

So, you want to be a Data Vizard.

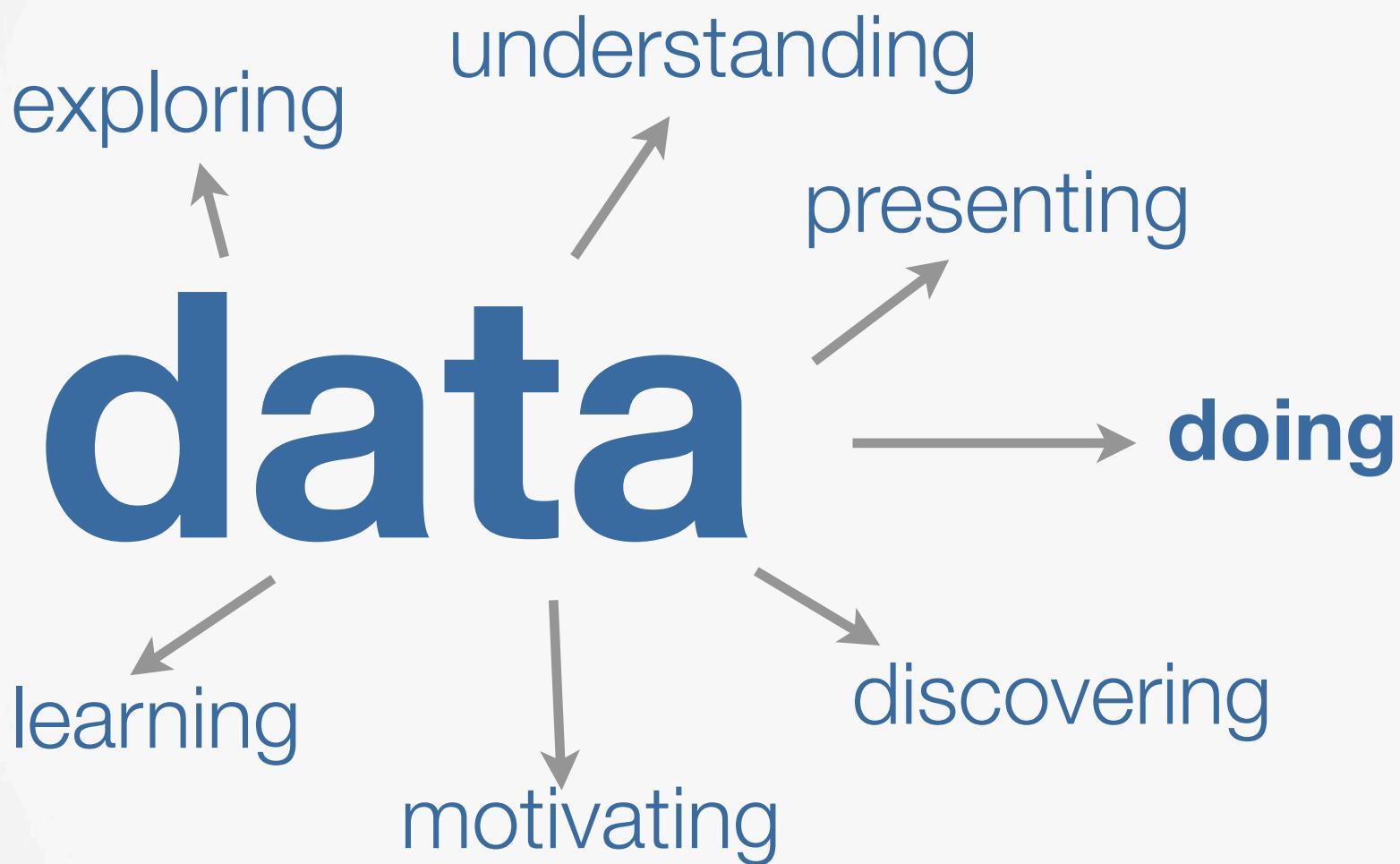
Zach Gemignani
CEO + founder
zach@juiceanalytics.com

Ken Hilburn
VP, Community Enablement
ken@juiceanalytics.com



we craft applications that make
using data enjoyable and rewarding

data



data → **doing**

data



doing



From data to doing

vizard fundamentals

Our tiny brains

How we see

Visual comprehension

Chart dejunking

Fonts

dashboard design

Needs + constraints

Principles

Structure + flow

Design Patterns

Wireframes

From data to doing

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Surveying the results of psychological experiments in the 1950s

“My problem is that I have been persecuted by an integer.”

Psychological Review
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The Magical Number Seven, Plus or Minus Two Some Limits on Our Capacity for Processing Information

George A. Miller
Harvard University

This paper was first read as an Invited Address before the Eastern Psychological Association in Philadelphia on April 15, 1955. Preparation of the paper was supported by the Harvard Psycho-Acoustic Laboratory under Contract N5ori-76 between Harvard University and the Office of Naval Research, U.S. Navy (Project NR 142-201, Report PNR-174). Reproduction for any purpose of the U.S. Government is permitted.

Received: May 4, 1955

My problem is that I have been persecuted by an integer. For seven years this number has followed me around, has intruded in my most private data, and has assaulted me from the pages of our most public journals. This number assumes a variety of disguises, being sometimes a little larger and sometimes a little smaller than usual, but never changing so much as to be unrecognizable. The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution.

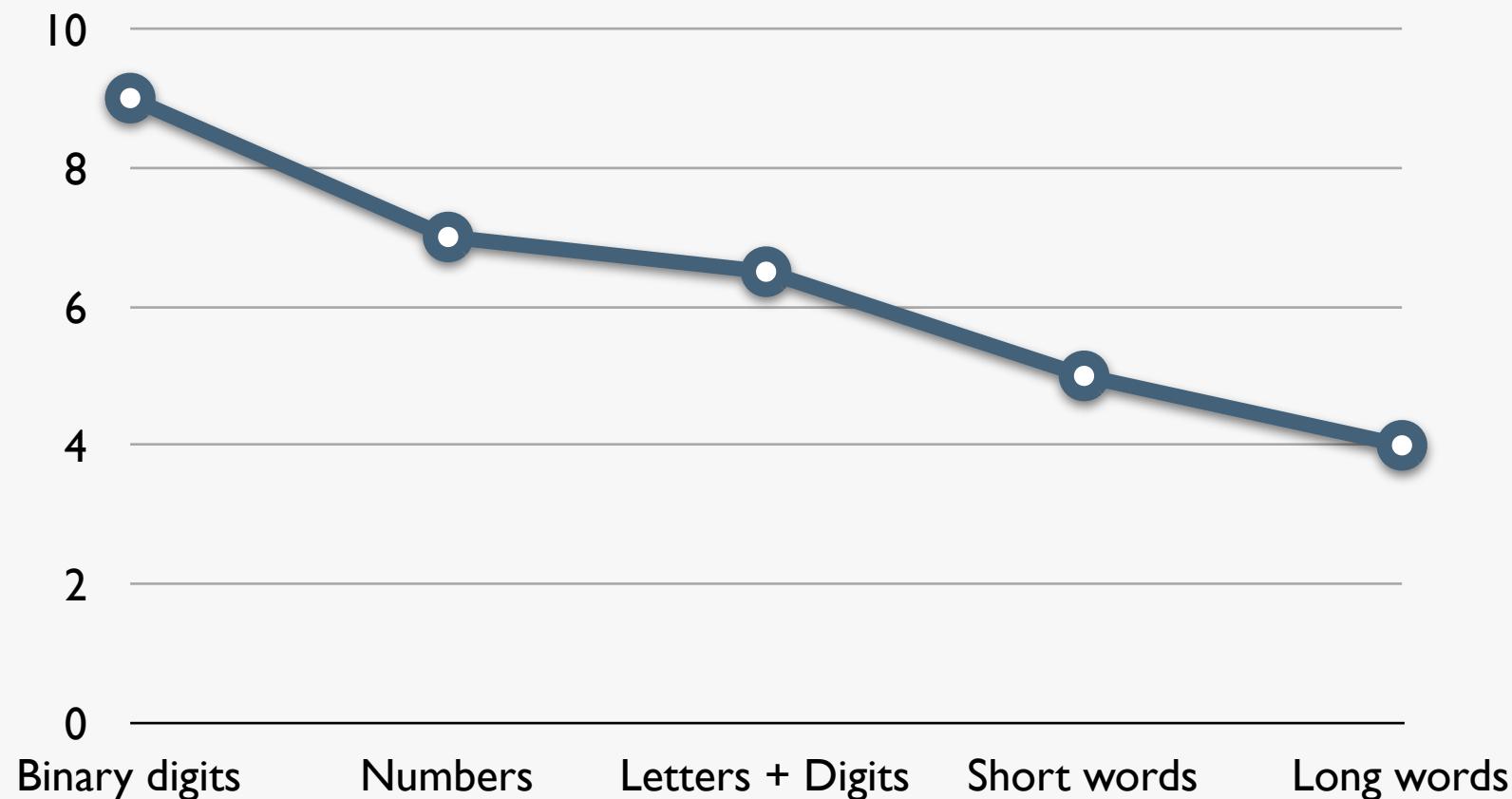
I shall begin my case history by telling you about some experiments that tested how accurately people can assign numbers to the magnitudes of various aspects of a stimulus. In the traditional language of psychology these would be called experiments in absolute judgment. Historical accident, however, has decreed that they should have another name. We now call them experiments on the capacity of people to transmit information. Since these experiments would not have been done without the appearance of information theory on the psychological scene, and since the results are analyzed in terms of the concepts of information theory, I shall have to preface my discussion with a few remarks about this theory.

Information Measurement

The “amount of information” is exactly the same concept that we have talked about for years under the name of “variance.” The equations are different, but if we hold tight to the idea that anything that increases the variance also increases the amount of information we cannot go far astray.

The advantages of this new way of thinking about variance are simple enough. Variance is always stated

Number of items we can recall



2,147,483,648 bytes

7

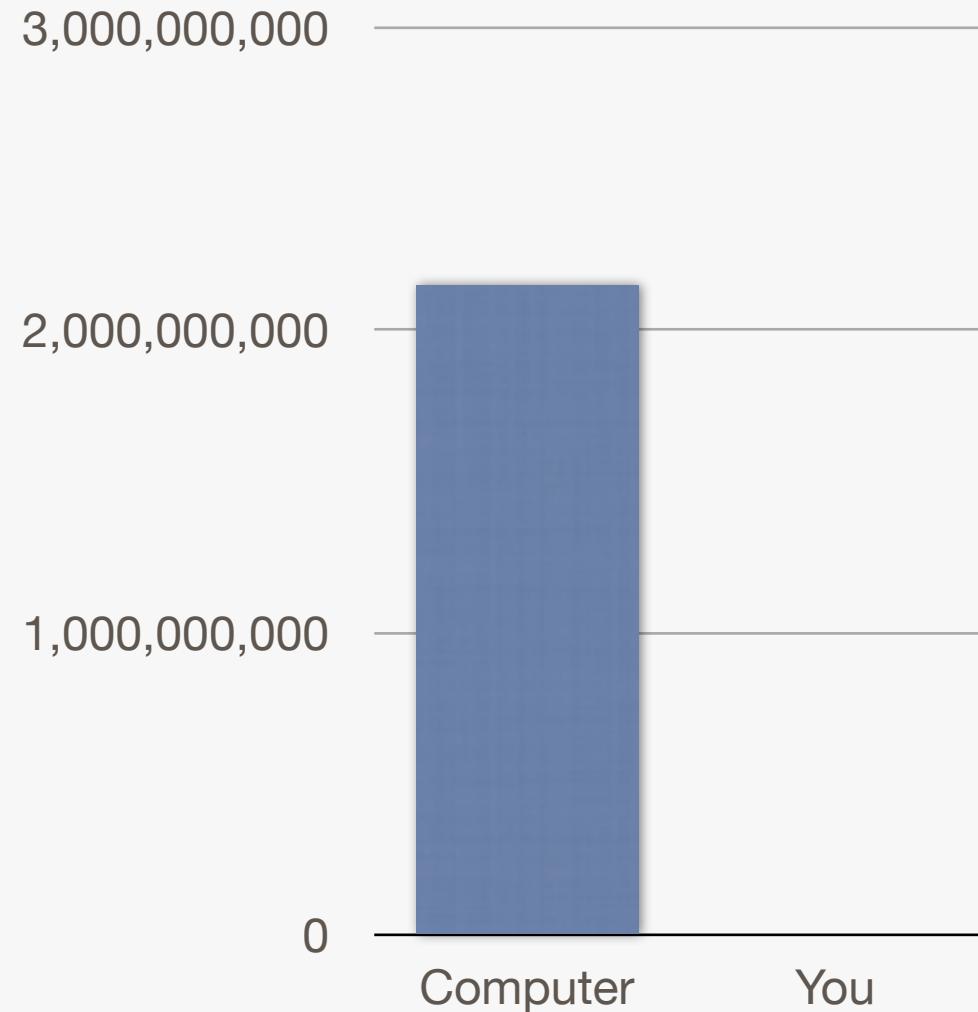
digits

5 one syllable words

2 seconds audio

3 visual images

Working memory capacity



giddy tame polish spade **Nr8** ZYETYFC

join again flag canvas **KCRAFT**

porter mine horse sound jarruvat depuis

jewel weight rice mark **EDITION 5DH**

sharp round nonsharp coin **RJHOK FREE**

2LKN X36G DV2P NDMN SMTL GOLD 5228AF

52BP KKM9 163J TX5T 76SW

min6+5zdgjajg 6x45QR

9R5 234417 6 999T 593744 PmzzRE 2Xw!@p

d61C25

How we judge amounts

People perceive...

