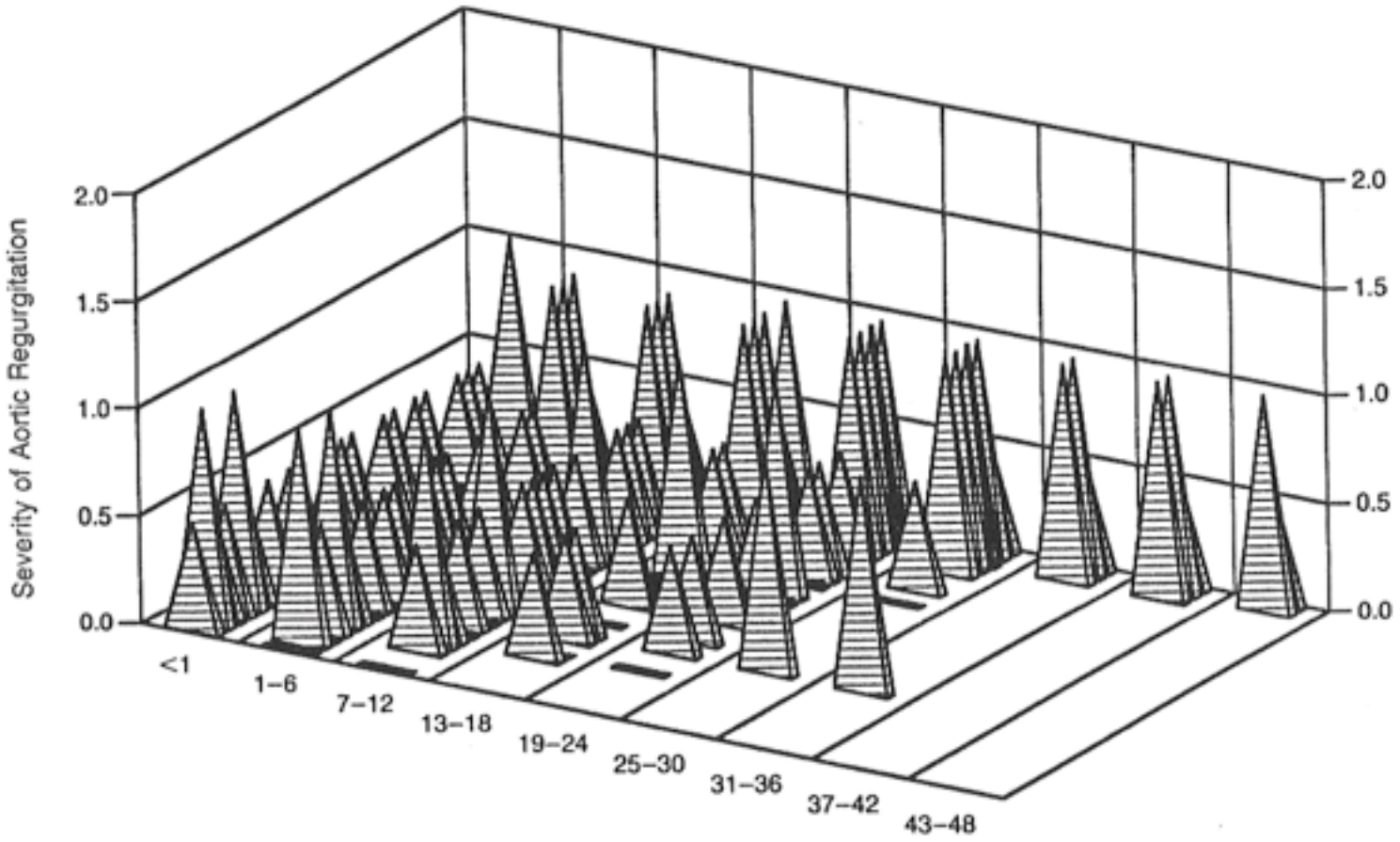
Design Choices in Building Graphs

February 10, 2009



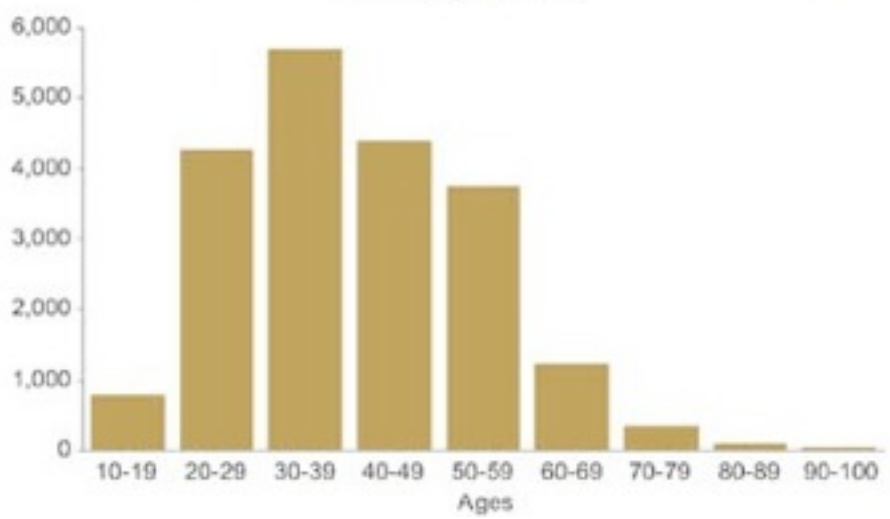
i247: Information Visualization and Presentation

Ljuba Miljkovic. Slides based on those from Marti Hearst and Maneesh Argawala

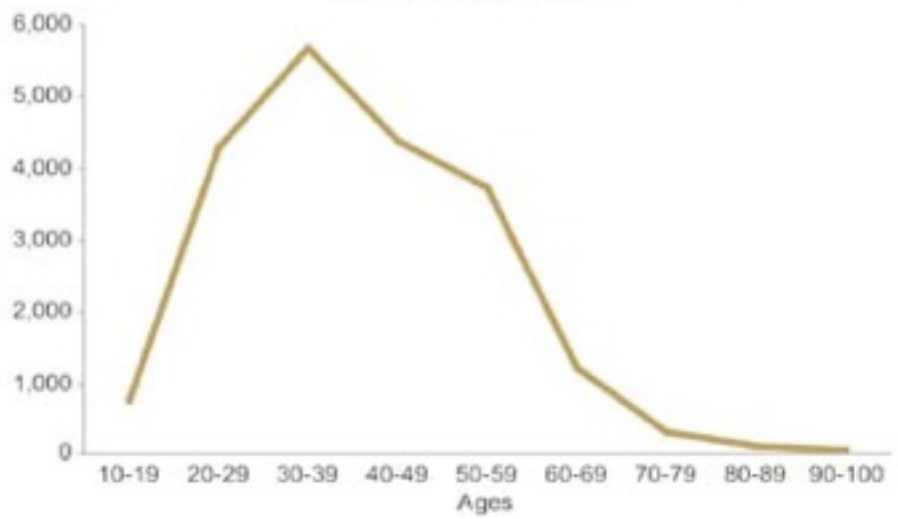
Today's Lecture

- How to choose among basic graph types
- Explore properties of various methods of encoding data visually

Same data, different impression



Bar Graph

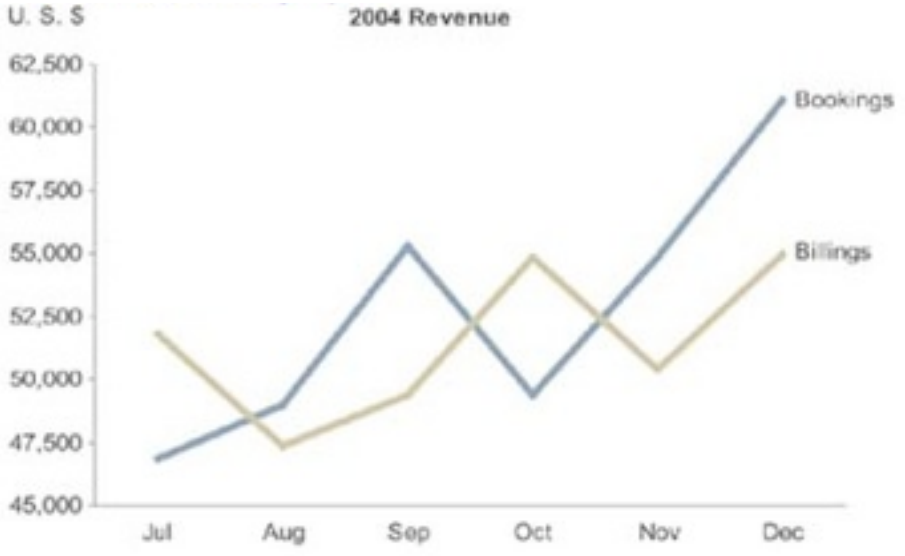


Line Graph

Use bars for encoding interval data
to encourage comparison

Use lines to spot trends in the data

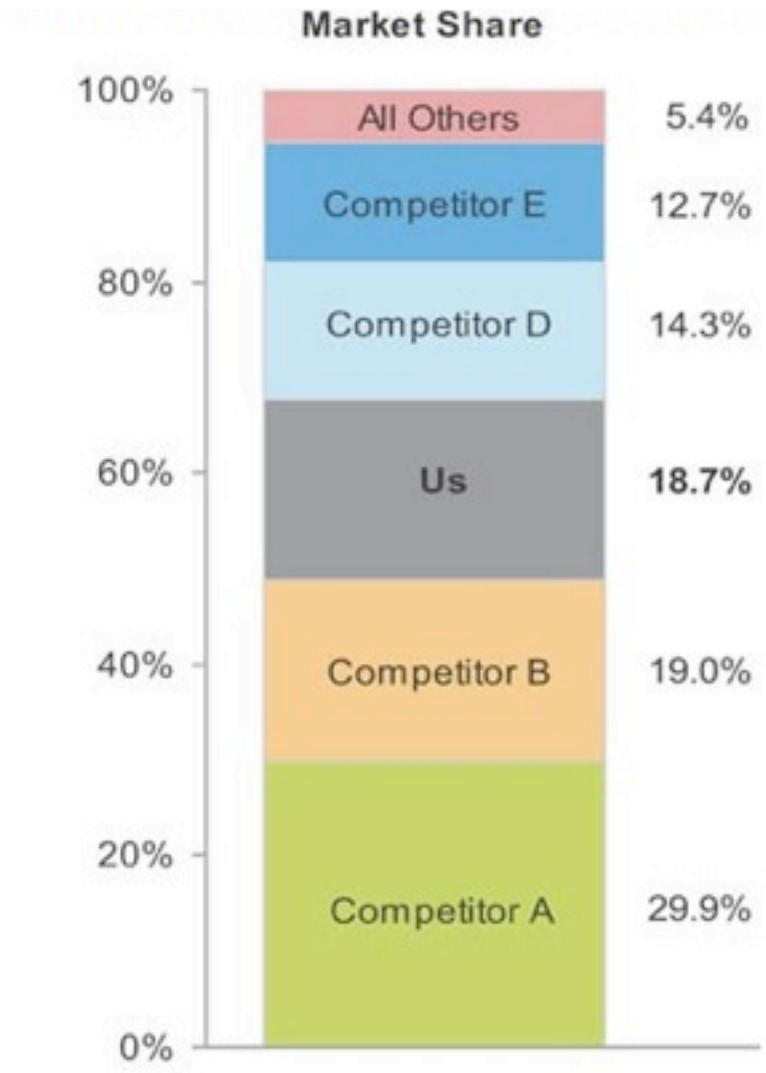
Bar Graph



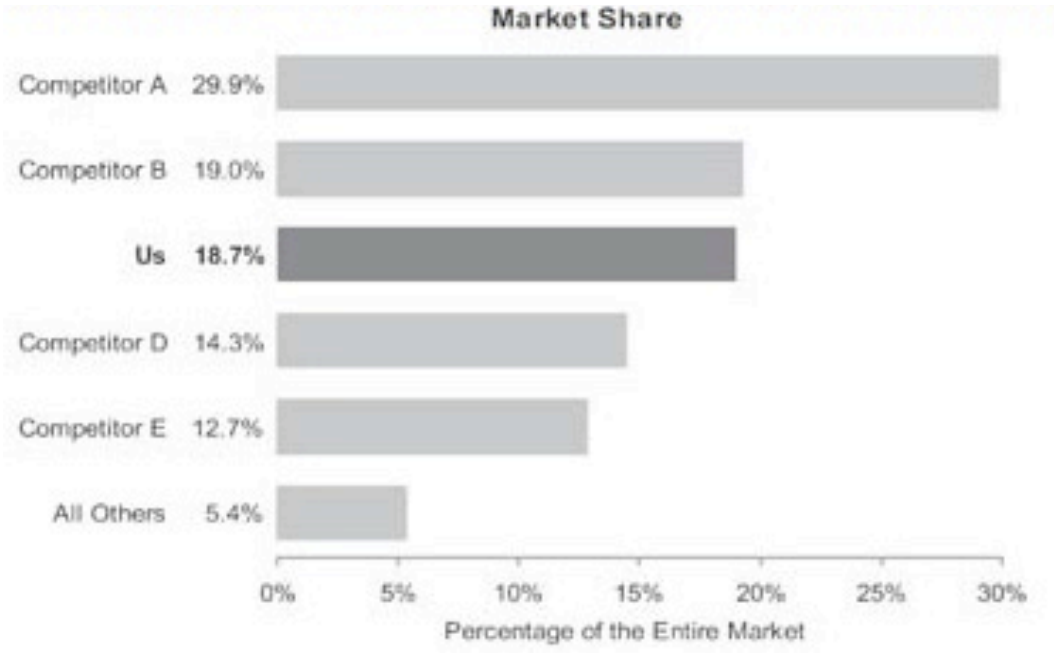
Line Graph

Stacked bar graphs.

