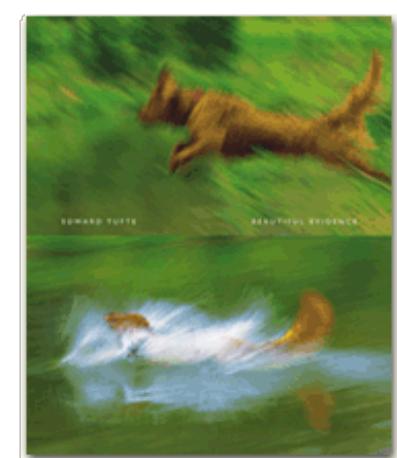
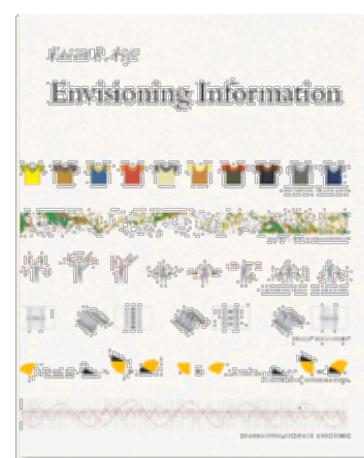
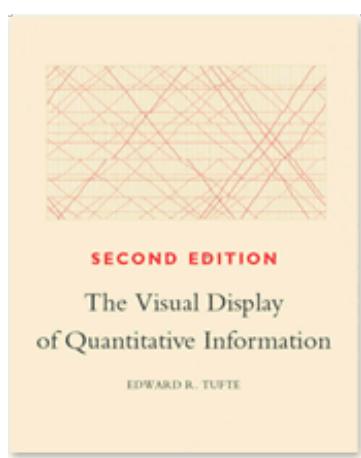
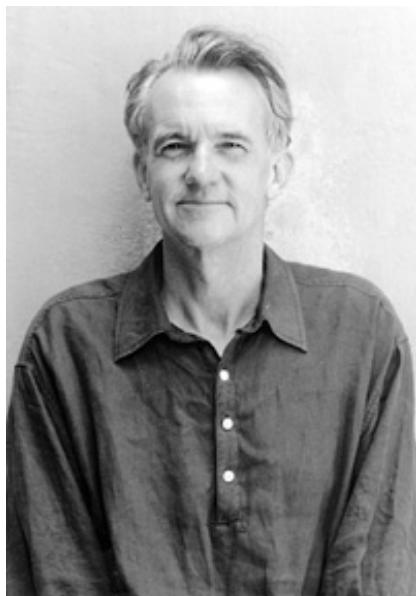


Data Visualization

Edward Tufte

Pioneer of Data Visualization

Loves data-dense, minimalistic visualizations



Tufte Principles

Above all else, show the data.

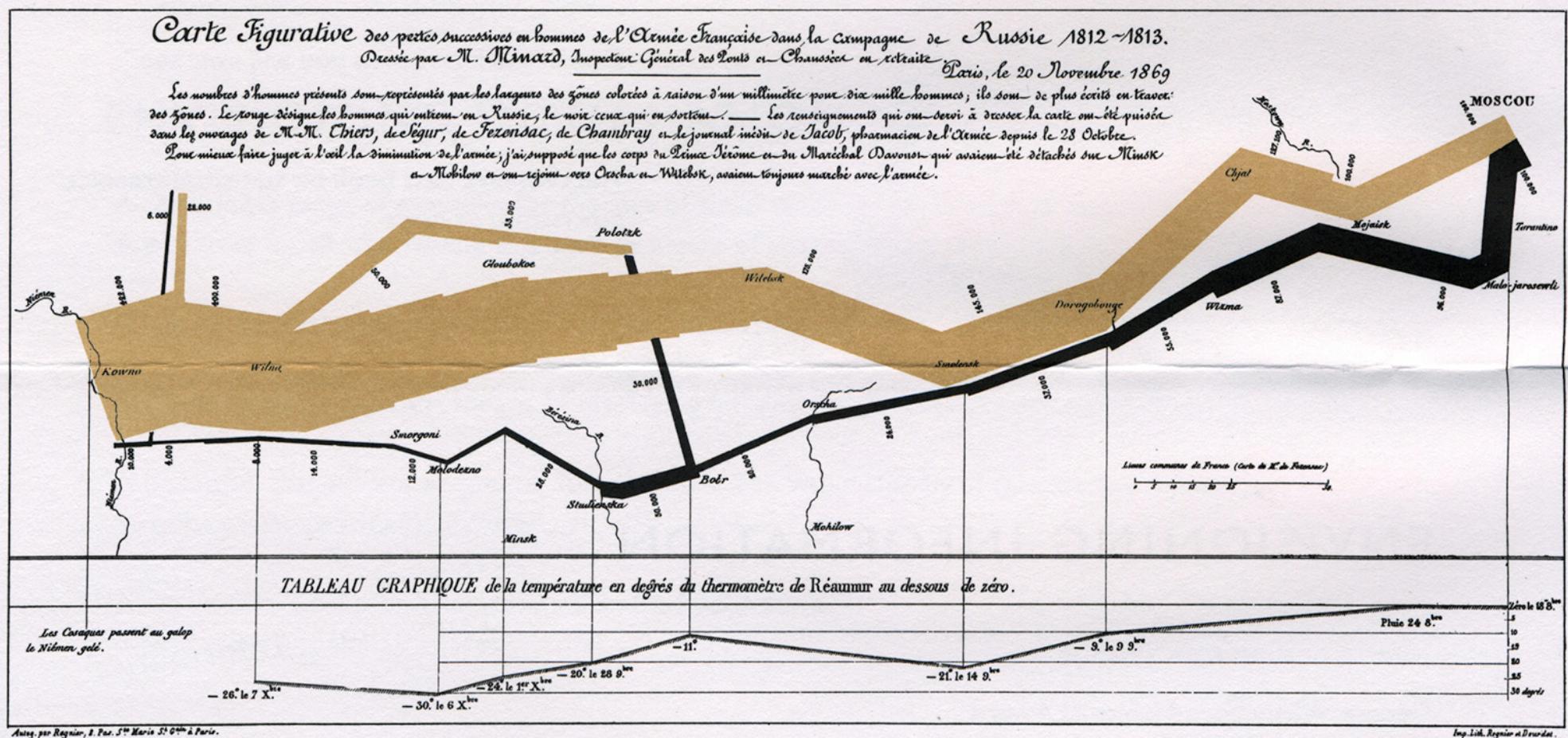
Maximize the data-ink ratio.

