


# Click to Enter

A SQLLOCKS  
PRESENTATION



Now you see it...  
But did you really?

Correcting Visual Fallacies...

Facts do not “speak for themselves”. They speak for or against competing theories. Facts divorced from theory or visions are mere isolated curiosities.

Thomas Sowell, *A Conflict of Visions*

Everything that informs us of something useful that we didn't already know is a potential signal. If it matters and deserves a response, its potential is actualized.

Stephen Few



What is a fallacy?

*/ˈfaləsē/*

noun

a mistaken belief, especially one based  
on unsound argument.

fal·la·cy



@sqllocks





**COMING  
SOON!**

8 Seconds





# Quick Discussion

# Question Of The Day

---

What should cost less: a  
gallon of gas or a gallon of milk?

YES  
43%

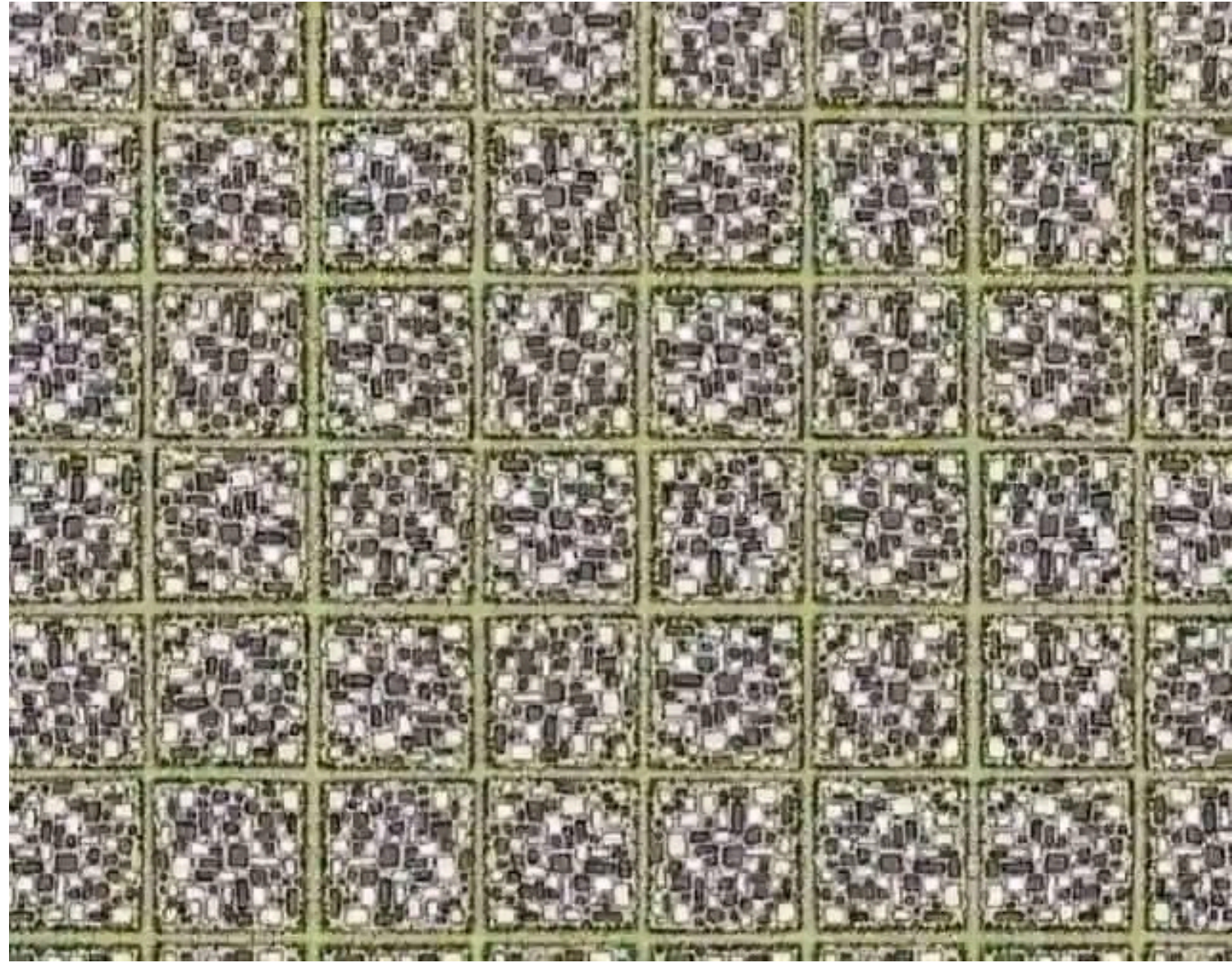


NO  
57%

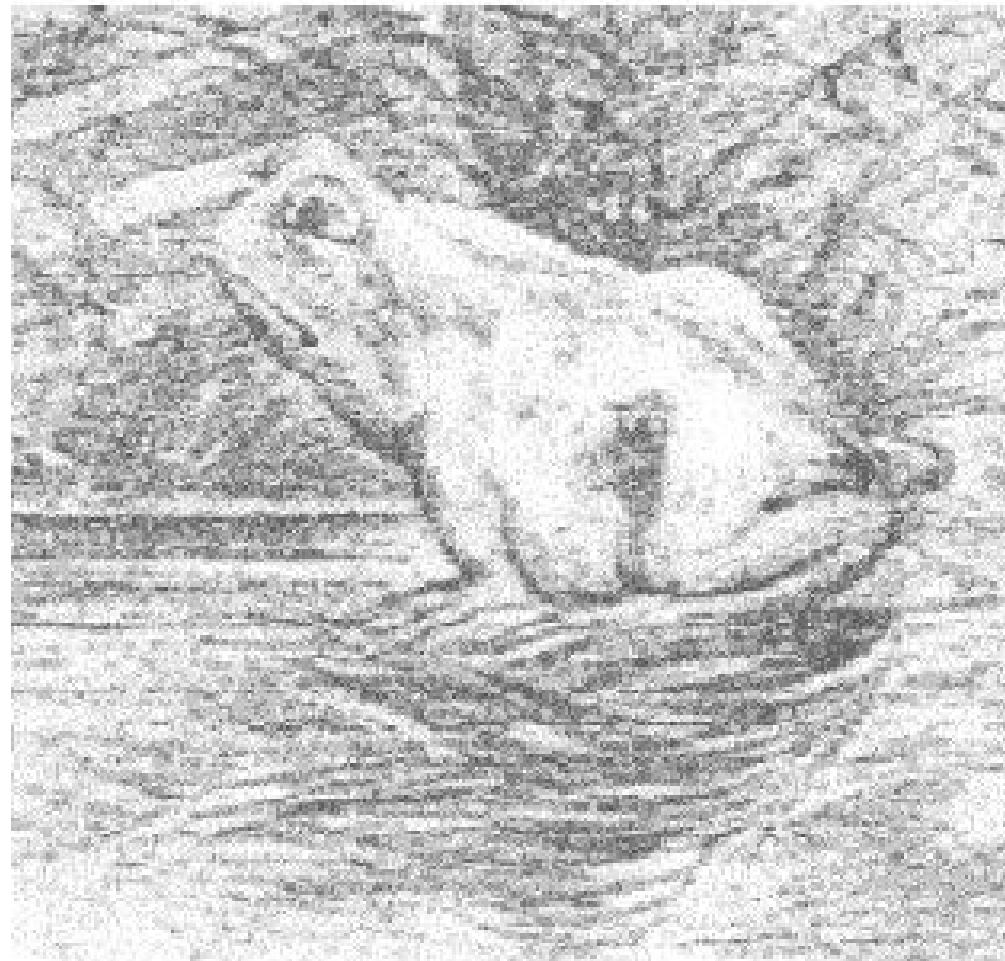


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To record your answer to the Question  
of the Day and other polls about today's  
news, visit [www.post-journal.com](http://www.post-journal.com).