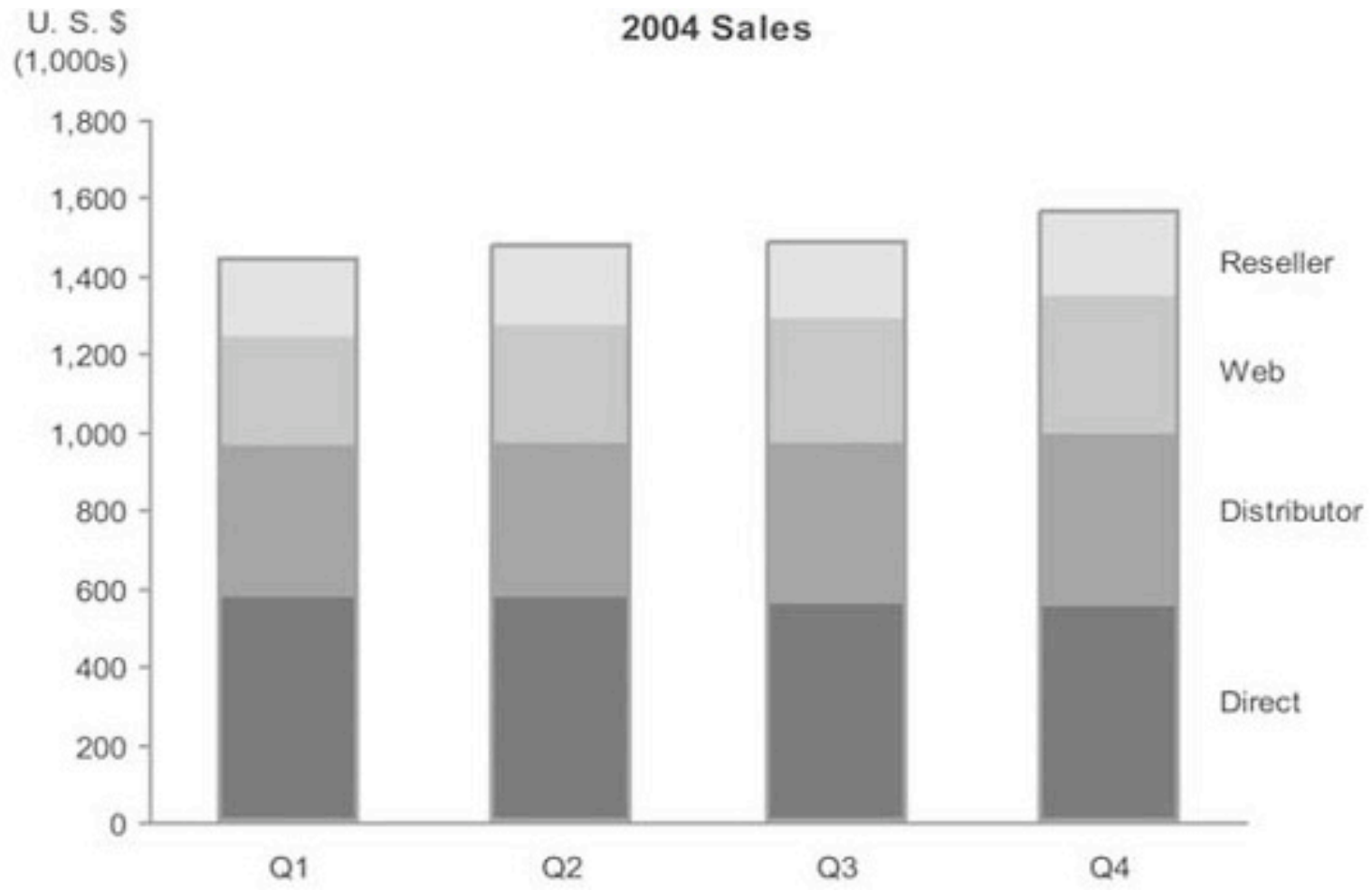
When and when not to use them



Pie charts work,
but bar graphs are preferred

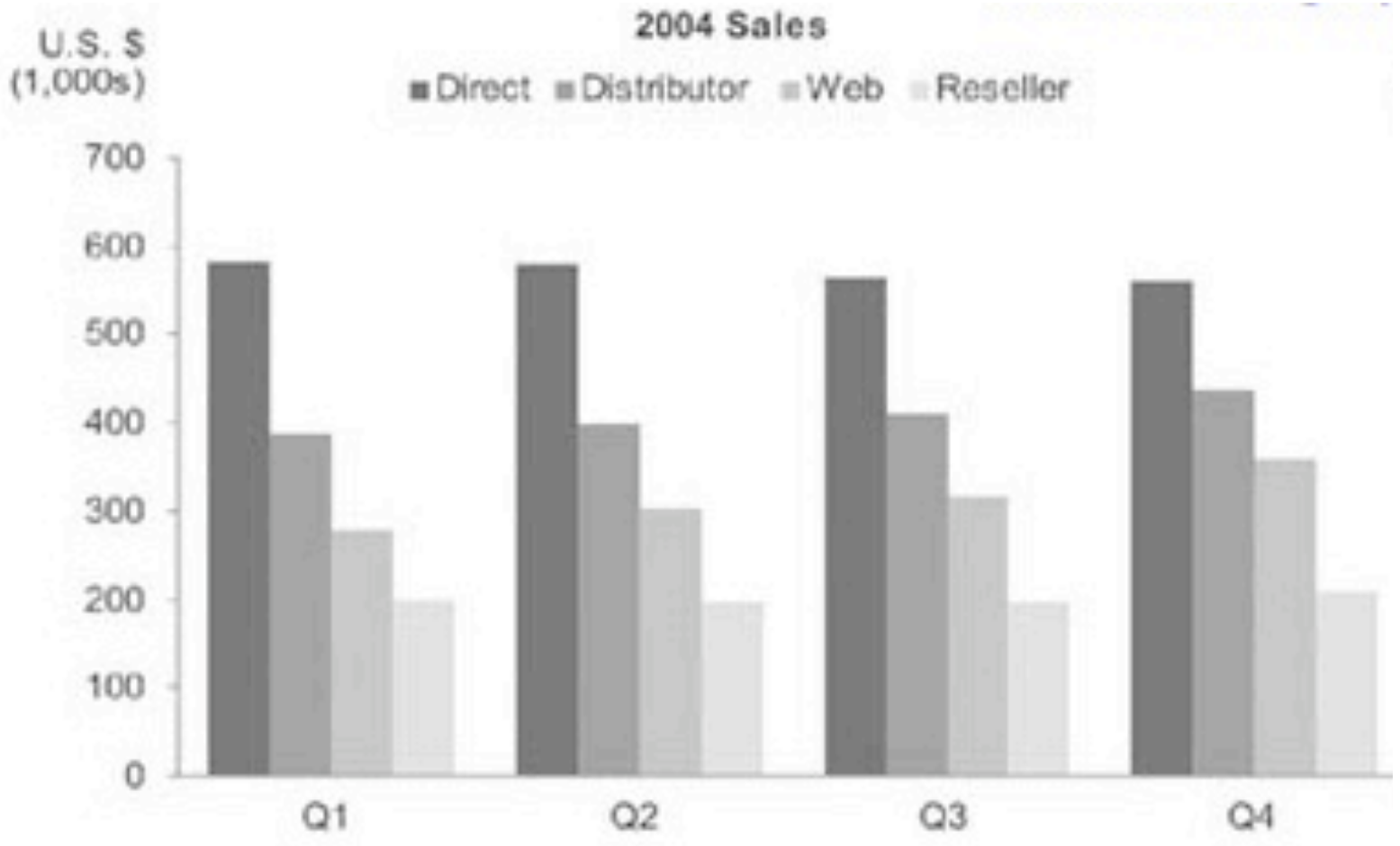


Stacked bars: use when showing multiple series, and greater emphasis on whole than parts

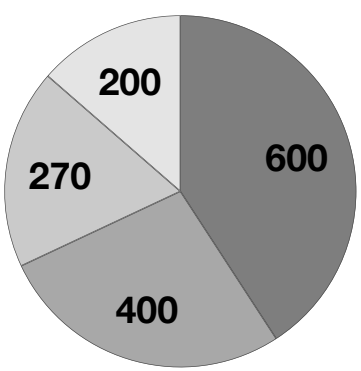


Possible Alternatives

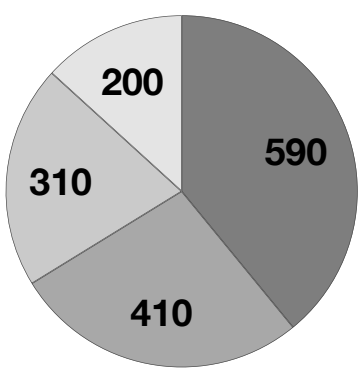
Grouped Bars to emphasize components



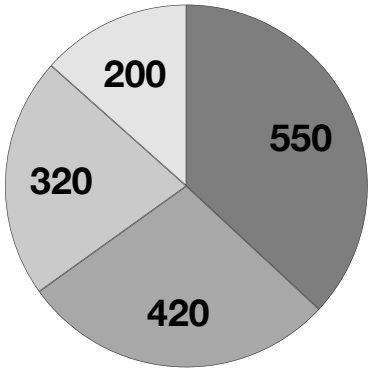
Possible Alternatives: Pie Charts?



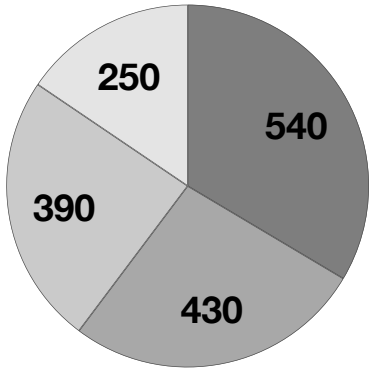
Q1



Q2

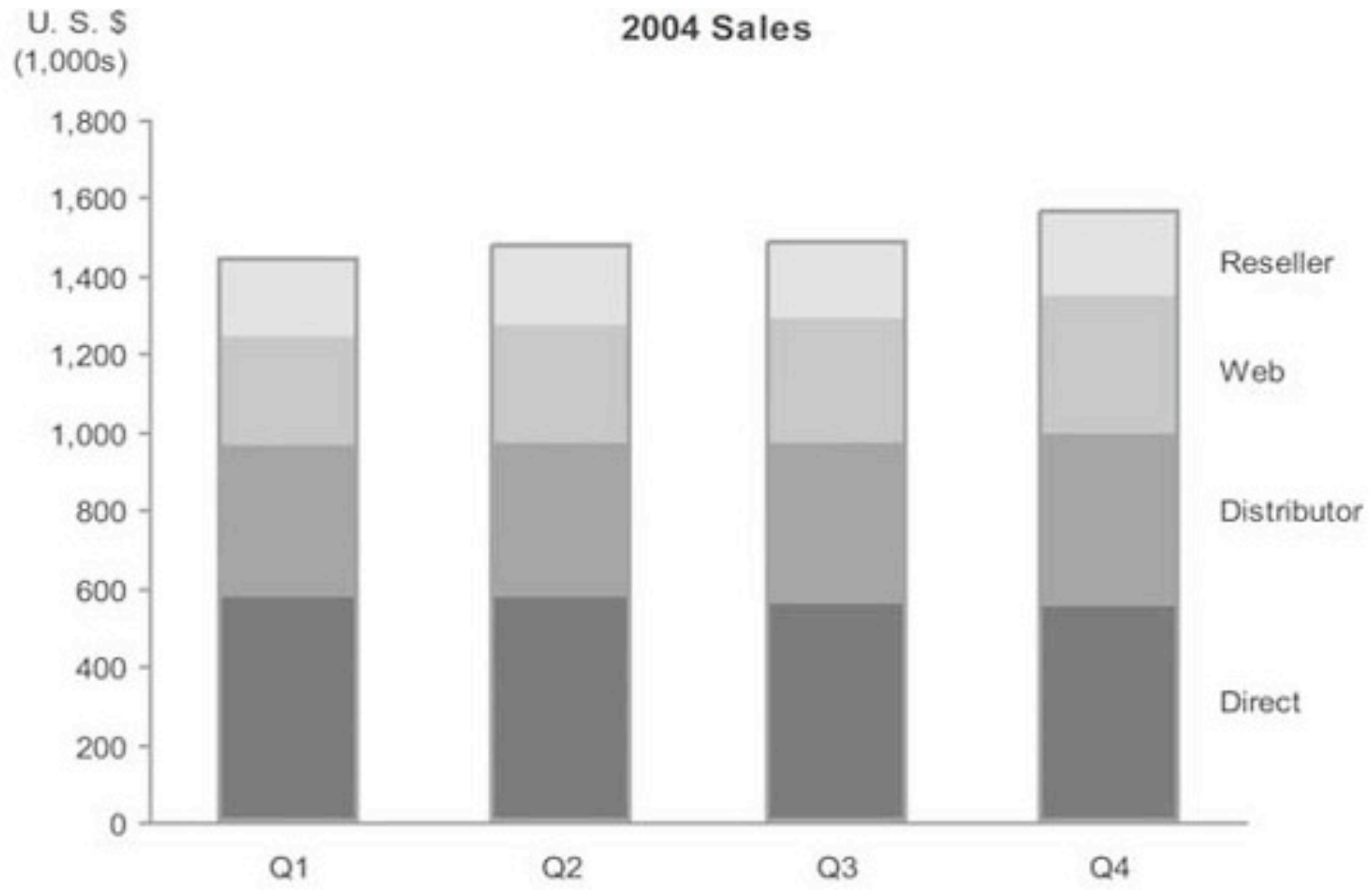


Q3

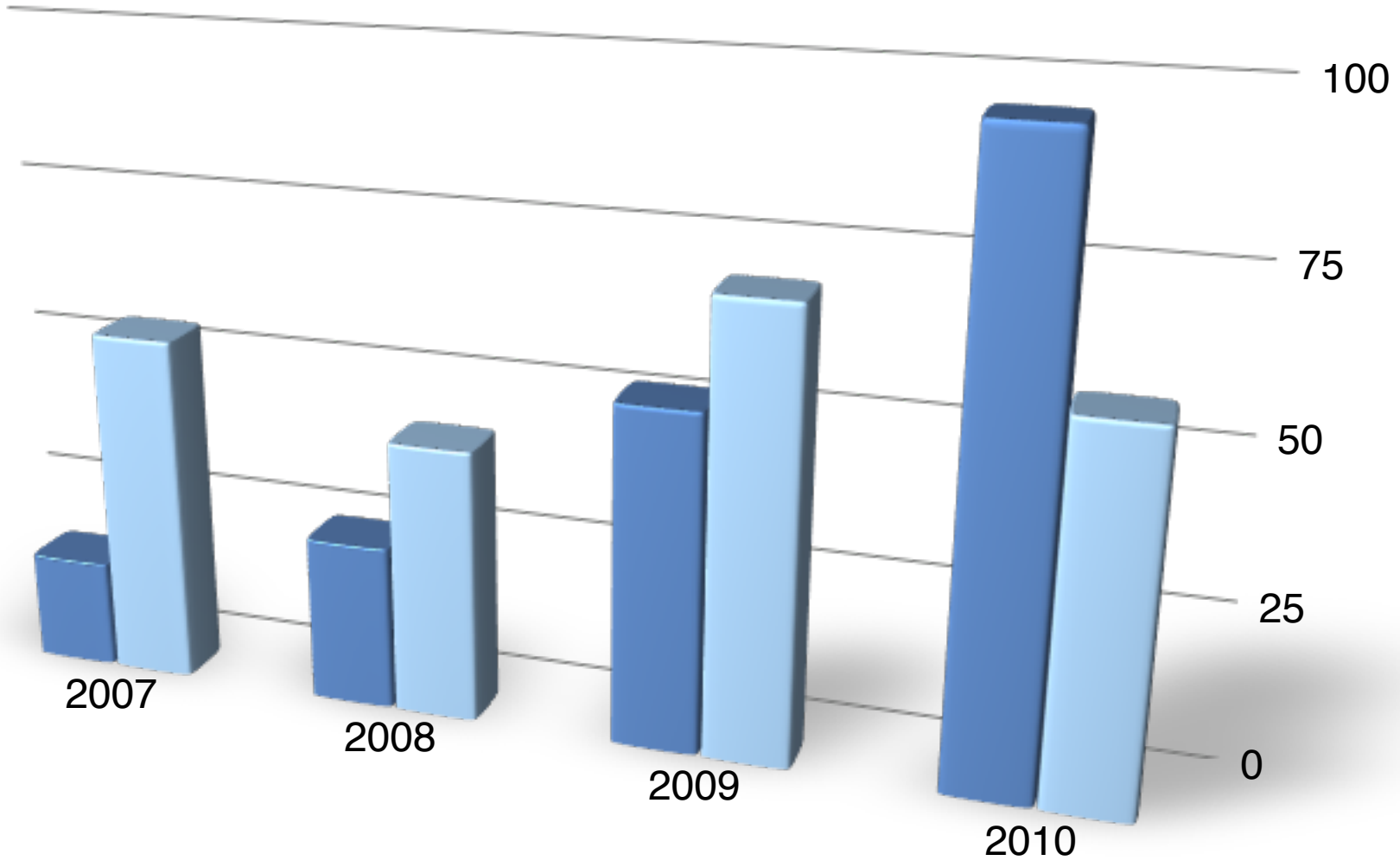


Q4

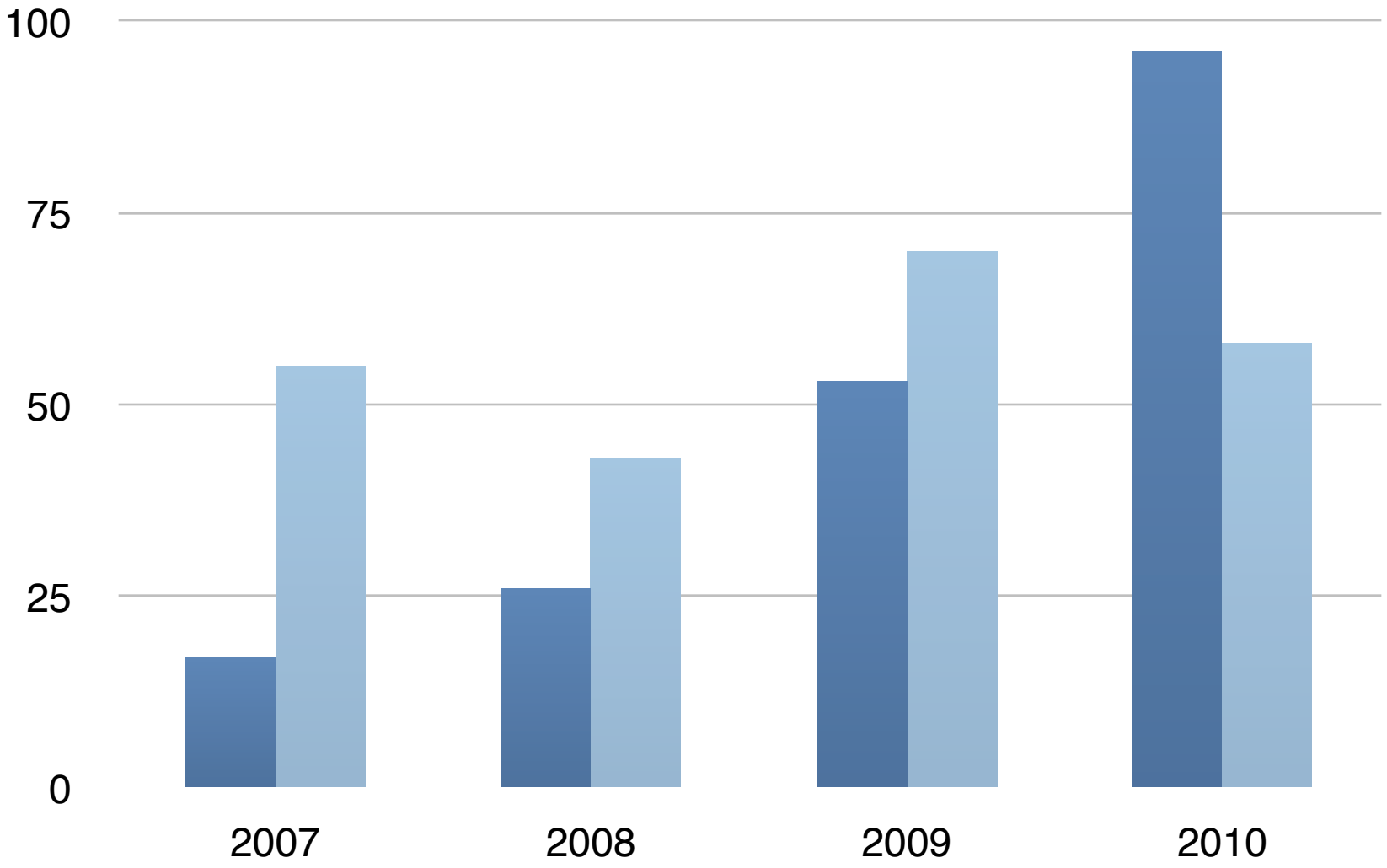
Stacked bars: use when showing multiple series, and greater emphasis on whole than parts