Accurately

Length of a line
Position in 2D space

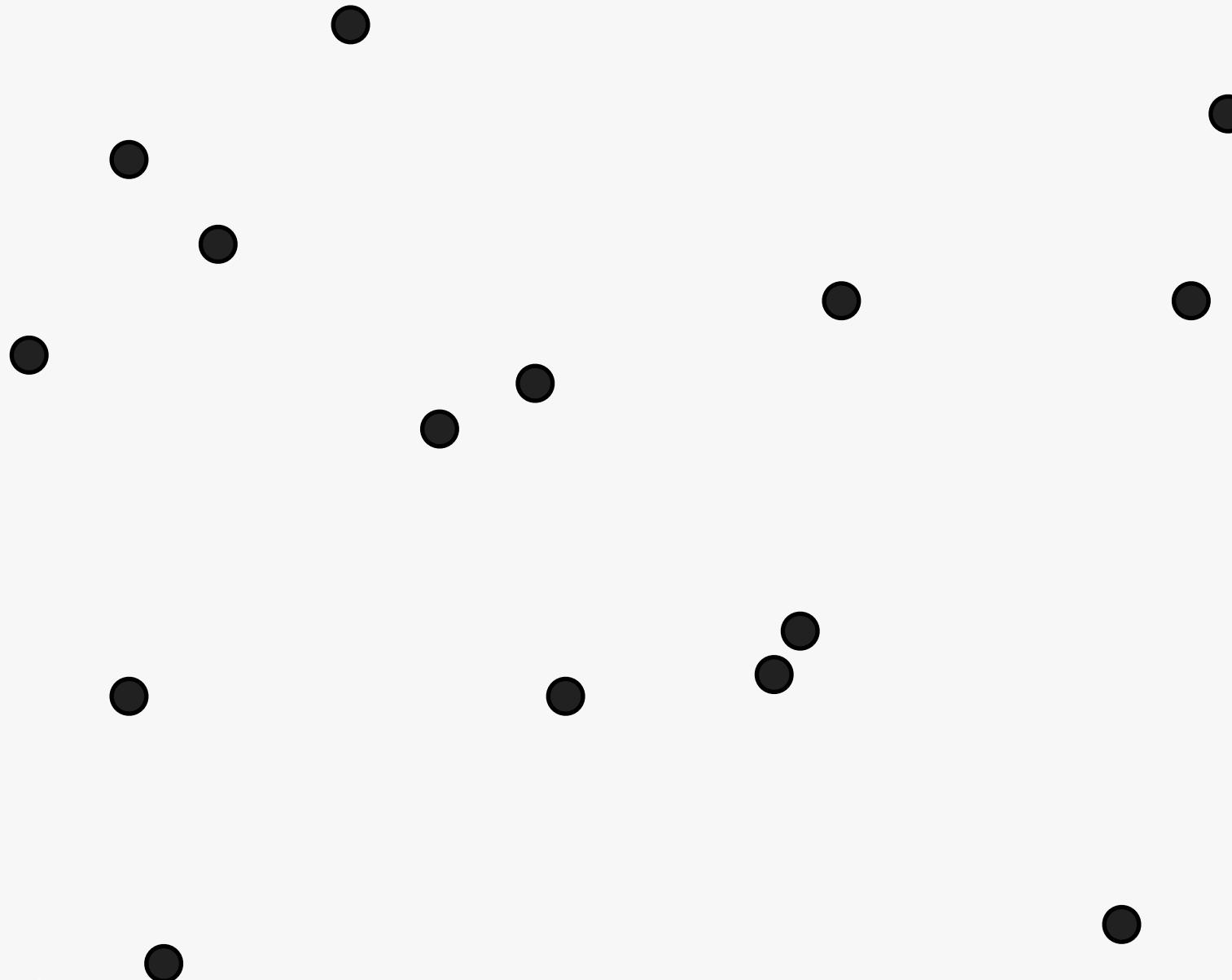
Semi-accurately

Area
Color intensity
Radial distance
Position in 3D space

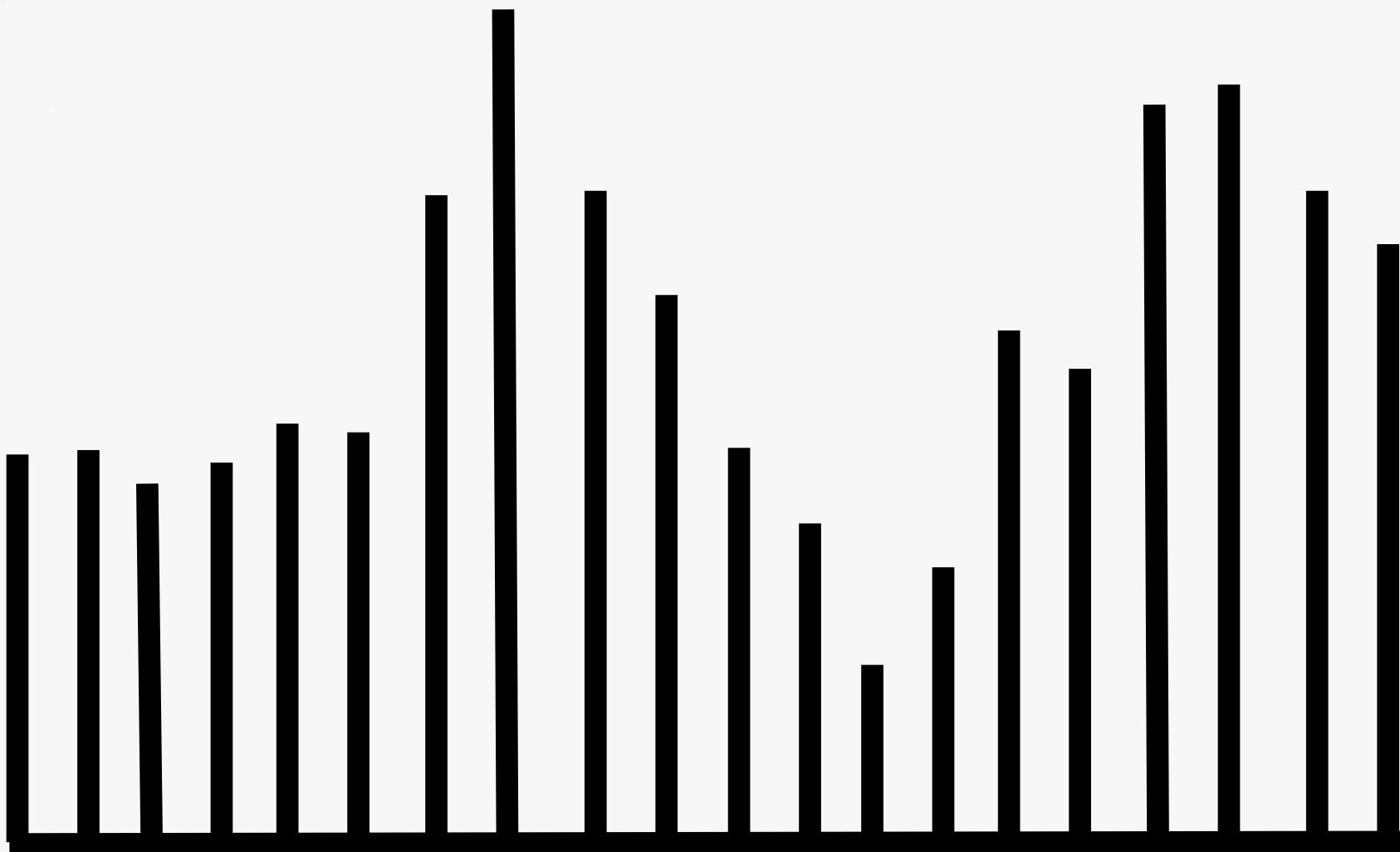
Not accurately at all

**Odds of winning in
Vegas**

Accurately: Position in 2D space



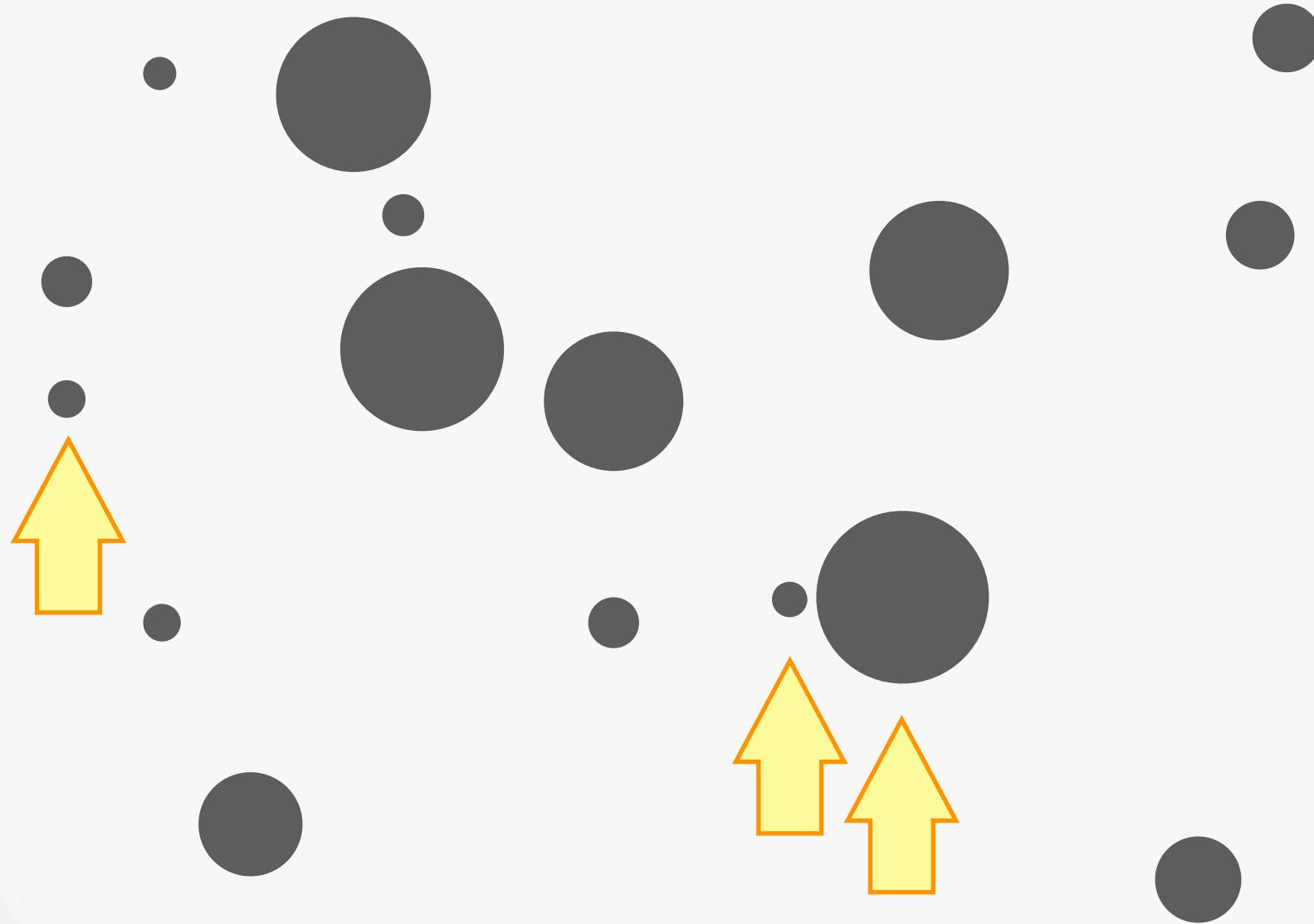
Accurately: 2D length



Semi-accurately: 2D area

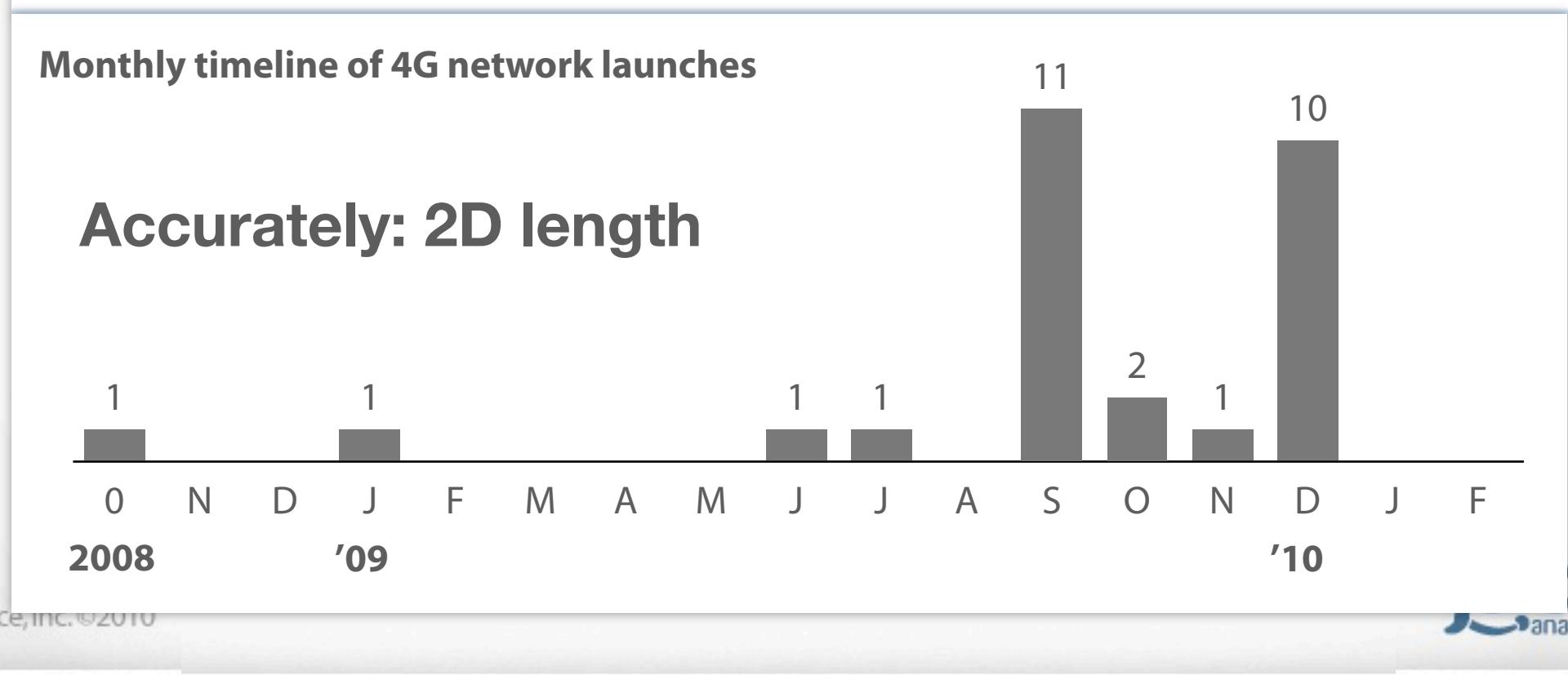
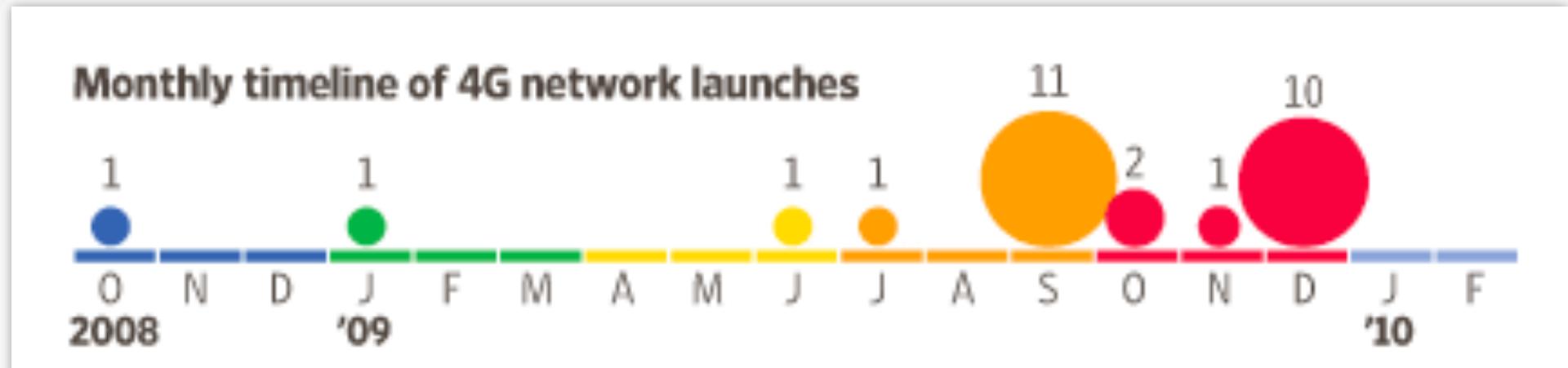


Semi-accurately: 2D area



An example

Semi-accurately: 2D area



People perceive...

Accurately

Length of a line
Position in 2D space

Semi-accurately

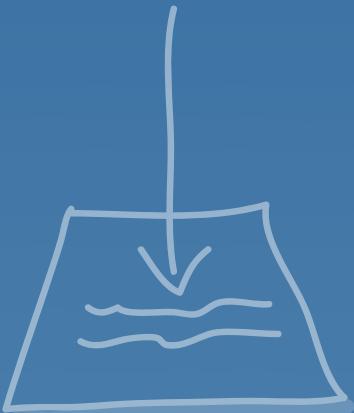
Area
Color intensity
Radial distance
Position in 3D space

Not accurately at all

**Odds of winning in
Vegas**



exercise

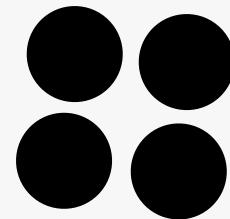
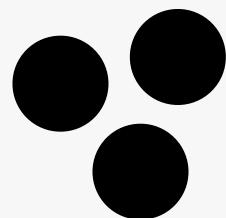
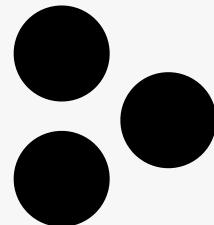


Mark components on your report that could be better displayed using *2D lengths or areas*.

6 principles of visual comprehension

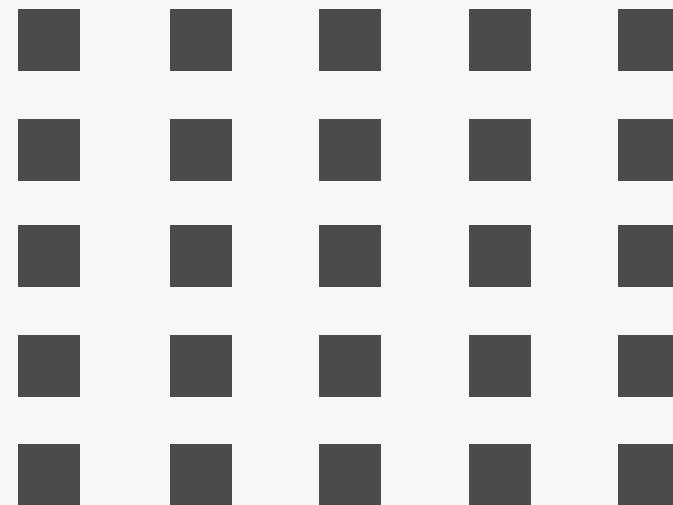
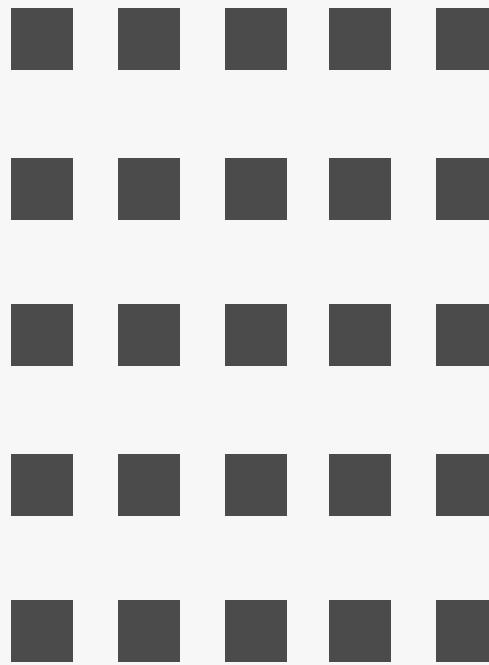
1) Principle of Proximity

Things that are spatially close belong to a group



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Things that are spatially close belong to a group



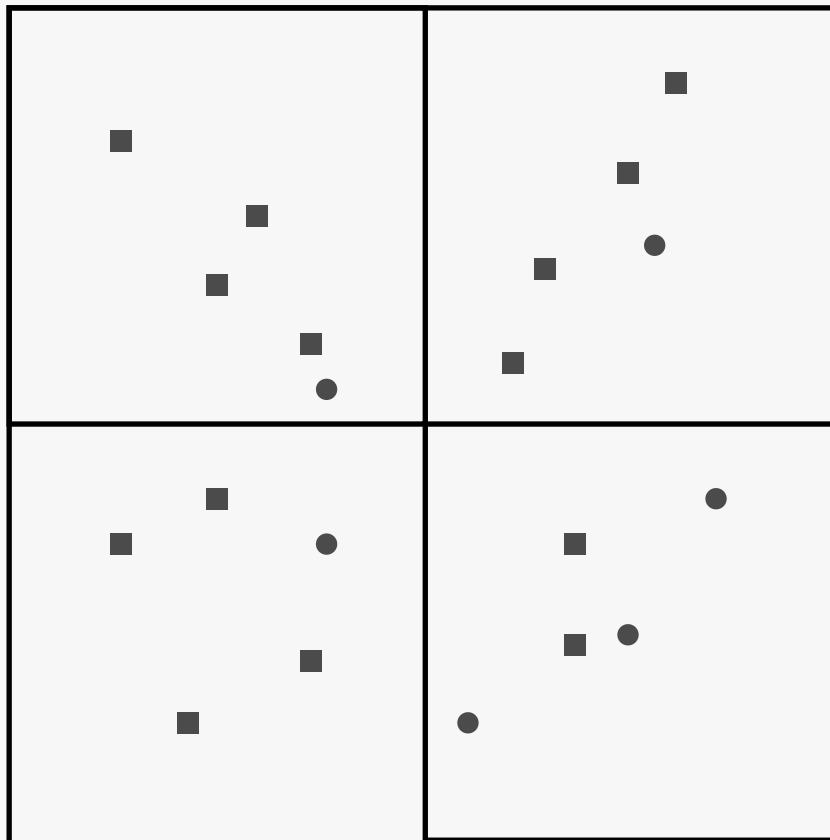
2) Principle of Similarity

Things that share color, size or shape belong to a group



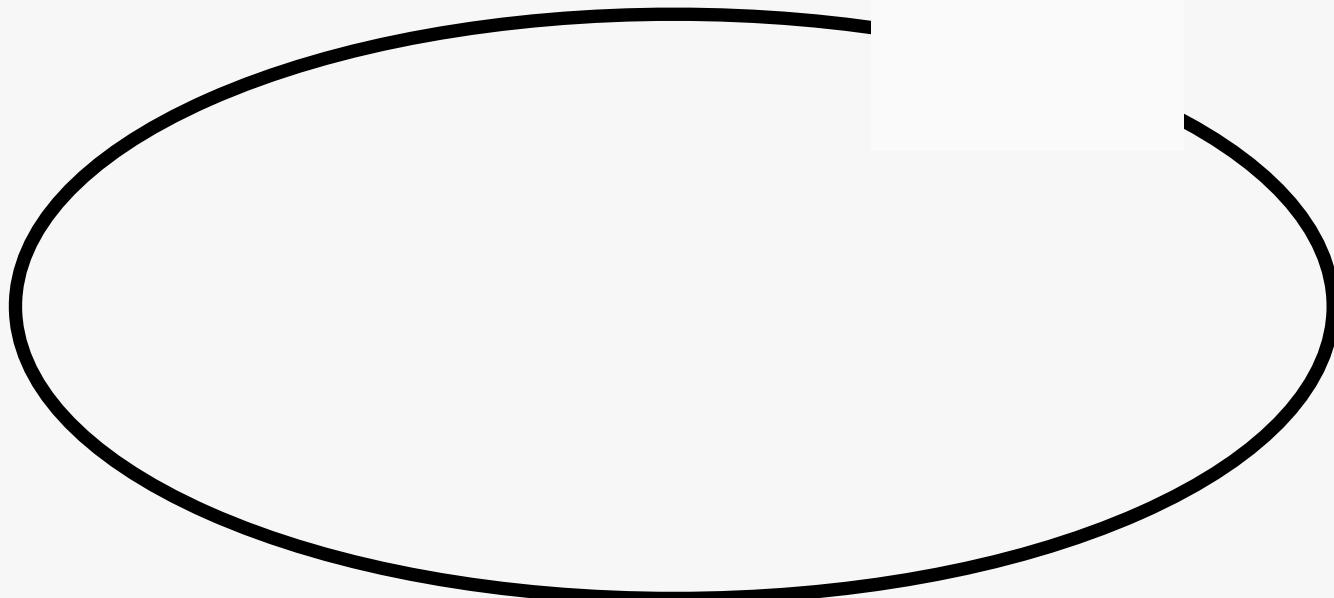
3) Principle of Enclosure

Objects that are enclosed by a shape will be seen as a group



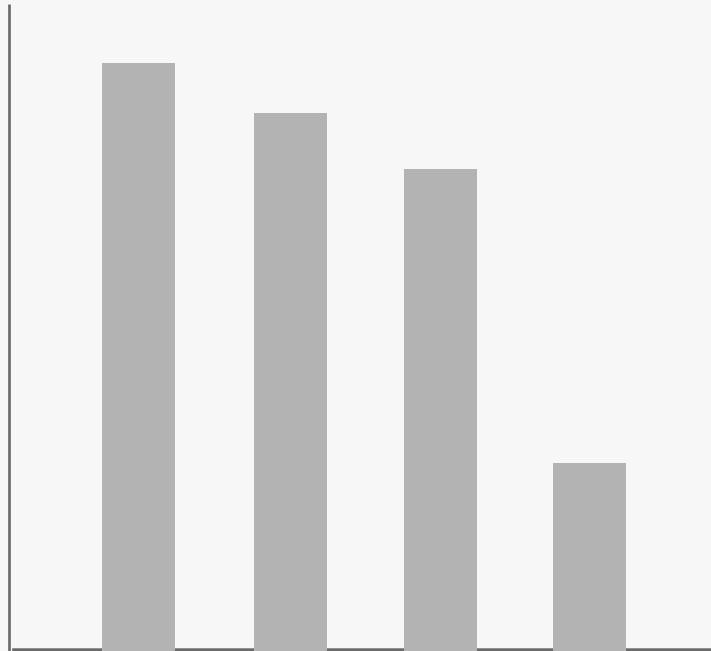
4) Principle of Closure

We strive to perceive shapes as complete



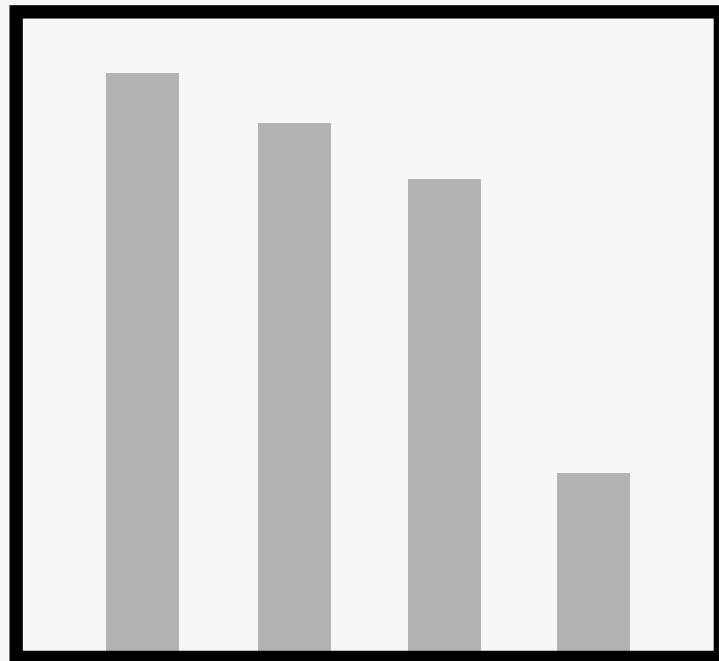
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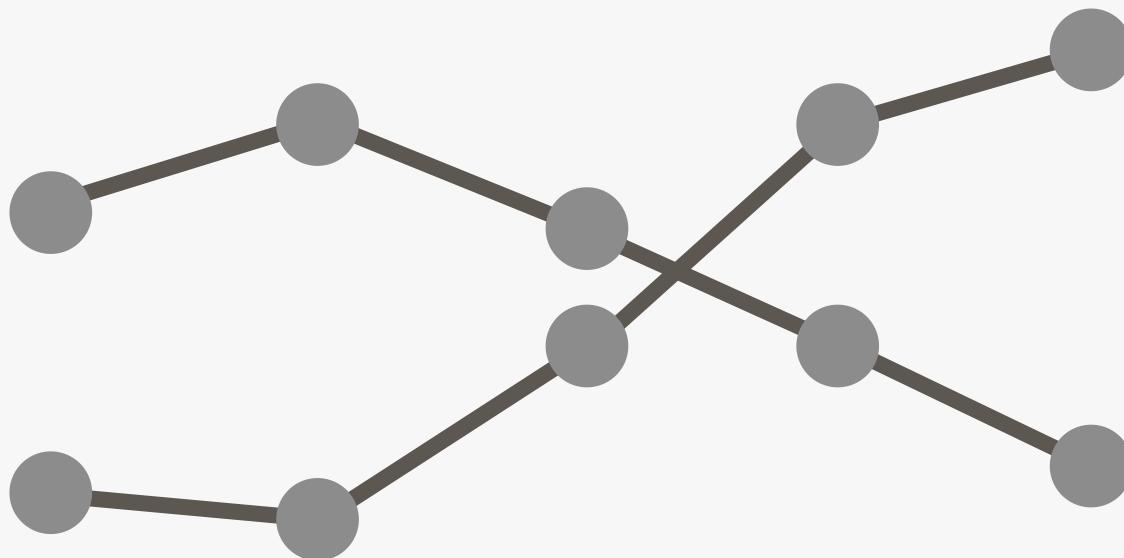
5) Principle of Continuity

Objects that are aligned are perceived as a group



6) Principle of Connection

Objects that are connected are part of the same group



Proximity

Things that are spatially close belong to a group

Similarity

Things that share color, size or shape belong to a group

Enclosure

Objects that are enclosed by a shape will be seen as a group

Closure

We strive to perceive shapes as complete

Continuity

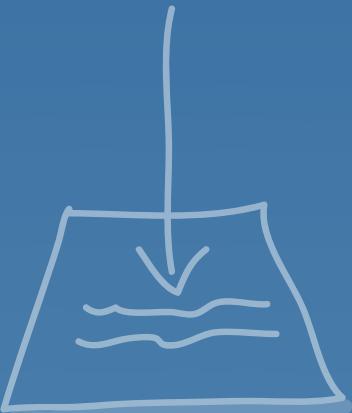
Objects that are aligned are perceived as a group