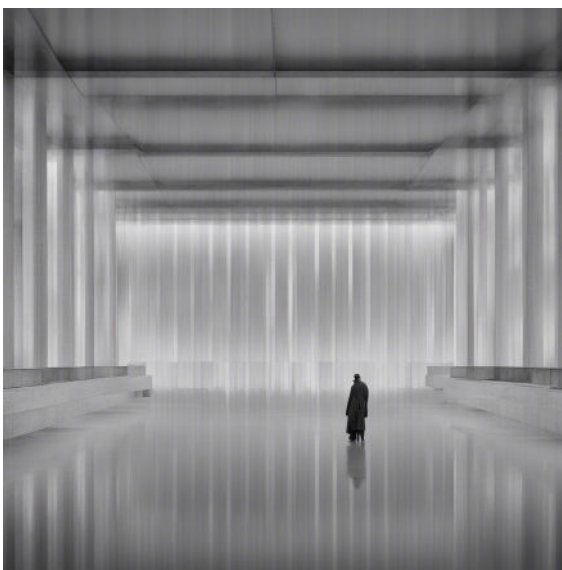




# AGGENDA

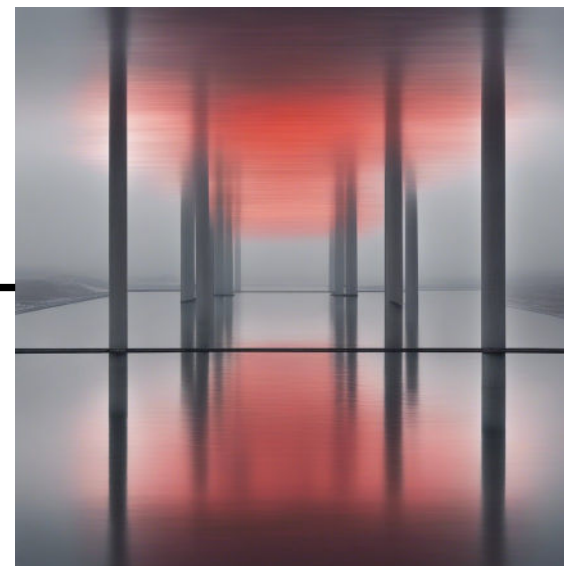


Color Theory



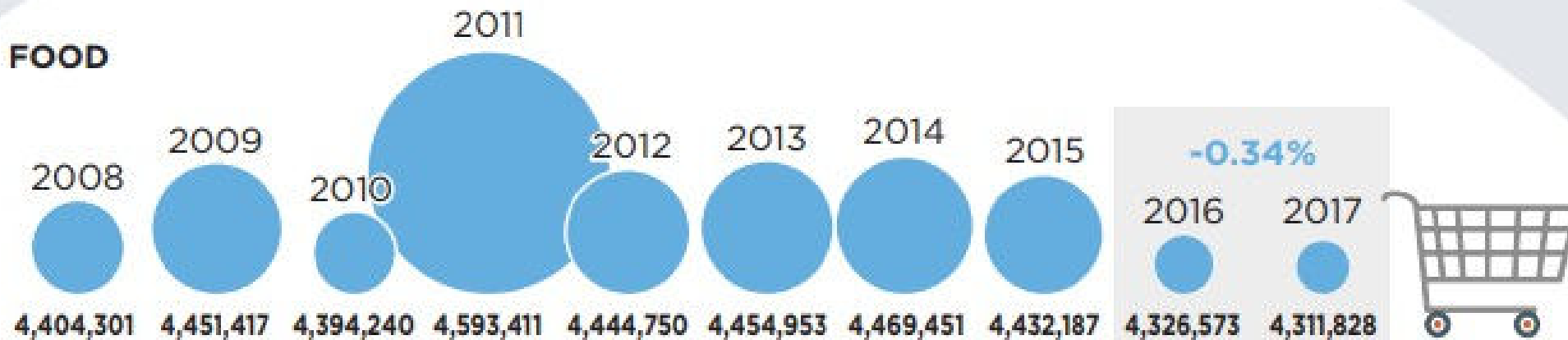
What About Me?

Biased  
?

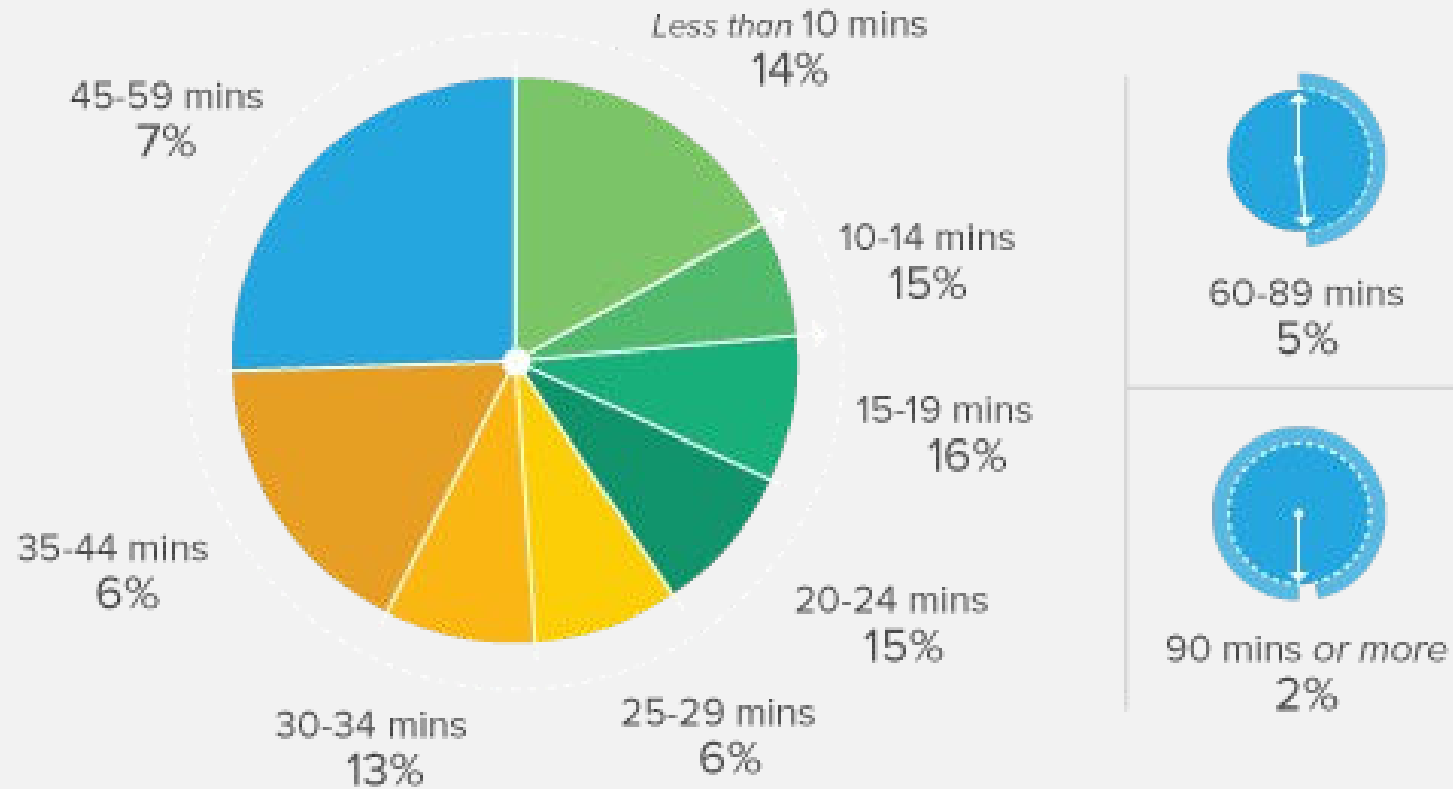


## BEER CONSUMPTION IN BELGIUM (in hectoliters)

**FOOD**



# AMERICANS' COMMUTE TIME



Source: US Census Bureau 2009 Report on Commuting in the United States

smartasset

## Proposition 126 ★

[View More](#)

The Constitutional Amendment would prohibit the state and each county, city, town, district, or other political subdivision in Arizona from imposing a new or increased tax on services that was not already in effect on December 31, 2017.

**Yes**

**No**

64.56%

35.44%

1,221,157 Votes

670,365 Votes

## Proposition 127 ★

[View More](#)

The Constitutional Amendment would replace Arizona's current plan for increasing renewable energy use by imposing a new mandate requiring nongovernmental electric utilities to increase the portion of their retail energy sales generated from certain types of renewable energy resources to 50% by 2030.