Erase non-data-ink

Erase redundant data-ink.

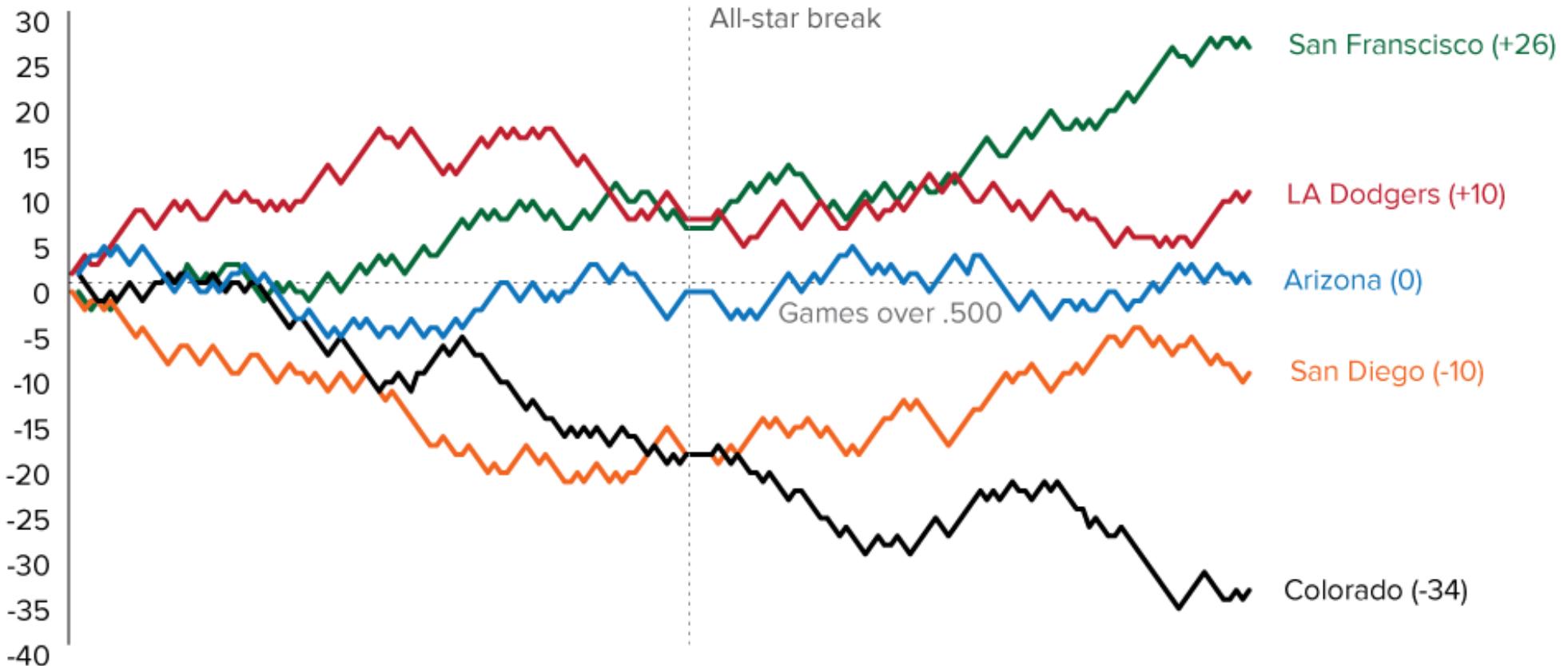
Revise and edit

