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Let

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LSE

LGIE

LGB

LISTO

Humans can see fine details.

Most people can resolve ~600 points/in² (~100 points/cm²), depending on the point size and shape, color, &c.

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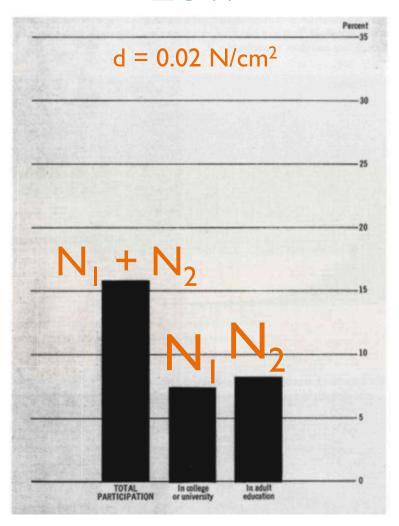
"Maximize data density and the size of the data matrix, within reason."

Applies to both text and graphical elements

Data Density = Number of data entries Area of graphic

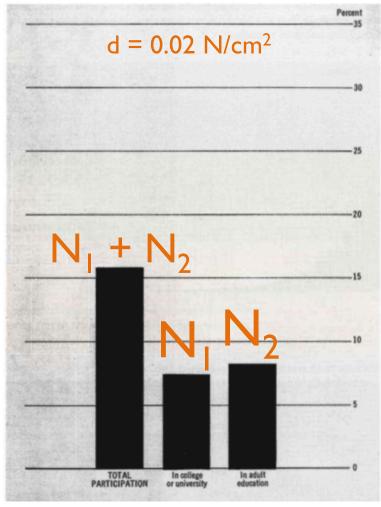
Data Density = Number of data entries Area of graphic