Connection

Objects that are connected are part of the same group



exercise

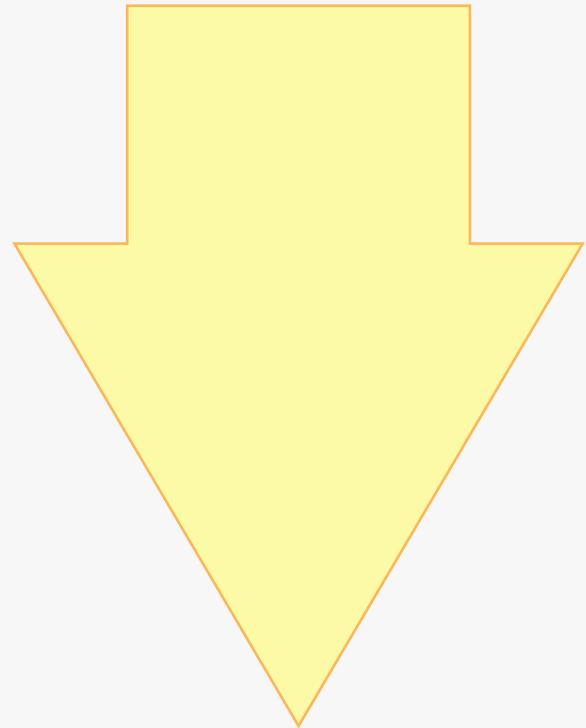


**Apply the 6 principles of
visual comprehension to your
report.**

Chart dejunking

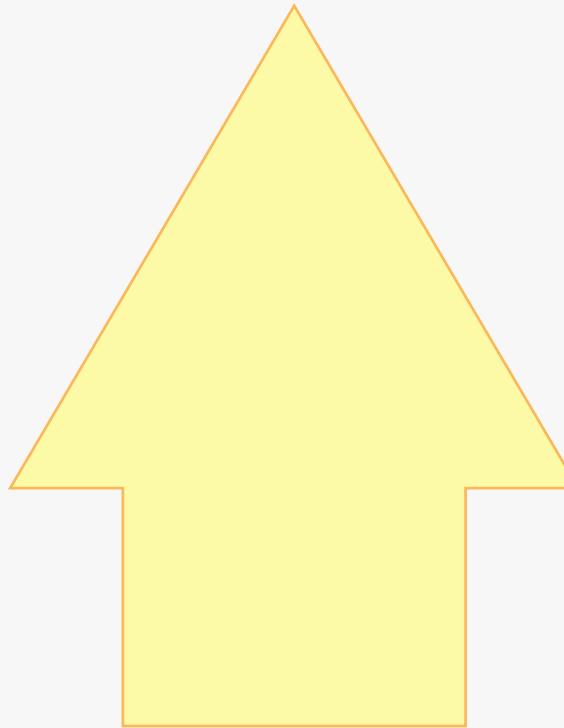


Fundamental rules of chart design



Reduce *chartjunk*

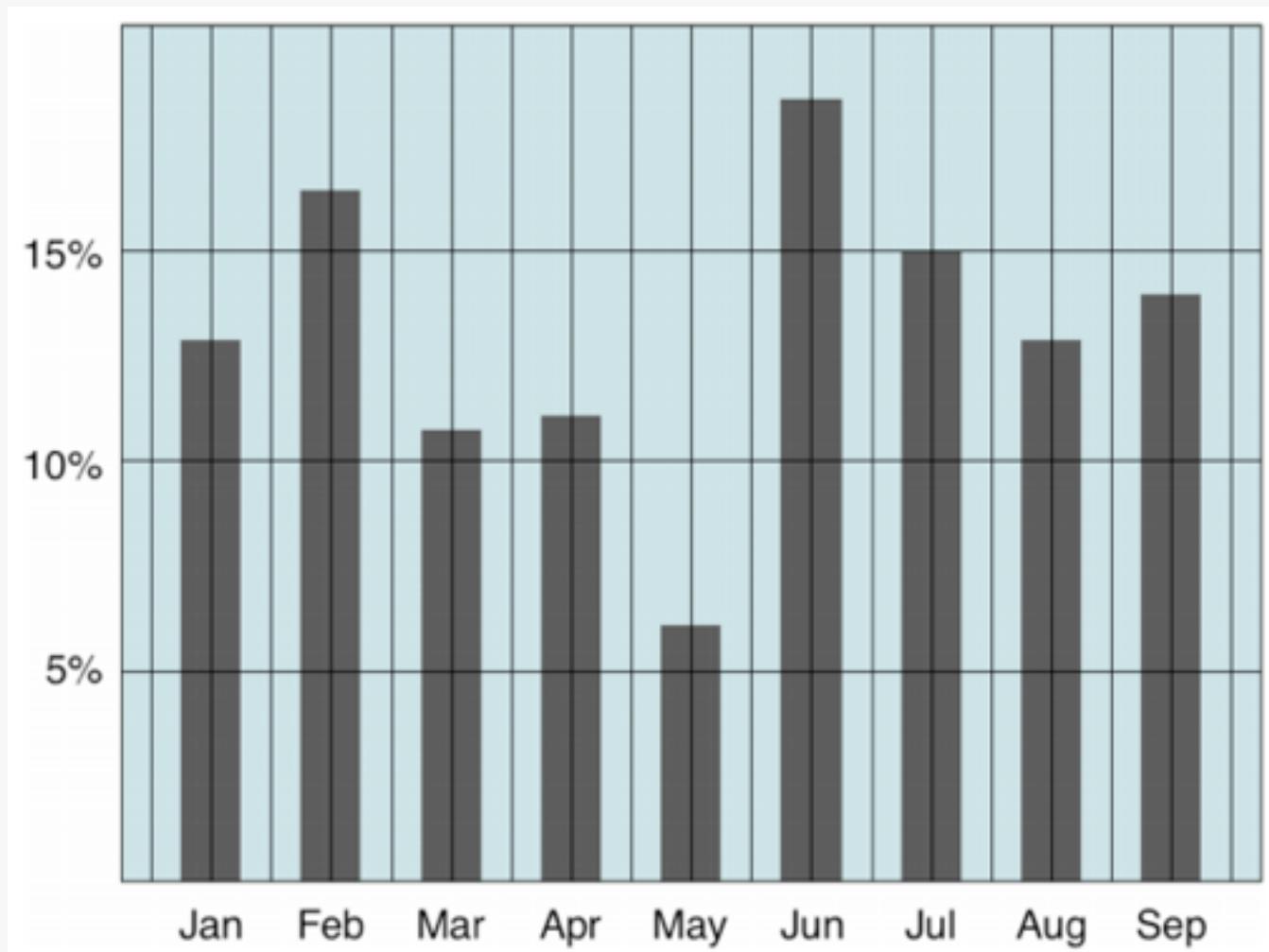
(remove chart elements that
are decorative or ornamental)



Increase *data-ink ratio*

(make every pixel tell a story about
your data)

Remove chart junk

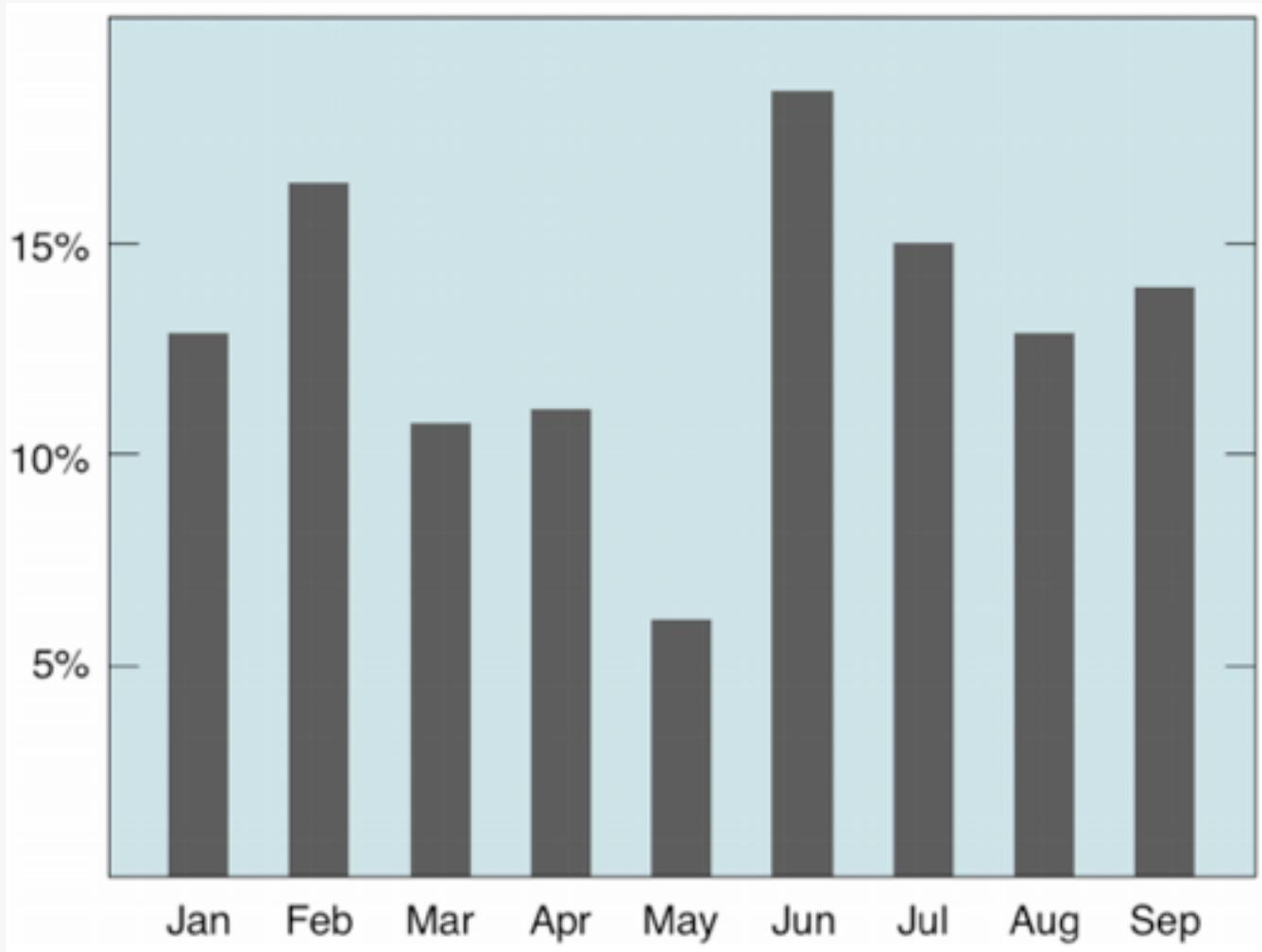


Images courtesy of Tim Bray: <http://www.tbray.org/ongoing/When/200x/2003/03/13/Data-Ink>

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Remove chart junk

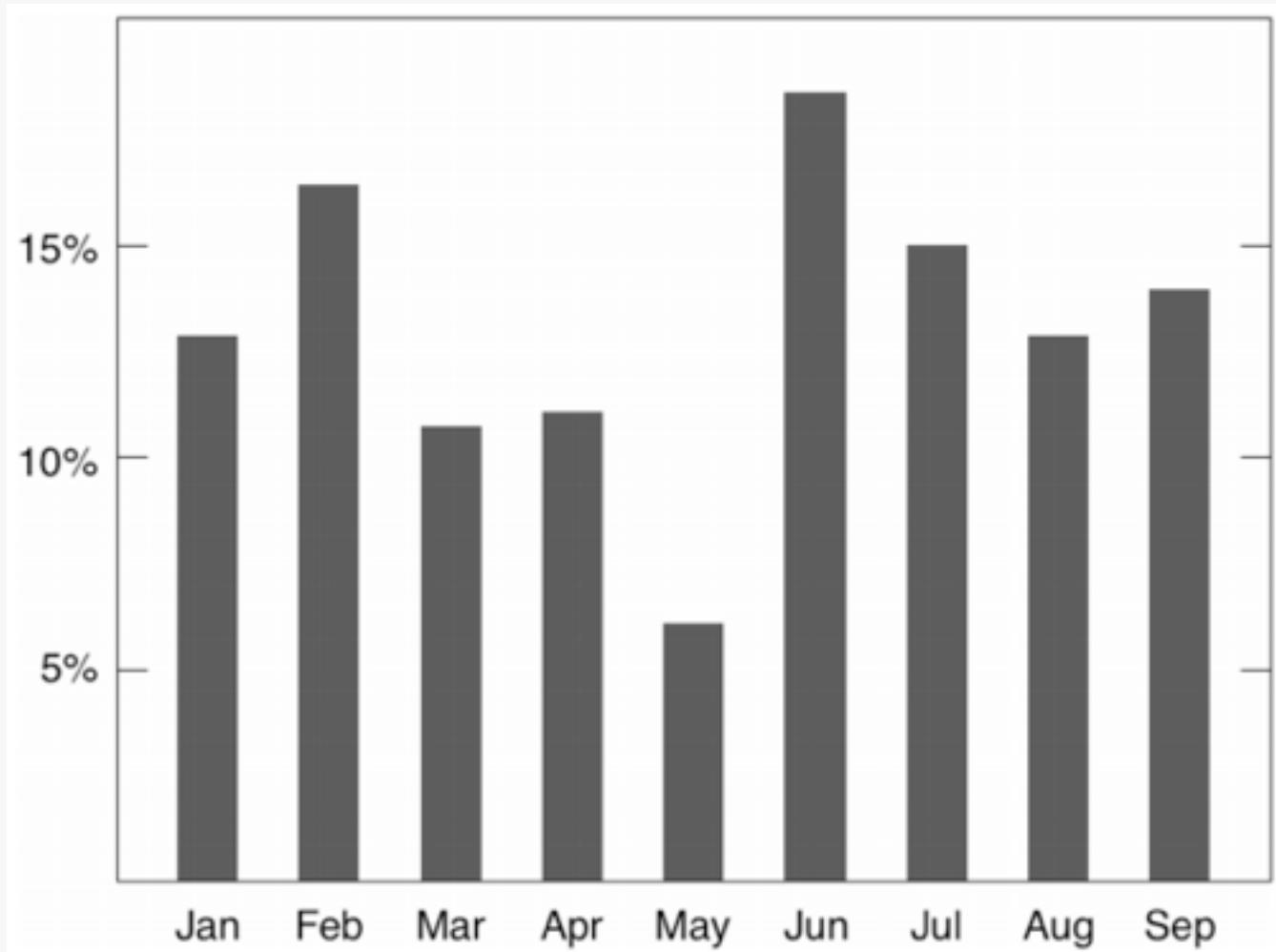


Images courtesy of Tim Bray: <http://www.tbray.org/ongoing/When/200x/2003/03/13/Data-Ink>

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Increase data ink

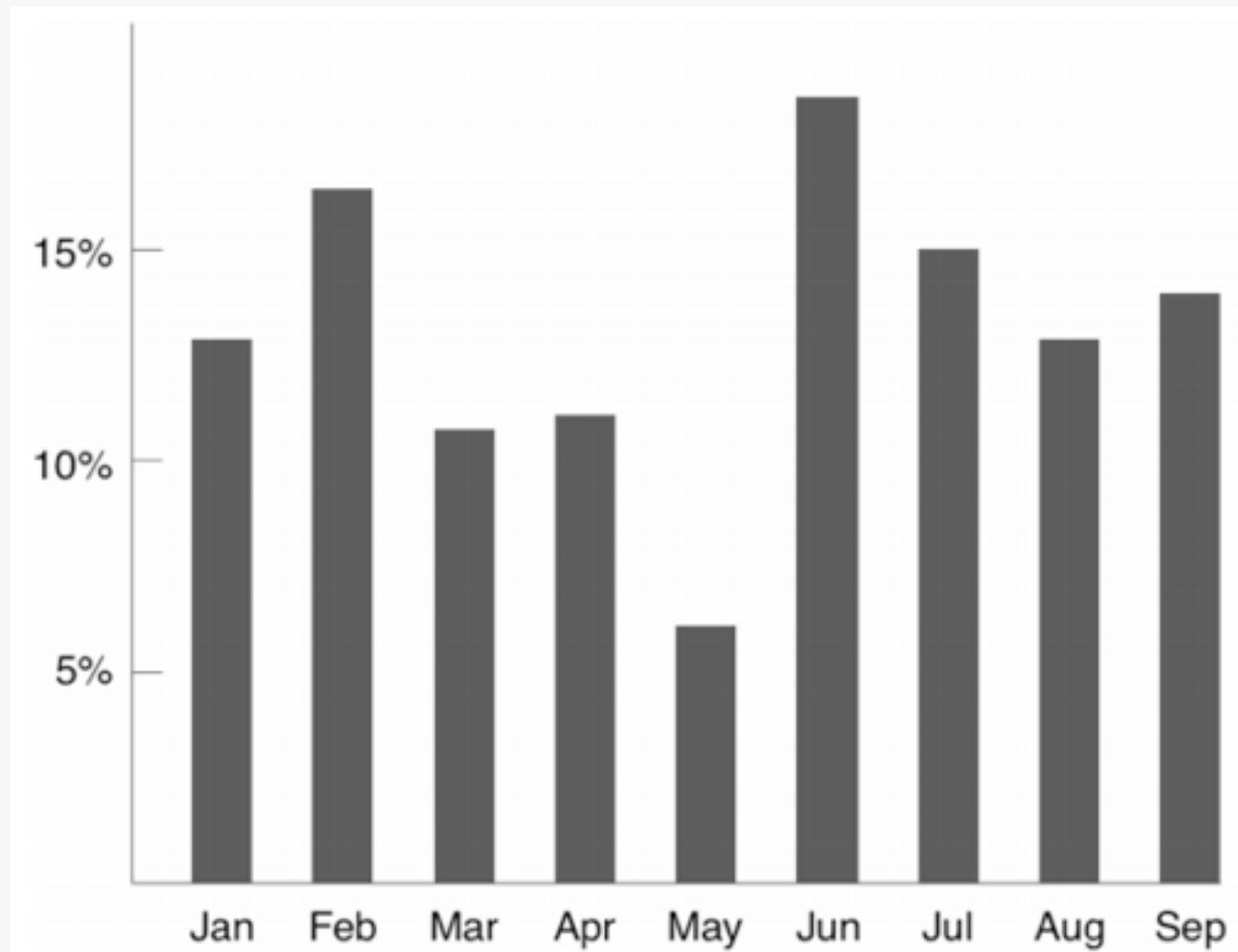


Images courtesy of Tim Bray: <http://www.tbray.org/ongoing/When/200x/2003/03/13/Data-Ink>

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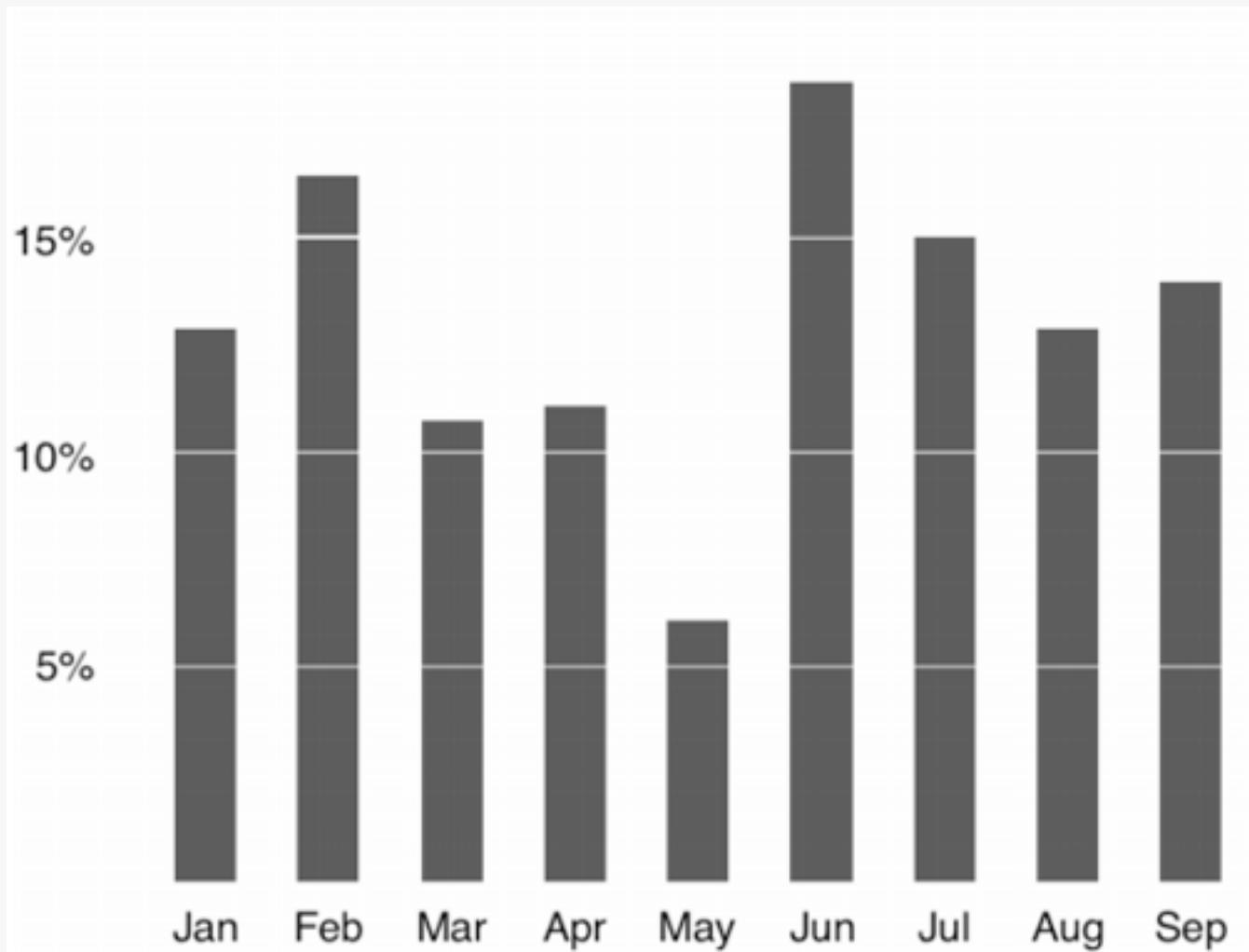
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Increase data-to-ink ratio