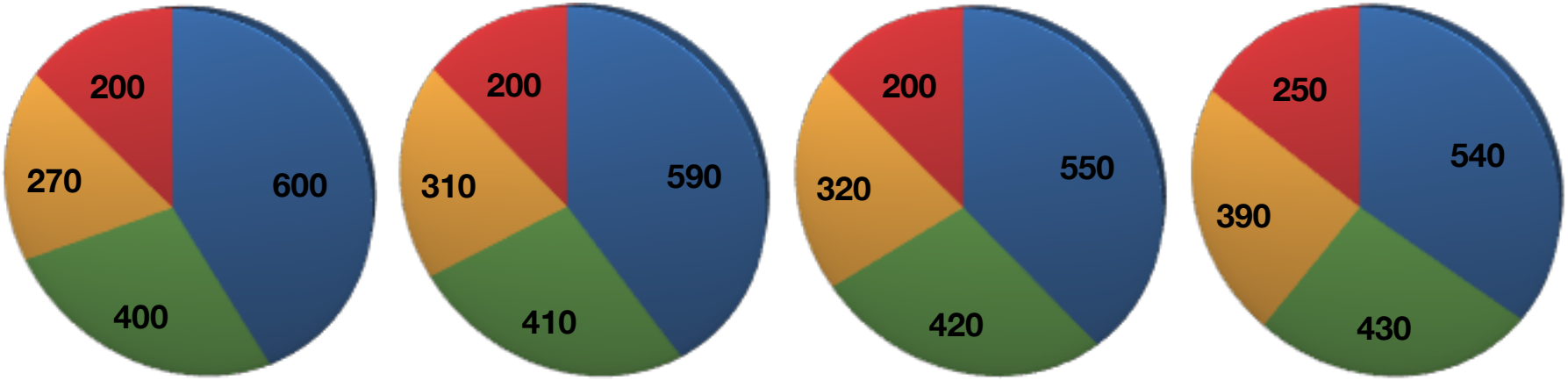
3D Bar Graph



2D Bar Graph



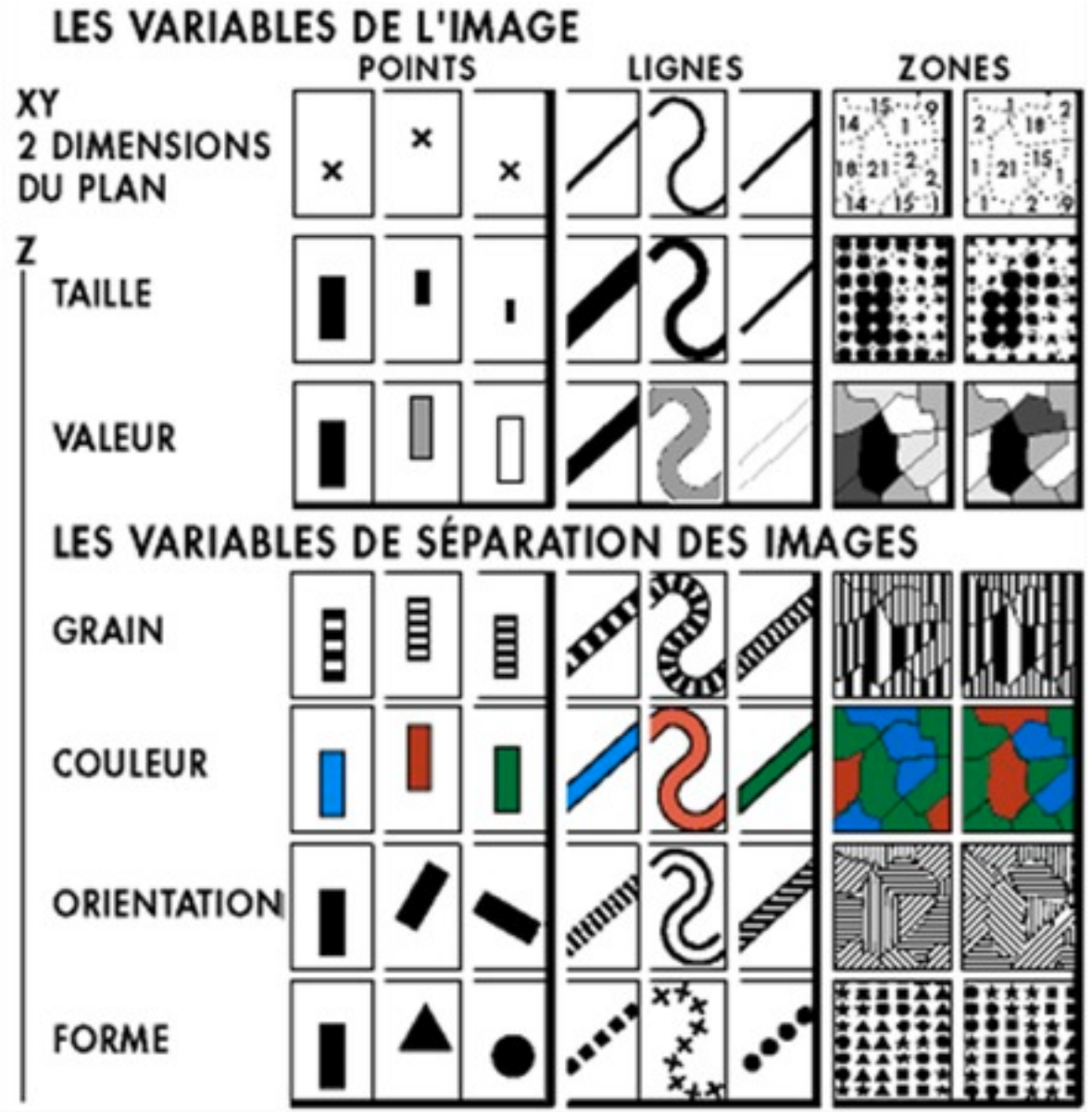
“Gorgeous” Pie Charts



Q1 Q2 Q3 Q4

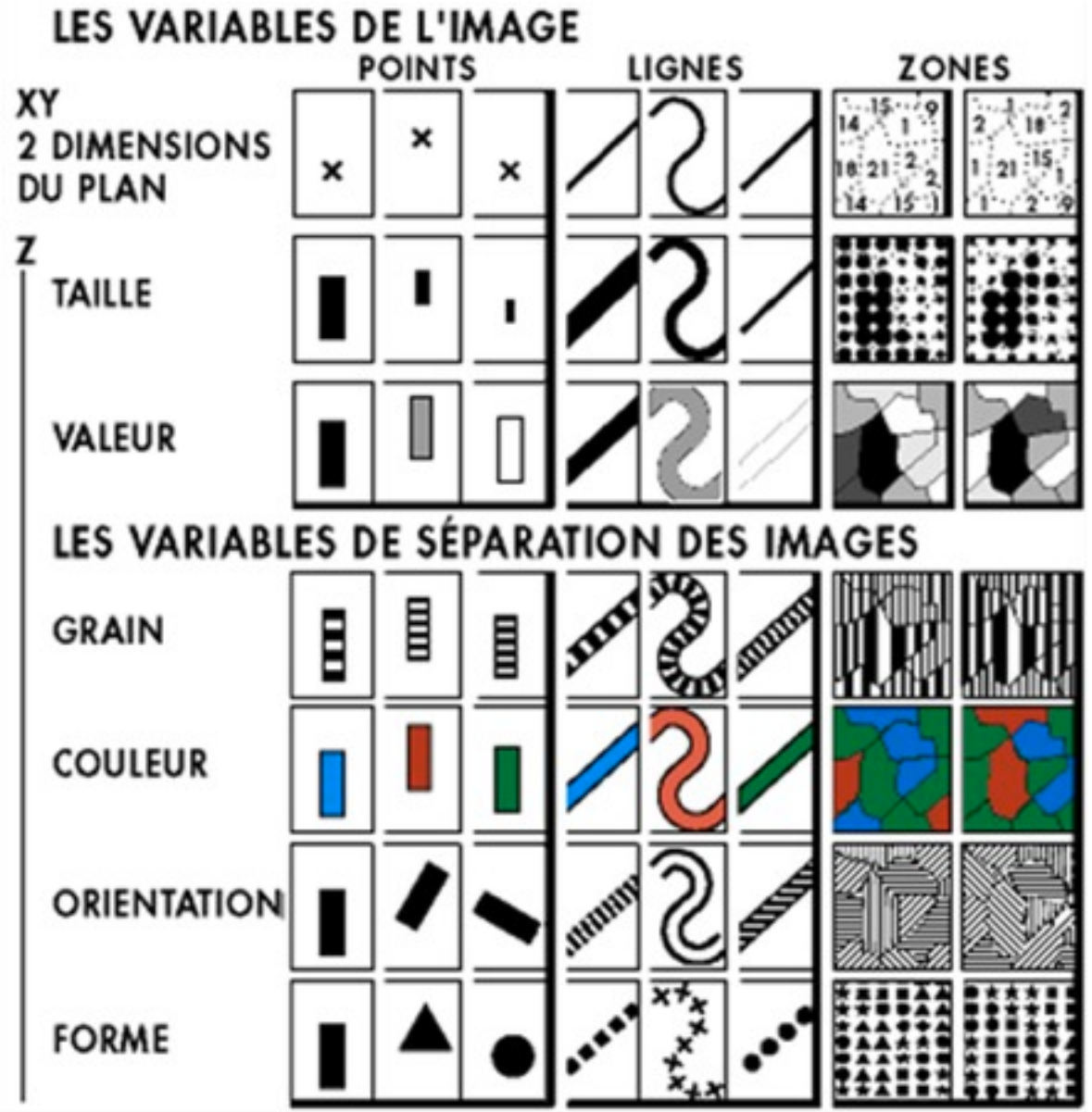
Which visual properties are appropriate for which information types?