Some of Tufte's Favorite Visualizations

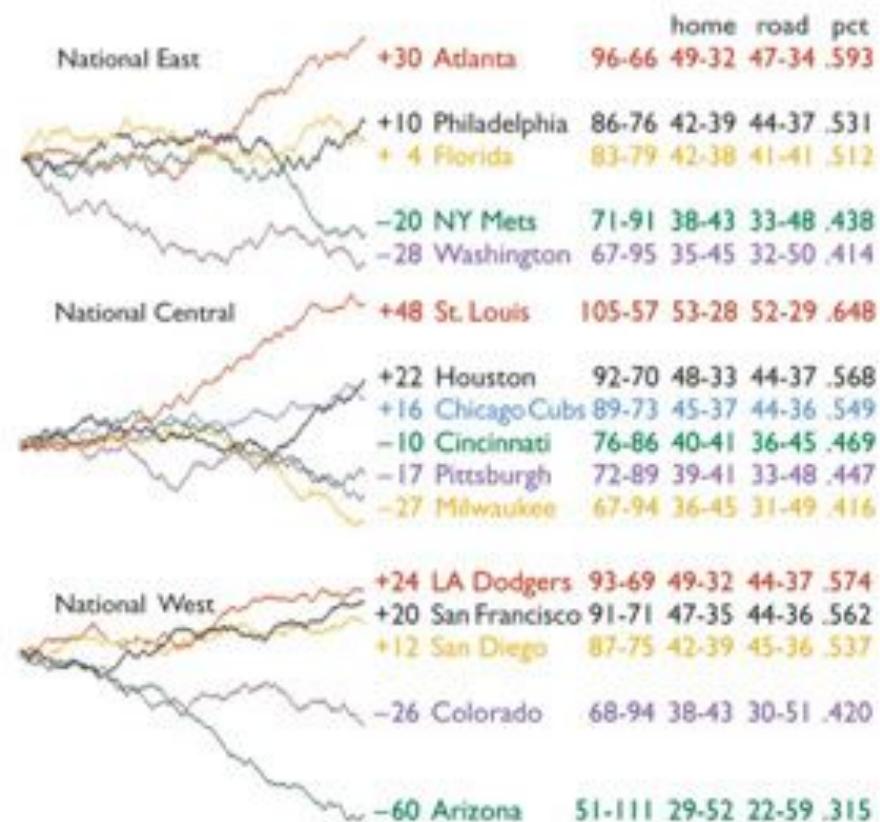
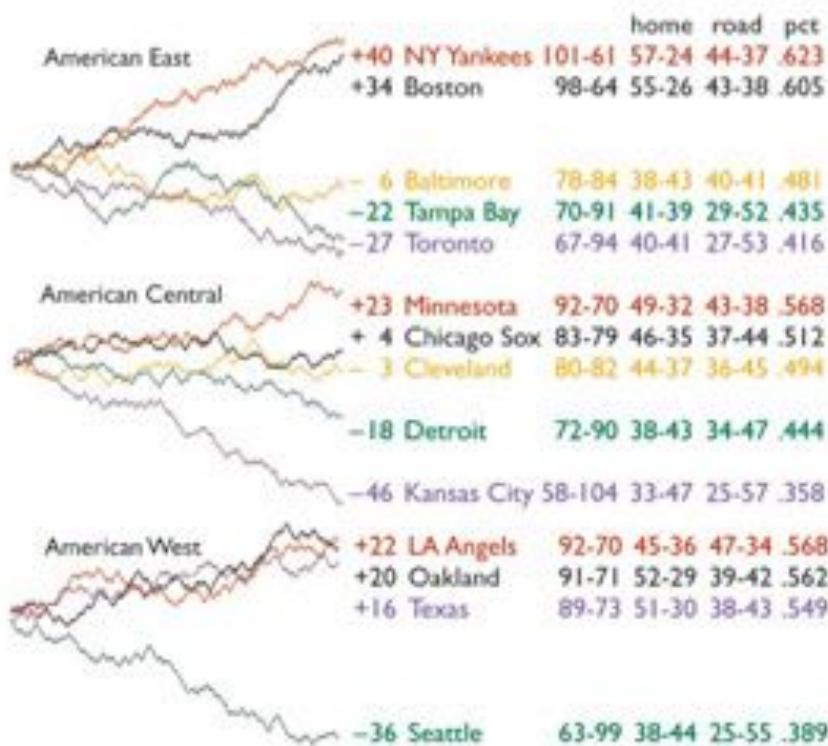