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Increase data ink

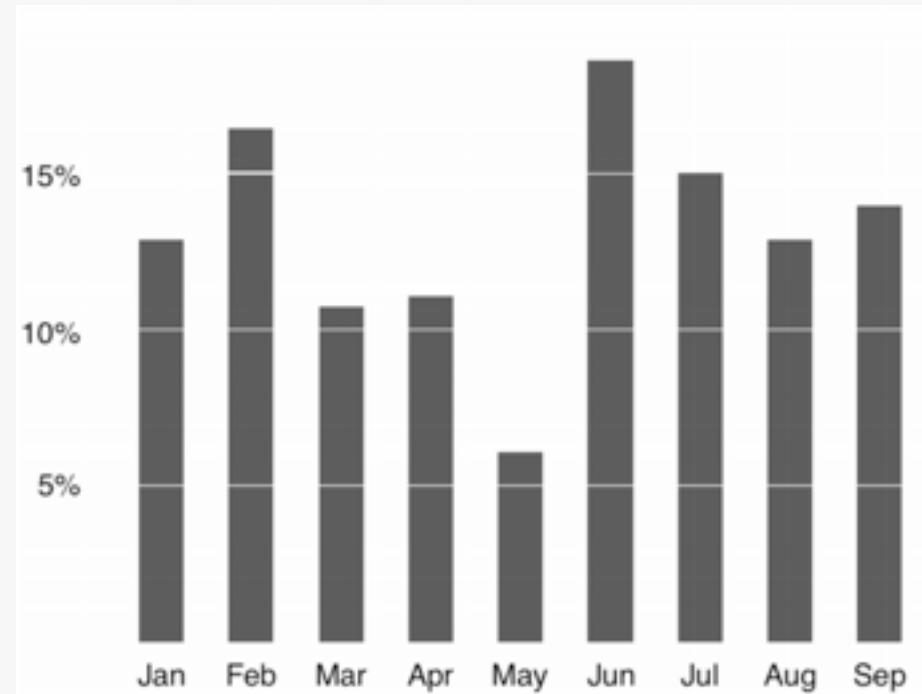
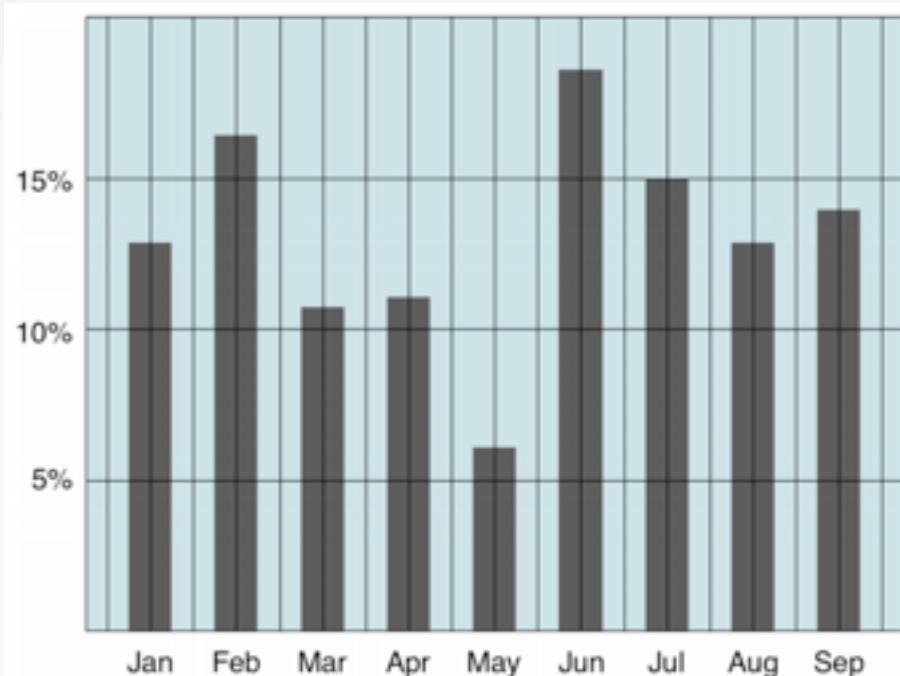


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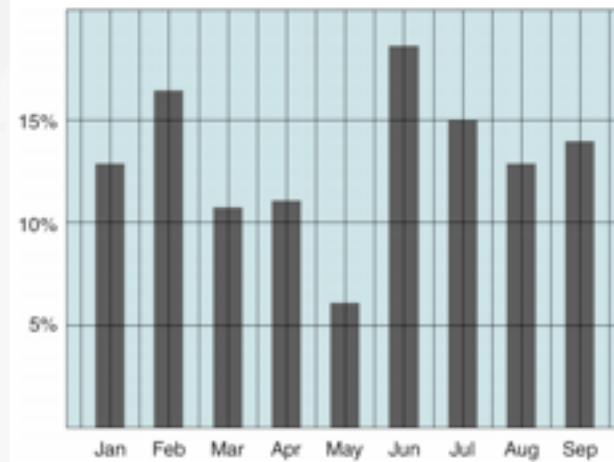
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Use your brain's strengths

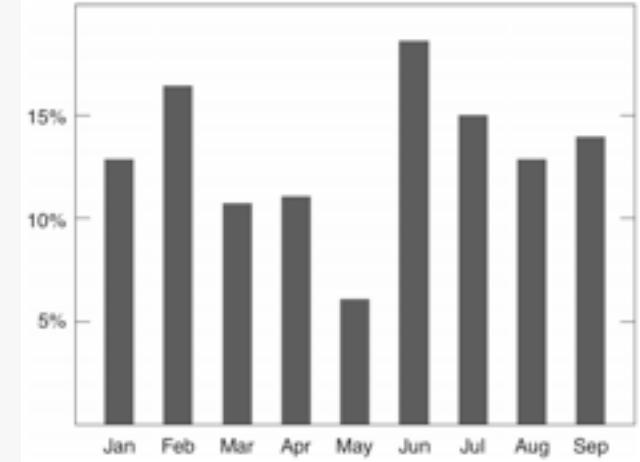
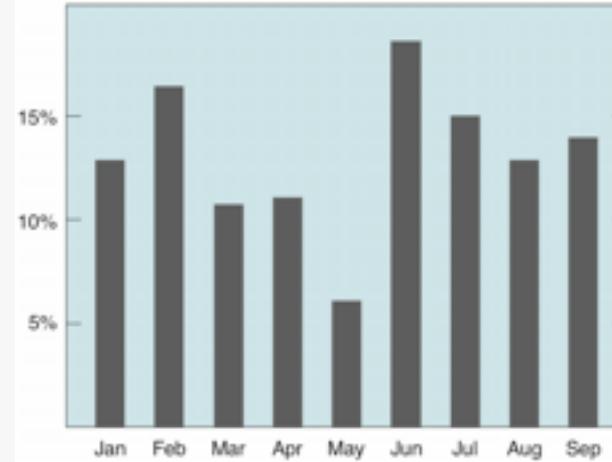


Images courtesy of Tim Bray: <http://www.tbray.org/ongoing/When/200x/2003/03/13/Data-Ink>
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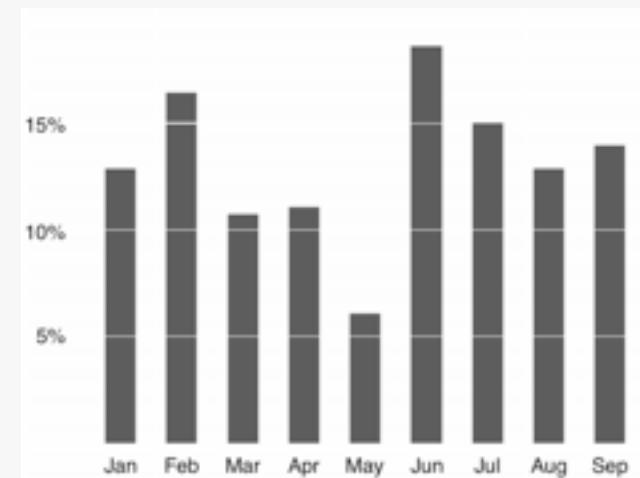
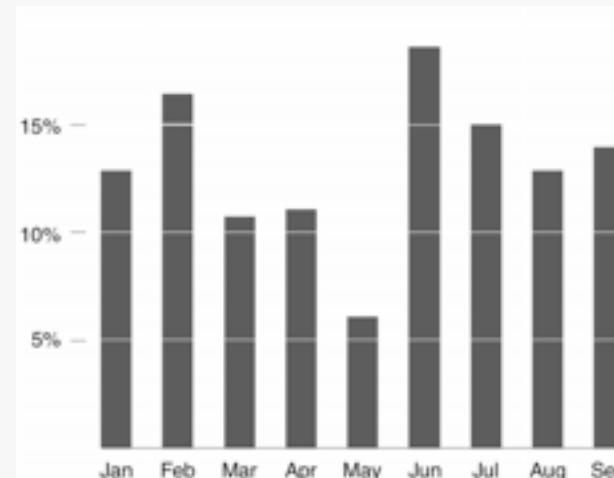
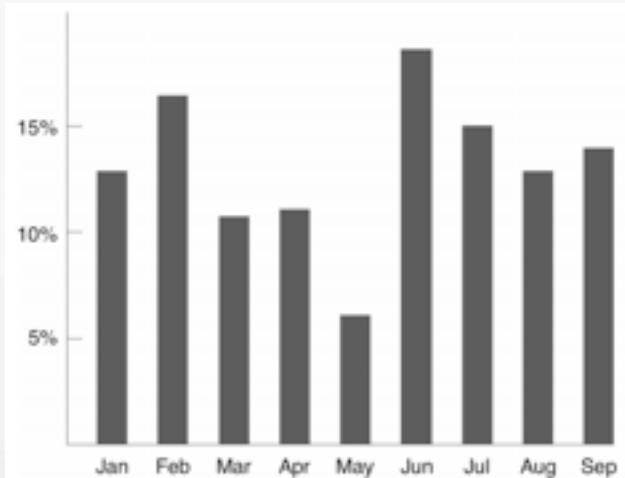
Remove chart-junk



Increase data-ink

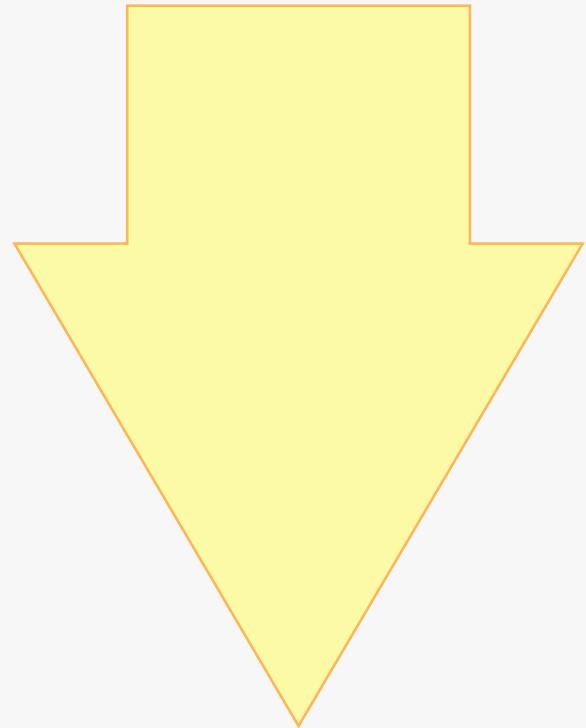


Increase data-ink



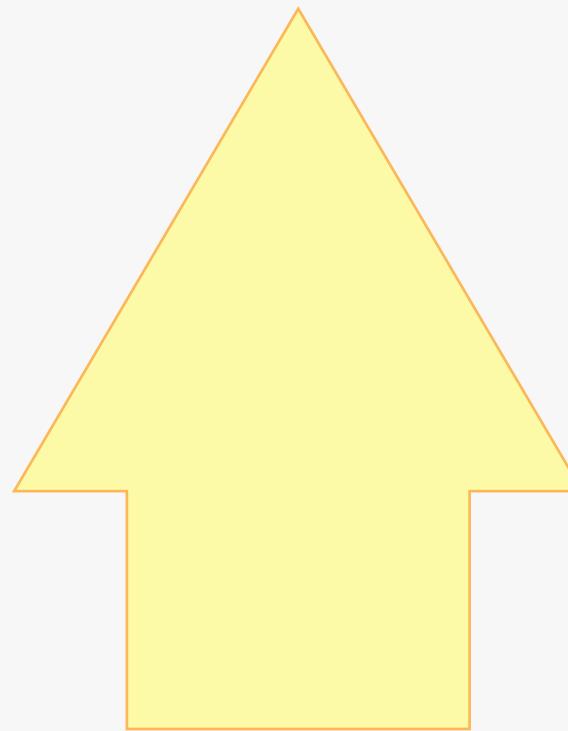
Images courtesy of Tim Bray: <http://www.tbray.org/ongoing/When/200x/2003/03/13/Data-Ink>

Fundamental rules of table design



Reduce *tablejunk*

(remove elements that are
decorative or ornamental)



Increase *data-ink ratio*
(make every character meaningful)

Reduce tablejunk

Team	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	\$61,184,250	\$72,346,275	\$72,505,825	\$77,893,950	\$80,657,500	\$60,521,550	\$58,348,000	\$56,943,475
Atlanta Braves	\$68,134,250	\$70,448,200	\$74,073,950	\$75,379,325	\$96,872,425	\$79,024,800	\$85,148,575	\$79,708,500
Baltimore Orioles	\$73,057,675	\$70,213,300	\$62,436,500	\$47,260,525	\$59,872,650	\$45,725,575	\$66,580,850	\$64,808,675
Boston Red Sox	\$55,142,125	\$64,950,275	\$85,592,900	\$90,305,050	\$89,473,775	\$104,340,450	\$108,314,225	\$111,204,200
Chicago White Sox	\$22,740,725	\$26,839,225	\$57,743,525	\$52,826,700	\$49,048,075	\$62,704,325	\$69,655,550	\$98,918,900
Chicago Cubs	\$51,889,225	\$50,449,450	\$61,553,675	\$67,581,100	\$72,092,250	\$78,535,925	\$77,866,900	\$84,679,625
Cincinnati Reds	\$28,588,575	\$43,395,550	\$43,488,350	\$37,542,000	\$50,874,800	\$38,453,450	\$49,715,225	\$53,115,200
Cleveland Indians	\$60,769,300	\$72,962,375	\$76,645,825	\$65,757,875	\$39,382,925	\$28,807,750	\$36,060,700	\$56,795,875
Colorado Rockies	\$53,716,200	\$54,563,575	\$65,803,700	\$52,639,850	\$55,818,050	\$57,670,000	\$41,197,425	\$34,277,500
Detroit Tigers	\$30,450,600	\$53,949,225	\$44,492,125	\$49,150,000	\$47,272,125	\$41,387,100	\$61,605,525	\$76,205,625
Florida Marlins	\$17,477,775	\$17,303,450	\$29,586,800	\$37,482,075	\$43,185,975	\$38,998,175	\$55,903,675	\$14,421,625
Houston Astros	\$49,643,275	\$47,489,925	\$55,909,875	\$58,748,525	\$67,778,700	\$74,666,300	\$73,825,975	\$88,991,825
Kansas City Royals	\$22,794,225	\$20,922,325	\$30,726,725	\$40,738,800	\$38,959,125	\$39,674,175	\$34,149,075	\$40,770,700
Los Angeles Dodgers	\$70,773,175	\$81,596,550	\$93,949,100	\$91,202,850	\$101,824,625	\$86,244,550	\$67,524,575	\$91,830,500
Anaheim/Los Angeles Angels	\$39,265,275	\$42,886,800	\$37,554,975	\$55,108,625	\$73,177,475	\$93,596,925	\$81,911,925	\$103,625,325
Milwaukee Brewers	\$38,329,400	\$28,519,800	\$39,897,525	\$43,351,575	\$35,023,275	\$27,518,500	\$40,234,825	\$56,790,000
Minnesota Twins	\$18,502,400	\$15,884,125	\$22,548,800	\$38,677,875	\$53,466,350	\$51,524,050	\$52,421,300	\$61,355,825
Montreal/Washington Nationals	\$14,977,325	\$30,006,750	\$28,978,750	\$34,527,225	\$49,950,950	\$35,997,925	\$40,484,575	\$52,722,925
New York Mets	\$57,824,475	\$79,509,775	\$83,191,450	\$90,993,850	\$100,748,800	\$96,758,950	\$97,009,400	\$97,020,275
New York Yankees	\$75,923,825	\$79,774,350	\$88,541,850	\$108,559,125	\$133,670,525	\$157,616,825	\$198,017,725	\$177,376,950
Oakland Athletics	\$22,340,700	\$29,603,075	\$31,306,250	\$36,740,500	\$48,423,875	\$55,393,675	\$53,720,450	\$62,322,050
Philadelphia Phillies	\$26,118,525	\$40,782,750	\$40,061,700	\$51,745,525	\$61,017,250	\$86,314,050	\$91,671,075	\$81,734,575
Pittsburgh Pirates	\$18,498,050	\$27,815,700	\$42,498,650	\$36,485,850	\$48,698,300	\$29,840,675	\$34,047,325	\$41,846,200
San Diego Padres	\$42,703,875	\$45,684,175	\$35,493,625	\$35,711,200	\$37,858,325	\$54,639,500	\$56,150,175	\$62,254,625
Seattle Mariners	\$48,041,825	\$56,649,050	\$67,546,875	\$80,282,675	\$80,726,400	\$72,807,000	\$67,096,350	\$84,927,400
San Francisco Giants	\$44,943,550	\$51,670,975	\$58,641,350	\$72,499,850	\$79,184,775	\$66,144,500	\$86,045,600	\$90,862,075
St. Louis Cardinals	\$42,313,275	\$56,901,725	\$66,612,800	\$71,248,325	\$67,057,175	\$75,633,525	\$89,730,625	\$85,039,625
Tampa Bay Rays	\$29,269,400	\$50,617,050	\$50,881,125	\$30,696,425	\$19,630,000	\$27,321,000	\$26,690,675	\$31,623,175
Texas Rangers	\$71,956,675	\$68,073,000	\$71,374,525	\$90,777,700	\$87,105,400	\$47,263,775	\$46,089,375	\$52,796,875
Toronto Blue Jays	\$42,797,425	\$44,459,925	\$67,677,225	\$66,262,350	\$47,480,550	\$48,093,275	\$43,621,625	\$66,587,975
Average	\$43,338,913	\$49,875,624	\$56,243,878	\$59,605,910	\$63,877,748	\$62,107,276	\$66,361,310	\$72,051,937

Reduce tablejunk

Team	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	\$61,184,250	\$72,346,275	\$72,505,825	\$77,893,950	\$80,657,500	\$60,521,550	\$58,348,000	\$56,943,475
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Florida Marlins	\$17,477,775	\$17,303,450	\$29,586,800	\$37,482,075	\$43,185,975	\$38,998,175	\$55,903,675	\$14,421,625
Houston Astros	\$49,643,275	\$47,489,925	\$55,909,875	\$58,748,525	\$67,778,700	\$74,666,300	\$73,825,975	\$88,991,825
Kansas City Royals	\$22,794,225	\$20,922,325	\$30,726,725	\$40,738,800	\$38,959,125	\$39,674,175	\$34,149,075	\$40,770,700
Los Angeles Dodgers	\$70,773,175	\$81,596,550	\$93,949,100	\$91,202,850	\$101,824,625	\$86,244,550	\$67,524,575	\$91,830,500
Anaheim/Los Angeles Angels	\$39,265,275	\$42,886,800	\$37,554,975	\$55,108,625	\$73,177,475	\$93,596,925	\$81,911,925	\$103,625,325
Milwaukee Brewers	\$38,329,400	\$28,519,800	\$39,897,525	\$43,351,575	\$35,023,275	\$27,518,500	\$40,234,825	\$56,790,000
Minnesota Twins	\$18,502,400	\$15,884,125	\$22,548,800	\$38,677,875	\$53,466,350	\$51,524,050	\$52,421,300	\$61,355,825
Montreal/Washington Nationals	\$14,977,325	\$30,006,750	\$28,978,750	\$34,527,225	\$49,950,950	\$35,997,925	\$40,484,575	\$52,722,925
New York Mets	\$57,824,475	\$79,509,775	\$83,191,450	\$90,993,850	\$100,748,800	\$96,758,950	\$97,009,400	\$97,020,275
New York Yankees	\$75,923,825	\$79,774,350	\$88,541,850	\$108,559,125	\$133,670,525	\$157,616,825	\$198,017,725	\$177,376,950
Oakland Athletics	\$22,340,700	\$29,603,075	\$31,306,250	\$36,740,500	\$48,423,875	\$55,393,675	\$53,720,450	\$62,322,050
Philadelphia Phillies	\$26,118,525	\$40,782,750	\$40,061,700	\$51,745,525	\$61,017,250	\$86,314,050	\$91,671,075	\$81,734,575
Pittsburgh Pirates	\$18,498,050	\$27,815,700	\$42,498,650	\$36,485,850	\$48,698,300	\$29,840,675	\$34,047,325	\$41,846,200
San Diego Padres	\$42,703,875	\$45,684,175	\$35,493,625	\$35,711,200	\$37,858,325	\$54,639,500	\$56,150,175	\$62,254,625
Seattle Mariners	\$48,041,825	\$56,649,050	\$67,546,875	\$80,282,675	\$80,726,400	\$72,807,000	\$67,096,350	\$84,927,400
San Francisco Giants	\$44,943,550	\$51,670,975	\$58,641,350	\$72,499,850	\$79,184,775	\$66,144,500	\$86,045,600	\$90,862,075
St. Louis Cardinals	\$42,313,275	\$56,901,725	\$66,612,800	\$71,248,325	\$67,057,175	\$75,633,525	\$89,730,625	\$85,039,625
Tampa Bay Rays	\$29,269,400	\$50,617,050	\$50,881,125	\$30,696,425	\$19,630,000	\$27,321,000	\$26,690,675	\$31,623,175
Texas Rangers	\$71,956,675	\$68,073,000	\$71,374,525	\$90,777,700	\$87,105,400	\$47,263,775	\$46,089,375	\$52,796,875
Toronto Blue Jays	\$42,797,425	\$44,459,925	\$67,677,225	\$66,262,350	\$47,480,550	\$48,093,275	\$43,621,625	\$66,587,975
Average	\$43,338,913	\$49,875,624	\$56,243,878	\$59,605,910	\$63,877,748	\$62,107,276	\$66,361,310	\$72,051,937

