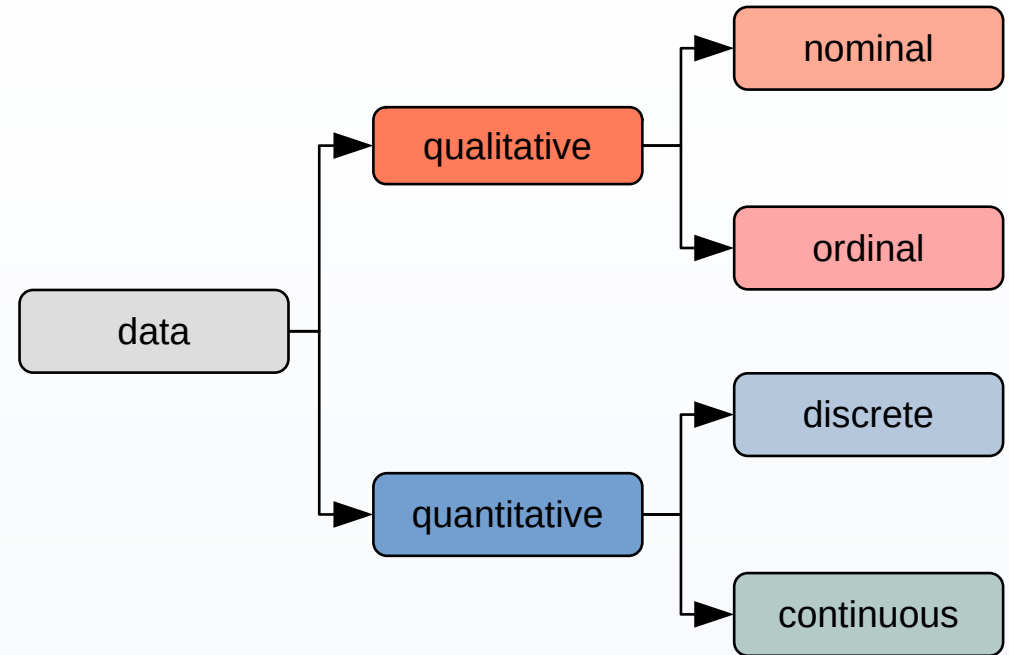
# Some Definitions

- **Statistics**: the science of collecting, analyzing, and presenting data
  - **Descriptive** statistics: organizing and summarizing data
  - **Inferential** statistics: drawing conclusions from “good” data
- **Population**: the entire set/group of what we’re studying
  - **Variable**: some characteristic that will have different values for each member of the population
- **Sample**: a portion of the population
- **Parameter**: a (numeric) characteristic/property of the population
- **Statistic**: a number that represents a property of the sample



# Types of Variables (Data)

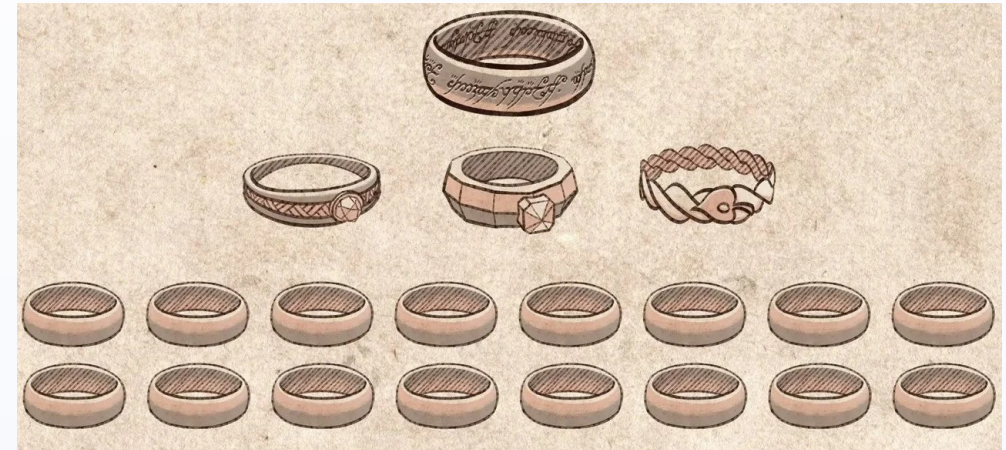
- Two broad categories
- **Qualitative** (categorical)
  - Categories
  - Describing attributes
- **Quantitative** (numerical)
  - Always numbers