Bertin's Graphical Vocabulary



Bertin's Graphical Vocabulary

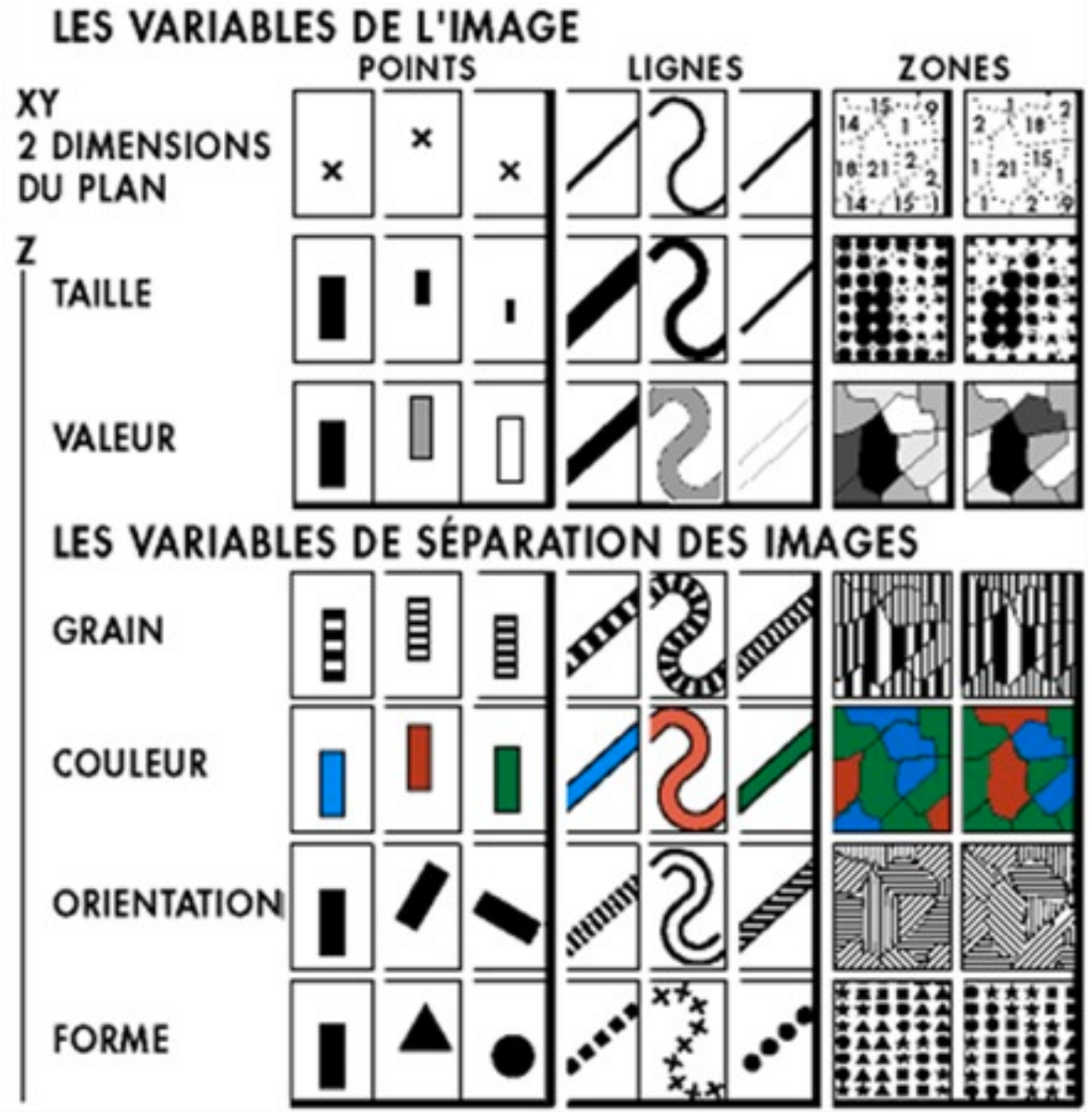
Position



Bertin's Graphical Vocabulary

Position

Stroke

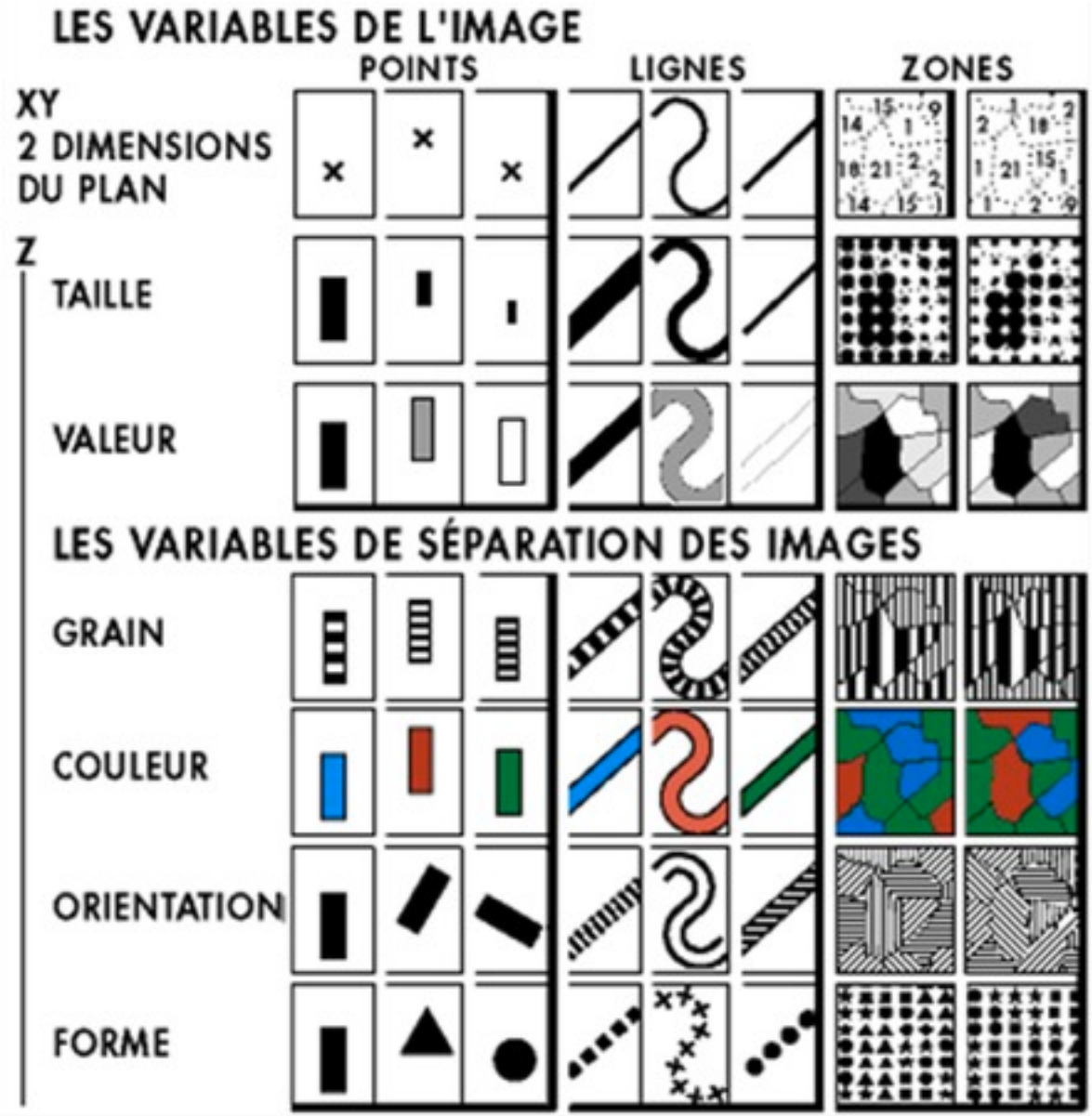


Bertin's Graphical Vocabulary

Position

Stroke

Brightness



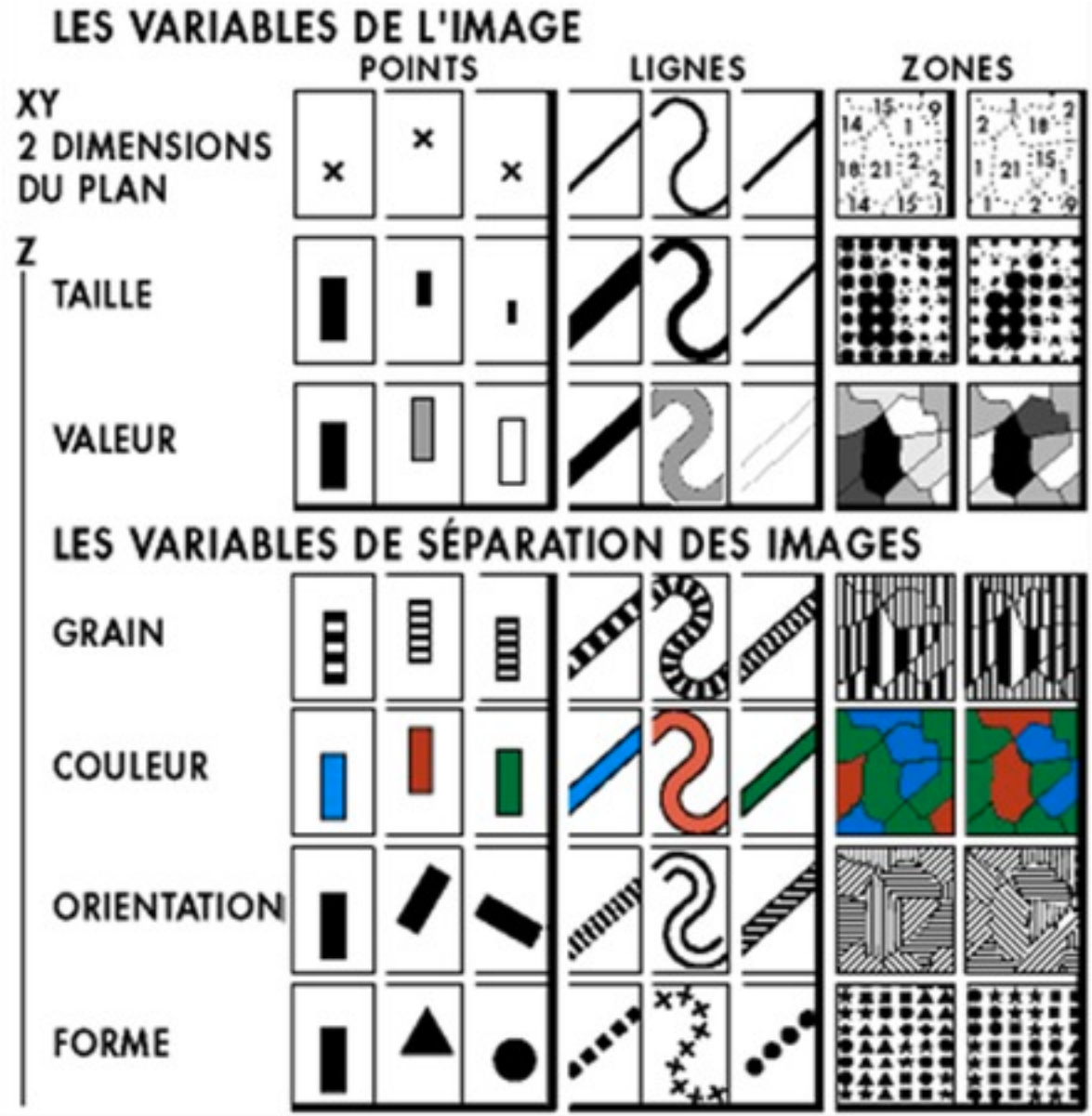
Bertin's Graphical Vocabulary

Position

Stroke

Brightness

Texture



Bertin's Graphical Vocabulary

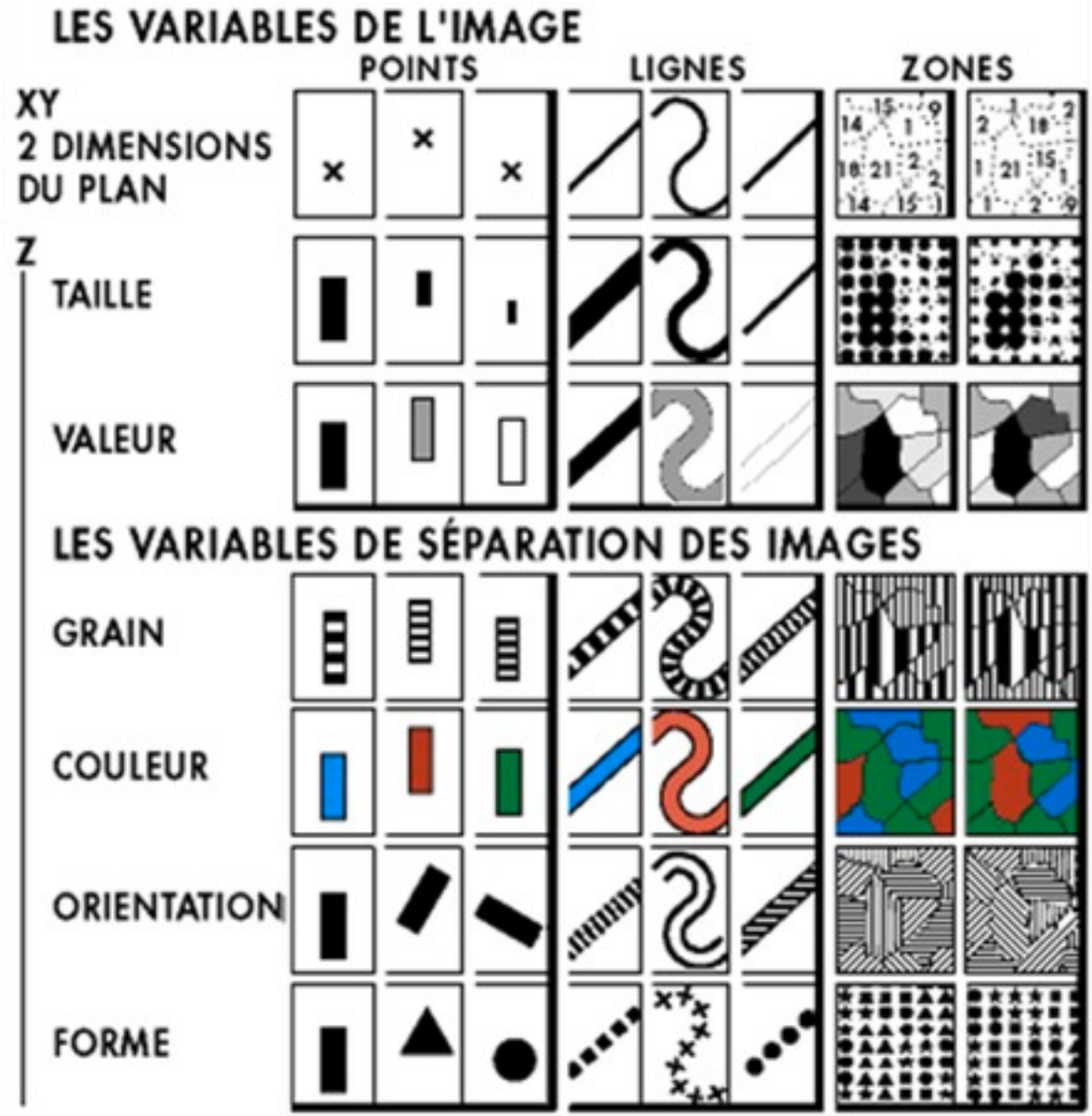
Position

Stroke

Brightness

Texture

Color



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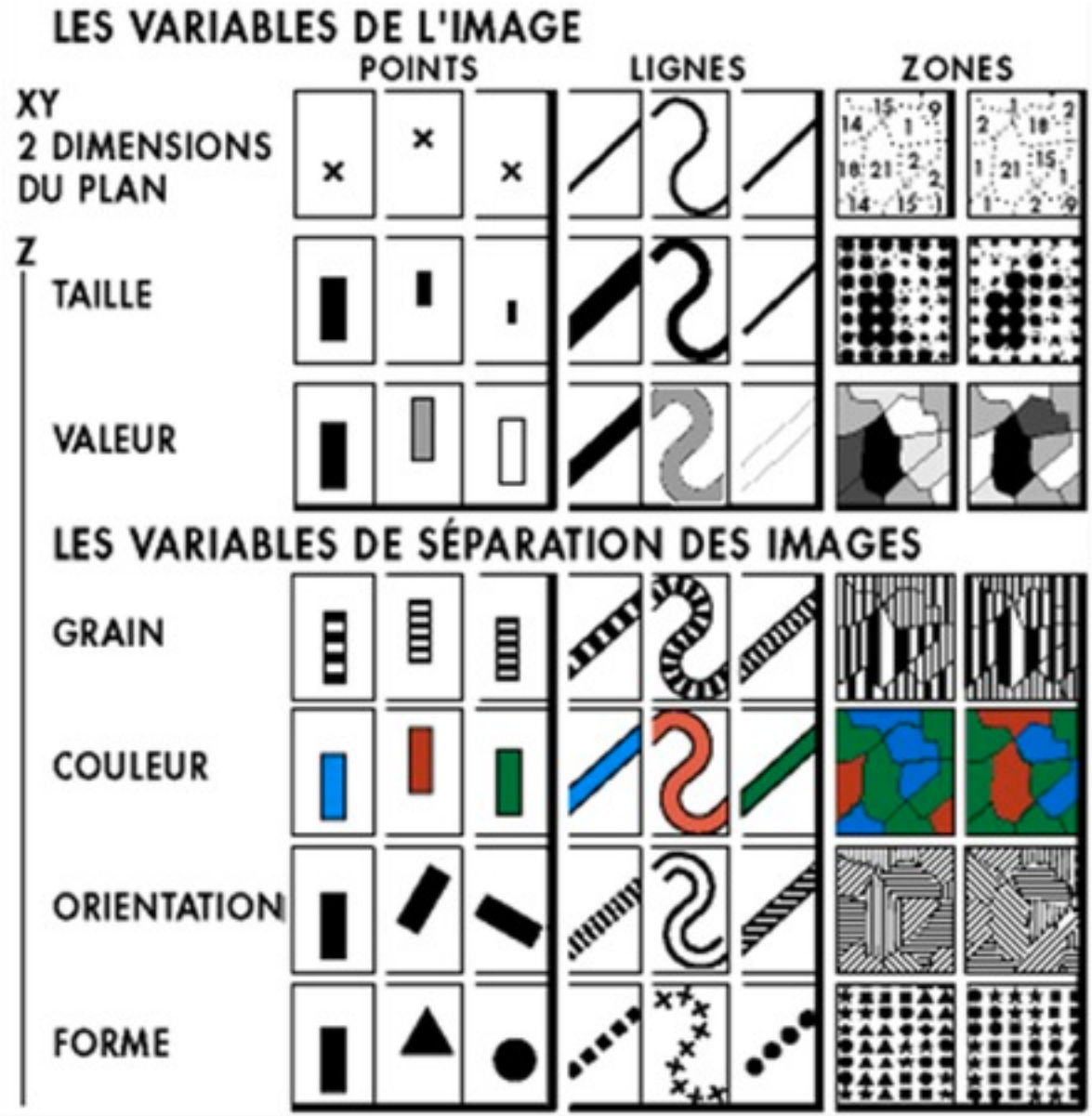