Some of Tufte's Favorite Visualizations

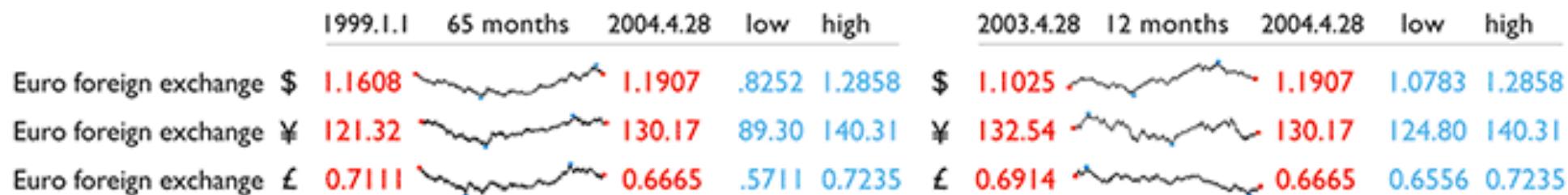
National League West: 2012



Some of Tufte's Favorite Visualizations



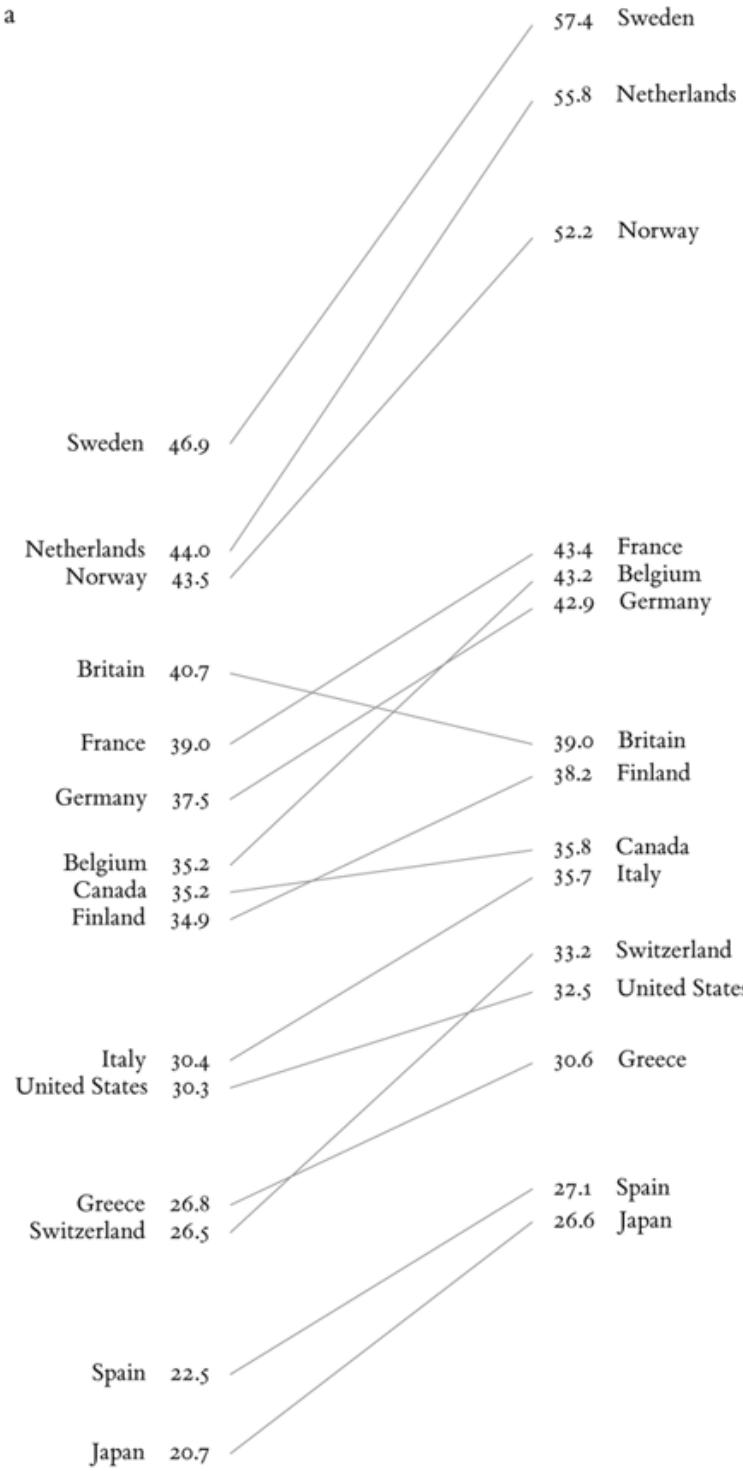
Some of Tufte's Favorite Visualizations



Current Receipts of Government as a
Percentage of Gross Domestic
Product, 1970 and 1979

1970

1979



Tufte Principles

Above all else, show the data.

Maximize the data-ink ratio.

Erase non-data-ink

Erase redundant data-ink.

Revise and edit

Visual Cues

Position

Length

Angle

Direction

Shapes

Area or Volume

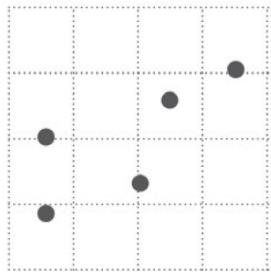
Color

Visual cues

When you visualize data, you encode values to shapes, sizes, and colors.