**No**

**Yes**

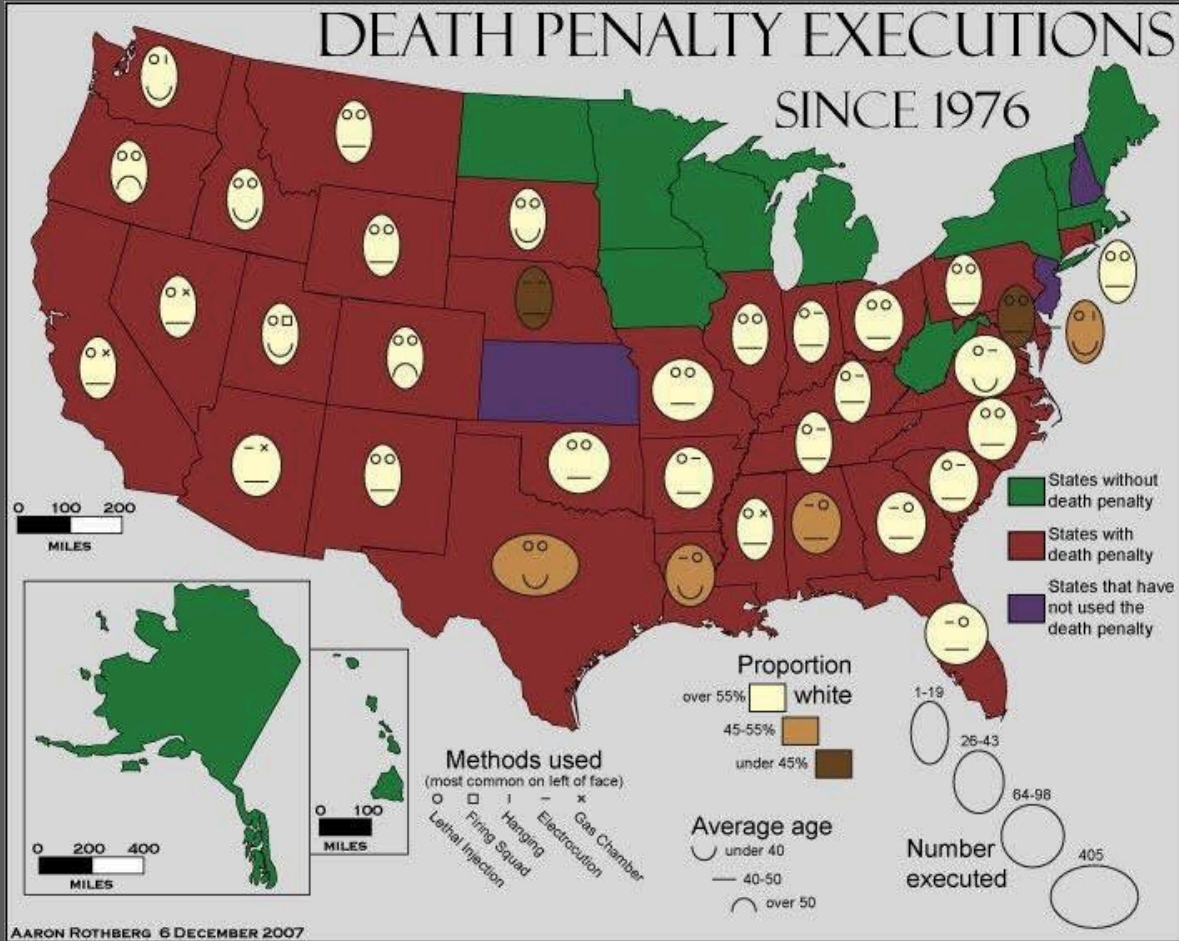
69.14%

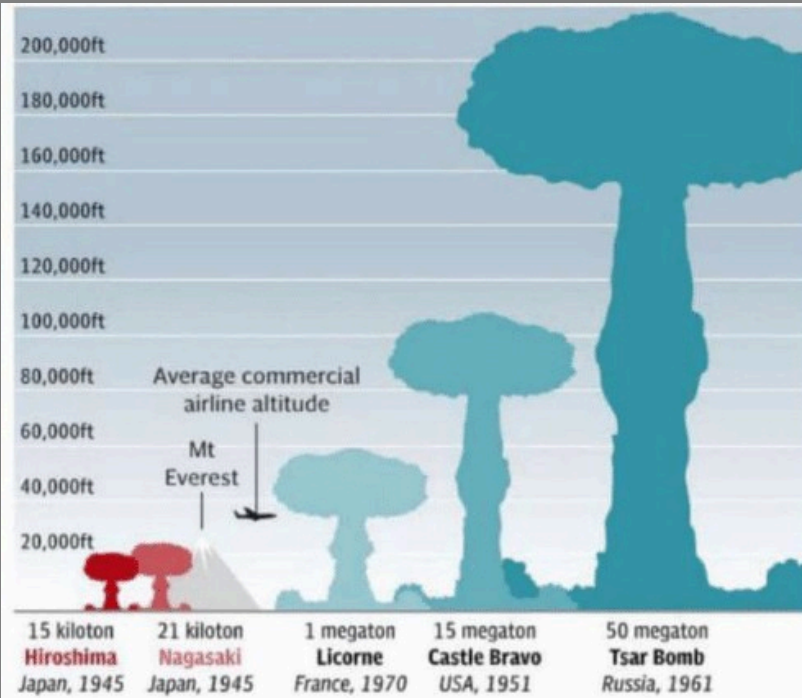
30.86%

1,343,187 Votes

599,656 Votes

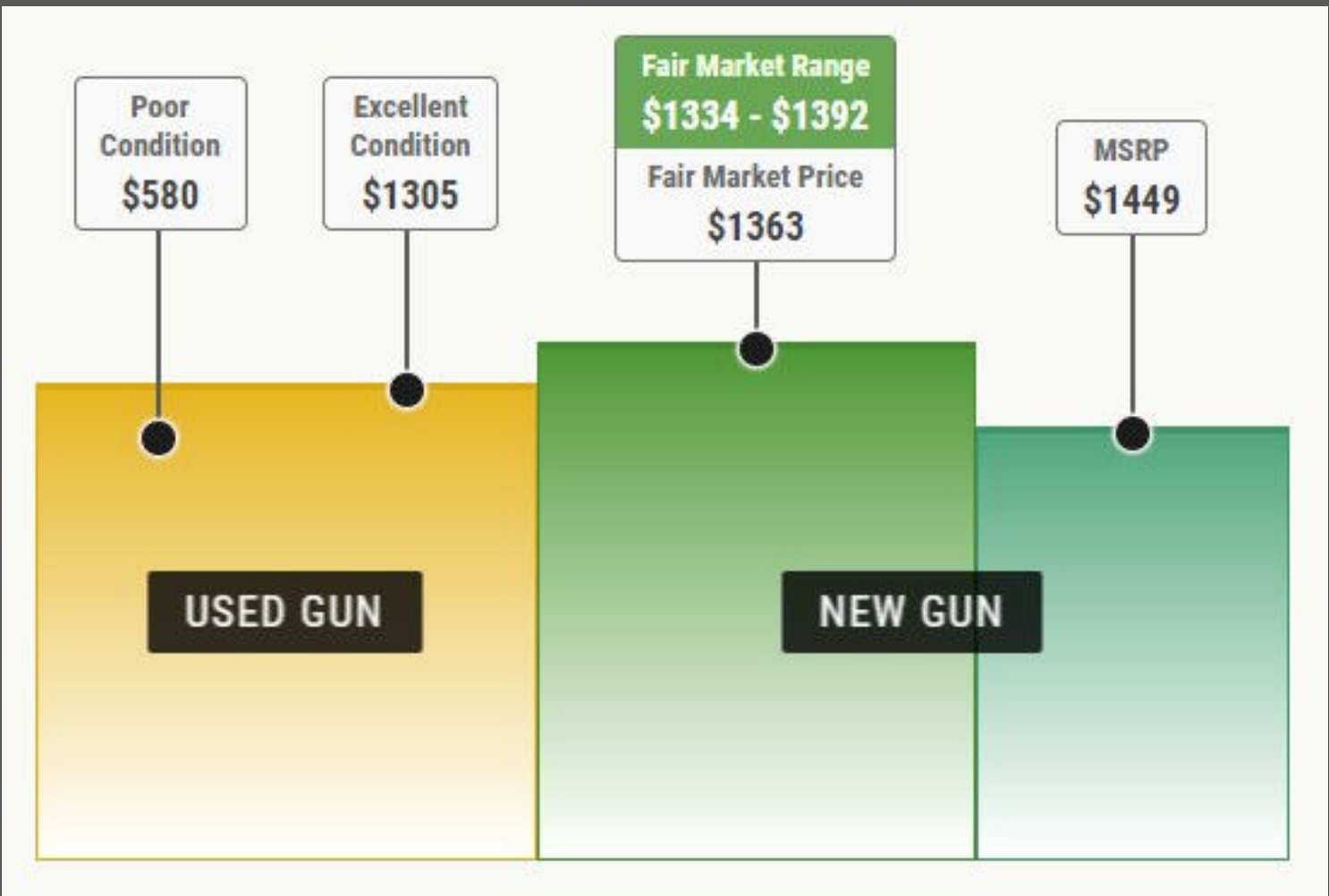
# DEATH PENALTY EXECUTIONS SINCE 1976



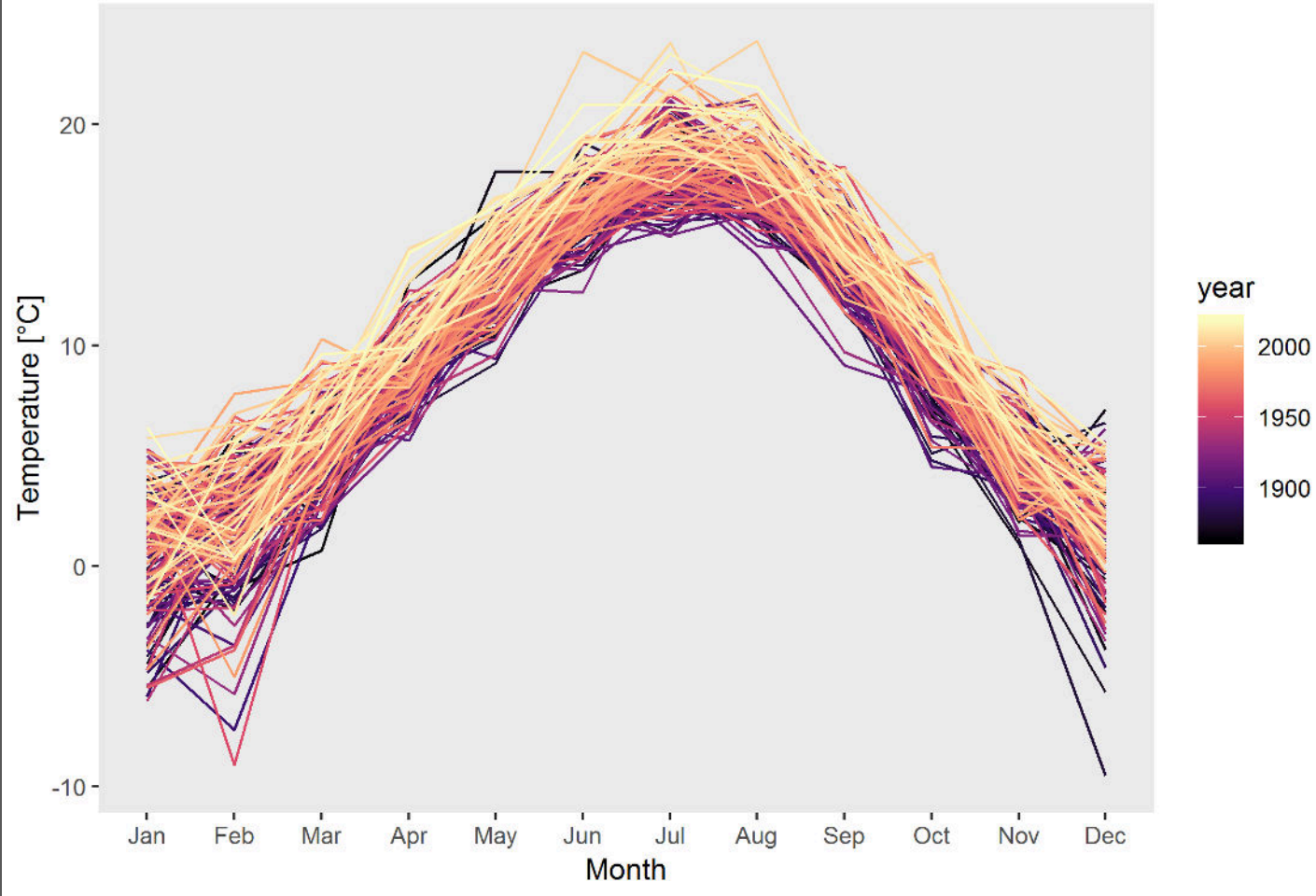


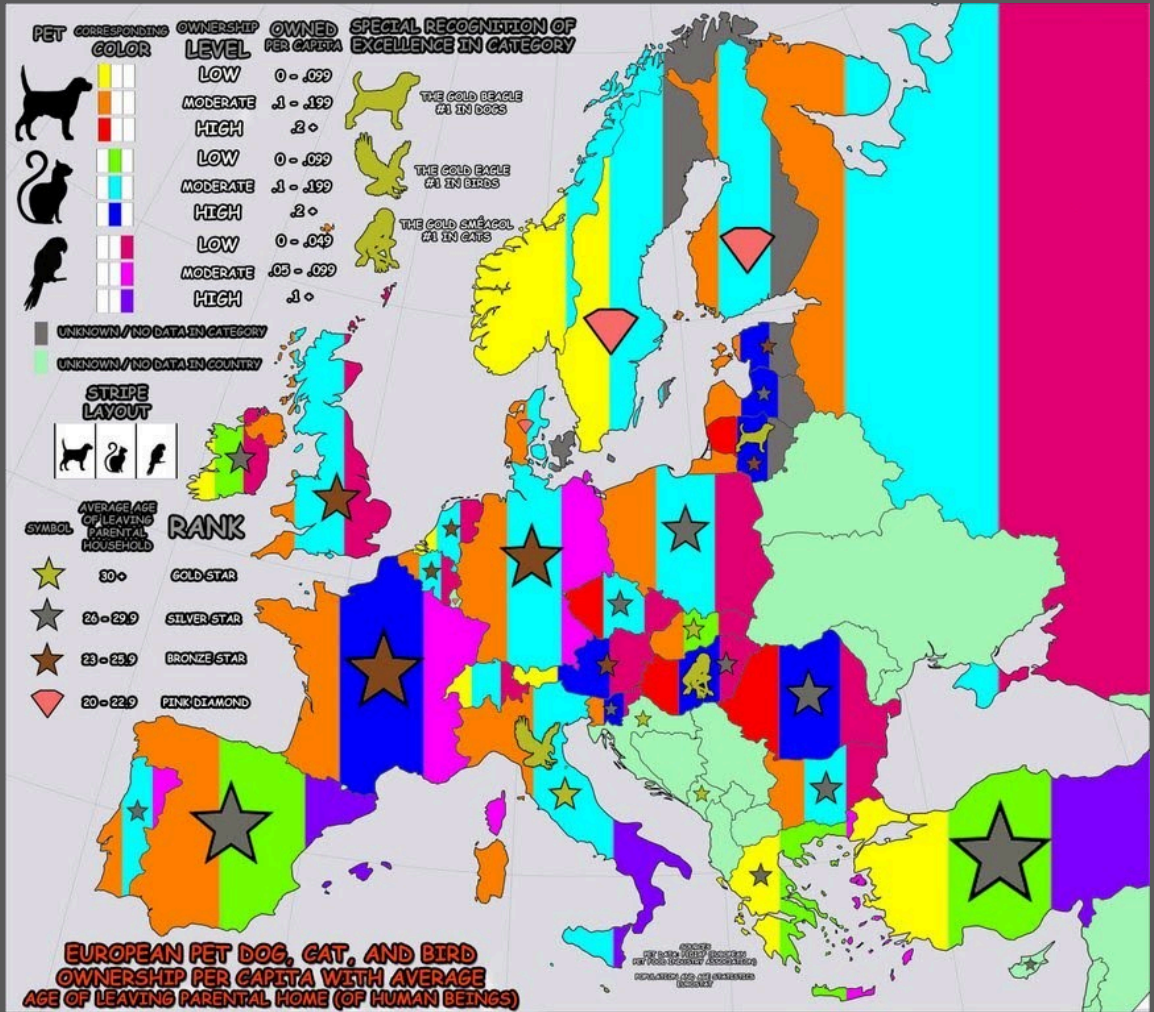

**lemme\_repeat** 1.462 Punkte 15 Std.  
 Mt Everest was the biggest tragedy of all  
 Antworten ↑ ↓ ...


**how\_bow\_dah** 942 Punkte 15 Std.  
 @lemme\_repeat what kind of sick : just  
 drops a mountain on someone  