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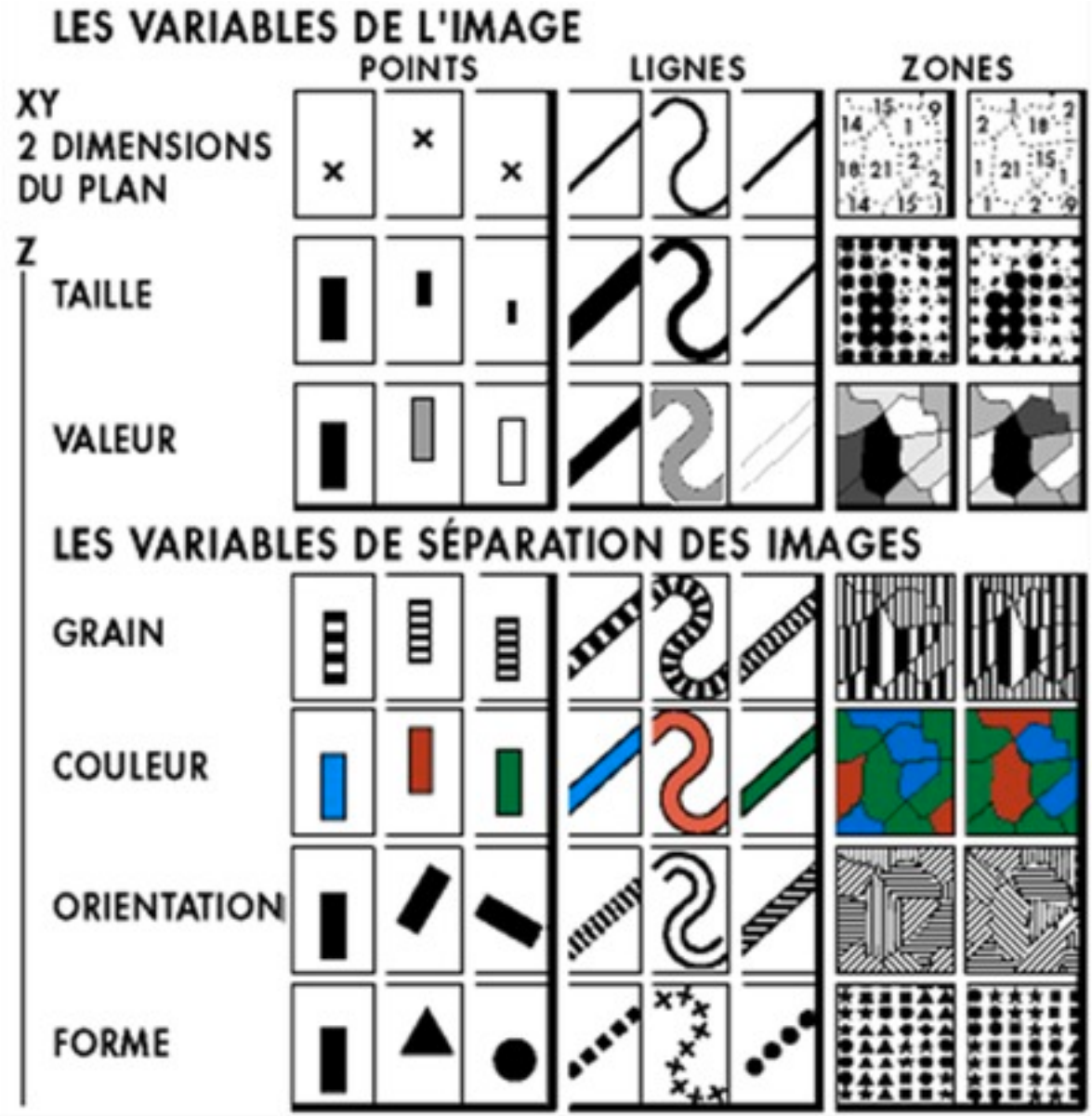
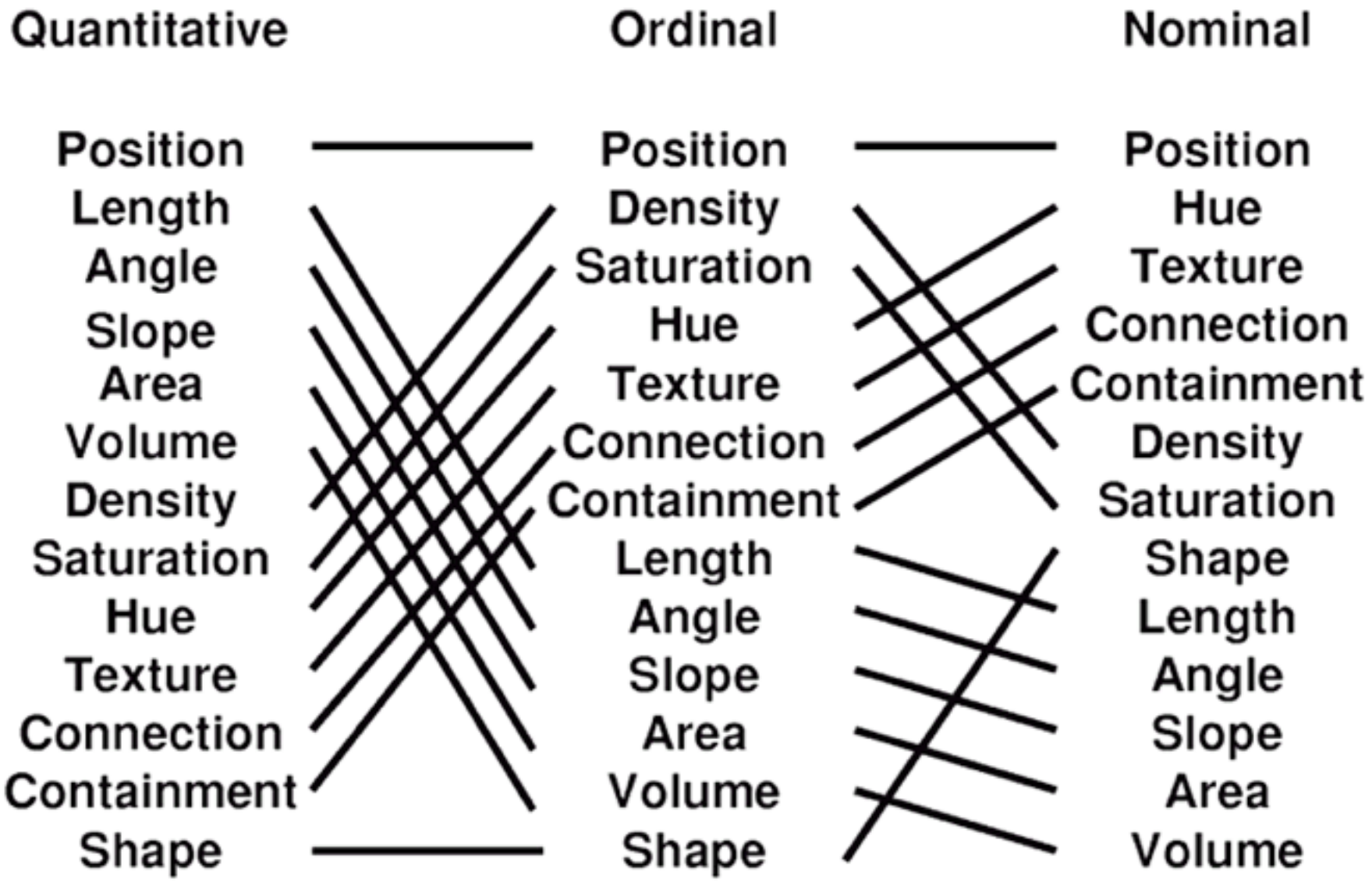


“A visualization is more effective than another if the information conveyed by one visualization is more readily perceived than the information in the other.”

-Mackinlay

Mackinlay's Ranking



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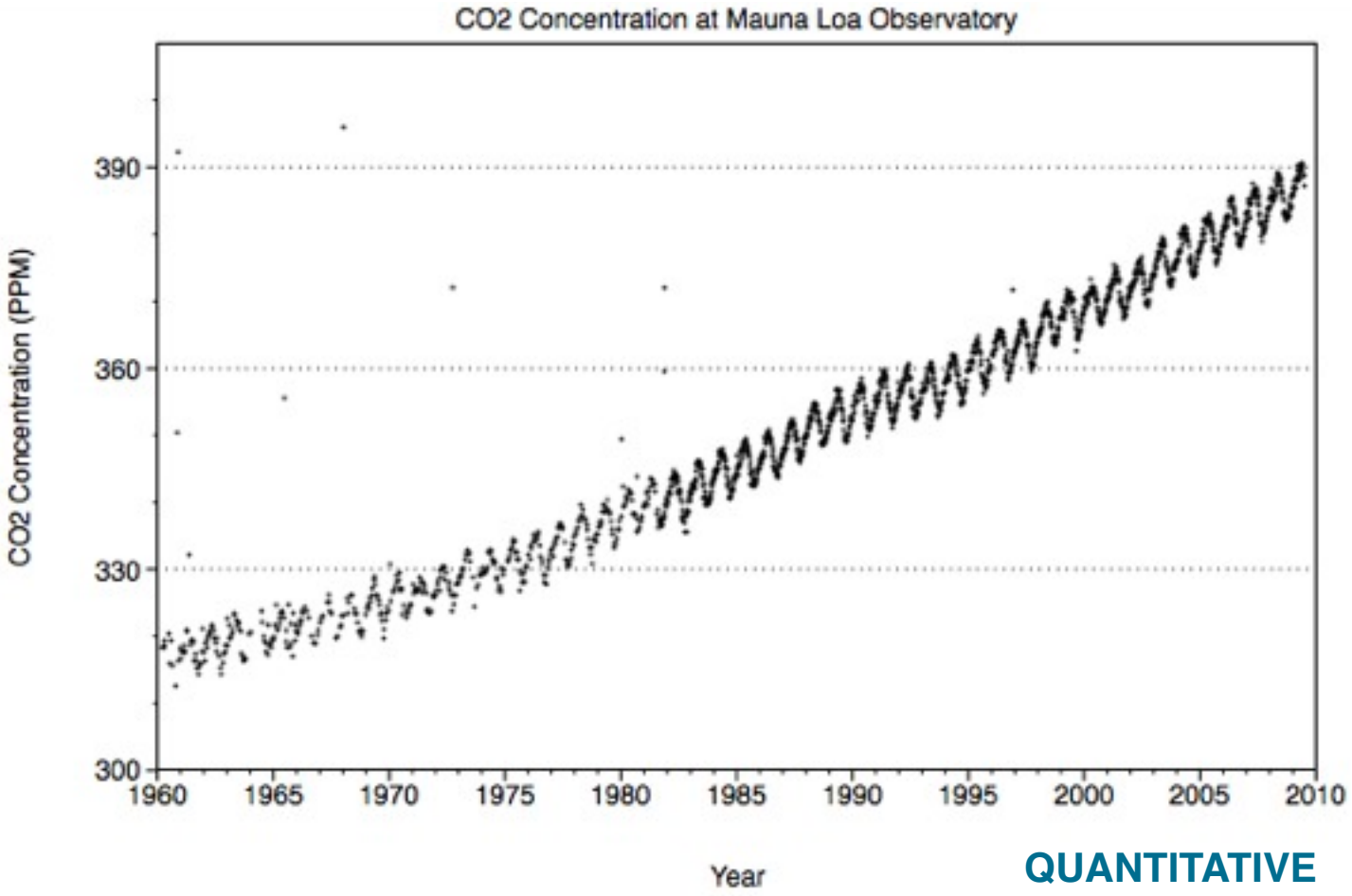

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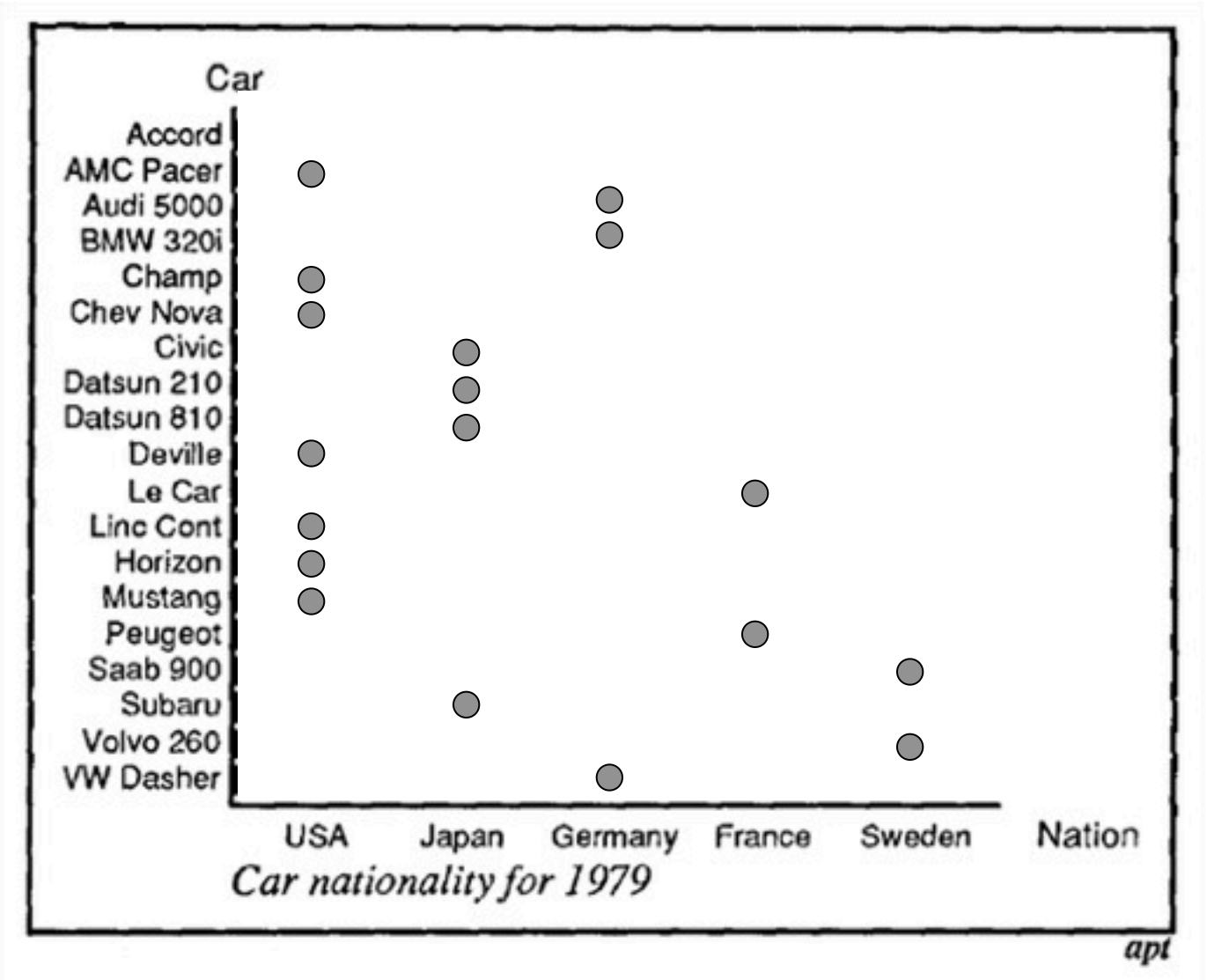

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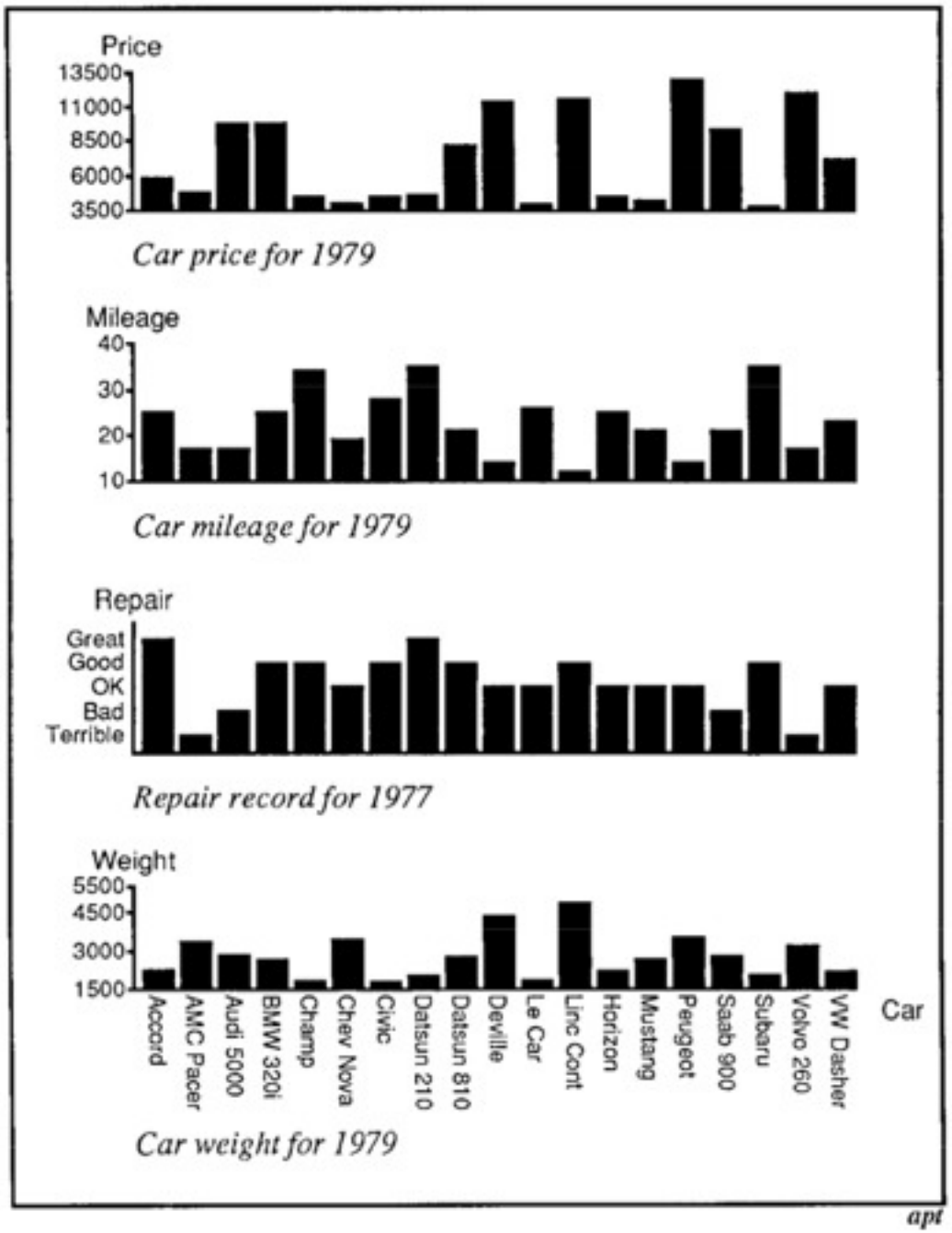