Reduce tablejunk

Team	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	\$61,184,250	\$72,346,275	\$72,505,825	\$77,893,950	\$80,657,500	\$60,521,550	\$58,348,000	\$56,943,475
Atlanta Braves	\$68,134,250	\$70,448,200	\$74,073,950	\$75,379,325	\$96,872,425	\$79,024,800	\$85,148,575	\$79,708,500
Baltimore Orioles	\$73,057,675	\$70,213,300	\$62,436,500	\$47,260,525	\$59,872,650	\$45,725,575	\$66,580,850	\$64,808,675
Boston Red Sox	\$55,142,125	\$64,950,275	\$85,592,900	\$90,305,050	\$89,473,775	\$104,340,450	\$108,314,225	\$111,204,200
Chicago White Sox	\$22,740,725	\$26,839,225	\$57,743,525	\$52,826,700	\$49,048,075	\$62,704,325	\$69,655,550	\$98,918,900
Chicago Cubs	\$51,889,225	\$50,449,450	\$61,553,675	\$67,581,100	\$72,092,250	\$78,535,925	\$77,866,900	\$84,679,625
Cincinnati Reds	\$28,588,575	\$43,395,550	\$43,488,350	\$37,542,000	\$50,874,800	\$38,453,450	\$49,715,225	\$53,115,200
Cleveland Indians	\$60,769,300	\$72,962,375	\$76,645,825	\$65,757,875	\$39,382,925	\$28,807,750	\$36,060,700	\$56,795,875
Colorado Rockies	\$53,716,200	\$54,563,575	\$65,803,700	\$52,639,850	\$55,818,050	\$57,670,000	\$41,197,425	\$34,277,500
Detroit Tigers	\$30,450,600	\$53,949,225	\$44,492,125	\$49,150,000	\$47,272,125	\$41,387,100	\$61,605,525	\$76,205,625
Florida Marlins	\$17,477,775	\$17,303,450	\$29,586,800	\$37,482,075	\$43,185,975	\$38,998,175	\$55,903,675	\$14,421,625
Houston Astros	\$49,643,275	\$47,489,925	\$55,909,875	\$58,748,525	\$67,778,700	\$74,666,300	\$73,825,975	\$88,991,825
Kansas City Royals	\$22,794,225	\$20,922,325	\$30,726,725	\$40,738,800	\$38,959,125	\$39,674,175	\$34,149,075	\$40,770,700
Los Angeles Dodgers	\$70,773,175	\$81,596,550	\$93,949,100	\$91,202,850	\$101,824,625	\$86,244,550	\$67,524,575	\$91,830,500
Anaheim/Los Angeles Angels	\$39,265,275	\$42,886,800	\$37,554,975	\$55,108,625	\$73,177,475	\$93,596,925	\$81,911,925	\$103,625,325
Milwaukee Brewers	\$38,329,400	\$28,519,800	\$39,897,525	\$43,351,575	\$35,023,275	\$27,518,500	\$40,234,825	\$56,790,000
Minnesota Twins	\$18,502,400	\$15,884,125	\$22,548,800	\$38,677,875	\$53,466,350	\$51,524,050	\$52,421,300	\$61,355,825
Montreal/Washington Nationals	\$14,977,325	\$30,006,750	\$28,978,750	\$34,527,225	\$49,950,950	\$35,997,925	\$40,484,575	\$52,722,925
New York Mets	\$57,824,475	\$79,509,775	\$83,191,450	\$90,993,850	\$100,748,800	\$96,758,950	\$97,009,400	\$97,020,275
New York Yankees	\$75,923,825	\$79,774,350	\$88,541,850	\$108,559,125	\$133,670,525	\$157,616,825	\$198,017,725	\$177,376,950
Oakland Athletics	\$22,340,700	\$29,603,075	\$31,306,250	\$36,740,500	\$48,423,875	\$55,393,675	\$53,720,450	\$62,322,050
Philadelphia Phillies	\$26,118,525	\$40,782,750	\$40,061,700	\$51,745,525	\$61,017,250	\$86,314,050	\$91,671,075	\$81,734,575
Pittsburgh Pirates	\$18,498,050	\$27,815,700	\$42,498,650	\$36,485,850	\$48,698,300	\$29,840,675	\$34,047,325	\$41,846,200
San Diego Padres	\$42,703,875	\$45,684,175	\$35,493,625	\$35,711,200	\$37,858,325	\$54,639,500	\$56,150,175	\$62,254,625
Seattle Mariners	\$48,041,825	\$56,649,050	\$67,546,875	\$80,282,675	\$80,726,400	\$72,807,000	\$67,096,350	\$84,927,400
San Francisco Giants	\$44,943,550	\$51,670,975	\$58,641,350	\$72,499,850	\$79,184,775	\$66,144,500	\$86,045,600	\$90,862,075
St. Louis Cardinals	\$42,313,275	\$56,901,725	\$66,612,800	\$71,248,325	\$67,057,175	\$75,633,525	\$89,730,625	\$85,039,625
Tampa Bay Rays	\$29,269,400	\$50,617,050	\$50,881,125	\$30,696,425	\$19,630,000	\$27,321,000	\$26,690,675	\$31,623,175
Texas Rangers	\$71,956,675	\$68,073,000	\$71,374,525	\$90,777,700	\$87,105,400	\$47,263,775	\$46,089,375	\$52,796,875
Toronto Blue Jays	\$42,797,425	\$44,459,925	\$67,677,225	\$66,262,350	\$47,480,550	\$48,093,275	\$43,621,625	\$66,587,975
Average	\$43,336,913	\$49,875,624	\$56,243,878	\$59,605,910	\$63,877,748	\$62,107,276	\$66,361,310	\$72,051,937

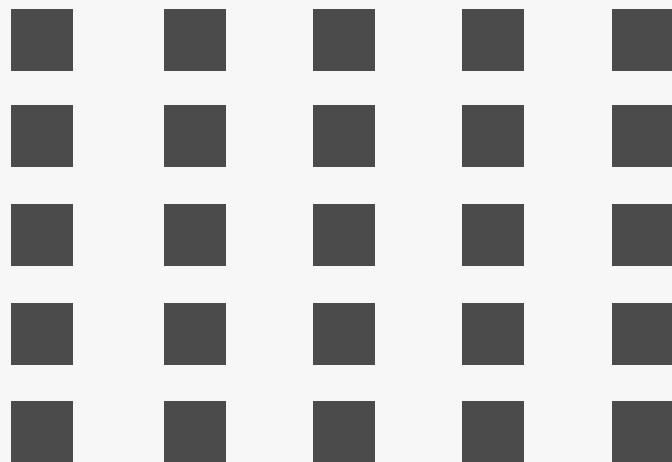
Principle of Continuity

Objects that are aligned are perceived as a group

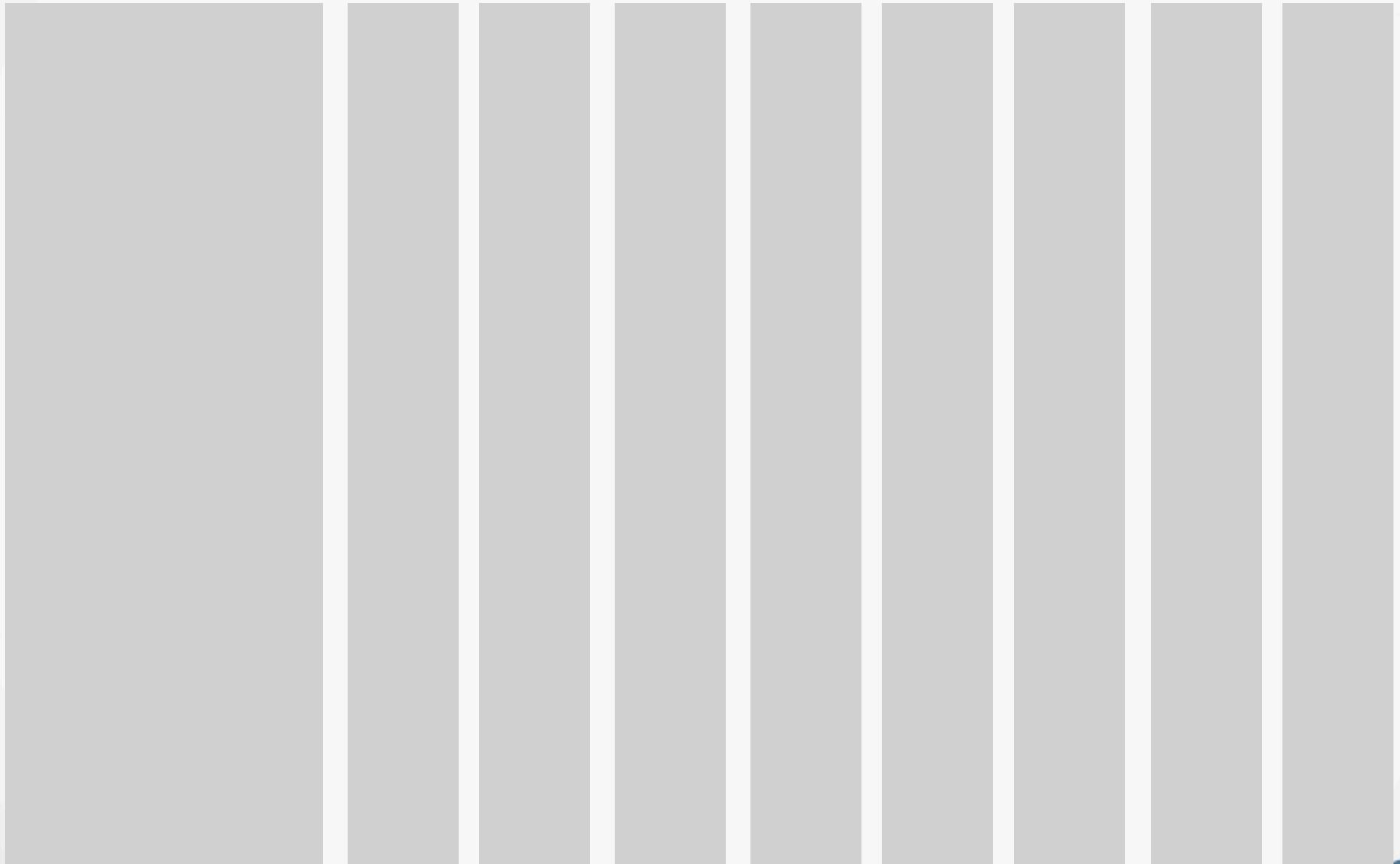


Principle of Proximity

Things that are spatially close belong to a group



Reduce tablejunk



Reduce tablejunk

Team	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	61,184,250	72,346,275	72,505,825	77,893,950	80,657,500	60,521,550	58,348,000	56,943,475
Atlanta Braves	68,134,250	70,448,200	74,073,950	75,379,325	96,872,425	79,024,800	85,148,575	79,708,500
Baltimore Orioles	73,057,675	70,213,300	62,436,500	47,260,525	59,872,650	45,725,575	66,580,850	64,808,675
Boston Red Sox	55,142,125	64,950,275	85,592,900	90,305,050	89,473,775	104,340,450	108,314,225	111,204,200
Chicago White Sox	22,740,725	26,839,225	57,743,525	52,826,700	49,048,075	62,704,325	69,655,550	98,918,900
Chicago Cubs	51,889,225	50,449,450	61,553,675	67,581,100	72,092,250	78,535,925	77,866,900	84,679,625
Cincinnati Reds	28,588,575	43,395,550	43,488,350	37,542,000	50,874,800	38,453,450	49,715,225	53,115,200
Cleveland Indians	60,769,300	72,962,375	76,645,825	65,757,875	39,382,925	28,807,750	36,060,700	56,795,875
Colorado Rockies	53,716,200	54,563,575	65,803,700	52,639,850	55,818,050	57,670,000	41,197,425	34,277,500
Detroit Tigers	30,450,600	53,949,225	44,492,125	49,150,000	47,272,125	41,387,100	61,605,525	76,205,625
Florida Marlins	17,477,775	17,303,450	29,586,800	37,482,075	43,185,975	38,998,175	55,903,675	14,421,625
Houston Astros	49,643,275	47,489,925	55,909,875	58,748,525	67,778,700	74,666,300	73,825,975	88,991,825
Kansas City Royals	22,794,225	20,922,325	30,726,725	40,738,800	38,959,125	39,674,175	34,149,075	40,770,700
Los Angeles Dodgers	70,773,175	81,596,550	93,949,100	91,202,850	101,824,625	86,244,550	67,524,575	91,830,500
Anaheim/Los Angeles Angels	39,265,275	42,886,800	37,554,975	55,108,625	73,177,475	93,596,925	81,911,925	103,625,325
Milwaukee Brewers	38,329,400	28,519,800	39,897,525	43,351,575	35,023,275	27,518,500	40,234,825	56,790,000
Minnesota Twins	18,502,400	15,884,125	22,548,800	38,677,875	53,466,350	51,524,050	52,421,300	61,355,825
Montreal/Washington Nationals	14,977,325	30,006,750	28,978,750	34,527,225	49,950,950	35,997,925	40,484,575	52,722,925
New York Mets	57,824,475	79,509,775	83,191,450	90,993,850	100,748,800	96,758,950	97,009,400	97,020,275
New York Yankees	75,923,825	79,774,350	88,541,850	108,559,125	133,670,525	157,616,825	198,017,725	177,376,950
Oakland Athletics	22,340,700	29,603,075	31,306,250	36,740,500	48,423,875	55,393,675	53,720,450	62,322,050
Philadelphia Phillies	26,118,525	40,782,750	40,061,700	51,745,525	61,017,250	86,314,050	91,671,075	81,734,575
Pittsburgh Pirates	18,498,050	27,815,700	42,498,650	36,485,850	48,698,300	29,840,675	34,047,325	41,846,200
San Diego Padres	42,703,875	45,684,175	35,493,625	35,711,200	37,858,325	54,639,500	56,150,175	62,254,625
Seattle Mariners	48,041,825	56,649,050	67,546,875	80,282,675	80,726,400	72,807,000	67,096,350	84,927,400
San Francisco Giants	44,943,550	51,670,975	58,641,350	72,499,850	79,184,775	66,144,500	86,045,600	90,862,075
St. Louis Cardinals	42,313,275	56,901,725	66,612,800	71,248,325	67,057,175	75,633,525	89,730,625	85,039,625
Tampa Bay Rays	29,269,400	50,617,050	50,881,125	30,696,425	19,630,000	27,321,000	26,690,675	31,623,175
Texas Rangers	71,956,675	68,073,000	71,374,525	90,777,700	87,105,400	47,263,775	46,089,375	52,796,875
Toronto Blue Jays	42,797,425	44,459,925	67,677,225	66,262,350	47,480,550	48,093,275	43,621,625	66,587,975
Average Salary	43,338,913	49,875,624	56,243,878	59,605,910	63,877,748	62,107,276	66,361,310	72,051,937

Reduce tablejunk

Team	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	61,184,250	72,346,275	72,505,825	77,893,950	80,657,500	60,521,550	58,348,000	56,943,475
Atlanta Braves	68,134,250	70,448,200	74,073,950	75,379,325	96,872,425	79,024,800	85,148,575	79,708,500
Baltimore Orioles	73,057,675	70,213,300	62,436,500	47,260,525	59,872,650	45,725,575	66,580,850	64,808,675
Boston Red Sox	55,142,125	64,950,275	85,592,900	90,305,050	89,473,775	104,340,450	108,314,225	111,204,200
Chicago White Sox	22,740,725	26,839,225	57,743,525	52,826,700	49,048,075	62,704,325	69,655,550	98,918,900
Chicago Cubs	51,889,225	50,449,450	61,553,675	67,581,100	72,092,250	78,535,925	77,866,900	84,679,625
Cincinnati Reds	28,588,575	43,395,550	43,488,350	37,542,000	50,874,800	38,453,450	49,715,225	53,115,200
Cleveland Indians	60,769,300	72,962,375	76,645,825	65,757,875	39,382,925	28,807,750	36,060,700	56,795,875
Colorado Rockies	53,716,200	54,563,575	65,803,700	52,639,850	55,818,050	57,670,000	41,197,425	34,277,500
Detroit Tigers	30,450,600	53,949,225	44,492,125	49,150,000	47,272,125	41,387,100	61,605,525	76,205,625
Florida Marlins	17,477,775	17,303,450	29,586,800	37,482,075	43,185,975	38,998,175	55,903,675	14,421,625
Houston Astros	49,643,275	47,489,925	55,909,075	58,748,525	67,778,700	74,666,300	73,825,975	88,991,825
Kansas City Royals	22,794,225	20,922,325	30,726,725	40,738,800	38,959,125	39,674,175	34,149,075	40,770,700
Los Angeles Dodgers	70,773,175	81,596,550	93,949,100	91,202,850	101,824,625	86,244,550	67,524,575	91,830,500
Anaheim/Los Angeles Angels	39,265,275	42,886,800	37,554,975	55,108,625	73,177,475	93,596,925	81,911,925	103,625,325
Milwaukee Brewers	38,329,400	28,519,800	39,897,525	43,351,575	35,023,275	27,518,500	40,234,825	56,790,000
Minnesota Twins	18,502,400	15,884,125	22,548,800	38,677,875	53,466,350	51,524,050	52,421,300	61,355,825
Montreal/Washington Nationals	14,977,325	30,006,750	28,978,750	34,527,225	49,950,950	35,997,925	40,484,575	52,722,925
New York Mets	57,824,475	79,509,775	83,191,450	90,993,850	100,748,800	96,758,950	97,009,400	97,020,275
New York Yankees	75,923,825	79,774,350	88,541,850	108,559,125	133,670,525	157,616,825	198,017,725	177,376,950
Oakland Athletics	22,340,700	29,603,075	31,306,250	36,740,500	48,423,875	55,393,675	53,720,450	62,322,050
Philadelphia Phillies	26,118,525	40,782,750	40,061,700	51,745,525	61,017,250	86,314,050	91,671,075	81,734,575
Pittsburgh Pirates	18,498,050	27,815,700	42,498,650	36,485,850	48,698,300	29,840,675	34,047,325	41,846,200
San Diego Padres	42,703,875	45,684,175	35,493,625	35,711,200	37,858,325	54,639,500	56,150,175	62,254,625
Seattle Mariners	48,041,825	56,649,050	67,546,875	80,282,675	80,726,400	72,807,000	67,096,350	84,927,400
San Francisco Giants	44,943,550	51,670,975	58,641,350	72,499,850	79,184,775	66,144,500	86,045,600	90,862,075
St. Louis Cardinals	42,313,275	56,901,725	66,612,800	71,248,325	67,057,175	75,633,525	89,730,625	85,039,625
Tampa Bay Rays	29,269,400	50,617,050	50,881,125	30,696,425	19,630,000	27,321,000	26,690,675	31,623,175
Texas Rangers	71,956,675	68,073,000	71,374,525	90,777,700	87,105,400	47,263,775	46,089,375	52,796,875
Toronto Blue Jays	42,797,425	44,459,925	67,677,225	66,262,350	47,480,550	48,093,275	43,621,625	66,587,975
Average Salary	43,338,913	49,875,624	56,243,878	59,605,910	63,877,748	62,107,276	66,361,310	72,051,937

Increase data-ink ratio

Team	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	61,184,250	72,346,275	72,505,825	77,893,950	80,657,500	60,521,550	58,348,000	56,943,475
Atlanta Braves	68,134,250	70,448,200	74,073,950	75,379,325	96,872,425	79,024,800	85,148,575	79,708,500
Baltimore Orioles	73,057,675	70,213,300	62,436,500	47,260,525	59,872,650	45,725,575	66,580,850	64,808,675
Boston Red Sox	55,142,125	64,950,275	85,592,900	90,305,050	89,473,775	104,340,450	108,314,225	111,204,200
Chicago White Sox	22,740,725	26,839,225	57,743,525	52,826,700	49,048,075	62,704,325	69,655,550	98,918,900
Chicago Cubs	51,889,225	50,449,450	61,553,675	67,581,100	72,092,250	78,535,925	77,866,900	84,679,625
Cincinnati Reds	28,588,575	43,395,550	43,488,350	37,542,000	50,874,800	38,453,450	49,715,225	53,115,200
Cleveland Indians	60,769,300	72,962,375	76,645,825	65,757,875	39,382,925	28,807,750	36,060,700	56,795,875
Colorado Rockies	53,716,200	54,563,575	65,803,700	52,639,850	55,818,050	57,670,000	41,197,425	34,277,500
Detroit Tigers	30,450,600	53,949,225	44,492,125	49,150,000	47,272,125	41,387,100	61,605,525	76,205,625
Florida Marlins	17,477,775	17,303,450	29,586,800	37,482,075	43,185,975	38,998,175	55,903,675	14,421,625
Houston Astros	49,643,275	47,489,925	55,909,075	58,748,525	67,778,700	74,666,300	73,825,975	88,991,825
Kansas City Royals	22,794,225	20,922,325	30,726,725	40,738,800	38,959,125	39,674,175	34,149,075	40,770,700
Los Angeles Dodgers	70,773,175	81,596,550	93,949,100	91,202,850	101,824,625	86,244,550	67,524,575	91,830,500
Anaheim/Los Angeles Angels	39,265,275	42,886,800	37,554,975	55,108,625	73,177,475	93,596,925	81,911,925	103,625,325
Milwaukee Brewers	38,329,400	28,519,800	39,897,525	43,351,575	35,023,275	27,518,500	40,234,825	56,790,000
Minnesota Twins	18,502,400	15,884,125	22,548,800	38,677,875	53,466,350	51,524,050	52,421,300	61,355,825
Montreal/Washington Nationals	14,977,325	30,006,750	28,978,750	34,527,225	49,950,950	35,997,925	40,484,575	52,722,925
New York Mets	57,824,475	79,509,775	83,191,450	90,993,850	100,748,800	96,758,950	97,009,400	97,020,275
New York Yankees	75,923,825	79,774,350	88,541,850	108,559,125	133,670,525	157,616,825	198,017,725	177,376,950
Oakland Athletics	22,340,700	29,603,075	31,306,250	36,740,500	48,423,875	55,393,675	53,720,450	62,322,050
Philadelphia Phillies	26,118,525	40,782,750	40,061,700	51,745,525	61,017,250	86,314,050	91,671,075	81,734,575
Pittsburgh Pirates	18,498,050	27,815,700	42,498,650	36,485,850	48,698,300	29,840,675	34,047,325	41,846,200
San Diego Padres	42,703,875	45,684,175	35,493,625	35,711,200	37,858,325	54,639,500	56,150,175	62,254,625
Seattle Mariners	48,041,825	56,649,050	67,546,875	80,282,675	80,726,400	72,807,000	67,096,350	84,927,400
San Francisco Giants	44,943,550	51,670,975	58,641,350	72,499,850	79,184,775	66,144,500	86,045,600	90,862,075
St. Louis Cardinals	42,313,275	56,901,725	66,612,800	71,248,325	67,057,175	75,633,525	89,730,625	85,039,625
Tampa Bay Rays	29,269,400	50,617,050	50,881,125	30,696,425	19,630,000	27,321,000	26,690,675	31,623,175
Texas Rangers	71,956,675	68,073,000	71,374,525	90,777,700	87,105,400	47,263,775	46,089,375	52,796,875
Toronto Blue Jays	42,797,425	44,459,925	67,677,225	66,262,350	47,480,550	48,093,275	43,621,625	66,587,975
Average Salary	43,338,913	49,875,624	56,243,878	59,605,910	63,877,748	62,107,276	66,361,310	72,051,937

