Good design is visual thinking

There are two deep problems
1. Problem of multi-variate data (high-dimension data; low-dimension data displays)
2. Problem of information resolution (how many bits per unit area or per unit time)

Example #1: Euclid's Geometry published in 1570.
1. Information design should be signed
2. Eliminate legends; put titles on lines/data. About half of all legends can be eliminated.
3. To escape flat-land (2D), build 3D models (pop-ups). Or be smart!

Five Grand Principles:
1. Enforce visual comparisons. The essential analytical act is comparison. Answer: "Compared to what?"
2. Show cause and effect. Show mechanism, process, or dynamics for intervention (policy) thinking.
3. Show multi-dimensionality since our world is high-dimension.
   Example #2: Napoleon's Russian march.
   One graph displays 6 different variables: size, place (2), direction, time, & temp.
   Purpose of graph by designer was to uphold the horror/futility of war
   A good test of design is if viewers reason about content versus noting features of the design.
4. Integrate text, images, etc. Don't break up argument by form. [See Figure 1 on page 57 or Appendix 2]
5. Presentation must be content-driven. Quality, relevance and integrity of content are fundamental.
   The best way to improve a presentation is to improve the content.

So where do these principles come from?
In the theory of information architecture, these principles come from the principles of analytical thinking:
   To show data, to make comparisons, and to understand process and causality.
First question: What is the cognitive task of this display? What is the analytical task?
   Chart junk means statistical stupidity. Think first; design second.
Example #3: Galileo Lynx: 1613. Galileo studied a 6 power telescope and built a 30 power by himself.
1. Make comparisons adjacent in space than 'stacked in time' (separated in space).
2. Use small multiples. Show detail and their summary; maintain overall focus.

Goal: So you will never see graphs the same way again.

Review of books:
1. (Visual Display of Quantitative Information)
2. Pictures of nouns (Envisioning Information)
3. Pictures of verbs (Visual Explanations
4. Pictures of adjectives/adverbs (aesthetics) New book

Other books:
William Cleveland; "Elements of Graphing Data". "Visualizing Data"
Graphical Methods for Data Analysis. Chambers, Cleveland, Kleiner and Tukey. Out of Print.

Financial displays
1. Assessment of change – the intellectual problem.
   Contextualize: does not require starting graphs at zero but by showing relevant history.
   Example #4: (p. 75) Show current year history of temperatures along with historic ranges.
   Assess extremes: Often randomly caused and thus will regress toward the mean.
   Analytic task is to show the mean and the variability.
2. Don't throw out data. Change design to include data. Detail helps build credibility
3. Adjust financial data for inflation – a major confounding factor. Show in constant dollars.
   Example #5: Retail sales history. Seasonal is a bore; trend (unadjusted) is a lie!
4. Don't trust a display if it doesn't have footnotes.
   Example #6: Hospital billing record!
5. 90% of financial/statistical displays are totally descriptive – no explanation and no mechanism.
   One way is to use annotation. Just a minimal link – enough to indicate.
6. Copy greatness. Find 20 best charts/graphics for your organization/field.
   These books are a museum of cognitive art.
   If over 100 data points, use graphs. If < 100 data points, use tables.

COMMENTS:
USERS: only two industries (computers and drugs) call customers 'users'.
Often design reproduces hierarchy/bureaucracy.
1. bureaucratic design
2. menu/tree design (leave's people stranded with no way to back up)

Solution: Allow a wide selection at the highest level.
The only thing that makes your web site unique is your content.
Humans can process input at 150 Mb/sec.
Lowest forms of display are overheads, PowerPoint and Pravda ads for Russians to vote communist.
"Goal: To make information displays worthy of the human mind and the human eye."

SERIOUS DECISION: LIFE AND DEATH [Afternoon session]
Medicine is about intervention / treatment.
Best information transmission is on paper. Give your reader hard copy to take away.
Talk is inefficient in communicating a large quantity of data/information
Talk is very efficient at facility reasoning.
Milo: Request copy of the Medical Interface.

CHALLENGER DISASTER:
No names on report. Names indicate responsibility and pride.
Need problems ordered by probable cause. Notice planned launch temp is 5 SD outside previous range.
Engineers failed to support their claim(their argument) with their charts.
1. See entire data matrix. (We are shown 4 non-launch tests plus only two launches.)
2. Displays should indicate causality (these don't).
3. *Data exhibits set the analytic agenda.*

We need routines to automate our thinking in this area.
1. Show me the data.
2. Show me the causality: the link between cause and effect.
3. What would I really like to see? Graphs shown are just a subset of those available.

Always march through this checklist.
This approach is applicable to quality control, process management and portfolio management.
This is part of the general architecture – to generate warning signals.

Example: John Snow and the London Cholera Epidemic.
Show's cause (Broad Street Pump); shows effects (deaths)
Show effects w/o proximate cause – and explain them (deaths near other pumps).
Show cause w/o effects and explain them (brewery near pump with no deaths).
Think causally; show causality.

NUTS AND BOLTS OF PRESENTATIONS
Use the teaching metaphor/model. Not acting, marketing, motivating, etc.
4. Particularize, generalize, particularize: PGP. Give immediate information payoff ASAP.
State content of a table/chart.
5. ?
6. Get there early; something good will happen. Fix problems
7. Audience is important – and must be respected. No patronizing; no contempt.
8. Use humor – but only to make your points clearer.
9. Avoid using masculine pronouns (The user, he clicked the button and used his manly strength...)
Perfectly OK to use collective noun with singular (e.g., they)
10. Allow time for questions afterward.
11. If you believe in something or believe it is important, then Show It! Stand up; stand out; show passion.
12. Finish early. No presentation is ever too short. Something good will happen afterward.
13. Practice
14. In traveling and making public presentations, drink water! No alcohol on low-humidity airplanes.
15. Content is Primary!