 Antworten ↑ ↓ ...



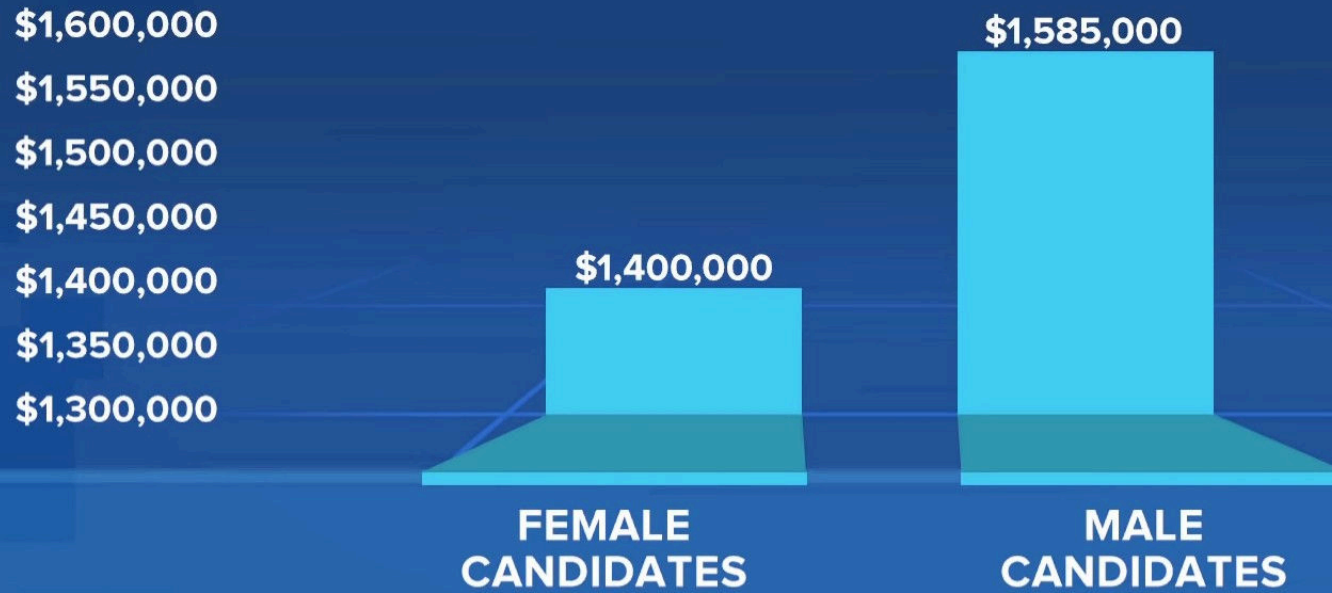
Monthly Temperature from 1864 - 2018, Basel-Binningen





# DEMOCRATIC WOMEN RAISE LESS MONEY THAN DEMOCRATIC MEN

AVERAGE RAISED BY HOUSE PRIMARY WINNERS



SOURCE: CENTER FOR RESPONSIVE POLITICS

— Employment-Population Ratio: Men (left)  
— Employment-Population Ratio: Women (right)



Shaded areas indicate U.S. recessions

Source: U.S. Bureau of Labor Statistics

fred.stlouisfed.org

# Question Of The Day

---

What should cost less: a  
gallon of gas or a gallon of milk?