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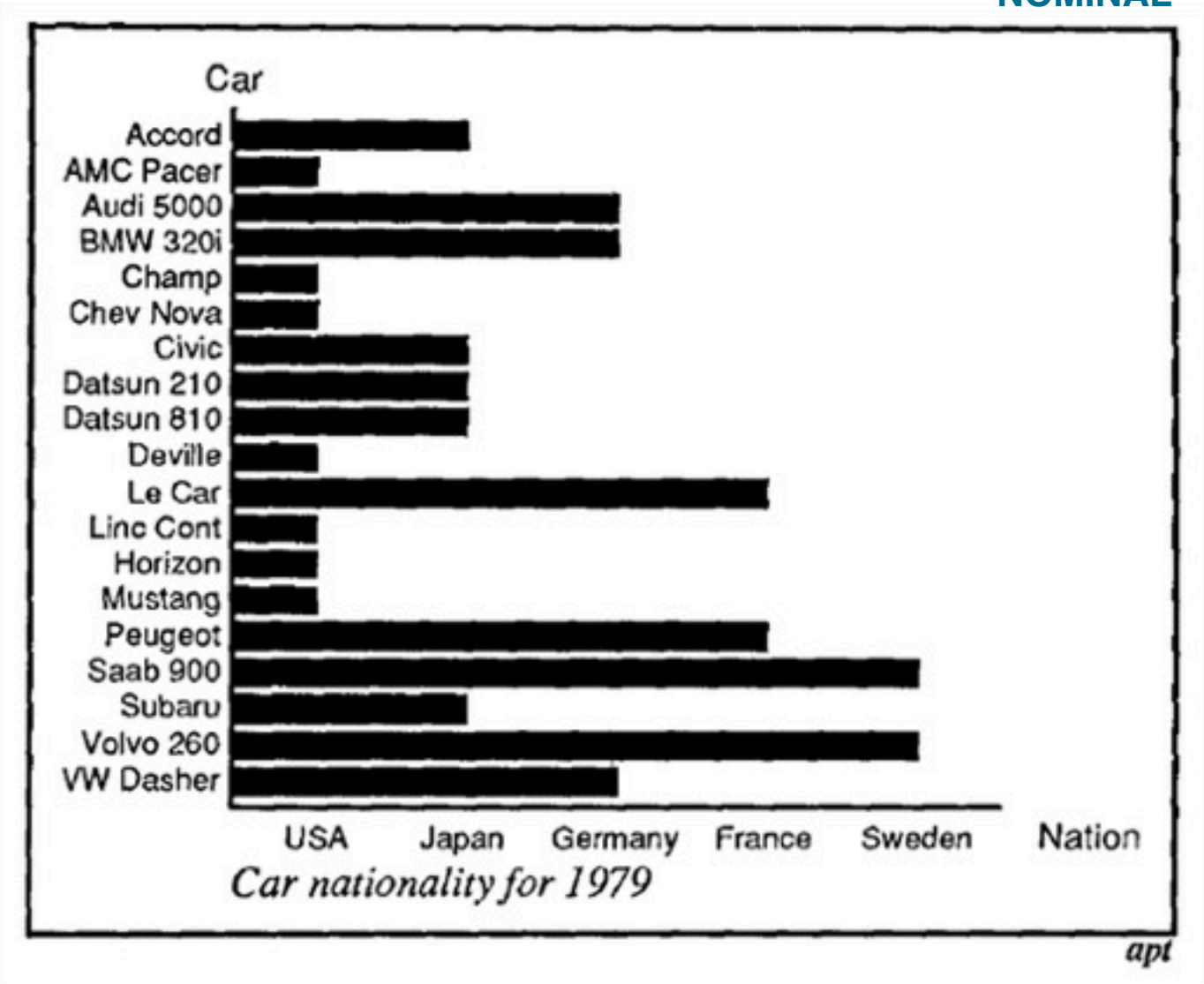

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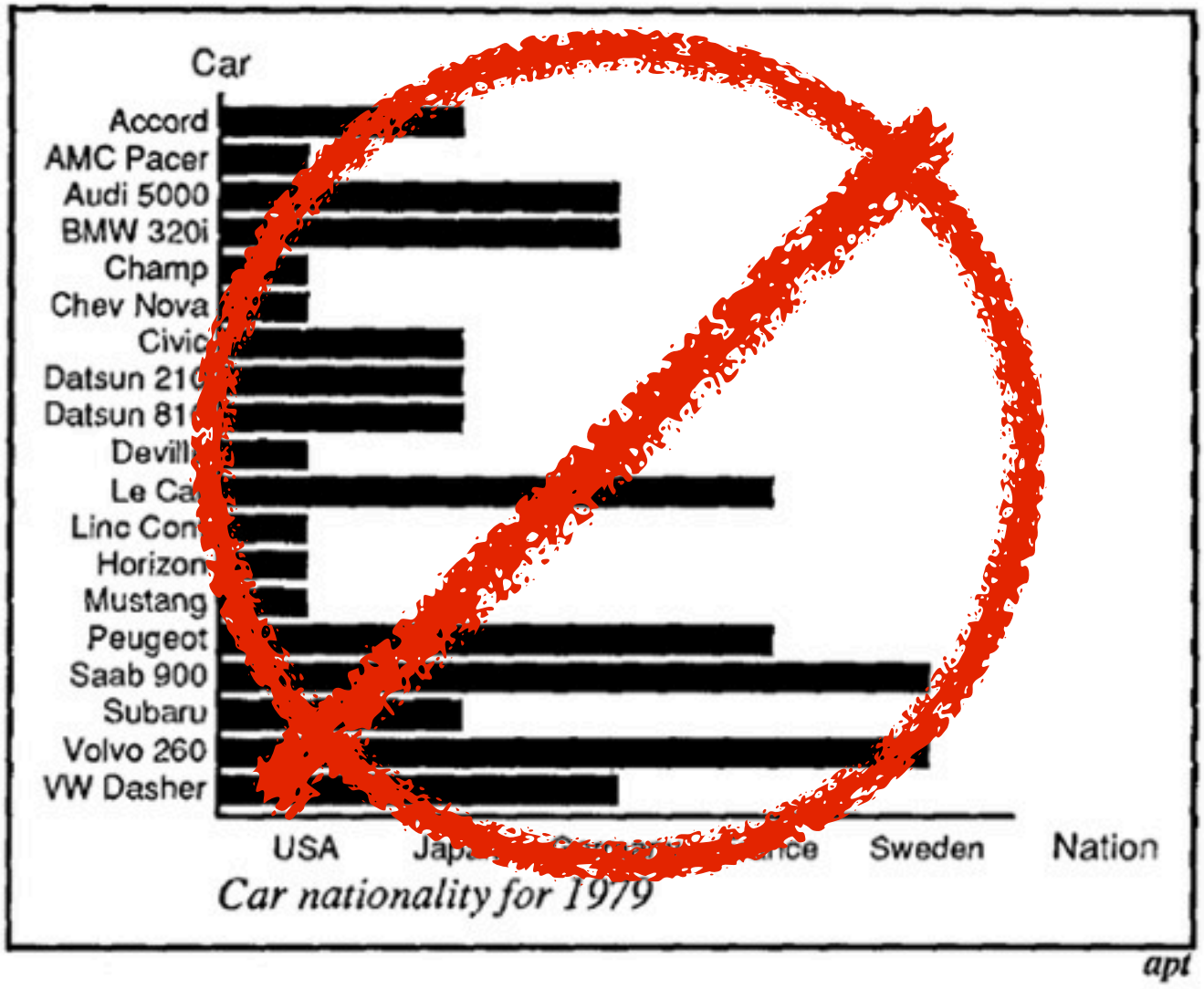

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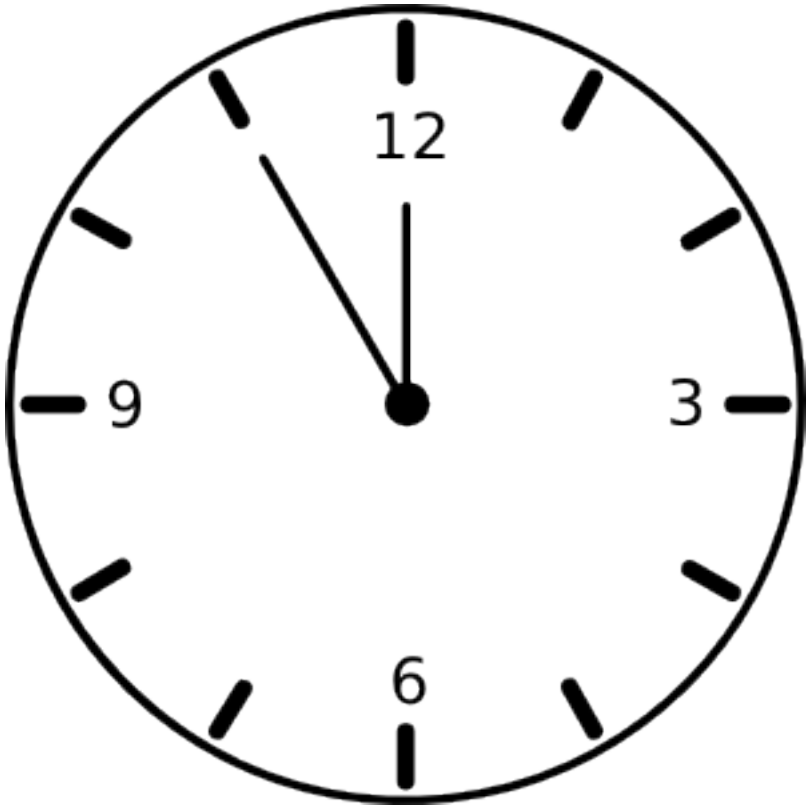

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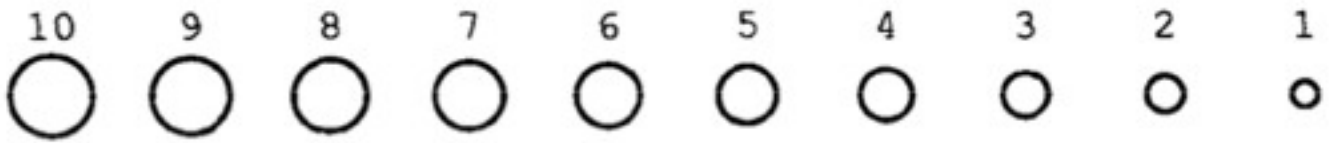

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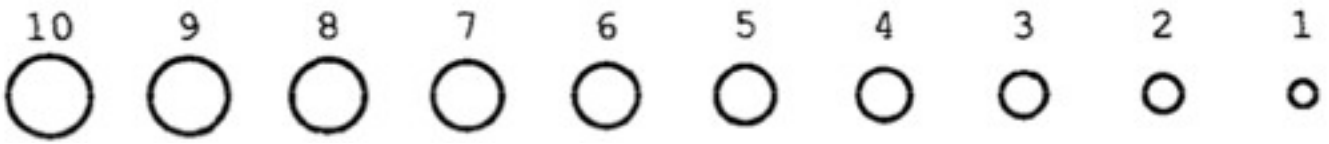

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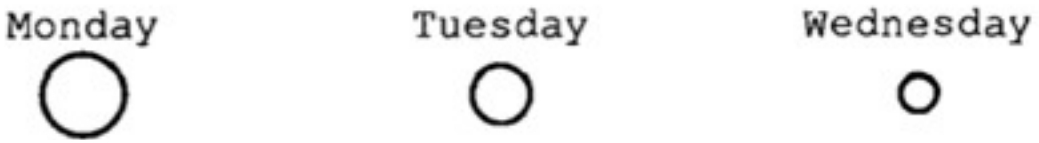

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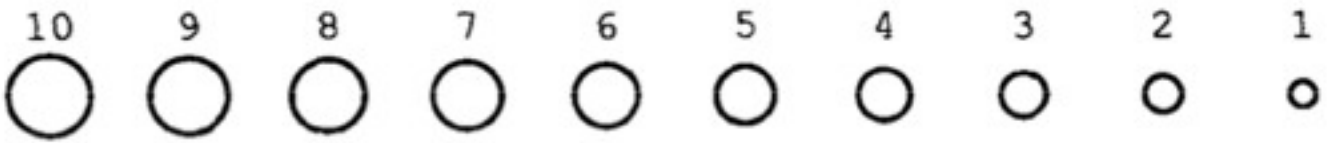

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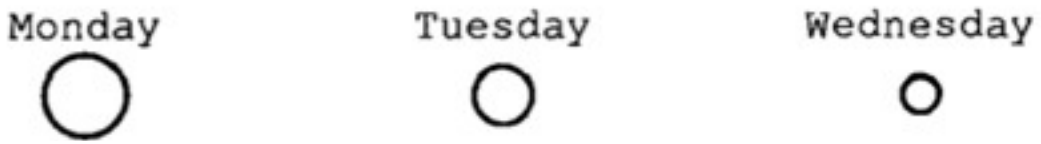

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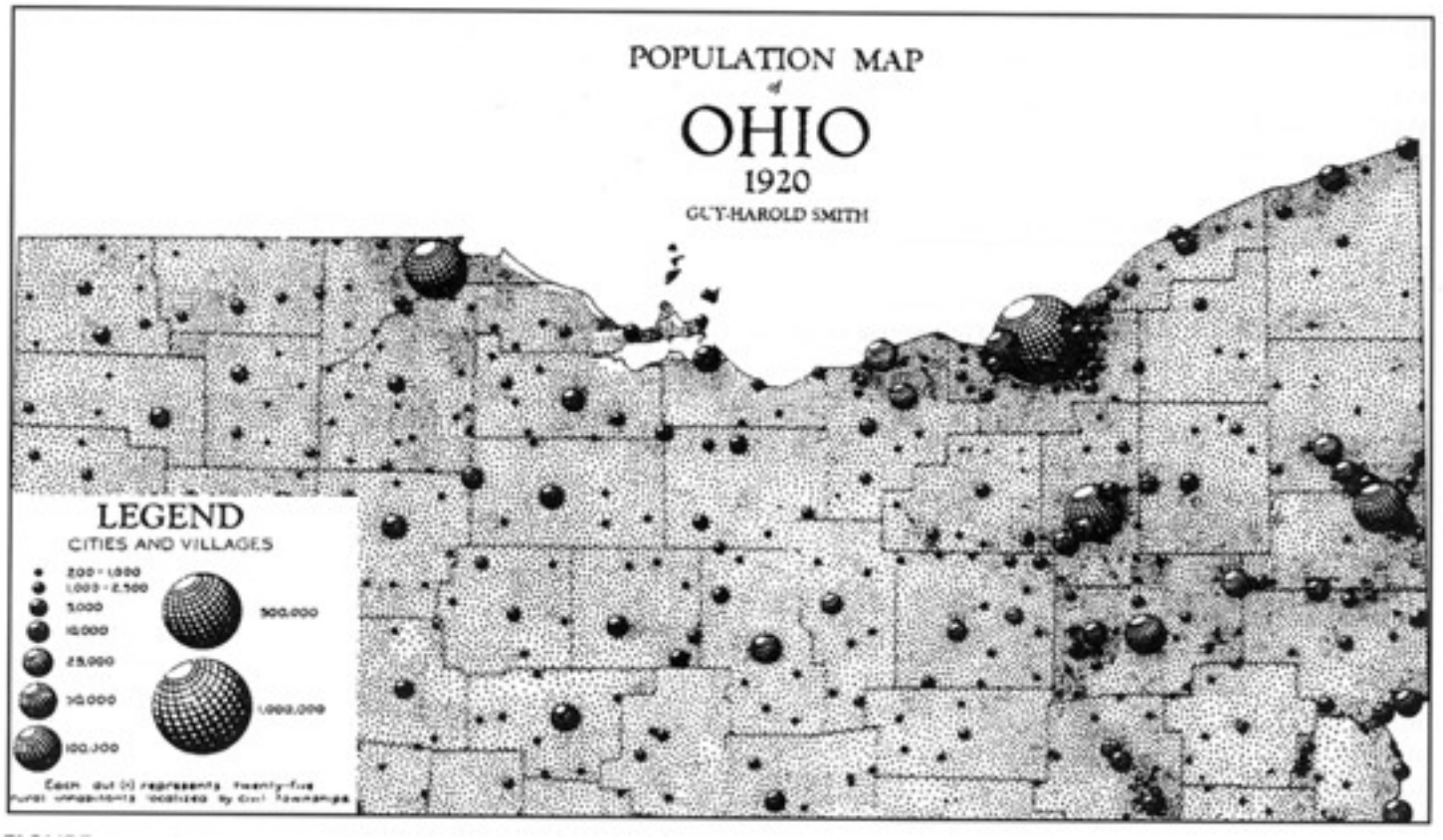