Increase data-ink ratio

Team	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	61,184,250	72,346,275	72,505,825	77,893,950	80,657,500	60,521,550	58,348,000	56,943,475
Atlanta Braves	68,134,250	70,448,200	74,073,950	75,379,325	96,872,425	79,024,800	85,148,575	79,708,500
Baltimore Orioles	73,057,675	70,213,300	62,436,500	47,260,525	59,872,650	45,725,575	66,580,850	64,808,675
Boston Red Sox	55,142,125	64,950,275	85,592,900	90,305,050	89,473,775	104,340,450	108,314,225	111,204,200
Chicago White Sox	22,740,725	26,839,225	57,743,525	52,826,700	49,048,075	62,704,325	69,655,550	98,918,900
Chicago Cubs	51,889,225	50,449,450	61,553,675	67,581,100	72,092,250	78,535,925	77,866,900	84,679,625
Cincinnati Reds	28,588,575	43,395,550	43,488,350	37,542,000	50,874,800	38,453,450	49,715,225	53,115,200
Cleveland Indians	60,769,300	72,962,375	76,645,825	65,757,875	39,382,925	28,807,750	36,060,700	56,795,875
Colorado Rockies	53,716,200	54,563,575	65,803,700	52,639,850	55,818,050	57,670,000	41,197,425	34,277,500
Detroit Tigers	30,450,600	53,949,225	44,492,125	49,150,000	47,272,125	41,387,100	61,605,525	76,205,625
Florida Marlins	17,477,775	17,303,450	29,586,800	37,482,075	43,185,975	38,998,175	55,903,675	14,421,625
Houston Astros	49,643,275	47,489,925	55,909,075	58,748,525	67,778,700	74,666,300	73,825,975	88,991,825
Kansas City Royals	22,794,225	20,922,325	30,726,725	40,738,800	38,959,125	39,674,175	34,149,075	40,770,700
Los Angeles Dodgers	70,773,175	81,596,550	93,949,100	91,202,850	101,824,625	86,244,550	67,524,575	91,830,500
Anaheim/Los Angeles Angels	39,265,275	42,886,800	37,554,975	55,108,625	73,177,475	93,596,925	81,911,925	103,625,325
Milwaukee Brewers	38,329,400	28,519,800	39,897,525	43,351,575	35,023,275	27,518,500	40,234,825	56,790,000
Minnesota Twins	18,502,400	15,884,125	22,548,800	38,677,875	53,466,350	51,524,050	52,421,300	61,355,825
Montreal/Washington Nationals	14,977,325	30,006,750	28,978,750	34,527,225	49,950,950	35,997,925	40,484,575	52,722,925
New York Mets	57,824,475	79,509,775	83,191,450	90,993,850	100,748,800	96,758,950	97,009,400	97,020,275
New York Yankees	75,923,825	79,774,350	88,541,850	108,559,125	133,670,525	157,616,825	198,017,725	177,376,950
Oakland Athletics	22,340,700	29,603,075	31,306,250	36,740,500	48,423,875	55,393,675	53,720,450	62,322,050
Philadelphia Phillies	26,118,525	40,782,750	40,061,700	51,745,525	61,017,250	86,314,050	91,671,075	81,734,575
Pittsburgh Pirates	18,498,050	27,815,700	42,498,650	36,485,850	48,698,300	29,840,675	34,047,325	41,846,200
San Diego Padres	42,703,875	45,684,175	35,493,625	35,711,200	37,858,325	54,639,500	56,150,175	62,254,625
Seattle Mariners	48,041,825	56,649,050	67,546,875	80,282,675	80,726,400	72,807,000	67,096,350	84,927,400
San Francisco Giants	44,943,550	51,670,975	58,641,350	72,499,850	79,184,775	66,144,500	86,045,600	90,862,075
St. Louis Cardinals	42,313,275	56,901,725	66,612,800	71,248,325	67,057,175	75,633,525	89,730,625	85,039,625
Tampa Bay Rays	29,269,400	50,617,050	50,881,125	30,696,425	19,630,000	27,321,000	26,690,675	31,623,175
Texas Rangers	71,956,675	68,073,000	71,374,525	90,777,700	87,105,400	47,263,775	46,089,375	52,796,875
Toronto Blue Jays	42,797,425	44,459,925	67,677,225	66,262,350	47,480,550	48,093,275	43,621,625	66,587,975
Average Salary	43,338,913	49,875,624	56,243,878	59,605,910	63,877,748	62,107,276	66,361,310	72,051,937

Increase data-ink ratio

Team	Average Salary (\$ millions)							
	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	61.2	72.3	72.5	77.9	80.7	60.5	58.3	56.9
Atlanta Braves	68.1	70.4	74.1	75.4	96.9	79.0	85.1	79.7
Baltimore Orioles	73.1	70.2	62.4	47.3	59.9	45.7	66.6	64.8
Boston Red Sox	55.1	65.0	85.6	90.3	89.5	104.3	108.3	111.2
Chicago White Sox	22.7	26.8	57.7	52.8	49.0	62.7	69.7	98.9
Chicago Cubs	51.9	50.4	61.6	67.6	72.1	78.5	77.9	84.7
Cincinnati Reds	28.6	43.4	43.5	37.5	50.9	38.5	49.7	53.1
Cleveland Indians	60.8	73.0	76.6	65.8	39.4	28.8	36.1	56.8
Colorado Rockies	53.7	54.6	65.8	52.6	55.8	57.7	41.2	34.3
Detroit Tigers	30.5	53.9	44.5	49.2	47.3	41.4	61.6	76.2
Florida Marlins	17.5	17.3	29.6	37.5	43.2	39.0	55.9	14.4
Houston Astros	49.6	47.5	55.9	58.7	67.8	74.7	73.8	89.0
Kansas City Royals	22.8	20.9	30.7	40.7	39.0	39.7	34.1	40.8
Los Angeles Dodgers	70.8	81.6	93.9	91.2	101.8	86.2	67.5	91.8
Anaheim/Los Angeles Angels	39.3	42.9	37.6	55.1	73.2	93.6	81.9	103.6
Milwaukee Brewers	38.3	28.5	39.9	43.4	35.0	27.5	40.2	56.8
Minnesota Twins	18.5	15.9	22.5	38.7	53.5	51.5	52.4	61.4
Montreal/Washington Nationals	15.0	30.0	29.0	34.5	50.0	36.0	40.5	52.7
New York Mets	57.8	79.5	83.2	91.0	100.7	96.8	97.0	97.0
New York Yankees	75.9	79.8	88.5	108.6	133.7	157.6	198.0	177.4
Oakland Athletics	22.3	29.6	31.3	36.7	48.4	55.4	53.7	62.3
Philadelphia Phillies	26.1	40.8	40.1	51.7	61.0	86.3	91.7	81.7
Pittsburgh Pirates	18.5	27.8	42.5	36.5	48.7	29.8	34.0	41.8
San Diego Padres	42.7	45.7	35.5	35.7	37.9	54.6	56.2	62.3
Seattle Mariners	48.0	56.6	67.5	80.3	80.7	72.8	67.1	84.9
San Francisco Giants	44.9	51.7	58.6	72.5	79.2	66.1	86.0	90.9
St. Louis Cardinals	42.3	56.9	66.6	71.2	67.1	75.6	89.7	85.0
Tampa Bay Rays	29.3	50.6	50.9	30.7	19.6	27.3	26.7	31.6
Texas Rangers	72.0	68.1	71.4	90.8	87.1	47.3	46.1	52.8
Toronto Blue Jays	42.8	44.5	67.7	66.3	47.5	48.1	43.6	66.6
Average Salary	43.3	49.9	56.2	59.6	63.9	62.1	66.4	72.1

Increase data-ink ratio

Team	Average Salary (\$ millions)							
	1999	2000	2001	2002	2003	2004	2005	2006
Arizona Diamondbacks	61.2	72.3	72.5	77.9	80.7	60.5	58.3	56.9
Atlanta Braves	68.1	70.4	74.1	75.4	96.9	79.0	85.1	79.7
Baltimore Orioles	73.1	70.2	62.4	47.3	59.9	45.7	66.6	64.8
Boston Red Sox	55.1	65.0	85.6	90.3	89.5	104.3	108.3	111.2
Chicago White Sox	22.7	26.8	57.7	52.8	49.0	62.7	69.7	98.9
Chicago Cubs	51.9	50.4	61.6	67.6	72.1	78.5	77.9	84.7
Cincinnati Reds	28.6	43.4	43.5	37.5	50.9	38.5	49.7	53.1
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Houston Astros	49.6	47.5	55.9	58.7	67.8	74.7	73.8	89.0
Kansas City Royals	22.8	20.9	30.7	40.7	39.0	39.7	34.1	40.8
Los Angeles Dodgers	70.8	81.6	93.9	91.2	101.8	86.2	67.5	91.8
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Milwaukee Brewers	38.3	28.5	39.9	43.4	35.0	27.5	40.2	56.8
Minnesota Twins	18.5	15.9	22.5	38.7	53.5	51.5	52.4	61.4
Montreal/Washington Nationals	15.0	30.0	29.0	34.5	50.0	36.0	40.5	52.7
New York Mets	57.8	79.5	83.2	91.0	100.7	96.8	97.0	97.0
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Oakland Athletics	22.3	29.6	31.3	36.7	48.4	55.4	53.7	62.3
Philadelphia Phillies	26.1	40.8	40.1	51.7	61.0	86.3	91.7	81.7
Pittsburgh Pirates	18.5	27.8	42.5	36.5	48.7	29.8	34.0	41.8
San Diego Padres	42.7	45.7	35.5	35.7	37.9	54.6	56.2	62.3
Seattle Mariners	48.0	56.6	67.5	80.3	80.7	72.8	67.1	84.9
San Francisco Giants	44.9	51.7	58.6	72.5	79.2	66.1	86.0	90.9
St. Louis Cardinals	42.3	56.9	66.6	71.2	67.1	75.6	89.7	85.0
Tampa Bay Rays	29.3	50.6	50.9	30.7	19.6	27.3	26.7	31.6
Texas Rangers	72.0	68.1	71.4	90.8	87.1	47.3	46.1	52.8
Toronto Blue Jays	42.8	44.5	67.7	66.3	47.5	48.1	43.6	66.6
Average Salary	43.3	49.9	56.2	59.6	63.9	62.1	66.4	72.1

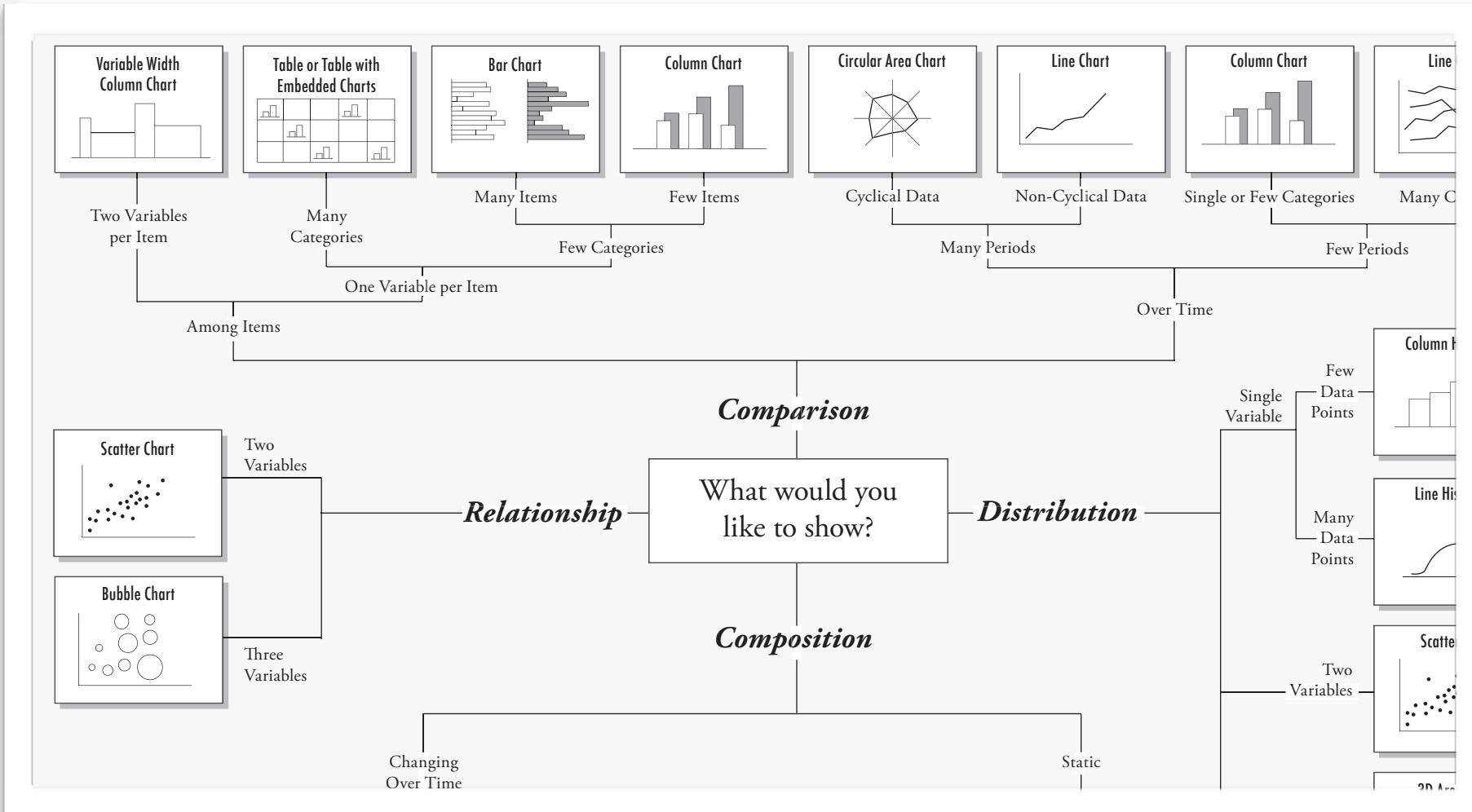
Tables

Remove **gridlines** to eliminate clutter

Use **lines** or **whitespace** to separate areas that are conceptually different

Display the **smallest number of digits** that you can to support the needs of the table

Choosing the right chart



Andrew Abela

http://extremepresentation.typepad.com/blog/2006/09/choosing_a_good.html

Chart Chooser

Welcome to the Chart Chooser

Use the filters to find the right chart type for your needs. Then download as Excel or PowerPoint templates and insert your data.

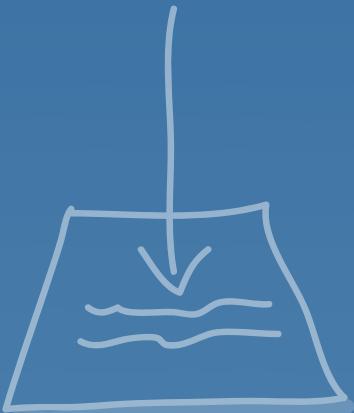
- Comparison
- Distribution
- Composition
- Trend
- Relationship
- Table



<http://www.chartchooser.com/>



exercise



De-junk your report!

FONTS
one

Reds

Hearty, earthy, jammy,
rustic

Whites

Tart, sophisticated, citrusy,
light



Serif

Hearty, rustic, somber,
dignified

Sans-serif

Light, modern, smooth,
simple

Serif

n h

Serif

Reds

Merlot, Shiraz, Cabernet
Sauvignon, Pinot Noir

Whites

Chardonnay, Sauvignon
Blanc, Riesling



Serif
Georgia
Palatino
Times New Roman

Sans-serif
Arial / Helvetica
Trebuchet
Verdana / Tahoma



Fonts - Simple rules

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Body Text

Clean readable text,
50-80% of your text
will look like this.

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Header

Use to separate and name sections

- 150%-200% of body

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- 85% of body
- Lower contrast

Notes

Additional things a user should be aware of

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- Same size as body
- High-impact color/bold/italic

Emphasis

Draw the eye to key points

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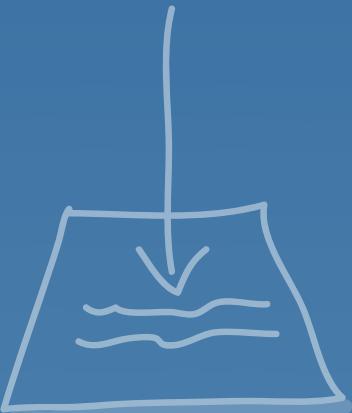
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exercise



Apply the Juice Simple Font Framework™ to your report.

From data to doing

vizard fundamentals

Our tiny brains

How we see

Visual comprehension

Chart dejunking

Fonts

dashboard design

Needs + constraints

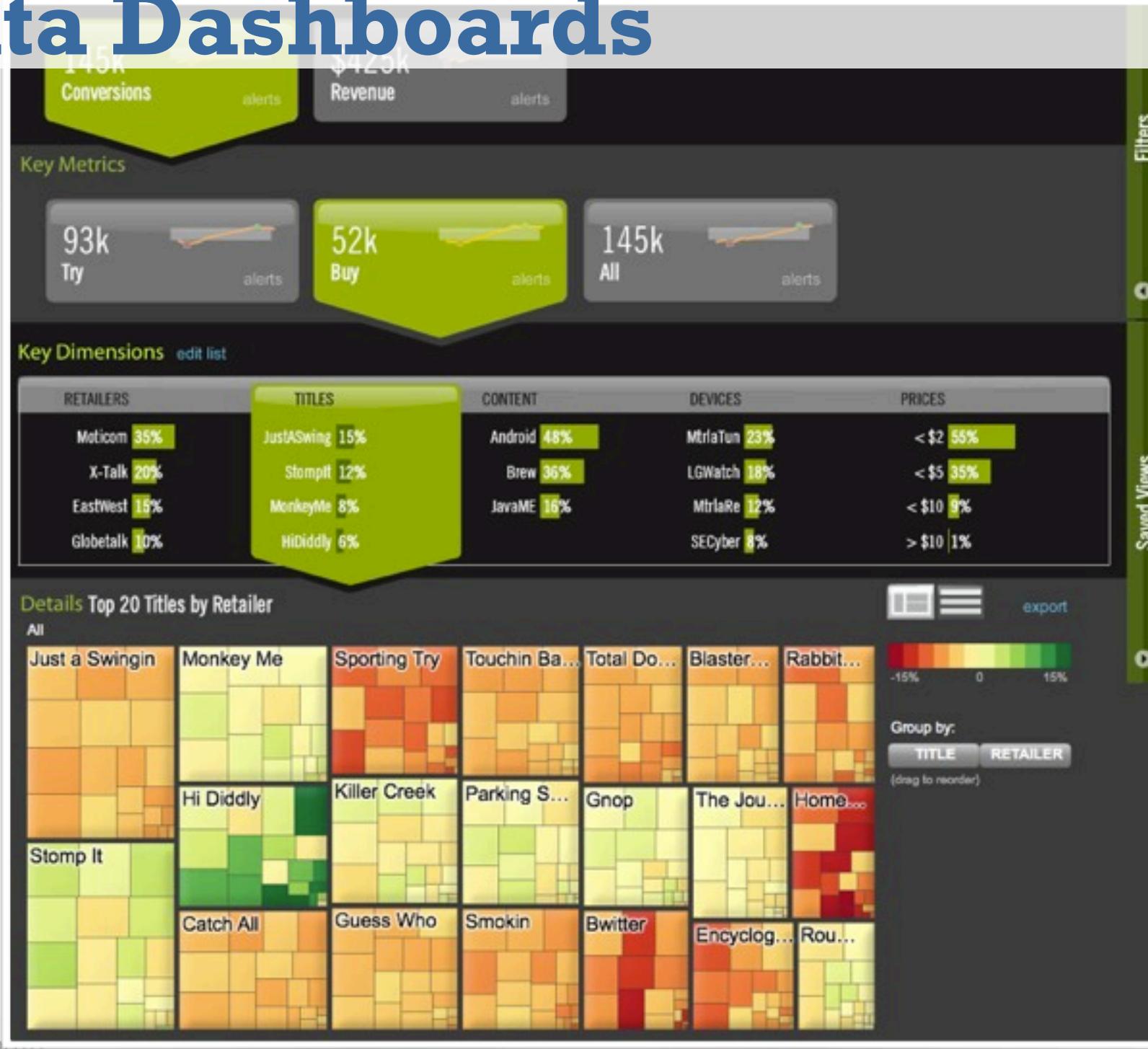
Principles

Structure + flow

Design Patterns

Wireframes

Data Dashboards



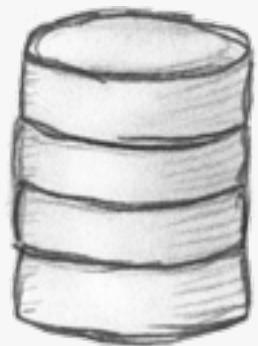
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analytics

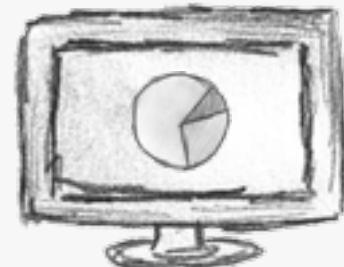
Why are dashboards important?

What process will help me design a good dashboard?