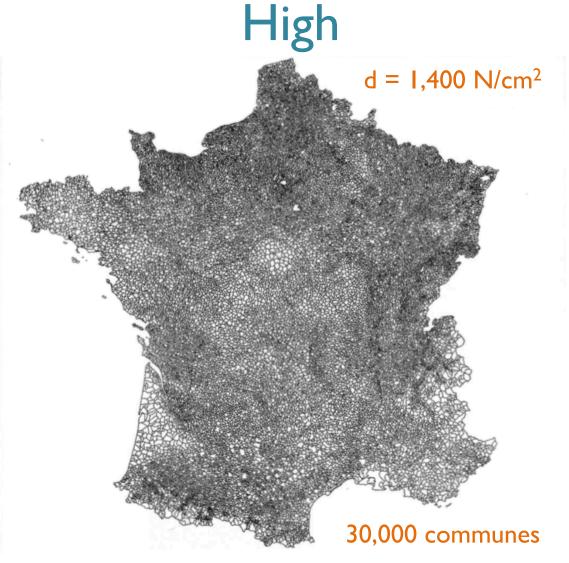
Low



Data Density = Number of data entries Area of graphic

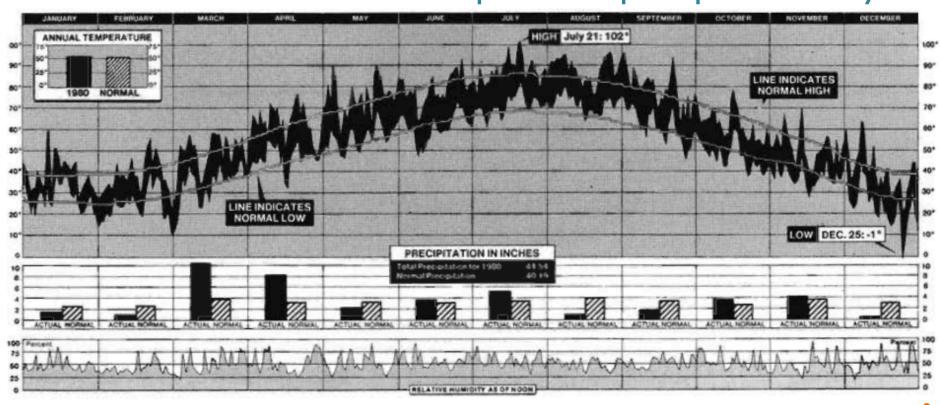
Low





Some more examples

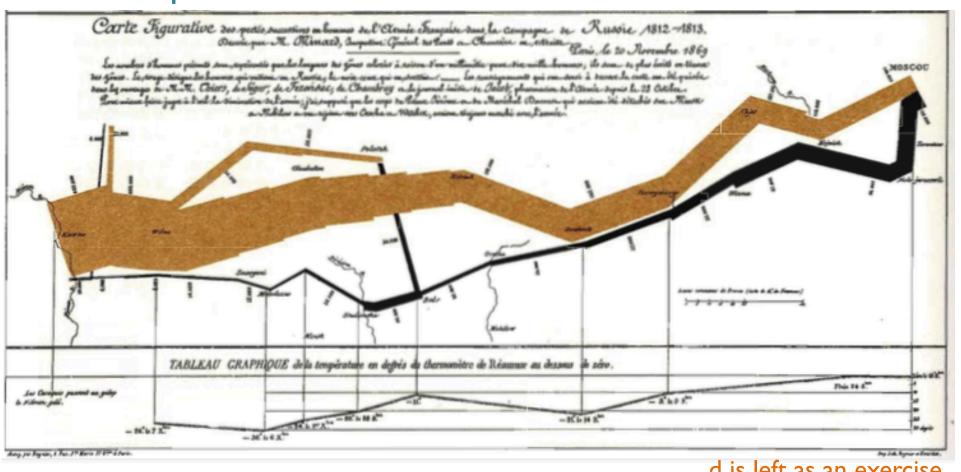
NYC's weather in 1980: temperature, precip, & humdity



 $d = 28 \text{ N/cm}^2$

Some more examples

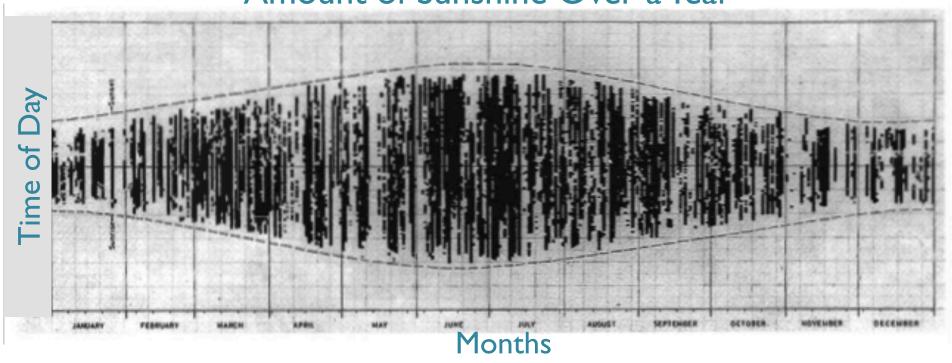
Napoleon's 1812-1813 march to/from Moscow



d is left as an exercise for the reader

Some more examples

Amount of Sunshine Over a Year



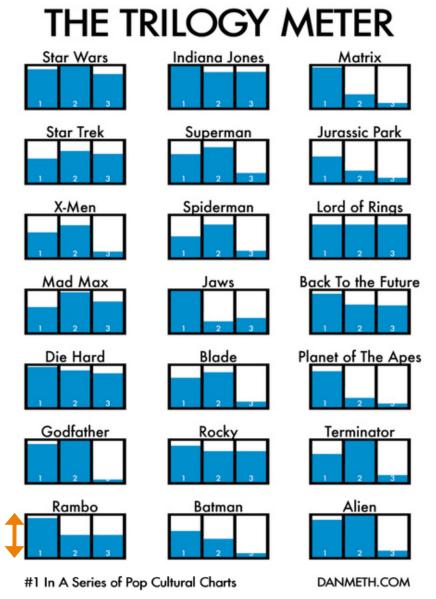
 $d = 160 \text{ N/cm}^2$

Graphics that repeat combinations of variables, each time changing a third variable