YES  
43%

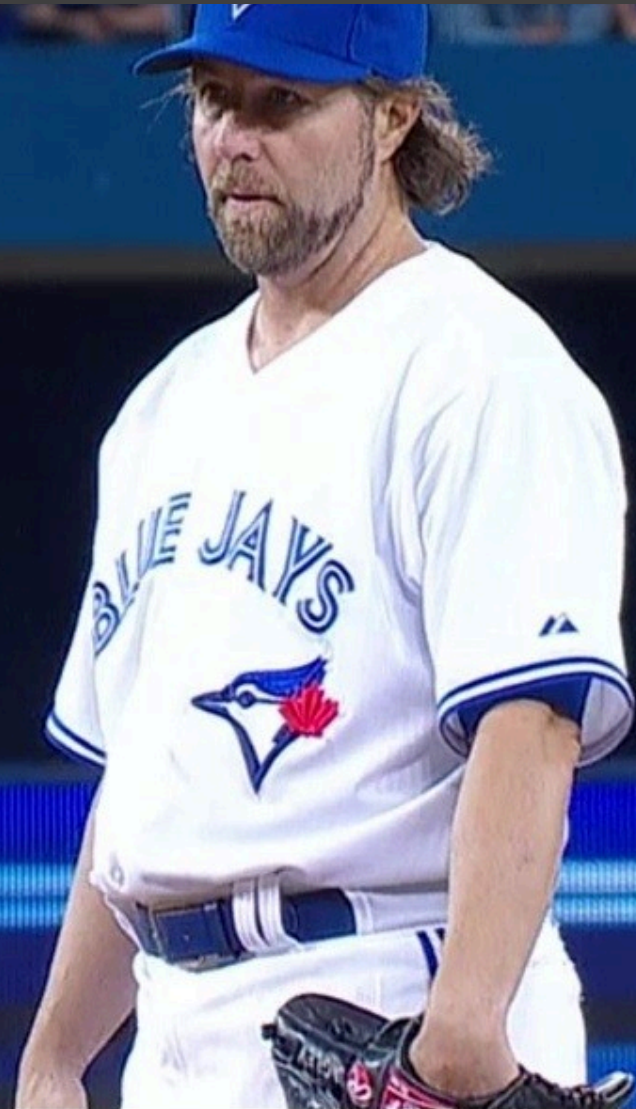
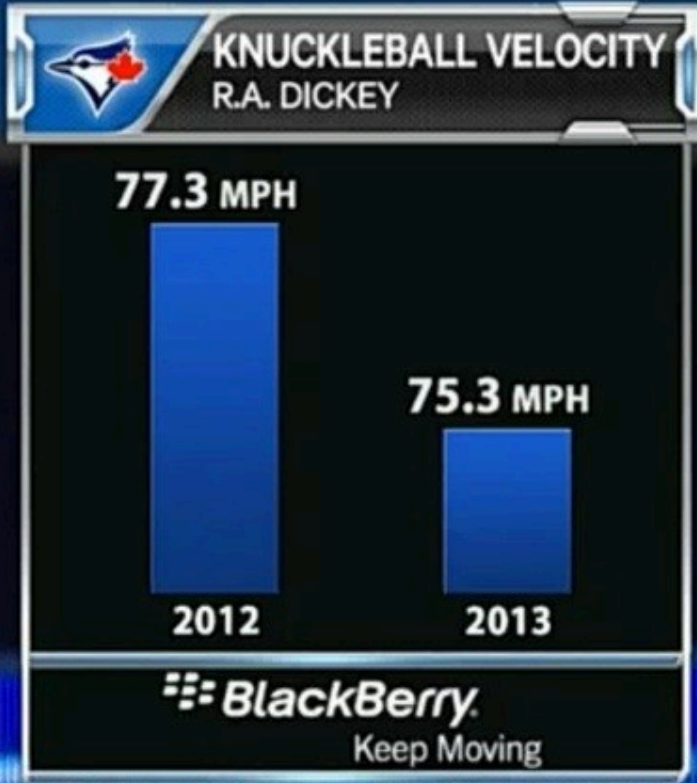



NO  
57%



---

To record your answer to the Question  
of the Day and other polls about today's  
news, visit [www.post-journal.com](http://www.post-journal.com).



Planet	Deaths	Has Golf
	0	NO
	0	NO
	120,315,672,896+	YES
	0	NO
	0	NO
	0	NO
	0	NO
	0	NO
	0	NO

