Cavalier:

Scientifically accurate representation of the data. Visualization should be practical and effective compared to other forms of communication. Data should be effectively communicated and should be easy to understand. The visualization should be designed and tailored to the audience which it is presented. The Visualization should require the minimum amount of resources and optimally communicates its goals. The visualization should be positively received by the audience.

Data Visualization Quality Features:

Visualization should be accurate and faithful to the source data. Visualization should be as simple as possible. It should fit the viewers needs and no extra information. Visualization should have a focus on important facts and features and should be adequately supported. The visualization should accomplish its purpose within its context. The visualization should stick to a theme. Data is user friendly and easy to understand.

TUFTE’S PRINCIPLES

PRINCIPLES OF GRAPHICAL EXCELLENCE

• Graphical Excellence is the well-designed presentation of interesting data – a matter of substance,

of statistics, and of design.

• Graphical Excellence consists of complex ideas communicated with clarity, precision, and efficiency

• Graphical Excellence is that which gives to the viewer the greatest number of ideas in the shortest

time with the least ink in the smallest space

• Graphical Excellence is nearly always multivariate; and, graphical excellence requires telling the truth

about the data

PRINCIPLES OF UNIFORMITY OF GRAPHICS

• The representation of numbers, as physically measured on the surface of the graphic itself, should

be directly proportional to the numerical quantities represented

• Lie Factor = (size of effect shown in graphic) / (size of effect in data)

• Clear, detailed, and thorough labeling should be used to defeat graphical distortion and ambiguity.

• Write out explanations of the data on the graphic itself.

• Label important events in the data

• Show data variation, not design variation

PRINCIPLES OF DATA VARIATION AND CONTEXT PRESERVATION

• In time-series displays of money, deflated and standardized units of monetary measurement are

nearly always better than nominal units.

• Avoid using areas (two dimensional images and graphics) to display one-dimensional data

• Graphics must not quote data out of context

PRINCIPLES OF GRAPHICAL DESIGN

• Above all else show the data.

• Maximize the data-ink ratio, within reason

• Data-Ink Ratio = Share of “ink” devoted to the data

• “Erase” non-data-ink, within reason

• “Erase” redundant data-ink, within reason

• Revise and edit

• Eliminate “chart-junk”

• Mobilize every graphical element, perhaps several times over, to show the data

• Maximize data density and the size of the data matrix, within reason

• Graphics can be shrunk way down

PRINCIPLES OF GRAPHIC DESIGN AESTHETICS

• Have a properly chosen format and design

• Use words, numbers and graphic elements together in concert

• Reflect a balance, a proportion, a sense of relevant scale

• Display an accessible complexity of detail

• Have a narrative quality, a story to tell about the data

• Pay attention to technical details and production to produce professional high-integrity displays of

statistical information

• Avoid content-free decoration, including chart-junk

• Data Visualizations are paragraphs about data and should be treated as such

Cavalier, Data Visualization Quality Features, and Tufte have several principles that they all share. They all state that the visualization should be as simple as possible without any extra information. Having appropriate context is mentioned in all. They emphasize that the visualization should be an accurate representation of the data. Cavalier and Tufte mention that design of the visual should be suitable. Quality features and Tufte state that should stick to a uniform theme and not have a lot of variation in the theme between them.

Quality Features and Cavalier put a strong emphasis on the audience or viewer of the visualization. Tufte puts less emphasis on the audience instead of focusing on design choices, however those design choices are for the viewer’s benefit. Tufte also mentions that there should be a narrative.

Cavalier puts emphasis on the practicality of the visualization whereas that is not directly mentioned in Tufte and Quality Features.

Tufte mentions many design features that will help accomplish the goals mentioned in Quality Features and Cavalier. Quality Features and Cavalier do not go into that specific of detail.

In short the Cavalier and The Quality Features give points that are tailored to the audience and they provide a concise series of principles that emphasize simplicity and accuracy.

Tufte conveys helpful design choices that help project a narrative that will communicate the idea effectively to the viewer. It also puts emphasis on accurate representation of the data which agrees with Cavalier and Quality Features.

Short summary of Quality Features and Cavalier:

Cavalier:

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Highlights:

CAVALIER'S PRINCIPLES FOR EVALUATING DATA VISUALIZATIONS

1. “The principle of analytical interest states that data visualization is right in so far as it keeps scientific rigor, order, and

method in the quantitative procedures.”

2. “The principle of functional or pragmatic interest states that data visualization is right in so far as the graphical

representation has a practical utility and added value over other communicative forms facilitating their comprehension.”

3. “The principle of managerial interest states that data visualization is right in so far as it is able to package data message and

graphic representation in a singular configuration that promotes the understanding of a meaningful communication.”

4. “The principle of interest for efficacy states that data visualization is right in so far as, taking into account the professional,

social and cultural context and target; it produces the intended communicative result by a suitable design.”

5. “The principle of interest for efficiency states that data visualization is right in so far as it achieves the communication goals

by the optimal means of communication with maximum benefits and minimal use of resources.”

6. “The principle of appraisal interest states that data visualization is right in so far as it receives a positive assessment from

the user in terms of usability and of other factors related to H–M interaction.”

DATA VISUALIZATION QUALITY FEATURES

• Fidelity - Above all else, a Data Visualization must be a faithful representation of the underlying data, not leaving out what is in

the data and not adding anything that is not.

• Simplicity - A quality Data Visualization should be as simple as possible, but not too simple (paraphrasing A. Einstein's

description of the best solution to a problem). Leave out irrelevant embellishments.

• Utility - A quality Data Visualization must be fit for purpose as defined by the viewer’s needs and not encumbered by

extraneous information, as interesting as that might be.

• Saliency - A quality Data Visualization focuses the viewer’s attention on the most important facts and conclusions, supported

as necessary by secondary, supporting information and details

• Efficacy - A quality Data Visualization accomplishes the purpose for which it was designed, its context. Knowing that context

is key to success.

• Uniformity - A quality Data Visualization or set of graphics adheres to a predetermined presentation theme.

• Amity - A quality Data Visualization is user friendly - it is easy for the viewer to grasp the message with the least required

expenditure of mental effort.

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