- Nominal: unordered categories
  - Eye color
  - Blood type
  - Pet type
- Ordinal: ordered categories
  - Race/election results
  - Opinion (agree/neutral/disagree)
  - School Marks
  - Rings of Power

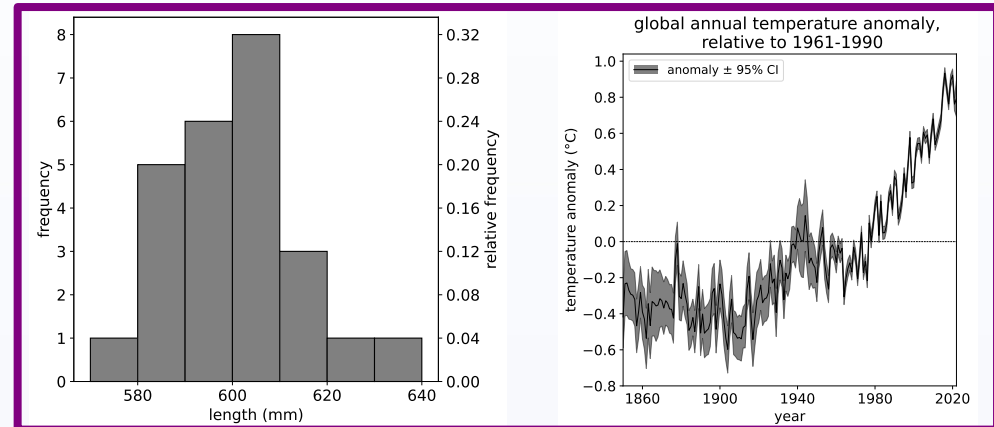
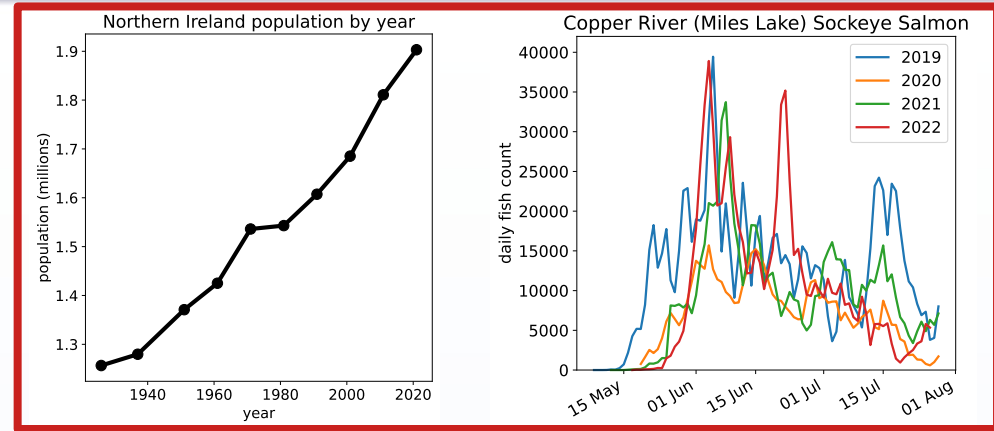


New Line Cinema



CGP Grey

- **Discrete:** only certain values
  - Population
  - Fish Counts
  - Basically, anything to do with counting
- **Continuous:** any real-valued numbers
  - e.g., -1, 42.0,  $\pi$
  - Fish Length
  - Temperature





- Problems:
  - The real world is messy
  - Can't possibly measure *everything*
- Statistics and data can help us make sense of this
- Can divide data into different categories
  - Here, primarily concerned with *quantitative* data (numbers)



- Illowsky and Dean, Chapter 1.1 – 1.2
- Caswell, Chapter 4.1
- Weiss, Chapter 1.1, 2.1
- Can Maths Predict the Future? [[The Royal Institution](#)]
- How Not to Fall for Bad Statistics [[The Royal Institution](#)]
- Why you should love statistics [[TED](#)]
- How lucky is too lucky? [[Stand-up Maths](#)]