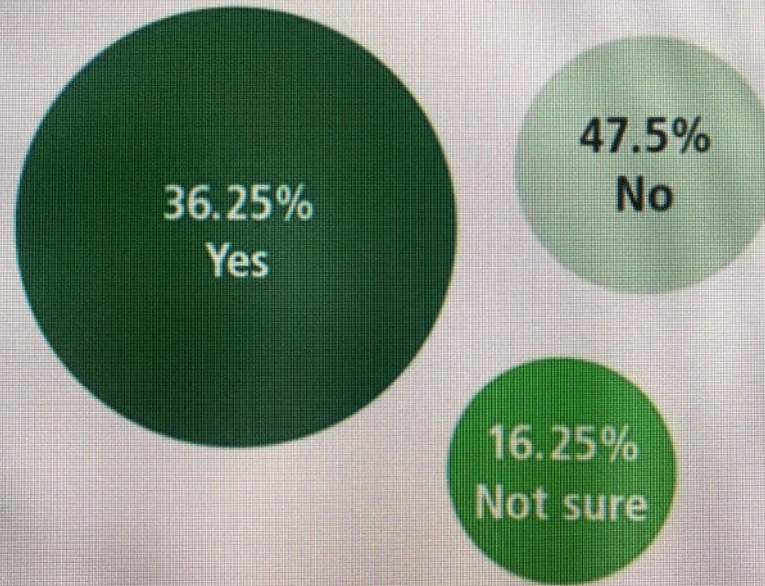
**COINCIDENCE?**

MemeCenter.com

have held their current position for an average of 7

### Do you feel you are faced with adequate job growth opportunities within your company?

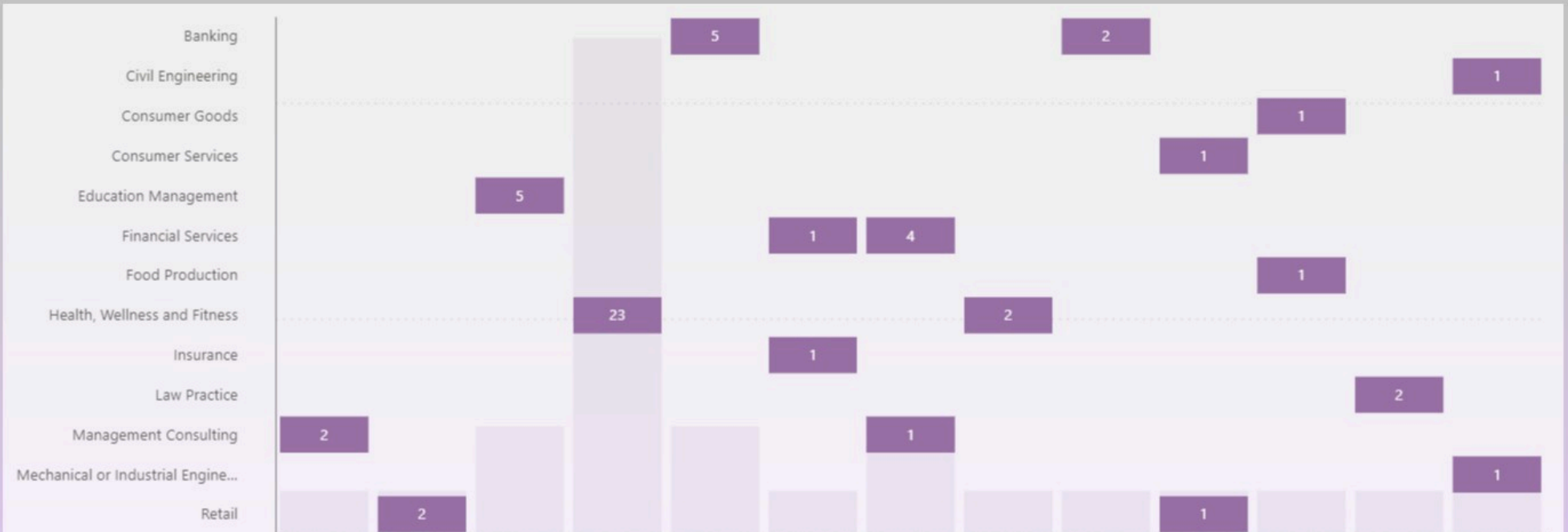
Mid-Level



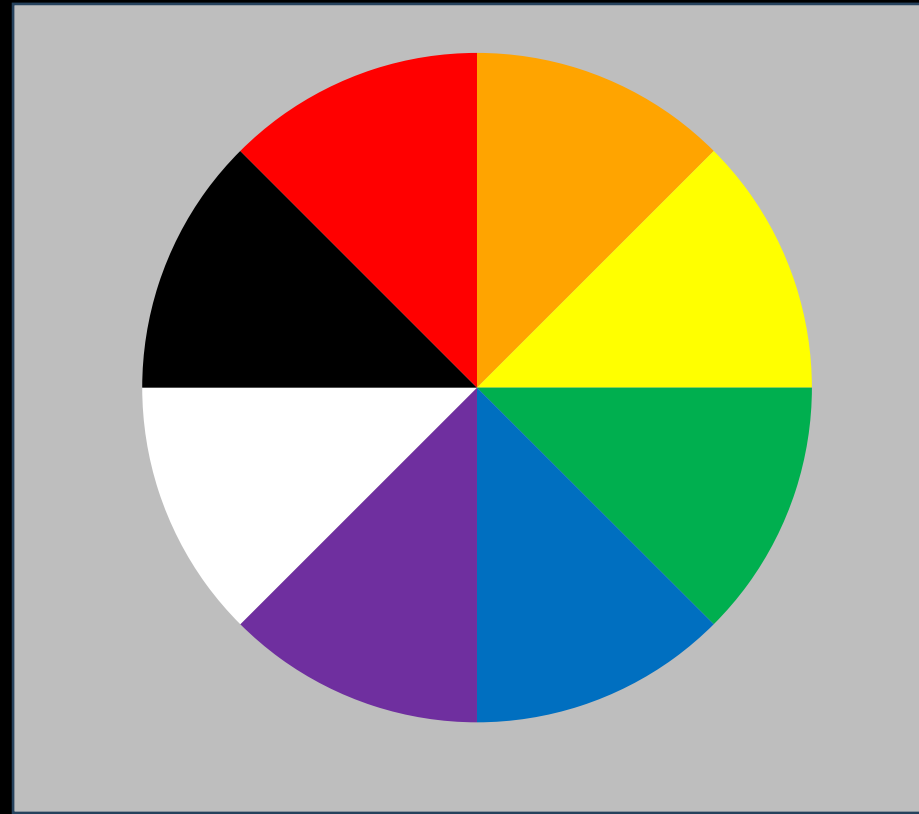
ary of \$96,100, our 2017 mid-level group is paid about \$8,000 more  
amount of additional compensation for the 2017 group is \$23,000  
es the total 2017 mid-level salary & compensation package averaged

# Employment Contract and Job Category

Universities: All  
Cohort Year Range: 2010 - 2021



List of companies



Quick Color Primer

“I am blessed to have so many  
great things in my life  
family, friends and God. All  
will be in my thoughts daily.”



Combines the energy of red and the happiness of yellow. It is associated with joy, sunshine, and the tropics.



The color of sunshine. It's associated with joy, happiness, intellect, and energy. Also caution.



The color of nature. It symbolizes growth, harmony, freshness, and fertility.



The color of the sky and sea. It is often associated with depth and stability. It symbolizes trust, loyalty, wisdom, confidence, intelligence, faith, truth, and heaven.



Combines the stability of blue and the energy of red. Purple is associated with royalty. It symbolizes power, nobility, luxury, and ambition.



Associated with light, goodness, innocence, purity, and virginity. White means safety, purity, and cleanliness.



Associated with power, elegance, formality, death, evil, and mystery.



The color of fire and blood, so it is associated with energy, war, danger, strength, power, determination as well as passion, desire, and love.

# Physiological Effect of Color

# Chromotherapy

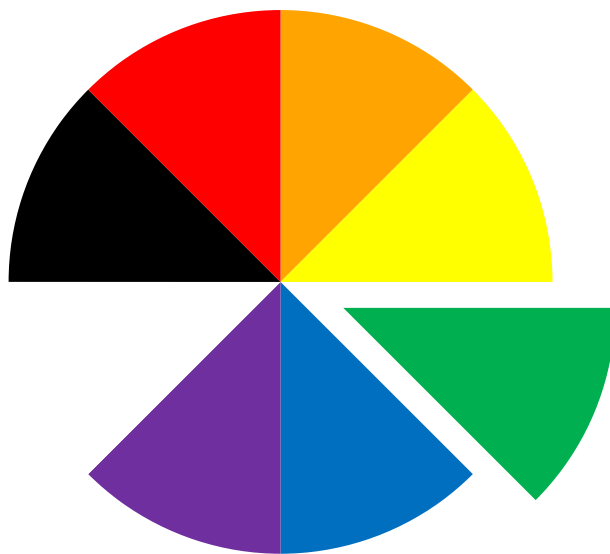
A method of treatment that uses the visible spectrum (colors) of electromagnetic radiation to cure diseases



Encourages Activity  
Stimulates Appetite  
Inspires Socializing



Activates Memory  
Ups Conversation  
Stimulates Nerves



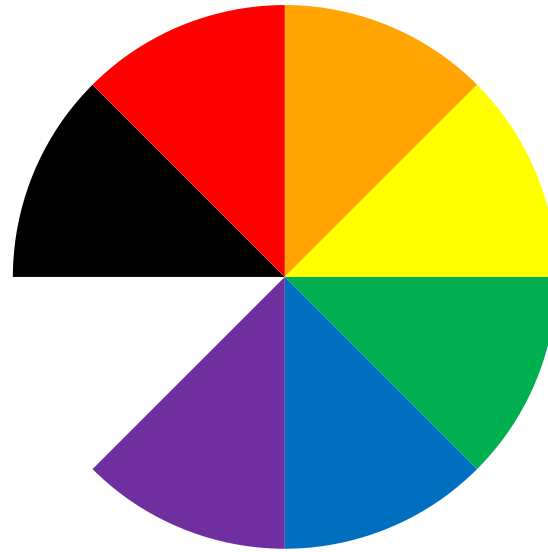
Enforces Safety  
Soothes, Heals  
Lessens Anxiety



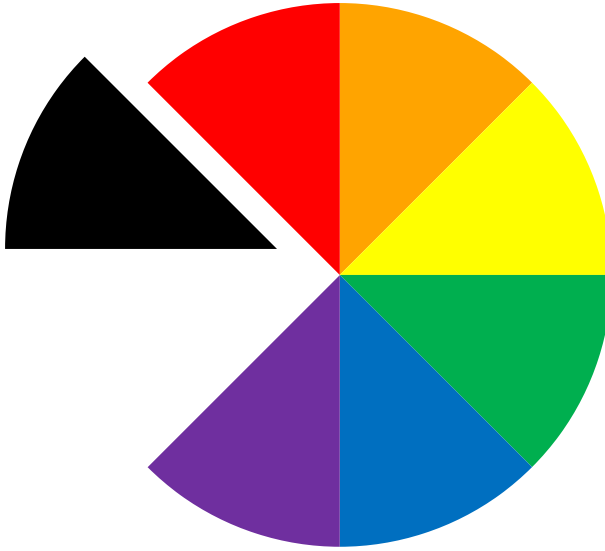
Aids Intuition  
Calms, Sedates  
Slows Metabolism



Boosts Creativity  
Inspires Spirituality  
Calms Nerves



Aids Mental Clarity  
Offers a Fresh Start  
Evokes Innocence



Suggest Potential  
Conveys Emptiness  
Has Slimming Effect



Increases Metabolism  
Increases Blood Pressure  
Boost Enthusiasm

**Bias**

# Types of Biases in Data Visualization

- Technical Bias
- Biased Language
- Biased Data Narrative

# Technical Bias

# Lie Factor

## Lie factor

$$\text{Lie factor} = \frac{\text{size of effect shown in graphic}}{\text{size of effect shown in data}},$$

where

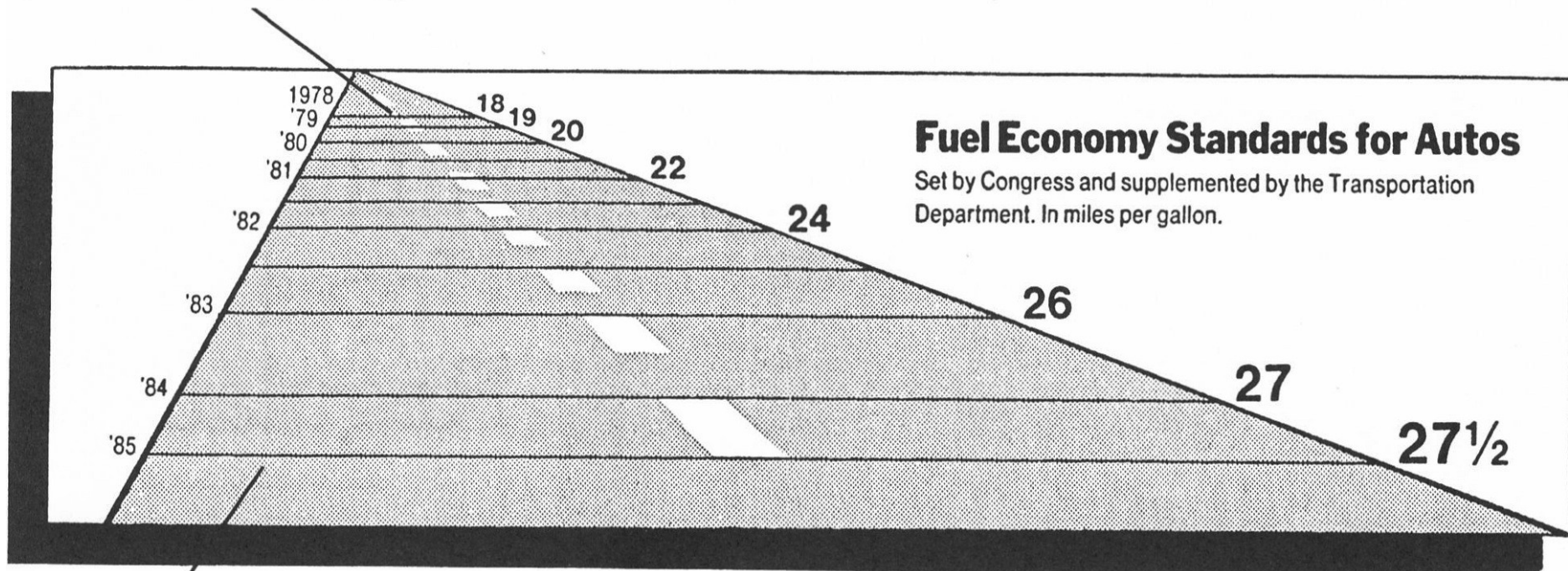
$$\text{size of effect} = \left| \frac{\text{second value} - \text{first value}}{\text{first value}} \right|.$$

A graph with a high lie factor (>1) would exaggerate change in the data it represents, while one with a small lie factor (>0, <1) would obscure change in the data. A perfectly accurate graph would exhibit a lie factor of 1.