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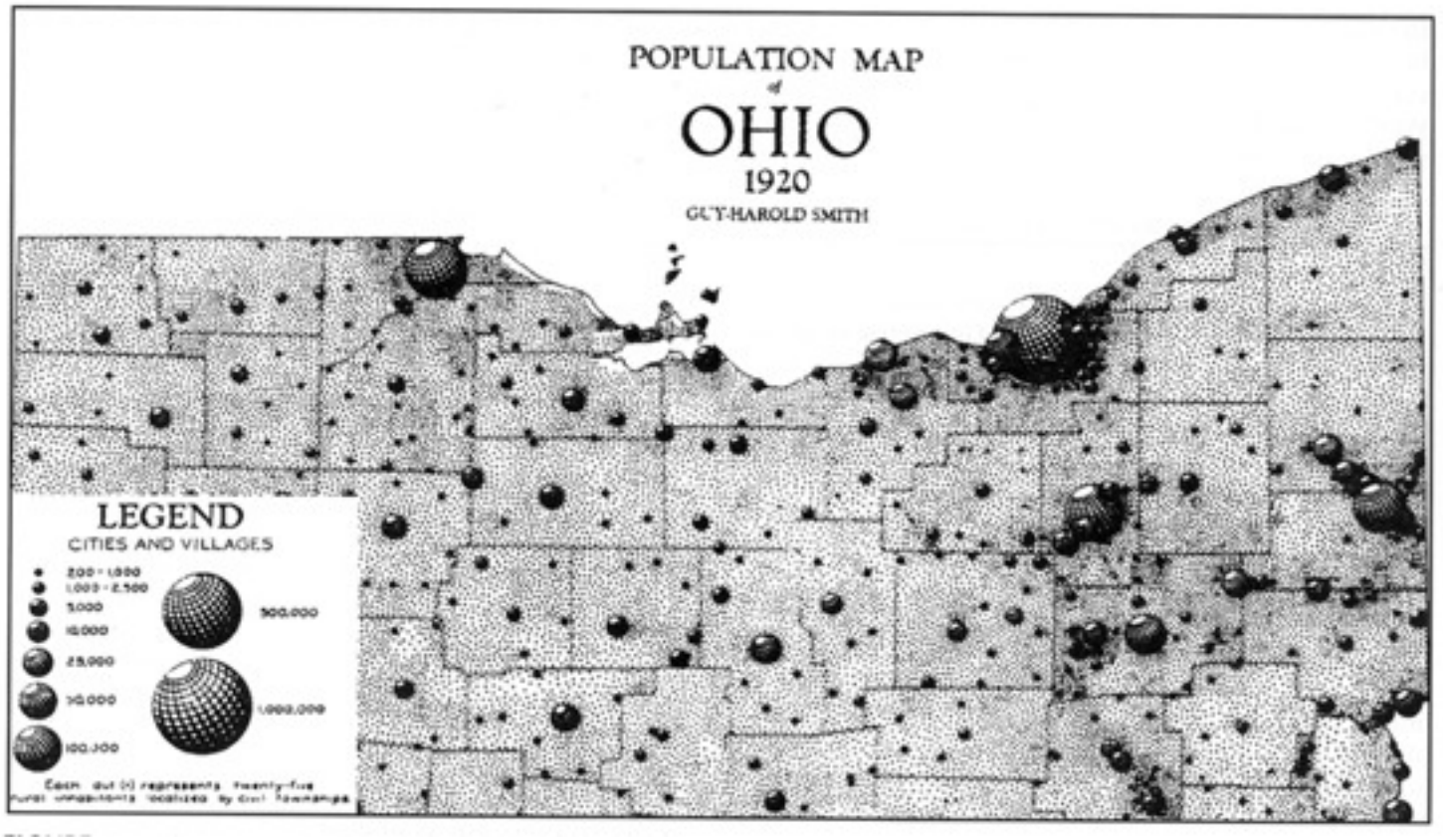

QUANTITATIVE

$$\text{Area} = \pi \cdot r^2$$

$$\text{Volume} = 4/3 \cdot \pi \cdot r^3$$

Position

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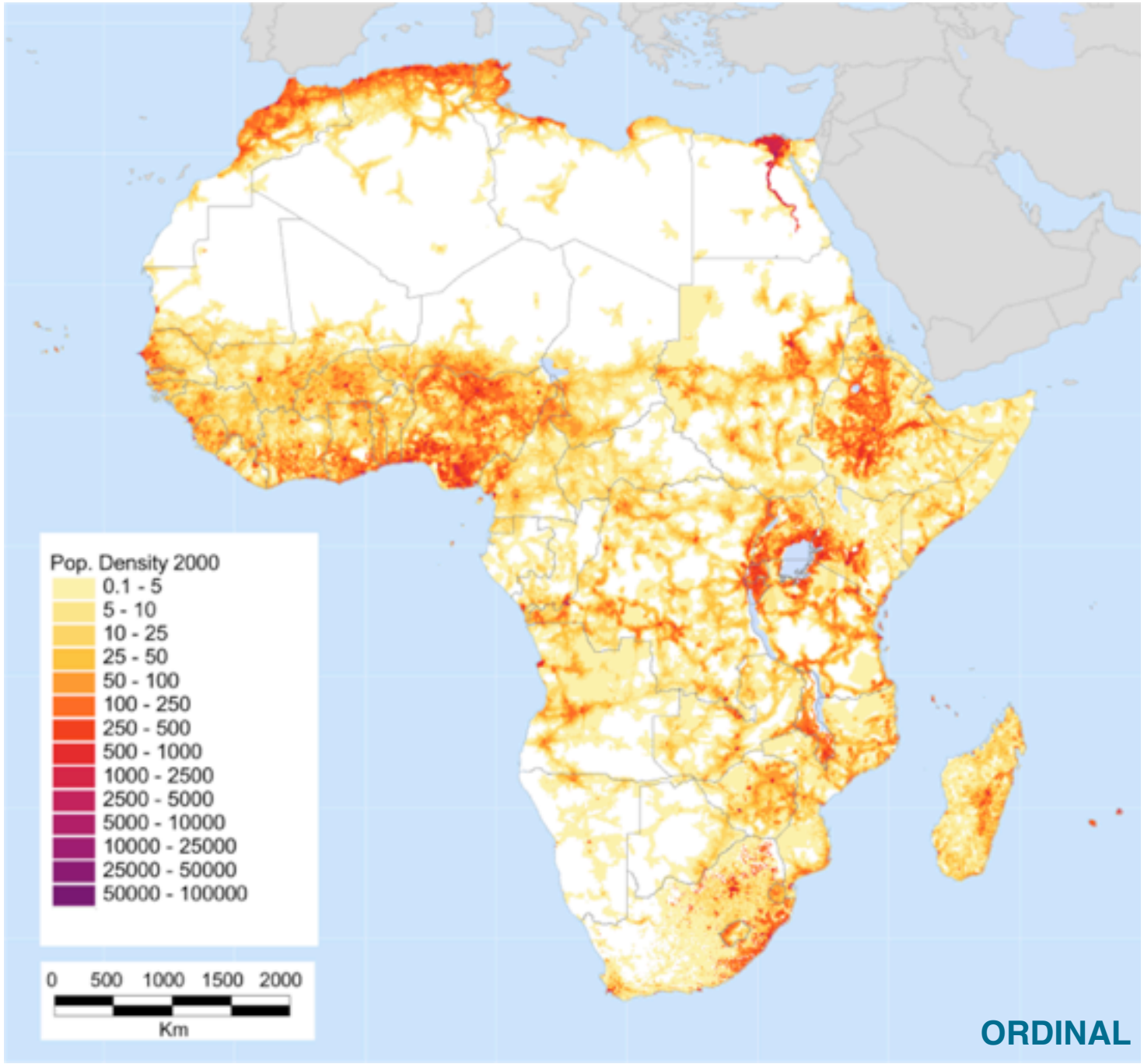

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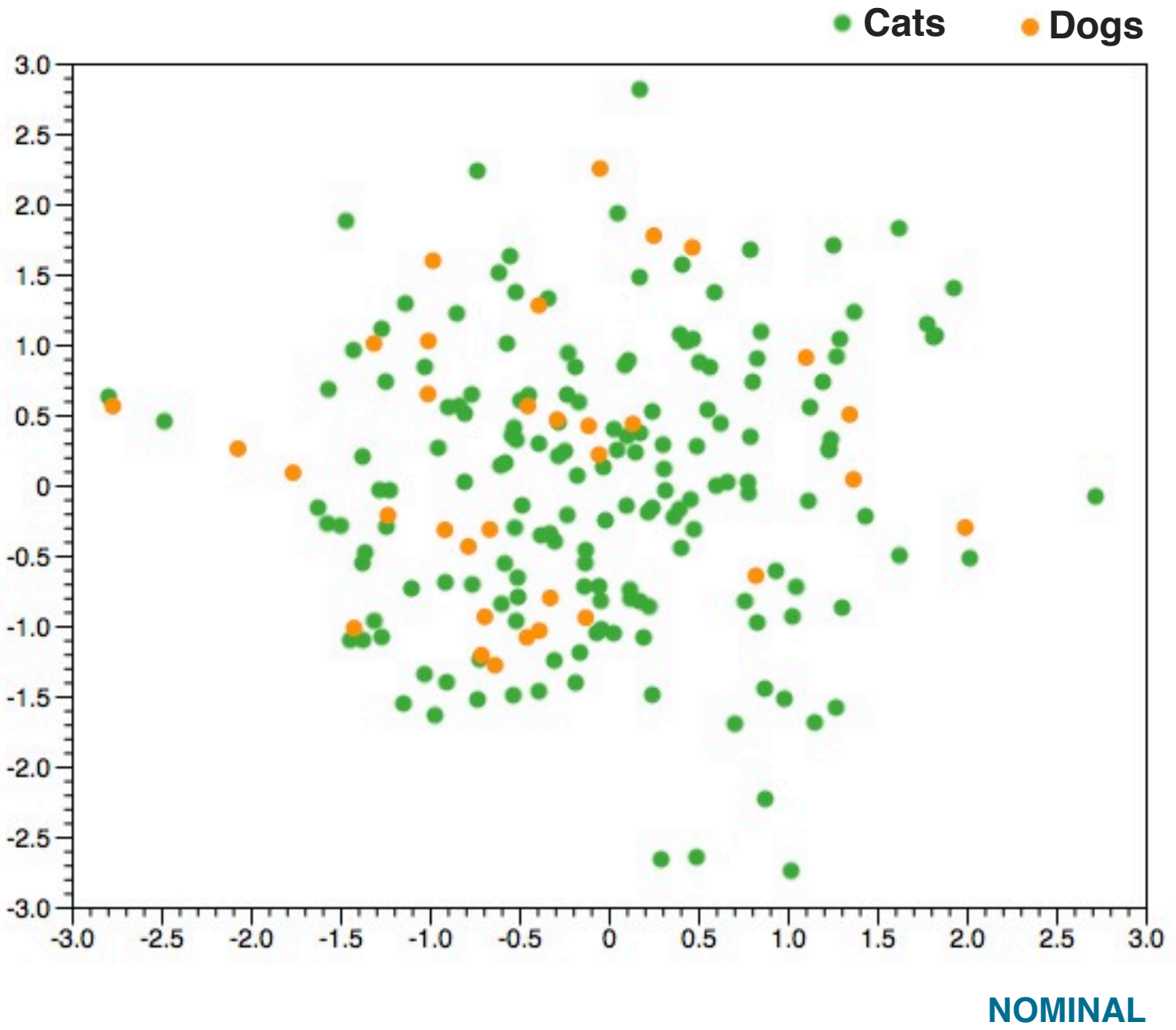

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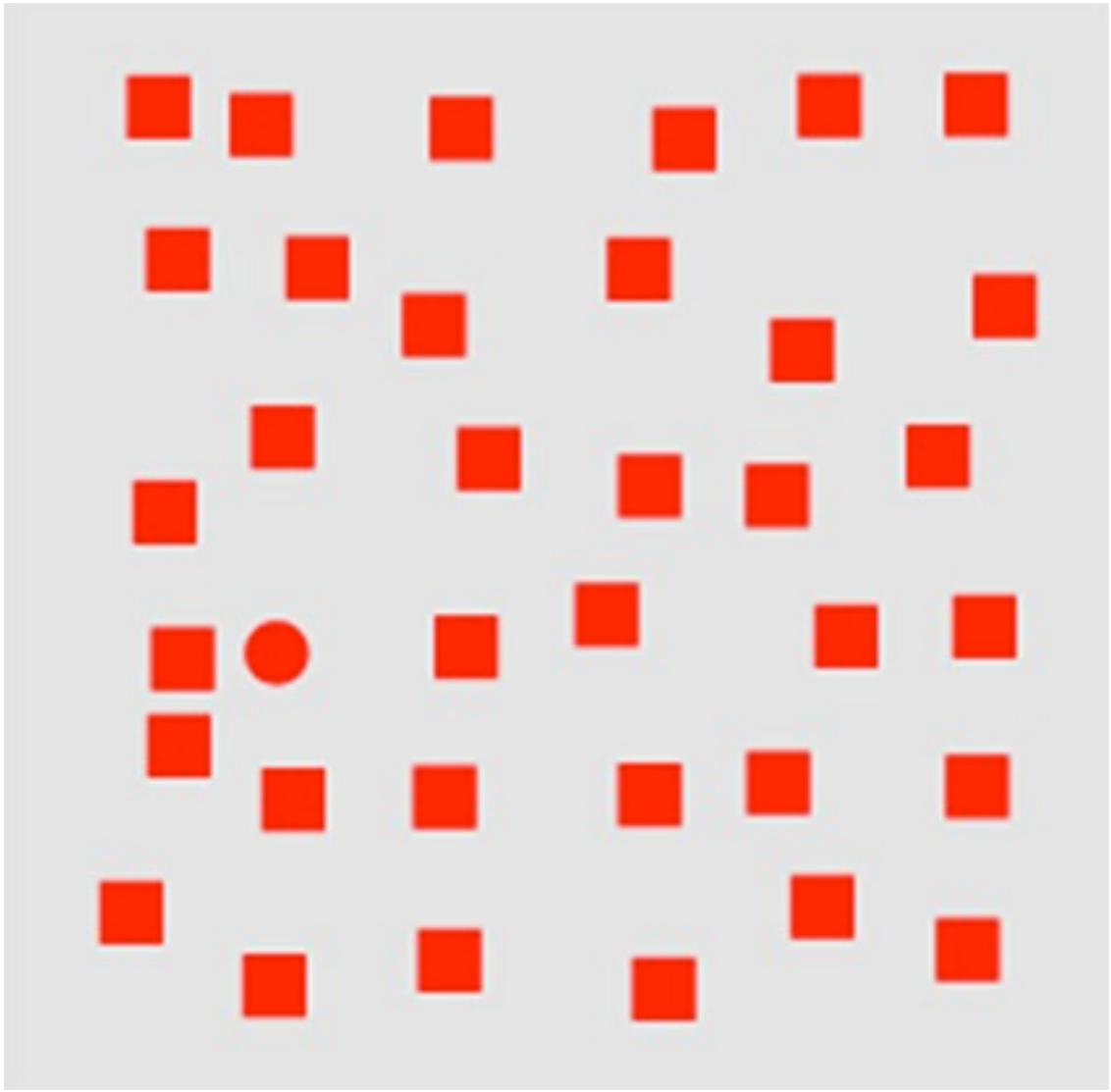