Position

Where in space the data is



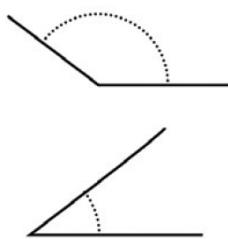
Length

How long the shapes are



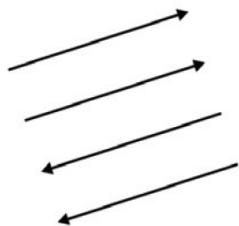
Angle

Rotation between vectors



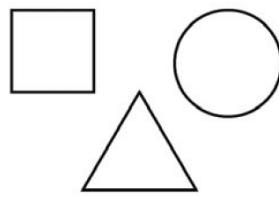
Direction

Slope of a vector in space



Shapes

Symbols as categories



Area

How much 2-D space



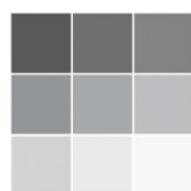
Volume

How much 3-D space



Color saturation

Intensity of a color hue



Color hue

Usually referred to as color



FIGURE 3-3 Visual cues

Visual cues

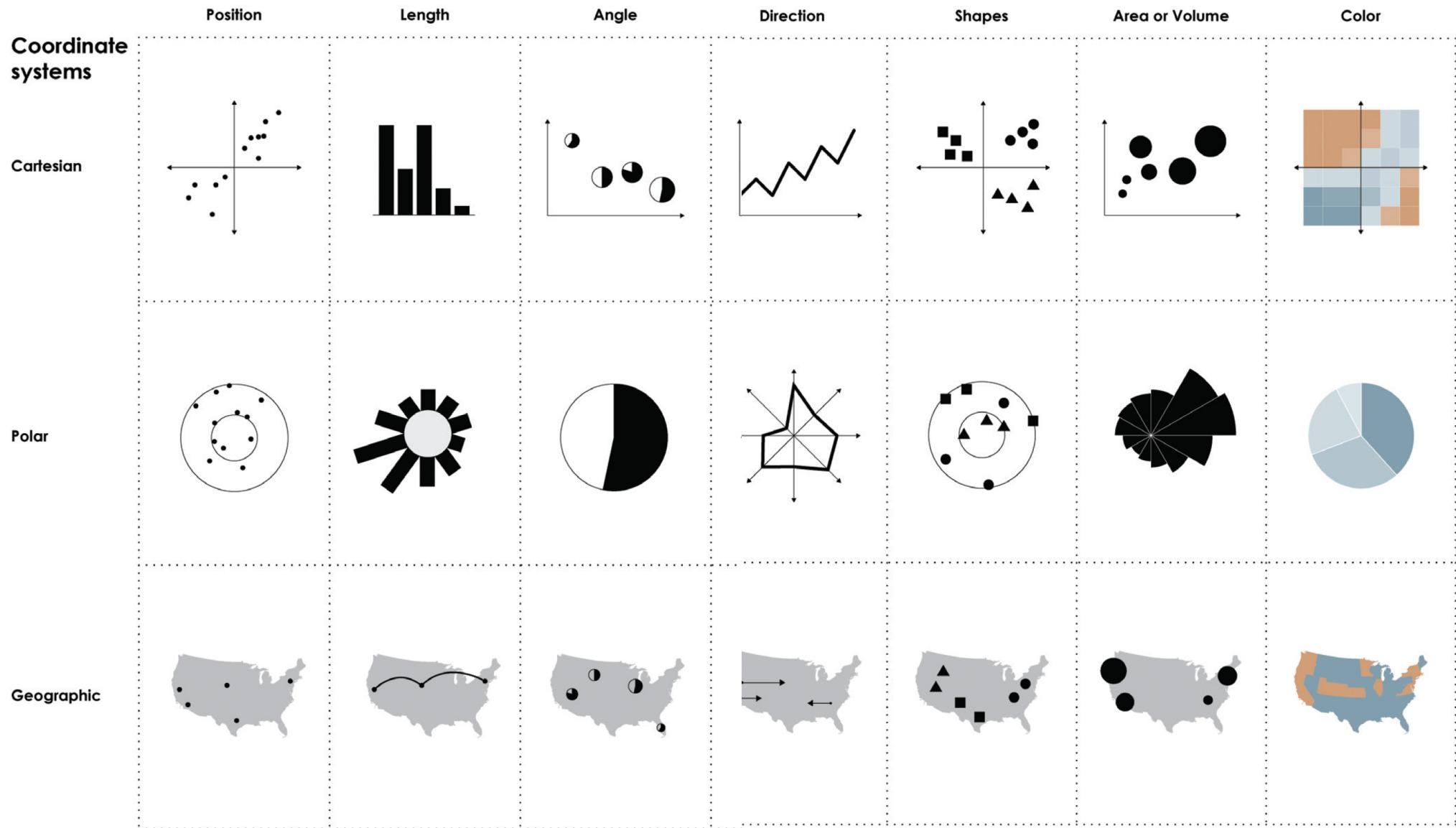


FIGURE 3-25 Visualization component combinations

Principles from Nathan Yau

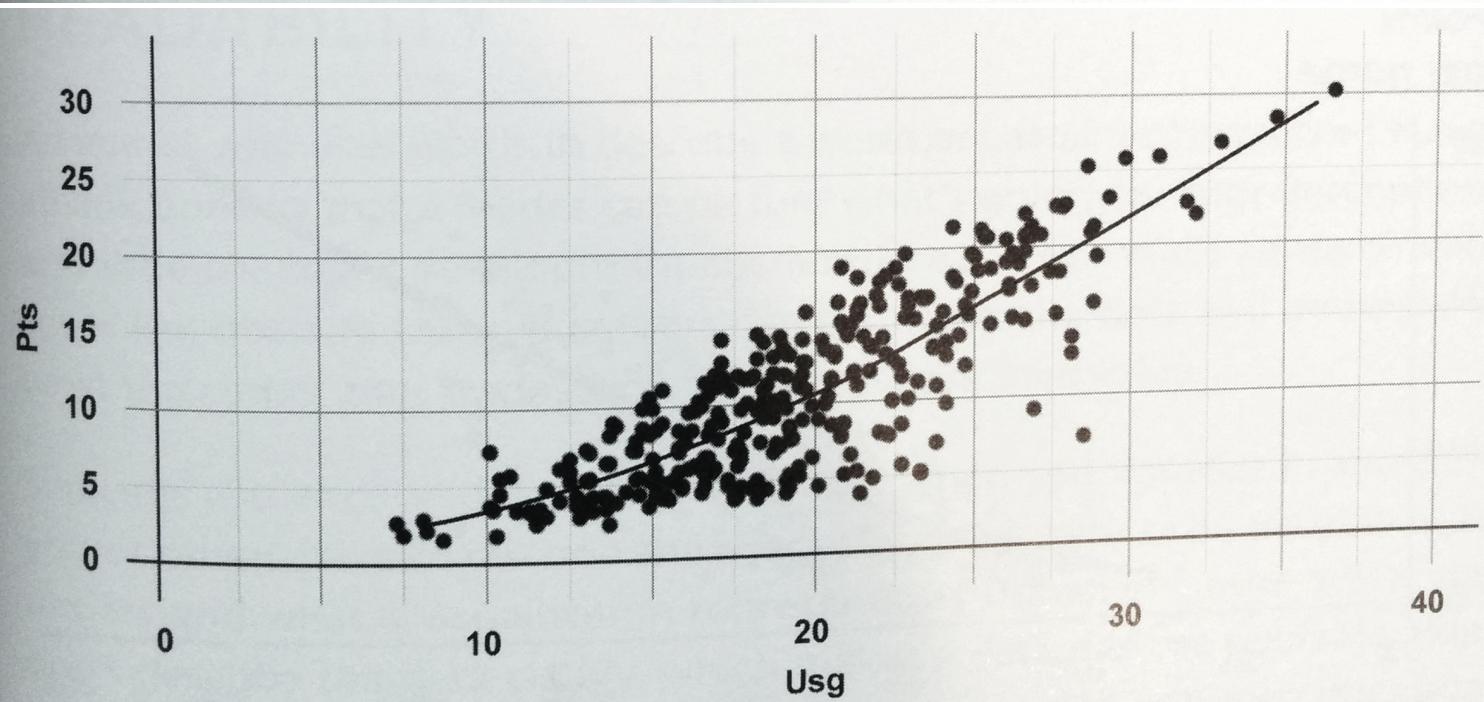
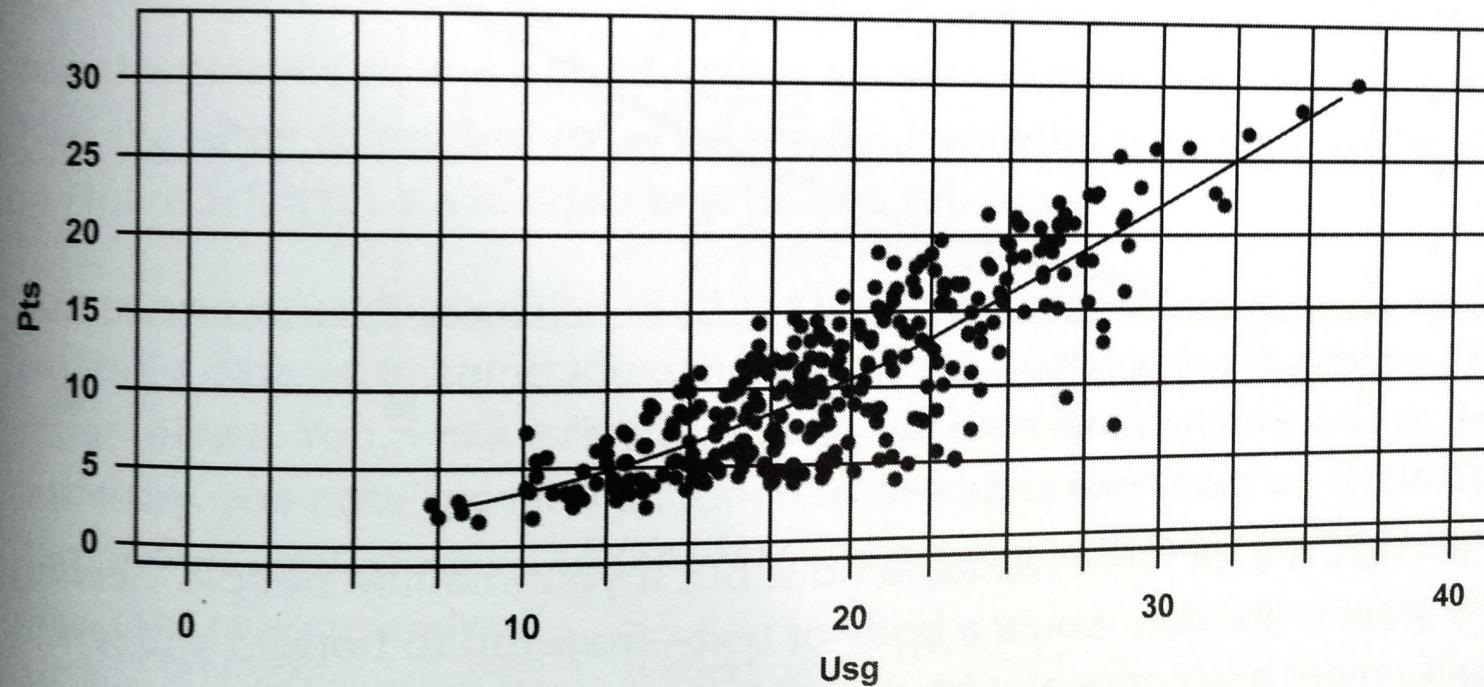
Visual Hierarchy

