Design Guidelines for Information Visualization

and communicating Effectively with Data

do these things correctly and with confidence

do follow some rules of perception

USE PRE-ATTENTIVE ATTRIBUTES *FOR RAPID SEARCH AND COMPARISONS*

MAKE CHARTS THAT FACILITATE READER TASKS; *AND DON'T BE YOUR OWN AUDIENCE*

REDUCE NON DATA INK FOR CLARITY, *INCREASE DATA INK FOR EMPHASIS*

FIX ASPECT RATIOS *WHEN TRENDS ARE WARPED; BANK YOUR LINES TO 45°*

ENCODING KEYS *AVOID ASKING THE READER TO DO EXTRA MENTAL WORK*

CLEARLY LABEL *HORIZONTALLY FOR LEGIBILITY, AND DIRECTLY ON LINE CHARTS.*

ESTABLISH INFORMATION HIERARCHIES *WITHIN AND BETWEEN CHARTS*

CHUNK INFORMATION *FOR SMOOTHER PROCESSING OF THE 'GESTALT OF THINGS'*

do consider maximums

LINE CHART *≤5 LINES*

PIE CHART *3-7 SLICES*

BAR CHART *≤10 BARS*

CATEGORICAL *5-12 COLORS*

do tell stories

EDITORIAL THINKING *CONSIDER FRAMING, FOCUS, ANGLE AND THE AUDIENCE*

ANNOTATION LAYER *CLARIFICATION OVER SIMPLICITY BY WALKING THE READER THOUGH*

DATA LAYER *HIGHLIGHT CAUSALITY, EMOTION WITHIN THE DATA*

NAVIGATION LAYER *CONSIDER SEQUENCING STRATEGY FOR NARRATION*

Guidelines by Chris Zimmerman (visualize@google.com) // icons by Meaghan Hendricks, Kirby Wu, Saeful Muslim, and Conor Healey data-to-viz.com

...and **do** be color conscious

PURPOSEFUL COLOR MAPPING *DON'T USE COLORS JUST BECAUSE*

USE SOFT, NATURAL COLOR *IN GENERAL SAVING SATURATION FOR HIGHLIGHTS.*

HARMONIOUS TONES *ACROSS AND ADJACENT IN THE COLOR WHEEL*

LEVERAGE CULTURAL ASSOCIATIONS *BUT BE COLOR BLIND SENSITIVE*

MAP COLOR CONSISTENTLY *WITHIN AND BETWEEN CHARTS*

AVOID OCCLUSION *BY INCREASING OPACITY*

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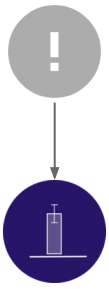
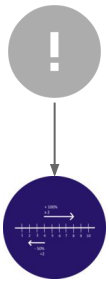
handle these topics with **care**



REVEAL UNCERTAINTY

Visualisations of data create an implication of precision (and have a veneer of authority) while in reality almost all datasets have a degree of uncertainty within them. Be candid about how you show the 'fuzziness in numbers' by using annotations, error bars, or opacity. These will not cast doubt among your audience but will instead forge new trust.



EXPAND TRUTHFULNESS

The more adequately a model fits what it stands for, without being needlessly complex, the easier it is for the audience to interpret it. Better models are more truthful, accurate, informative and understandable. This can be done via rational thinking to expand the breadth and depth of analytical comparisons.

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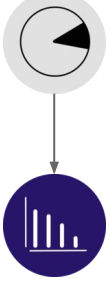
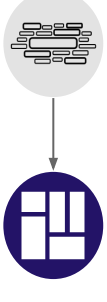
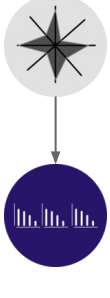
think twice about these chart types



PIE CHARTS *It's OK to leverage the strong part-to-whole metaphor we all understand, but* ***beware of the handicap we have when contrasting angle judgements.*** *Pies can be effective for 25%, 30% or 75% shares, but* ***not for many thin slices nor even distributions.*** *Order the largest wedges from the top. Consider a histogram or other forms of distribution that don't rely on angular comparisons.*



WORD CLOUDS *are intuitive and space efficient, but* ***should not be presented simply as insight in and of themselves.*** *Their random ordering, meaningless color coding, absence of relationships, and word length distortions make accurate comparisons challenging. As alternatives, a histogram will often do, or a treemap can provide several meaningful dimensions.*



RADAR CHARTS *sacrifice precision as its hard to compare values along different axes. What's more, if the number of values is even, then opposite directions along the same axis may unintentionally suggest that these variables are opposite in nature. Radar charts can however successfully contrast general 'footprints' and do so well as small multiples with area shading.*

STACKED AREA OR BAR CHARTS *are fundamentally flawed in that they do not compare values along an even baseline. Only the layer at the bottom can be compared accurately with itself, while the subsequent layers are all warped from those beneath them. Converting to a line chart will solve this problem quickly and reveal trends.*