# Lie Factor

- Lie factor = 14.8
- 53% increase in data
- 733% increase in length

This line, representing 18 miles per gallon in 1978, is 0.6 inches long.

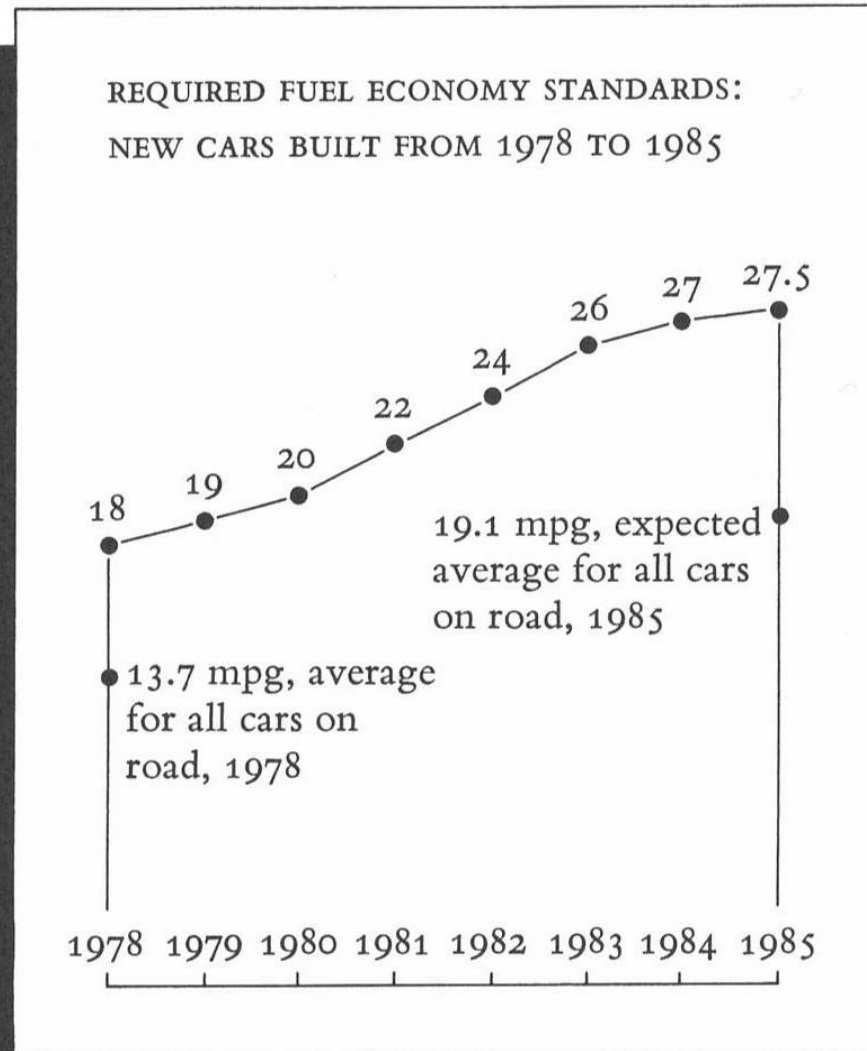


This line, representing 27.5 miles per gallon in 1985, is 5.3 inches long.