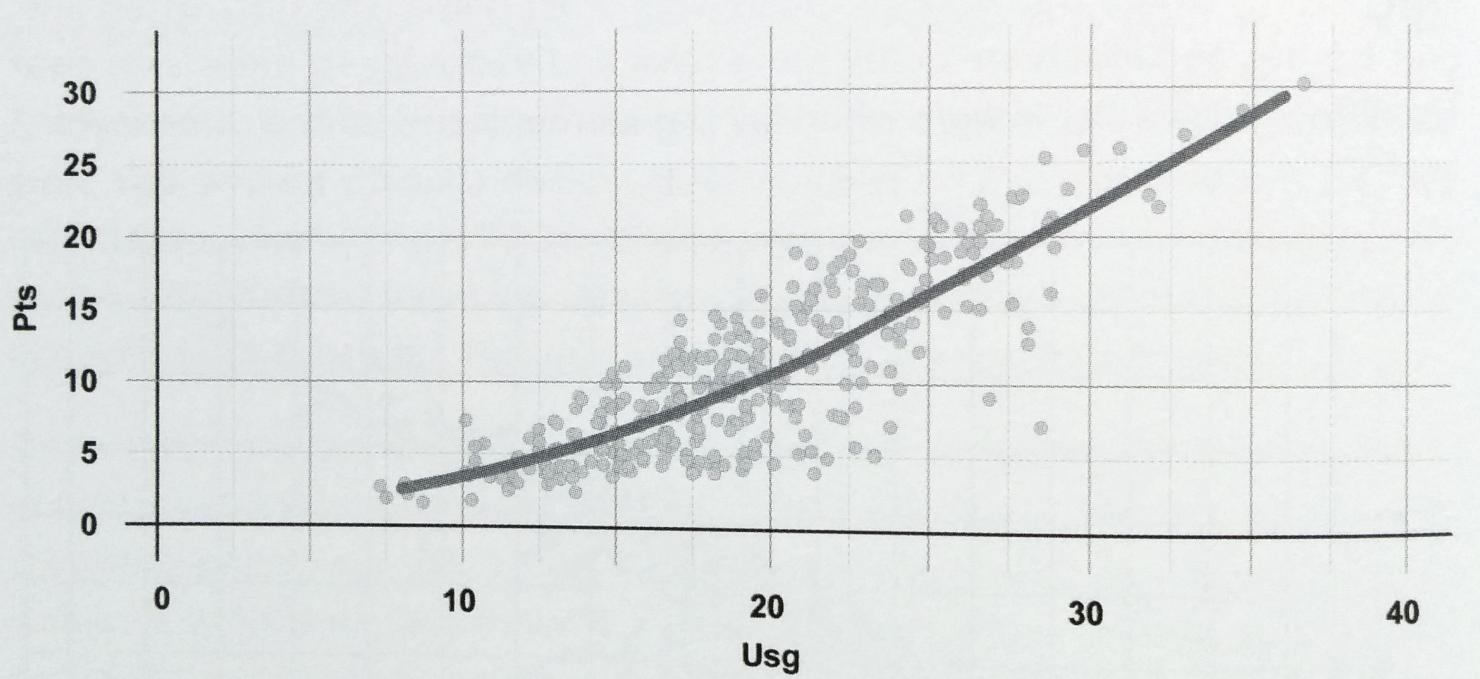
Readability

Highlighting to Guide Readers Through

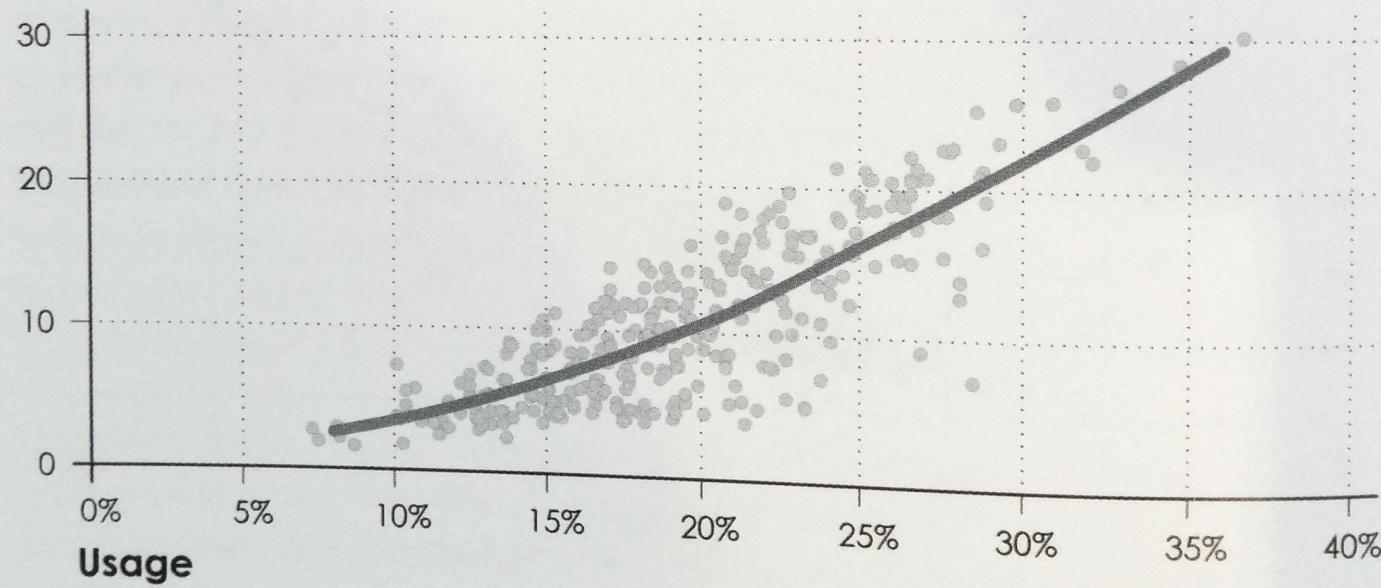
Annotation to Explain the Data

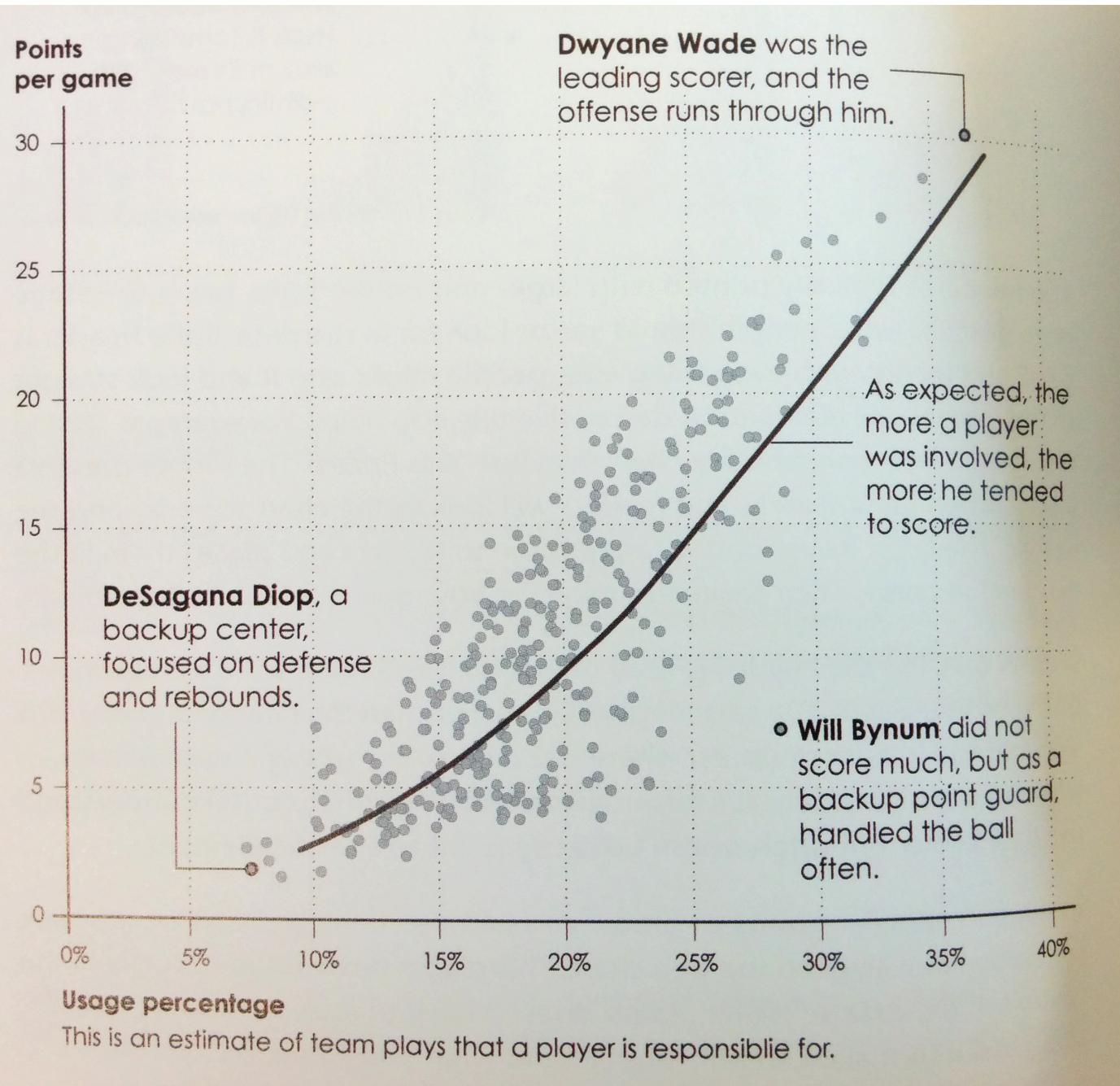
Do The Math





Points
per game



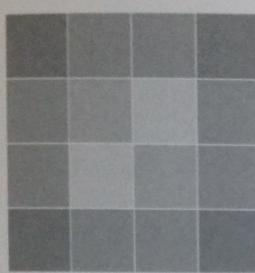


Harder to Compare

Easier to Compare

Narrow color scale

Colors look washed out and pattern is less obvious.



Wide color scale

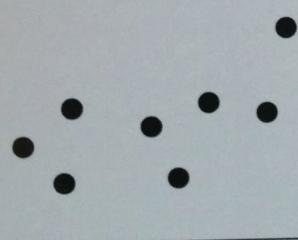
Greater contrast between bins makes pattern obvious.



vs.

Showing data points only

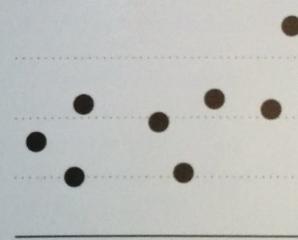
It's harder to compare positions as you scan across.



vs.

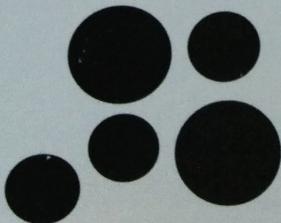
Additional visual elements

Line increments make comparison quicker.



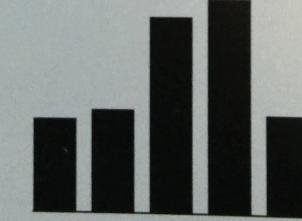
Using area as visual cue

Although area has its merits, it can be hard to see small differences.



Using length as visual cue

Small differences are easier to see without a square root transform.



vs.

FIGURE 5-7 Allowing comparisons