

Week 3 Faculty Homework

1.
 - a. Clarity basically means that the visualization doesn't have any unnecessary clutter and presents the data in an easily interpretable manner. Precision is the accuracy of the data represented. Efficiency is about how to convey the maximum insights using the least possible amounts of graphical elements.
 - b. A pie chart showing survey responses for 10 different options might lack clarity. With so many slices, it becomes hard to read and compare values. Switching to a simple bar chart would make it easier to see which options are most and least popular, improving clarity and understanding.
2.
 - a. In the supposed age of "free and ubiquitous data", true value doesn't lie in the ability to access data, but rather the ability to make sense of the copious amounts of data available. Hence, visualization enables quick, easy-to-understand and intuitive representation of highly complex data.
 - b. Effective visualisations reveal patterns, anomalous data points and insights that might have remained hidden in the raw data. Thus, the data-to-insight process is highly accelerated as actionable knowledge can be clearly seen in the data representation.
3.
 - a. Exploratory visualization is used during data analysis to discover trends, correlations or outliers within the raw data. For instance, when we visualize user behaviour data on a particular website, the goal is to uncover the common patterns in user behavior.
 - b. Explanatory visualization is oftentimes used to 'explain'/communicate a specific insight to an audience. Such as when a data scientist may create a dashboard ('explanatory visualization') to showcase the impact of a specific marketing campaign on company sales in order to represent that relationship very clearly to a board of directors.
4.
 - a. According to Tamara Munzner's ranking, position and length are most effective for encoding quantitative data as they are accurately perceived by the human visual system. They are intuitive and allow for precise comparisons
 - b. Identity channels like shape, color, hue and texture distinguish categories / groups. These are more appropriate to differentiate between groups rather than compare magnitudes. For example, different shapes may be used to represent different people in a scatter plot.
5. Expressiveness ensures that the visualisations completely and truthfully represent all the data – without adding anything or leaving anything out. Effectiveness ensures that the the user can easily understand the intended message given. Both are essential

because a visually stunning chart that is misleading (low expressiveness) or confuses (low effectiveness) fails the purpose set out for it.

6. a. This is a polar area chart, which may also be called a coxcomb diagram. It shows the causes of death in the Crimean War.

b. The primary message was the more soldiers died from preventable diseases than from battle wounds.

c. The months and causes were grouped by colour and area size by the radial layout. This clearly visualised the seasonal patterns and aided in highlighting the impact of sanitary reforms.

7. a. Qualitative colour palette is for categorical data that doesn't have any inherent ordering like using different hues to show different regions in a map. Sequential Palette is used for numeric data like income. Diverging Palette is used for numerical data that diverges from the center value such as temperature anomalies below or above an average value.

b. Around 8% of men have some type of color blindness, specifically red-green. To ensure that accessibility is maintained, designers should use color blind safe palettes and add textures or labels as redundancy.

8. Three questions you should ask yourself: Who is your target audience?(knowing background may help determine the design style), What are you trying to show?(helps clarify the core message), How do you intend to show it? (choose chart types that will best communicate the intended message with clarity and accuracy)

9. a. Dynamic visualisations offer interactivity which allows users to explore data very deeply. Unlike static images, dynamic visualisations can reveal multiple perspectives, support decision making and personalise insights.

b. Tooltips, which are basically data points that give more information on hovering, enrich understanding of the data without creating unnecessary clutter. For example, on a scatter plot of various COVID-19 cases, tooltips can give greater details about each data point which enhances the data exploration without overwhelming the chart.

10. a. Creative coding uses code for artistic or expressive purposes beyond simply utility, but rather aesthetics. Particularly in data visualisation, it allows experimentation with form, interactivity, impact and storytelling.

b. A very exceptional example of creative coding which I came across in my research is Flight Patterns by Aaron Koblin(<https://www.aaronkoblin.com/project/flight-patterns/>). This visualisation mapped thousands of paths of air traffic over North America, using color and form to create a useful yet visually stunning outcome. It uses FAA data and Processing (a creative coding environment). The reason I find this example so

compelling is due to its fusion of utility and beauty. Without using any words, simply this visualisation, we can see the scale of infrastructure, the activity in our skies and the interconnectedness of cities and communities. This visualization pushes boundaries by merging data science, art, and storytelling. It really does show how creative coding can be used not just to present data, but to evoke emotion and provoke real thoughtful discussions.