Big pile of valuable,
lonely **data**



analyst, the
reluctant
gatekeeper

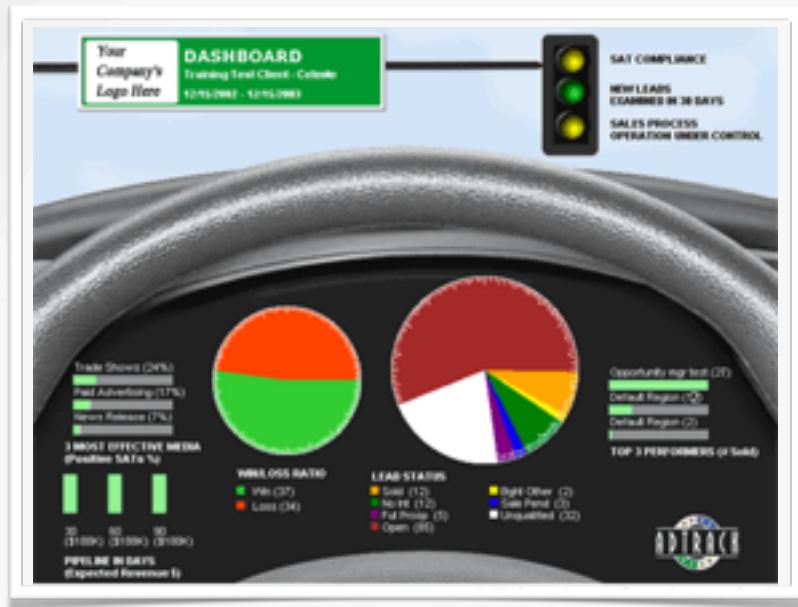


info-hungry **front-line** folks
who can add context and
meaning to the data



Dashboard acts as a bridge
to front-lines and multiplies the
value of the data

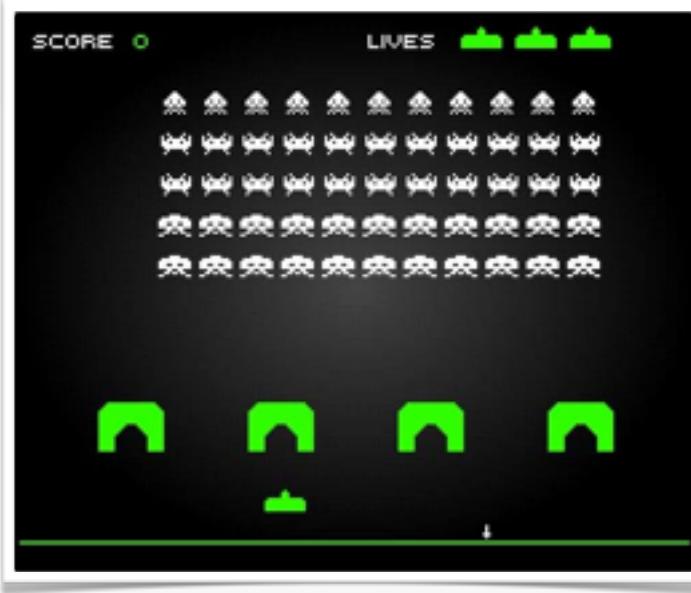
early → evolution → late



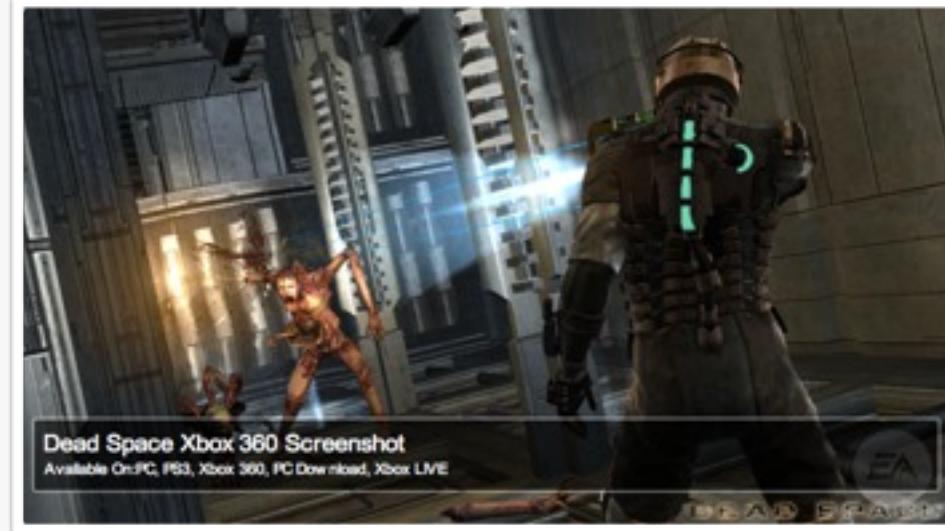
One screen
Information density
Few options
Simple interaction

Many views
Information comprehension
Exploration
Highly interactive

early → evolution → late

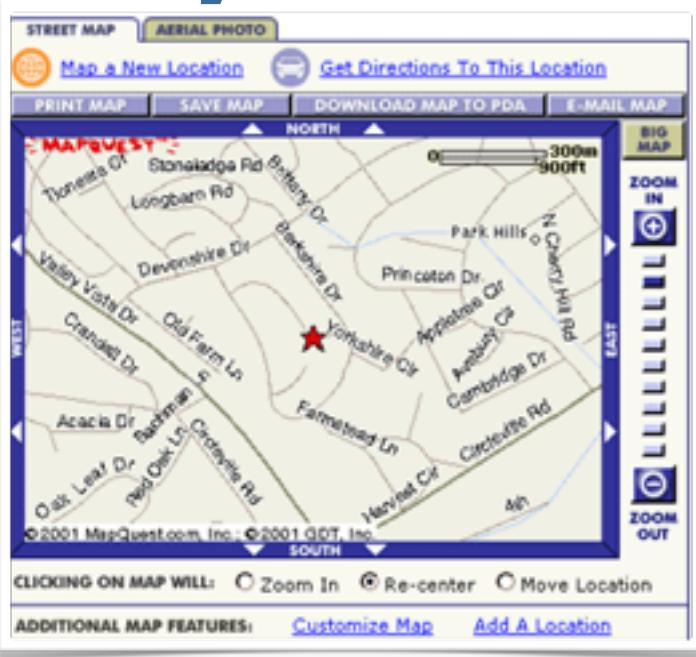


One screen
Information density
Few options
Simple interaction

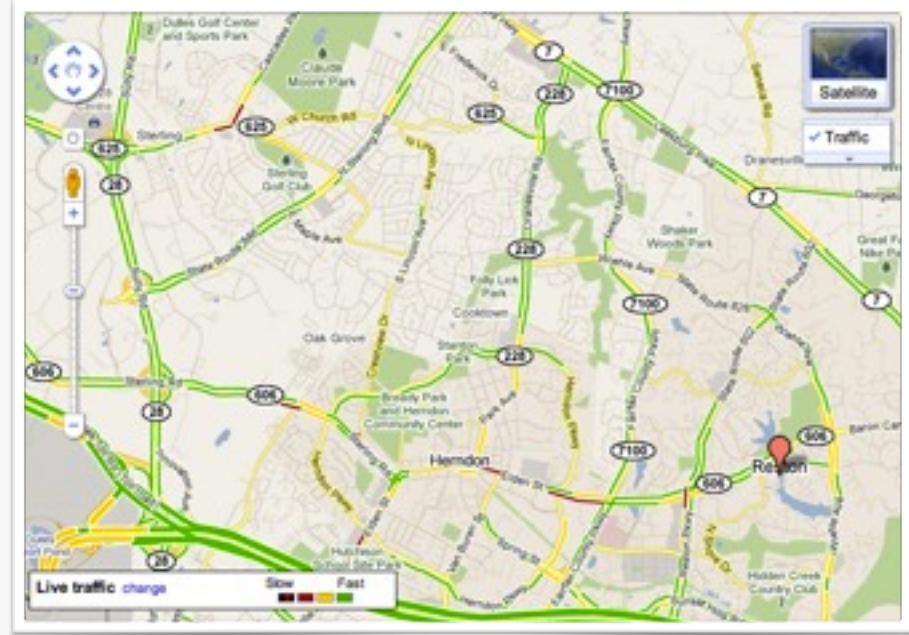


Many views
Information comprehension
Exploration
Highly interactive

early → evolution → late



One screen
Information density
Few options
Simple interaction



Many views
Information comprehension
Exploration
Highly interactive

data visualization



interface design



Breadth and depth of data

User workflows and guidance

Connections and interaction between visuals

Flexibility and configuration

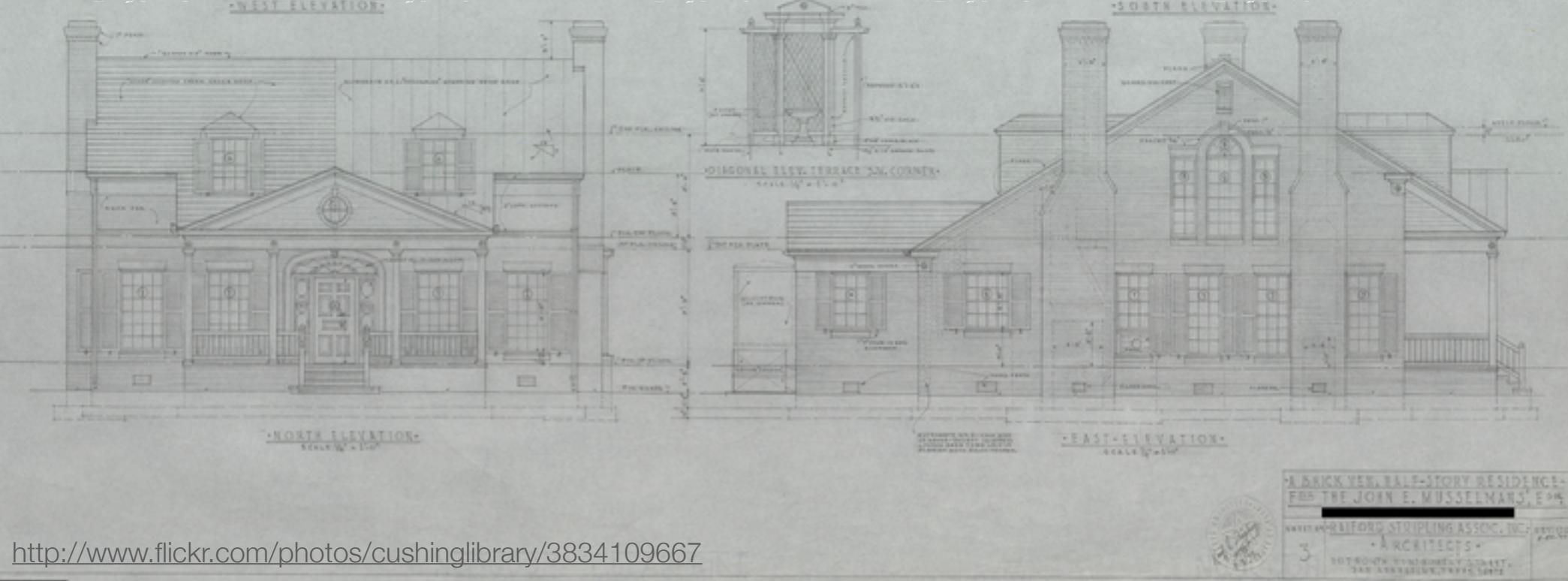
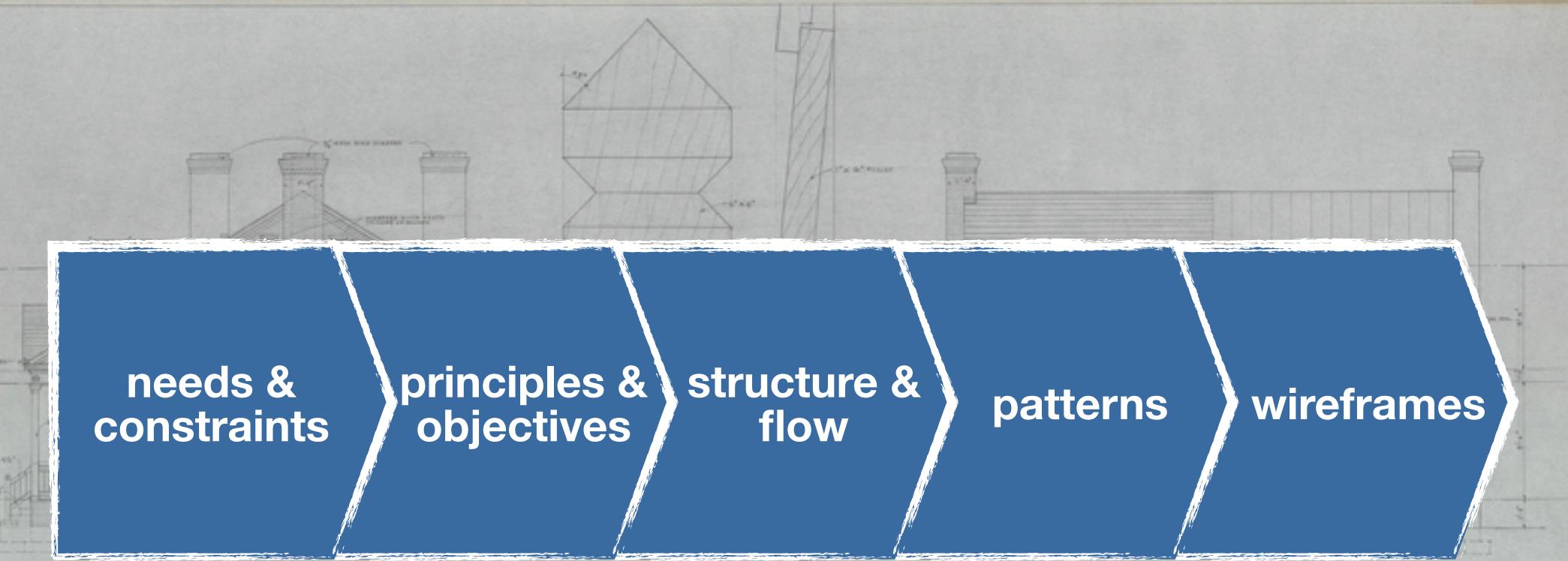
needs & constraints

principles & objectives

structure & flow

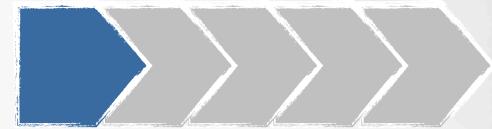
patterns

wireframes



<http://www.flickr.com/photos/cushinglibrary/3834109667>

Inputs to design



Technology

Screen resolution
Data refresh rate

Data

Measures
Dimensions



data

the gap



decision-makers

Users

Executive
Analyst

Required features

Export data
Mobile access

Workflow

Processes
Other data sources



Principles of dashboard design

Thou shalt...

- **Guide users** along the journey to find answers
- **Focus on actions** that can be executed in the user's role
- **Pursue simplicity** by minimizing distracting information and design elements



Objective:

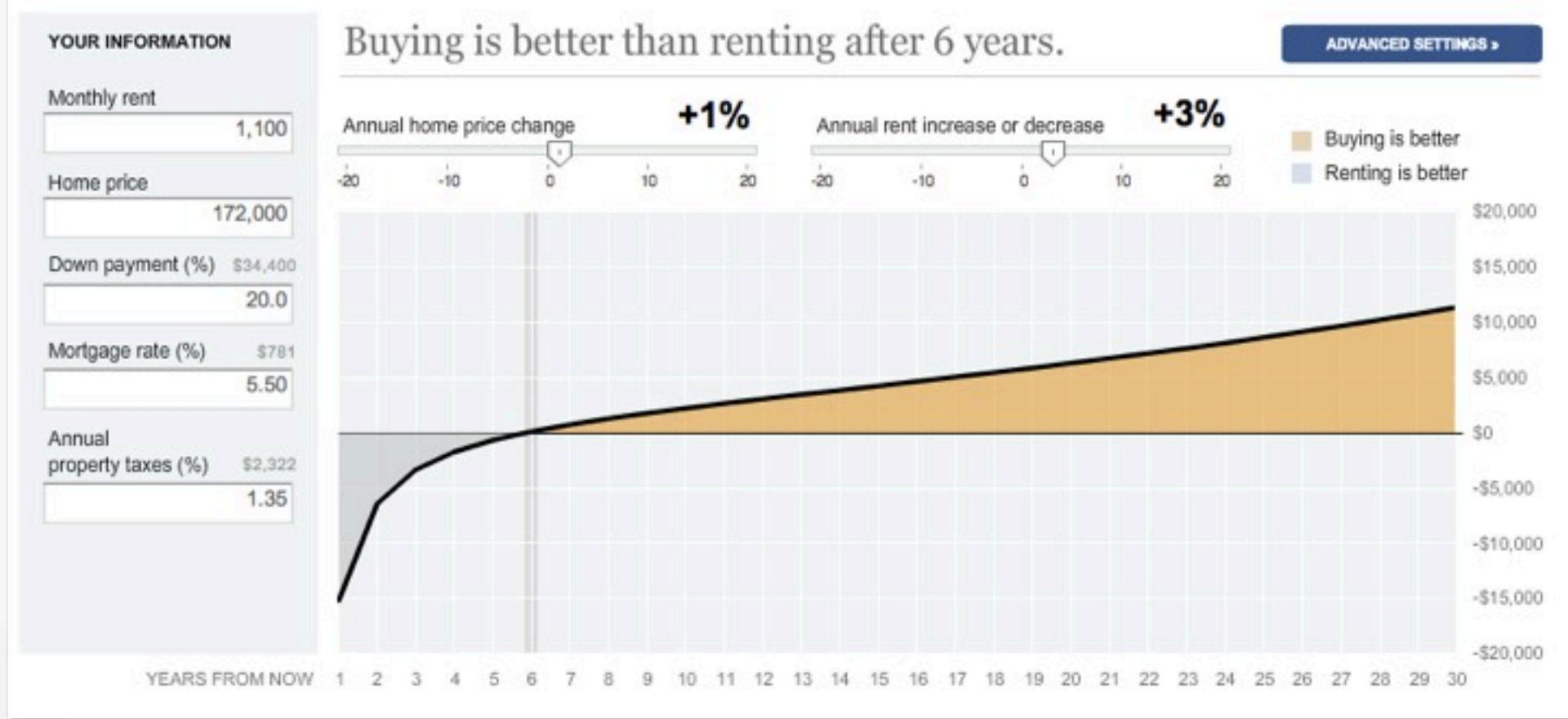
What should I be able to accomplish by using the dashboard?



New York Times

Is It Better to Buy or Rent?

Whether renting is better than buying depends on many factors, particularly how fast prices and rents rise and how long you stay in your home. Compare the costs of buying and renting a home in the calculator below. Click the **ADVANCED SETTINGS** button to change inputs such as your rate of return on investments, condo/common fees and your tax bracket.



<http://www.nytimes.com/interactive/business/buy-rent-calculator.html>



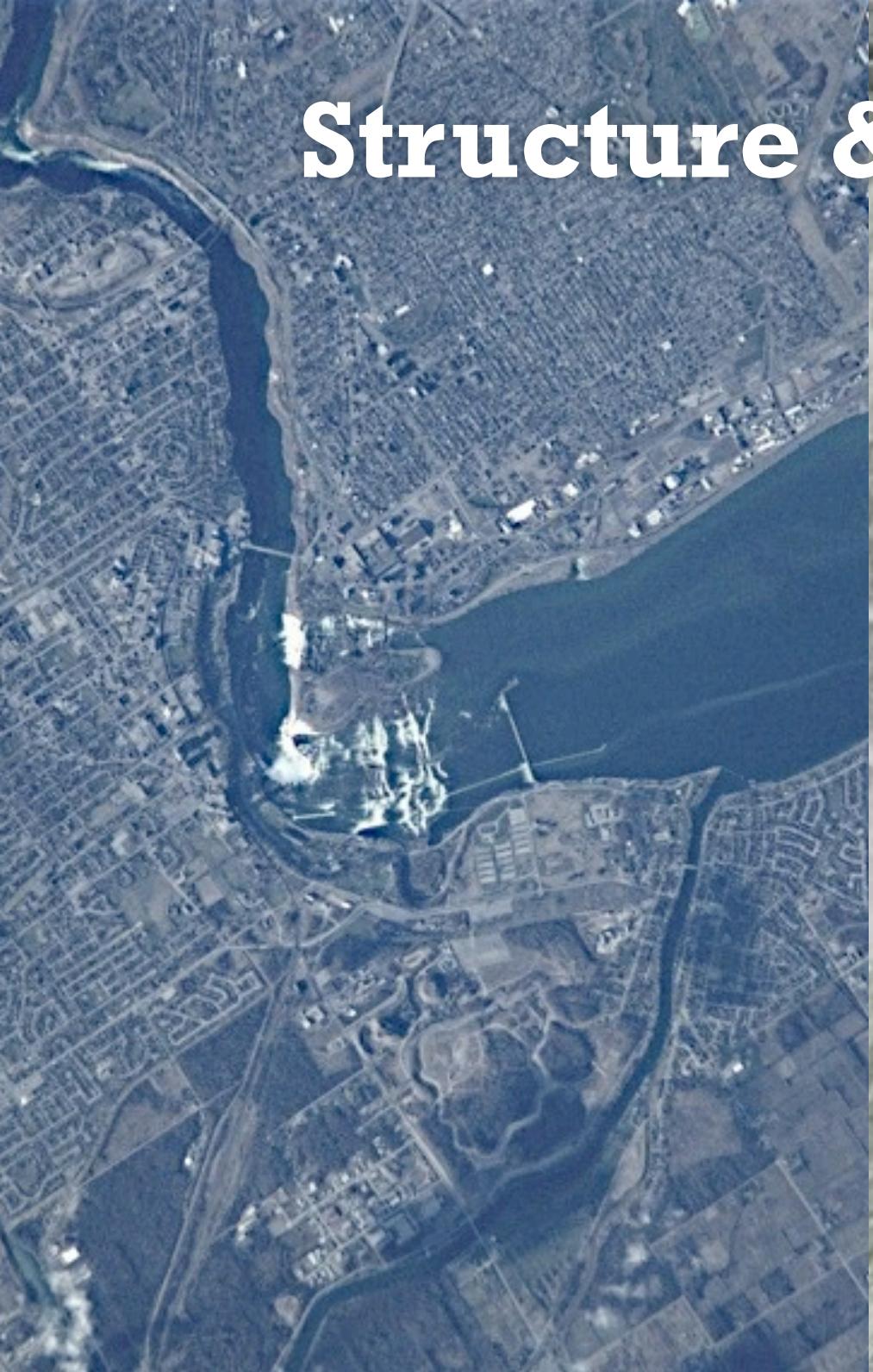
Periscopic: VoteEasy

The screenshot displays the VoteEasy interface for Vermont. At the top, a navigation bar includes links for ABORTION, AFGHANISTAN, CRIME, ECONOMY, EDUCATION, ENVIRONMENT, GUNS, HEALTHCARE, IMMIGRATION, SOCIAL ISSUES, SOCIAL SECURITY, and TAXES. Below this, a sidebar for the SENATE shows "Best Match" candidates: STEVE CAIN (Independent), DAN FREILICH (Independent), and PATRICK LEAHY (Democratic). A central poll asks, "How important is this issue to you?" with options for "ECONOMY: yes" (green) and "no" (gray), with a scale from "very" to "somewhat". To the right, HOUSE candidates are listed: GUS JACCACI (Independent), PAUL BEAUDRY (Republican), JANE NEWTON (Socialist), and PETER WELCH (Democratic).