- Easy to compare
- Almost entirely data-ink
- Small and high-density
- Show a narrative
- Decrease fraction of time spent understanding the variables

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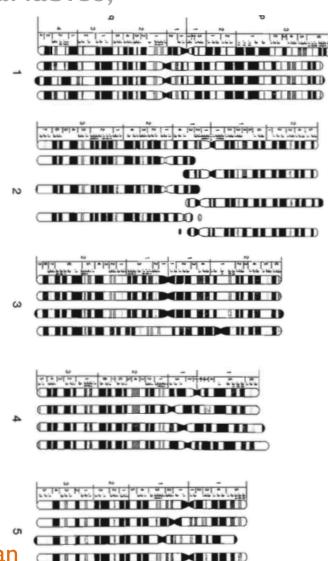


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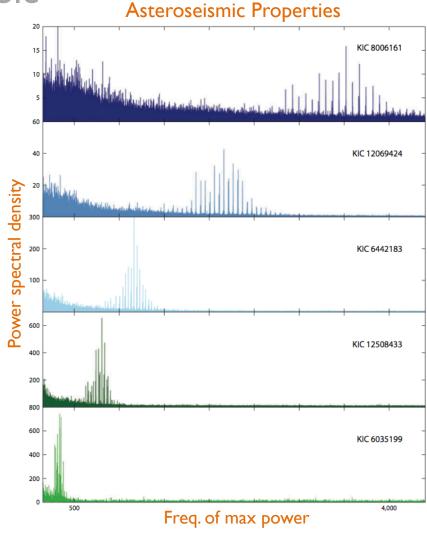
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Human Chimp Gorilla Oranguta



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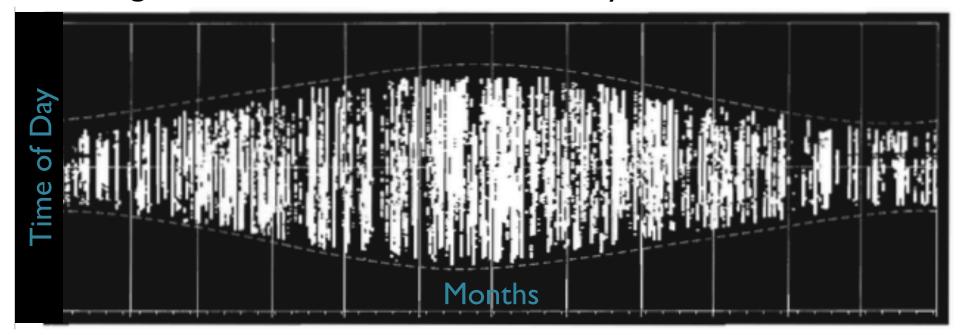


What do these have in common? (What makes a "good" high-resolution graphic?)

- Based on large datasets
 - Show "large" data's big-picture behavior
 - "Small" data should go in tables
- Physically small enough to absorb with minimal eye movement
- Use data element reduction techniques to eliminate superfluous crowding (thin lines, small dots, &c.)
- Avoid chartjunk like the plague

Efficient, Not Overwhelming

- A good data-rich graphic should allow the viewer to answer 3 levels of questions:
 - Elementary: What is the value of Y at X?
 - Intermediate: What is the mean trend of Y with X?
 - Big Picture: What does this trend say about X and Y?



Eeek!

 As the discussion was wrapping up, we realized that Gail's copy of Tufte didn't have the "sparklines" section that later versions do. So we talked about those too. Fun!