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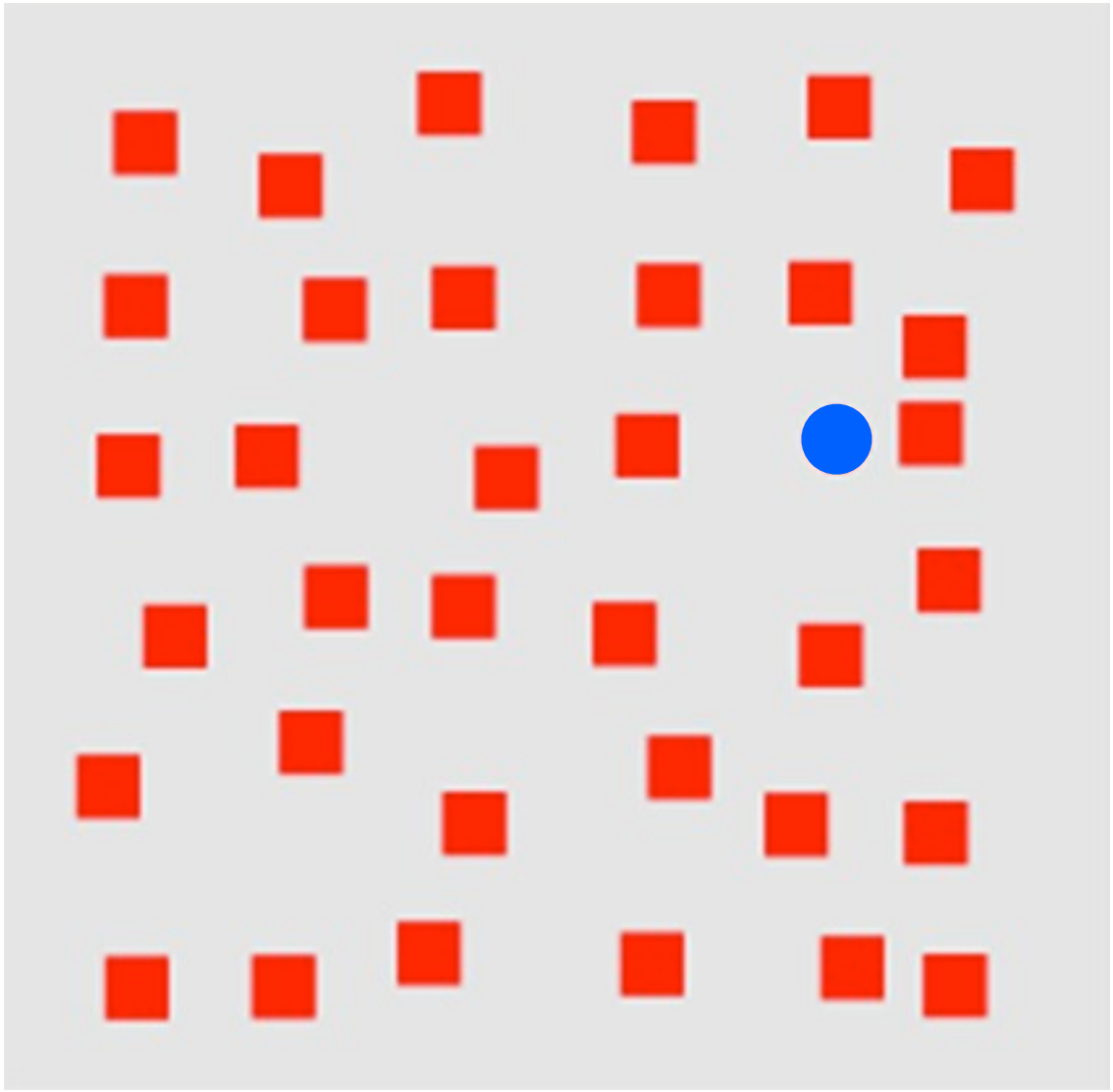

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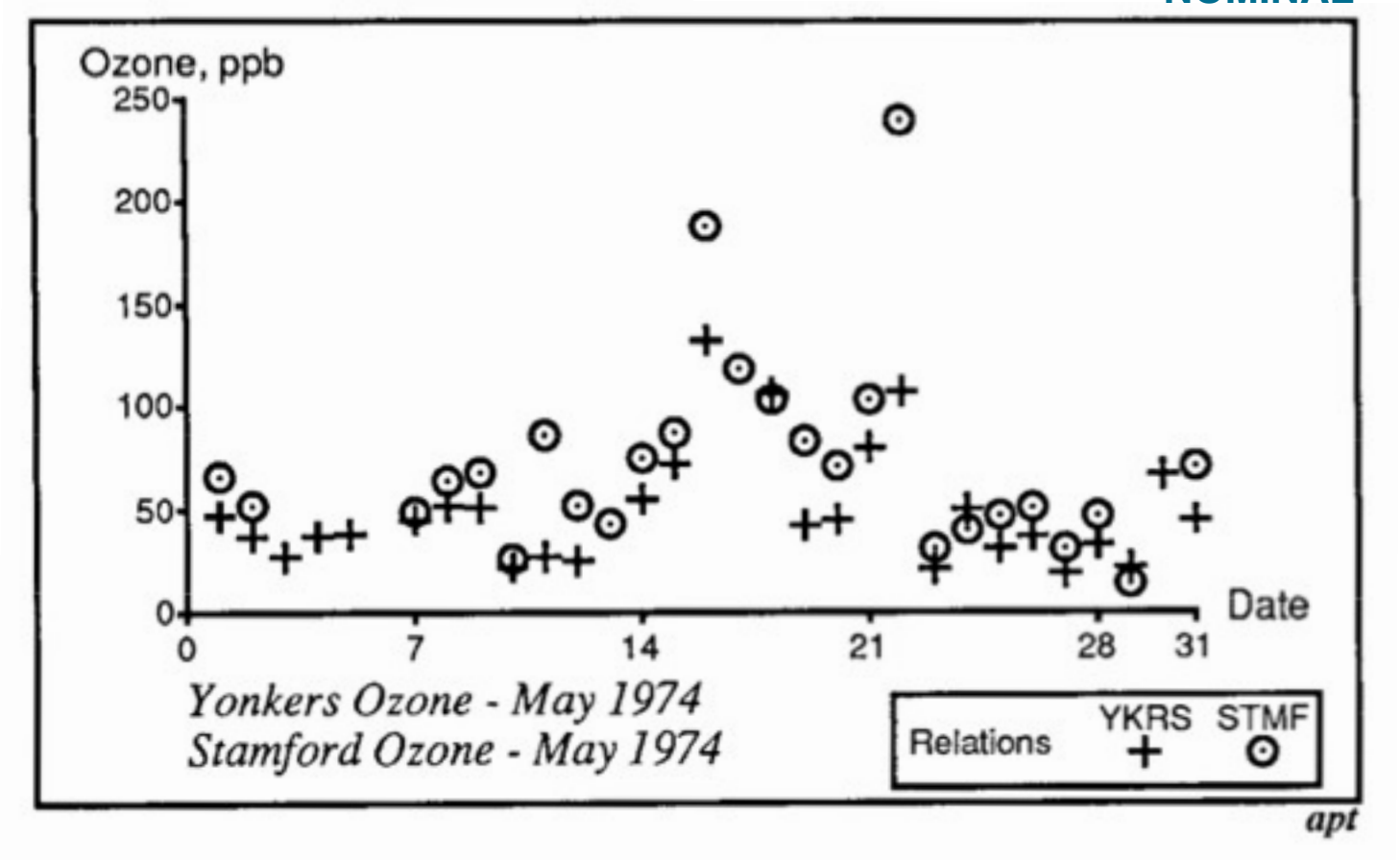

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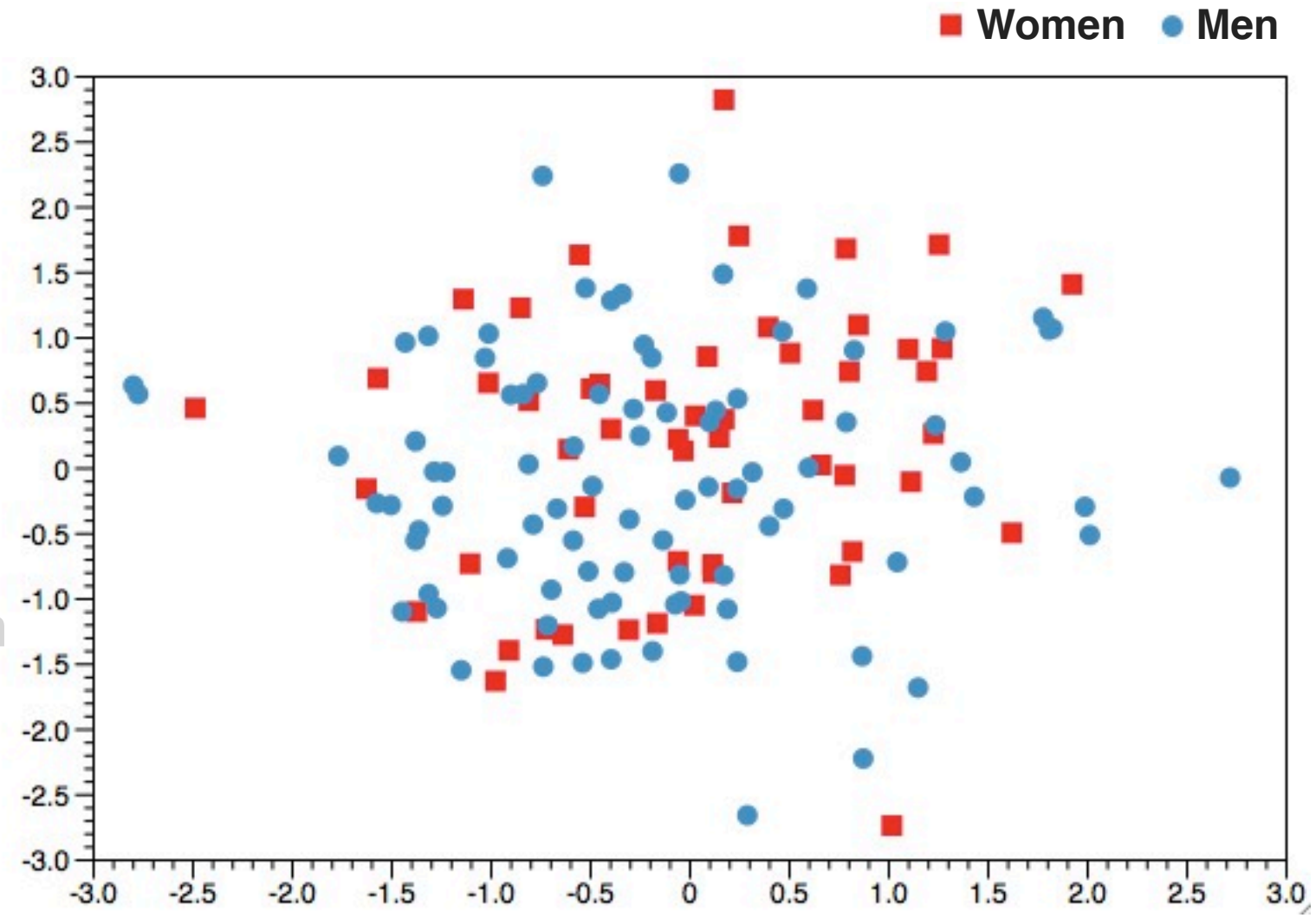

NOMINAL

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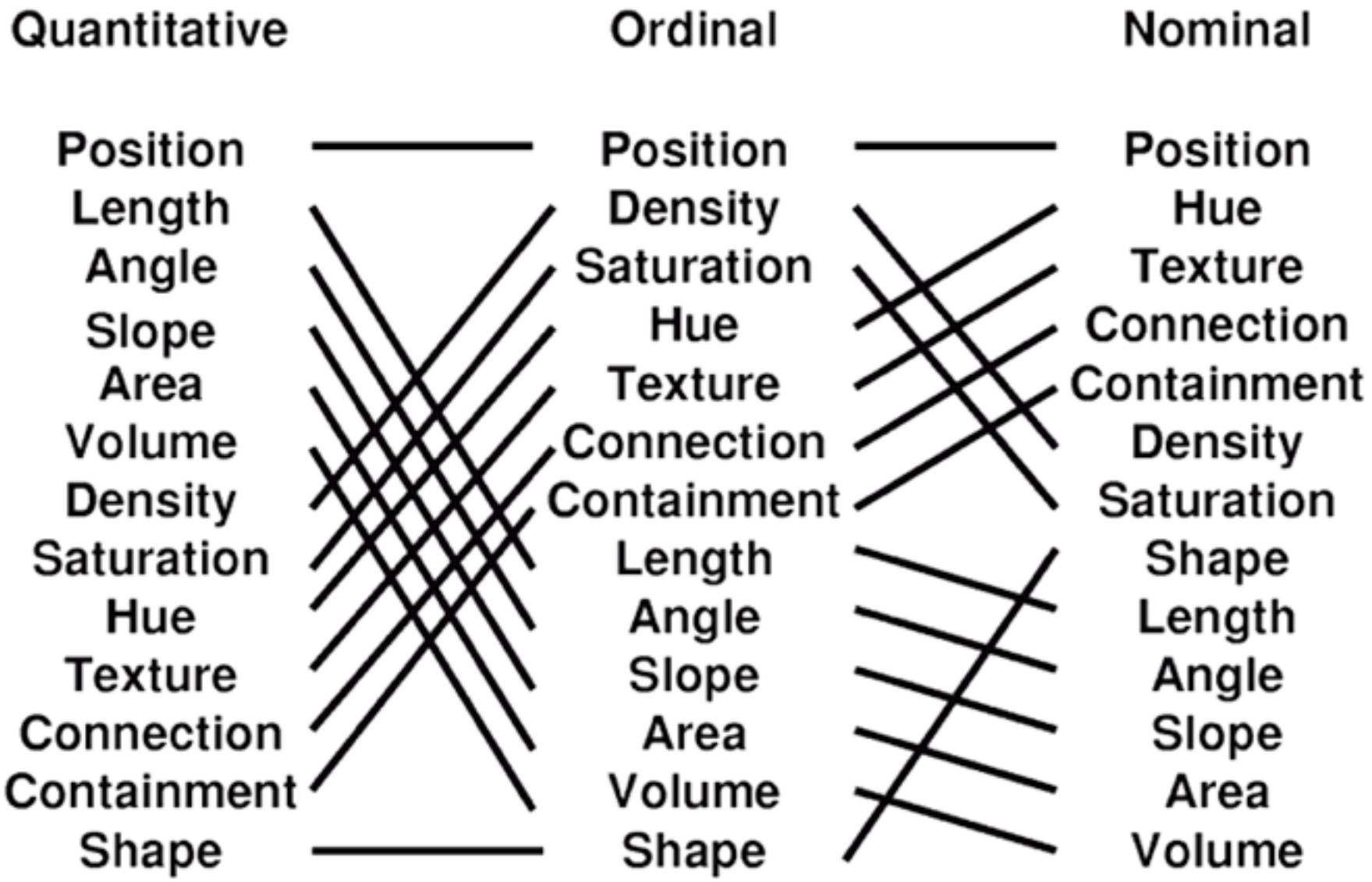
http://www.cs.cmu.edu/~treuille//resc/set/

Mackinlay's Ranking



Limitations of Mackinlay and Bertin

- Does not cover may visualization techniques
  - Networks, maps, diagrams
  - 3D, animation, illustration, photography

- Does not consider interaction

Review

- Be careful with stacked bar graphs and pie charts
- Use 3D sparingly
- Consider the appropriateness of a visual encoding for the data you're presenting
  - Some visual encodings are better suited to a given task

Next week

- No class on Monday
- Wednesday: Perceptual Properties