<http://works.periscopic.com/voteeasy/#>

JUICE
analytics

Structure & flow



<http://emmanuellibrary.files.wordpress.com/2010/10/barrel-rider.jpg>

What does this tell me?





Process

Client: Subaru
Campaign: Subaru
Flight Dates: 10.01.08 - 12.31.08
IO#; SUB-100108

Summary Campaign Detail Conversions

Subaru Campaign Summary: May 19 - May 25, 2008

80% of total time has passed and 55% of total budget has been spent

TOTAL:	\$321K media spend	1,657k impressions	55k clicks	11.4k conversions	\$569k revenue
FILTERED BY GOOGLE, BRAND TV:	\$191k	564k	32k	7k	\$345k
% OF TOTAL:	59.5%	34.0%	58.1%	61.4%	60.6%

eCPM has {declined} by {x%} between {date} and {date}

Weekly Impressions (blue bars) and eCPM (line with circles) from May 19 to June 25, 2008.

Date	Weekly Impressions	eCPM
May 19	400,000	0.35
May 26	700,000	0.45
June 2	1,000,000	0.55
June 9	600,000	0.65
June 16	900,000	0.75
June 23	500,000	0.85
June 30	700,000	0.95
July 7	600,000	0.85

0.75% average click through rate

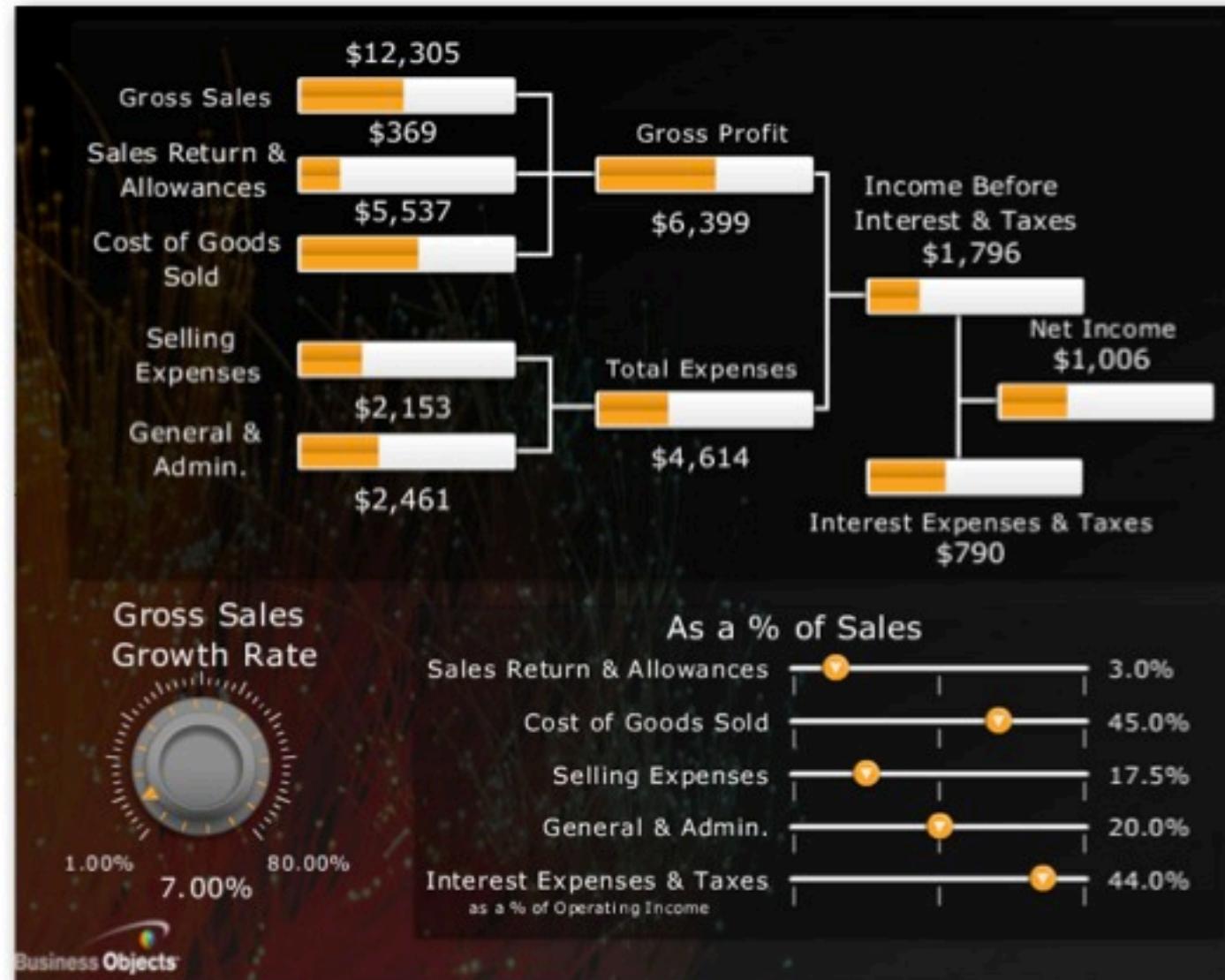
Cost per click has {declined} by {x%} between {date} and {date}

Weekly Clicks (green bars) and Cost per Click (line with circles) from May 19 to June 25, 2008.

Date	Weekly Clicks	Cost per Click
May 19	10,000	0.90
May 26	15,000	0.75
June 2	20,000	0.85
June 9	25,000	0.80
June 16	30,000	0.40
June 23	35,000	0.45
June 30	40,000	0.40
July 7	45,000	0.40



Relationships



Business Objects

Juice, Inc. ©2010

JUICE
analytics



Drill-down workflow

Aperture Your customer. In sight.

Logout

report parameters INSORD_3 / CAMPAIGN_Y from 04/01/10 to 04/11/10 for ALL and ALL

Excel PDF

AUDIENCE	26,170,089	15,913	1,972	2,263	0.06%
summary	impressions	clicks	view-throughs	conversions	ctr

INFLUENCE

FINANCE	HOUSEHOLD	DEMOGRAPHICS
\$50k-\$75k (Income)	1-3 Yrs (Length of Resi... High School	
Bank Card	1 Unit	Females 35-44 yrs
\$100k-\$250k (Net W...	1-2 (Household Size)	Males 45-54 yrs
<100k	16-17 yrs (Children Age)	36-45 yrs (Adult Age)

BEHAVIOR	GEOMEDICX ZIP+4
Gifts	Cholesterol
Education	Eye Glasses
Health and Fitness	COPD
Internet/Online Subscri...	Hearing Loss

INDEXING

FINANCE	HOUSEHOLD	DEMOGRAPHICS	BEHAVIOR	GEOMEDICX ZIP+4
\$100k-\$250k (Net W...	0-2 yrs (Children Age)	High School	Education	ADHD
Bank Card	1-2 (Household Size)	Males 55-64 yrs	Gifts	Cholesterol
\$40k-\$50k (Income)	1-3 Yrs (Length of Resi... Females 35-44 yrs		Health and Fitness	Smoking Cessation
<100k	1 Unit	36-45 yrs (Adult Age)	Internet/Online Subscri...	Eye Glasses

AUDIENCE DETAILS influence : behavior

Experian Behavior Bank (top 10)

Category	Percent (%)
Total	~10
Be Oldskool	~9
Sports	~11
Purchase via Online	~9
Pet Education	~8
Investor	~7
MarketOnline Subscrber	~16
General Cooking	~8
Gardening	~6
Domestic Trend	~7

Experian MOR Bank (all)

Category	Percent (%)
News and Financial	~5
Health and Fitness	~80
Family & General	~10
Do-It-Yourselfers	~5

In Market (top 10)

Category	Percent (%)
Organic	~5
Gold Card	~5
Health Insurance	~5
Telcom	~10
Some products w/US Emergency/Certified	~5
Reef Tank	~5
Do It Yourselfer	~5
Public Affairs	~45
Teaching Resources	~25
Gold Card	~10

Dashboard Design Patterns

Features,
visualizations,
layouts, &
design approaches
for constructing
your dashboard





Global filters

wefelfine.org

The screenshot shows a dashboard interface with a dark background. At the top, there are six global filter sections: Feeling (All), Gender (Female), Age (30 - 39), Weather (Sunny), Location (All), and Date (2010). Below these filters is a sidebar with a vertical list of words starting with 'a' (abandoned, able, abnormal, abroad, absent, absolute, absorbed, abstract, absurd, abused, academic, acceptable, accepted, accepting, accomplished, according, accountable, accurate, ace, aching, achy, acid, acknowledged, across, acting) and a vertical column of years from 2006 to 2011. A large orange arrow points from the sidebar towards the center of the dashboard. In the center, there is a large, stylized icon of a person's head and shoulders. To the right of the person icon is a vertical timeline with decades labeled '30s', '40s', '50s', '60s', '70s', and '80s'. Above the '30s' label is a sun icon, and above the '70s' label is a snowflake icon. The bottom of the dashboard features decorative icons of a woman, a man, and a cloud.

Feeling All Gender Female Age 30 - 39 Weather Sunny Location All Date 2010

All Feelings Both Genders All Ages All Weather All Locations All Dates

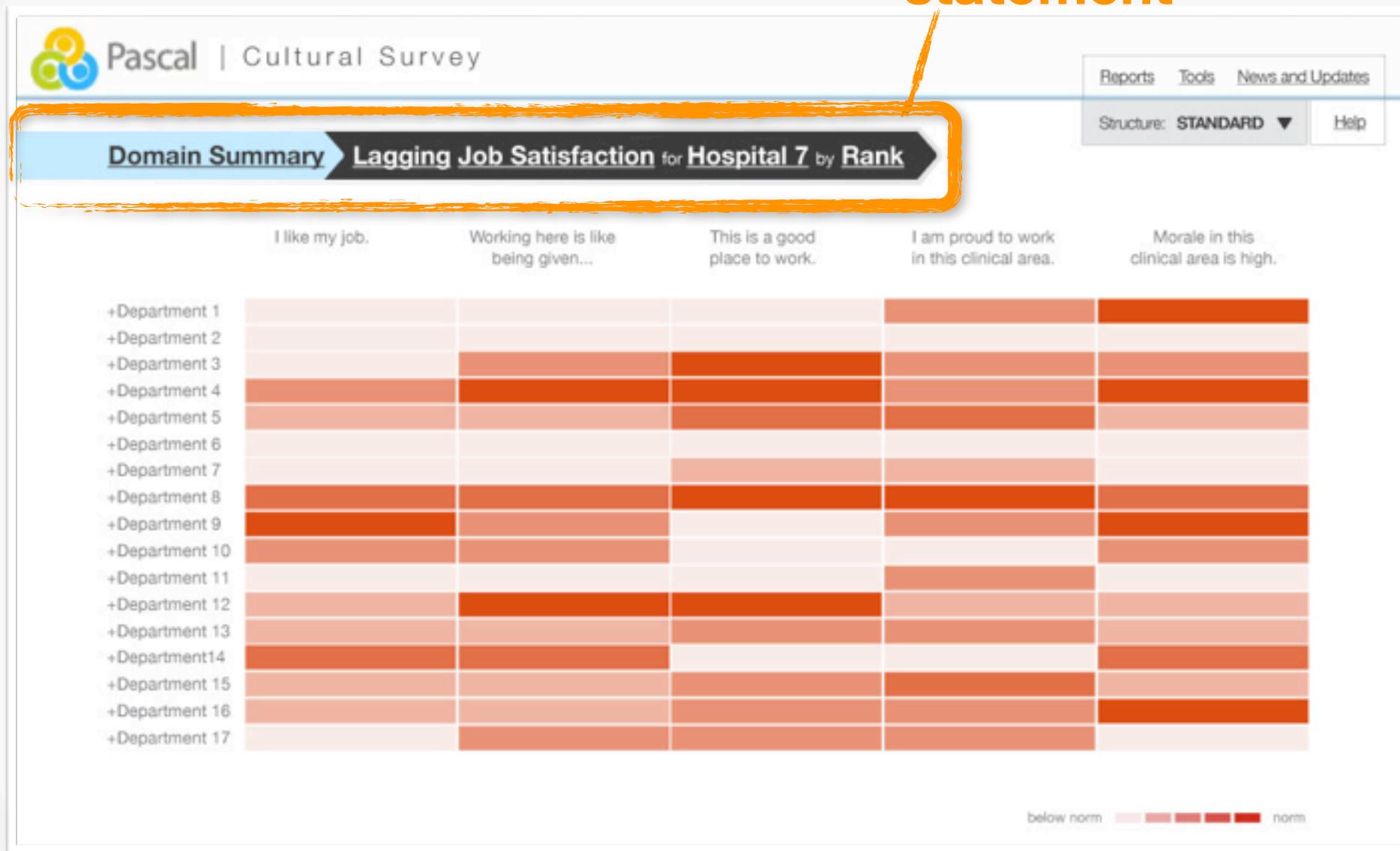
A abandoned
B able
C abnormal
D abroad
E absent
F absolute
G absorbed
H abstract
I absurd
J abused
K academic
L acceptable
M accepted
N accepting
O accomplished
P according
Q accountable
R accurate
T ace
U aching
V achy
W acid
X acknowledged
Y across
Z acting

Choose Country

2006	Feb
2007	Mar
2008	Apr
2009	May
2010	Jun
2011	Jul
	Aug
	Sep
	Oct
	Nov
	Dec

Configurable title

User constructs the view with a summary statement





Leaderboard

THE WORLD'S BEST COUNTRIES

A Newsweek study of health, education, economy, and politics ranks the globe's true national champions.

COUNTRY GROUPS

Select a group...

INCOME GROUPS

Low

Middle

High

POPULATION GROUPS

Small

Medium

Large

COUNTRY LIST

Sort by: Rank Country

4 Australia
7 Canada
9 Japan
11 United States
12 Germany
14 United Kingdom
15 Korea, South
16 France
21 Spain
23 Italy
29 Poland
37 Malaysia
39 Romania
42 Peru
45 Mexico
46 Argentina
48 Brazil
49 Ukraine
51 Russia

SCORES & RANK BY CATEGORY

EDUCATION

HEALTH

QUALITY OF LIFE

ECONOMIC DYNAMISM

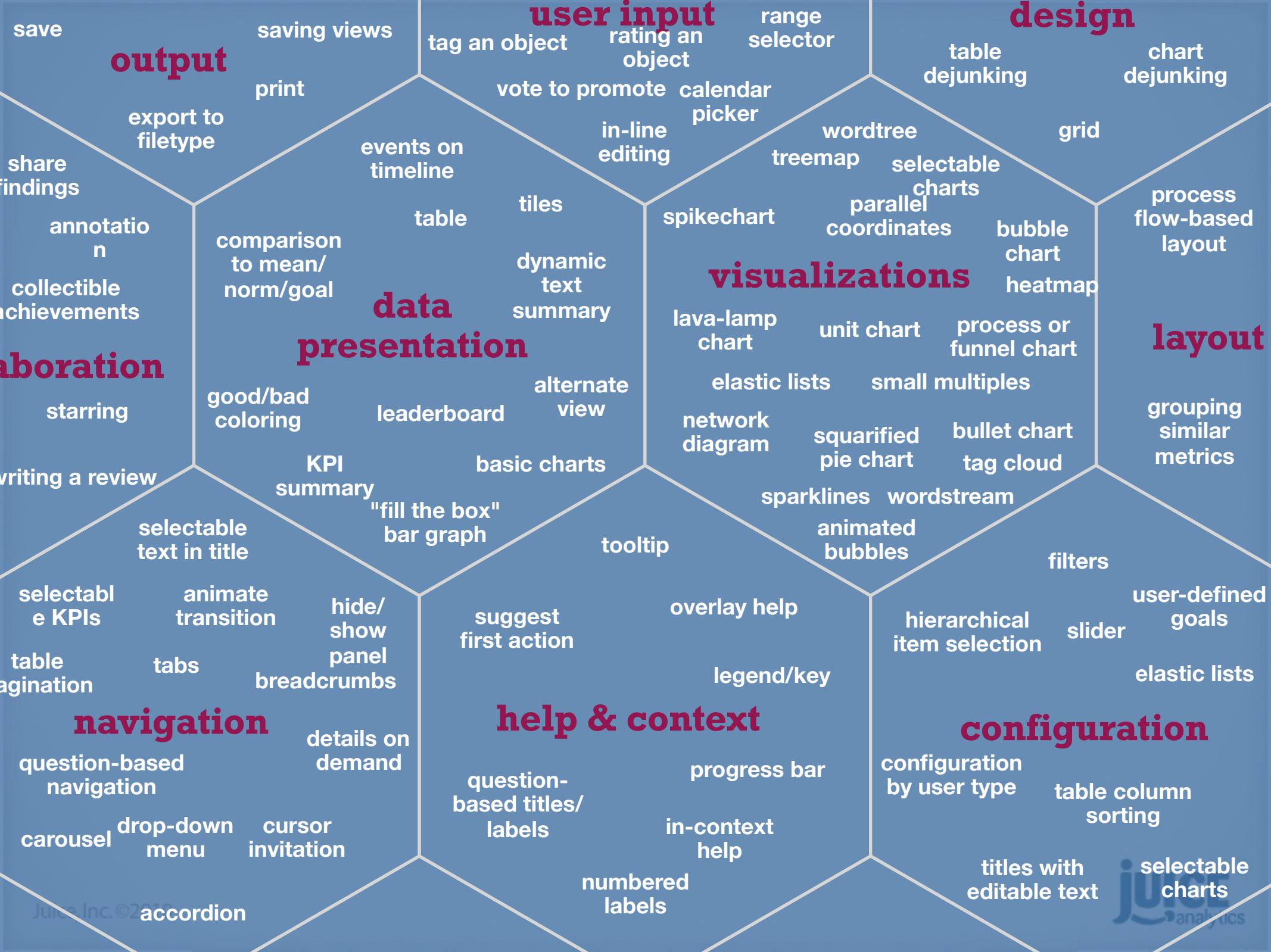
Answer the common question: what is the best & worse performing?

47 Chile: 69.47

COUNTRY DETAILS

How to use this interactive

- Use the **COUNTRY LIST**, far left, to browse the World's best 100 countries. Select a country to see its score and rank in each of the five categories: Education, Health, Quality of Life, Economic Dynamism and Political Environment.
- Dots in the middle columns represent countries plotted by rank (horizontal) and score (vertical).
- Detailed metrics for each country across the five categories will appear in the column to the far right, and enable quick comparisons between any two countries.
- Use the buttons along the top - **INCOME** and **POPULATION GROUPS** - to view and compare countries in the same income and population brackets.



Inventario



Prod 1



Prod 2



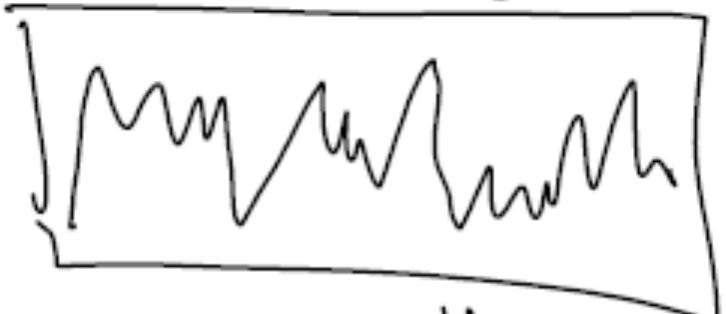
Prod 3



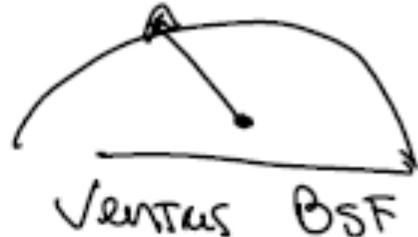
Prod 4

Ventas

Ran Rate



Mes en Curso



Ventas x Vendedor

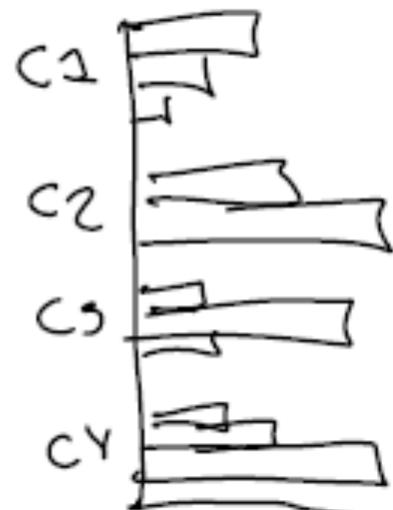


Contabilidad

Cuentas por cobrar



Cuentas por pagar





Wireframes

Focus on...

Layout

Realistic data
structure and size

Visible features

Don't sweat...

Look & feel

Realistic data

Invisible features (business
logic, database)

Examples of effective dashboards

Qualcomm

TrendView

AppliedBroadband

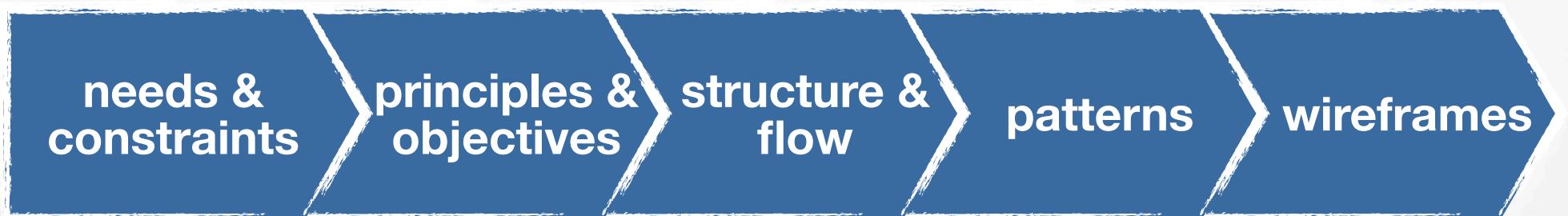
Why are dashboards important?

Tools for guiding users to answers and action

Persuade and empower a broad audience

Require new skills beyond data visualization

What process will help me design a good dashboard?





we craft applications that make
using data enjoyable and rewarding

Download these slides later:

Workshop: <http://www.bit.ly/AEAJuiceWS>

Keynote: <http://www.bit.ly/AEAJuiceKN>