# Lie Factor

---

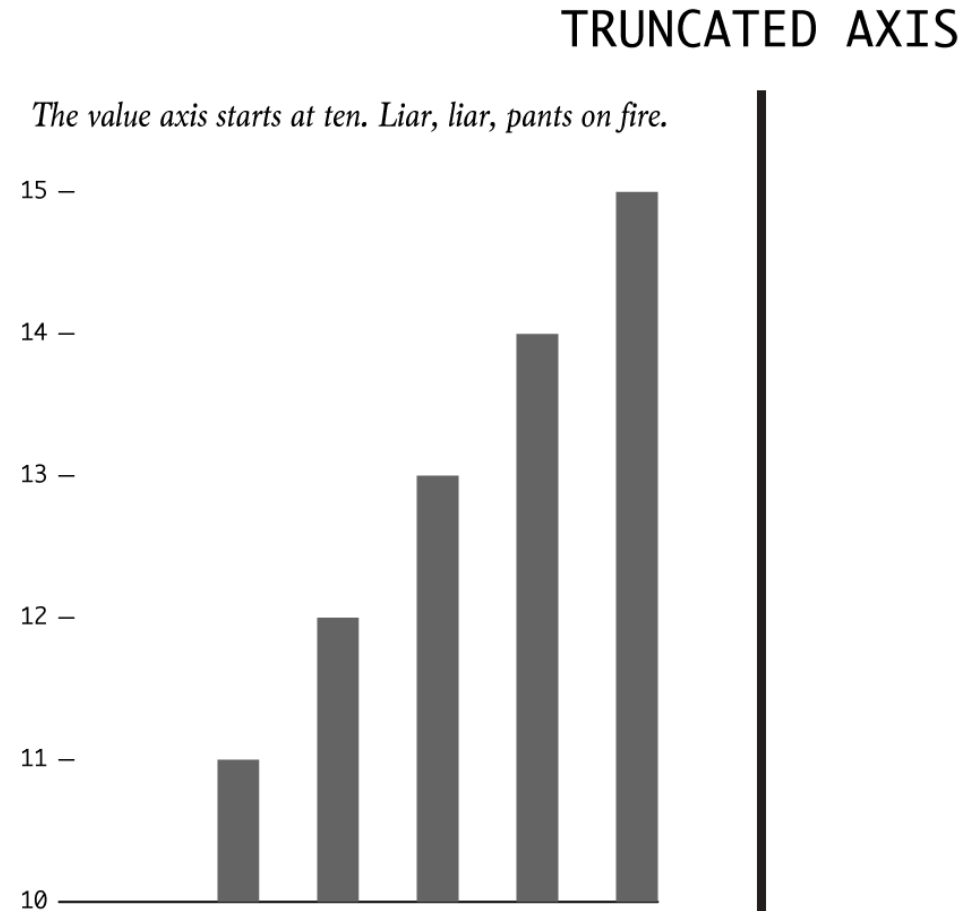
The Non-Lying Version



# Truncated Axis

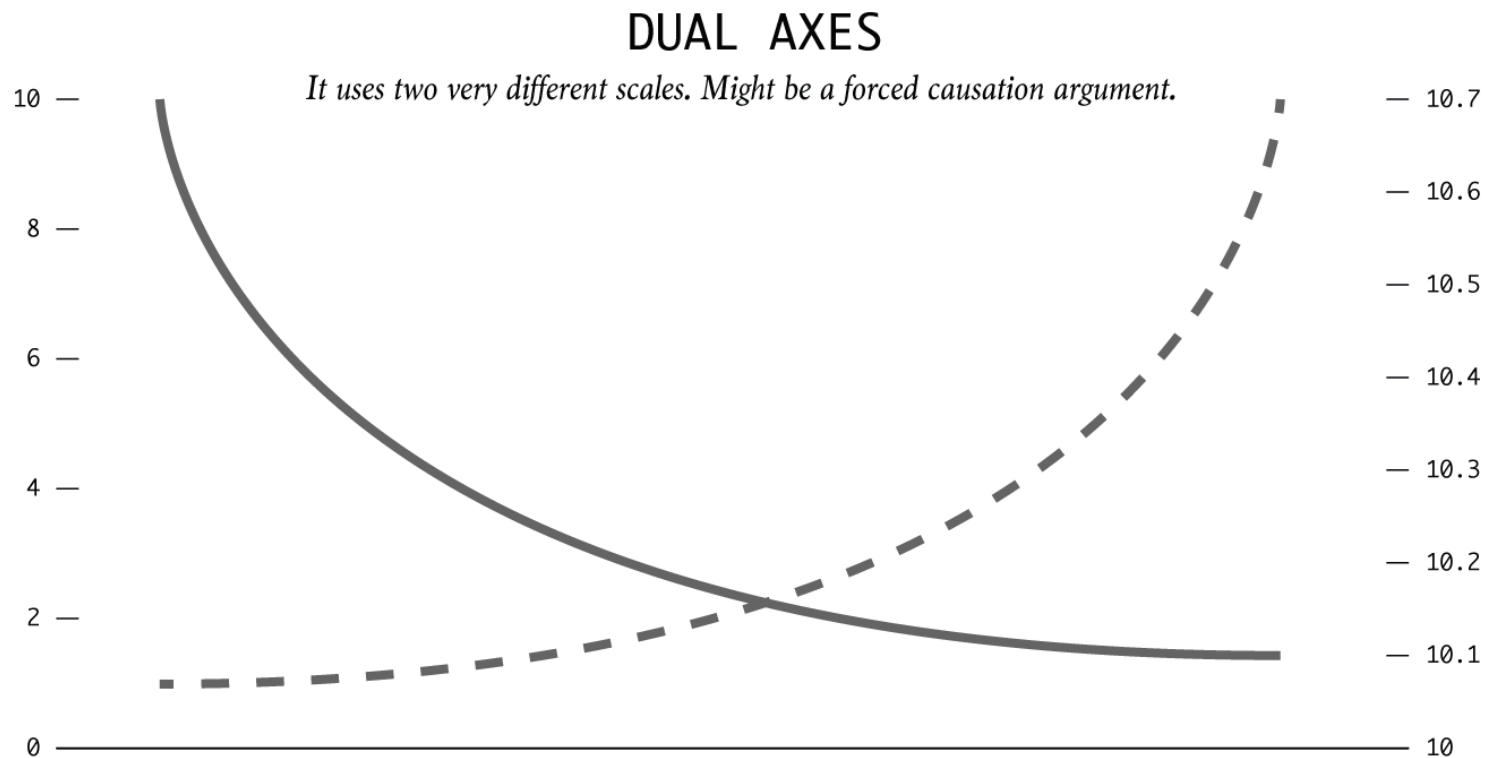
---

flowingdata.com



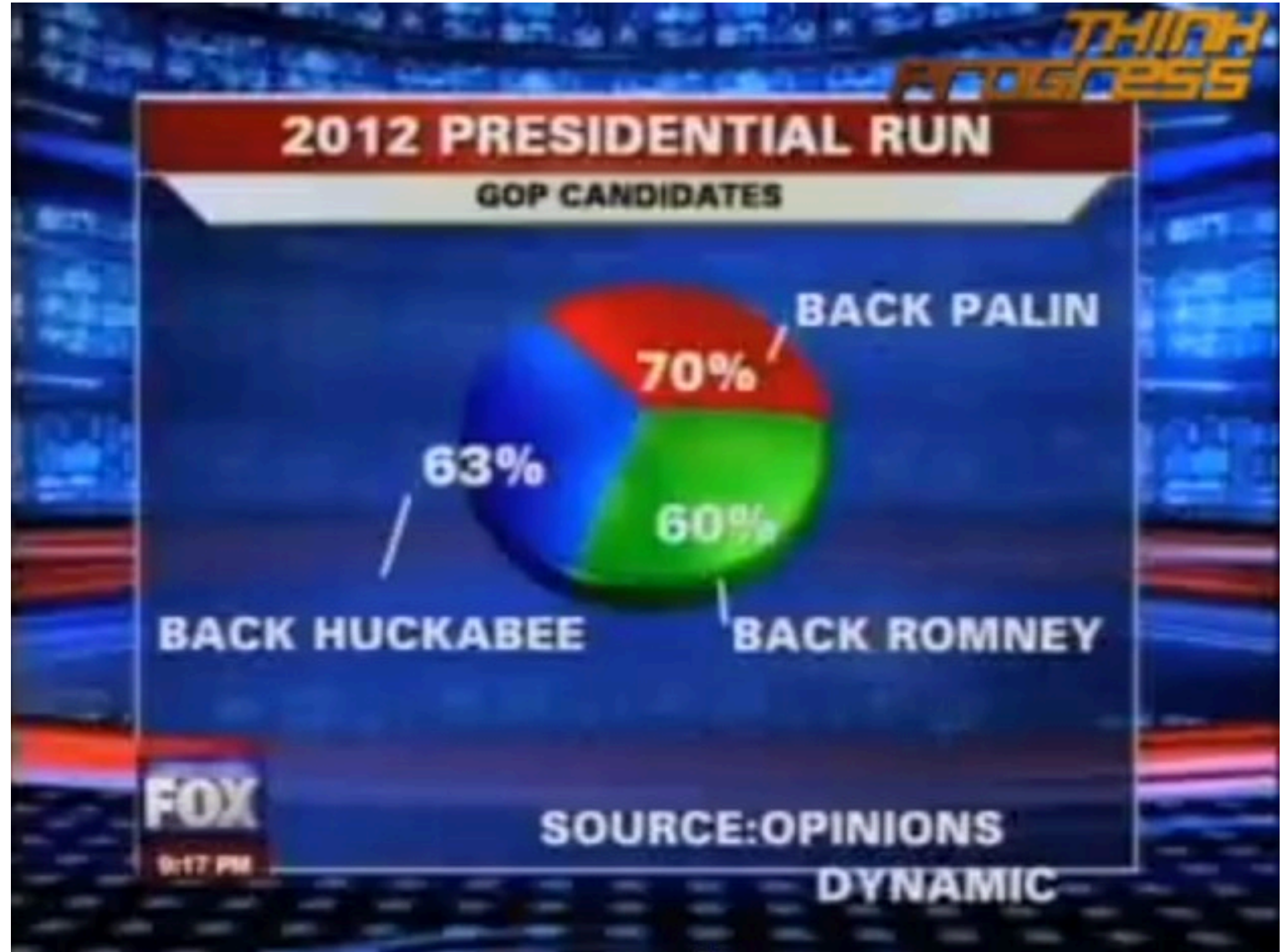
# Dual Axes

flowingdata.com



# Parts of a Whole

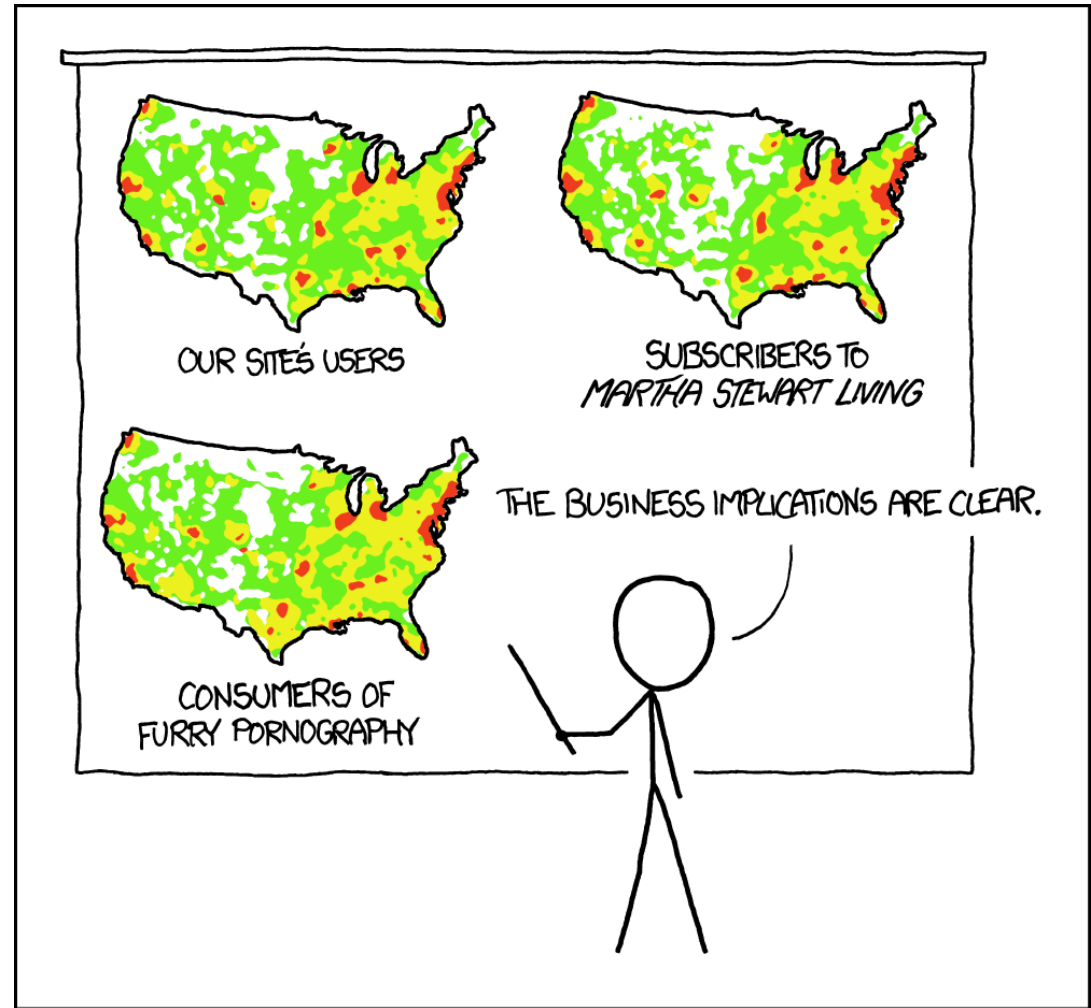
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# Dangers in Absolutes

---

Xkcd.com

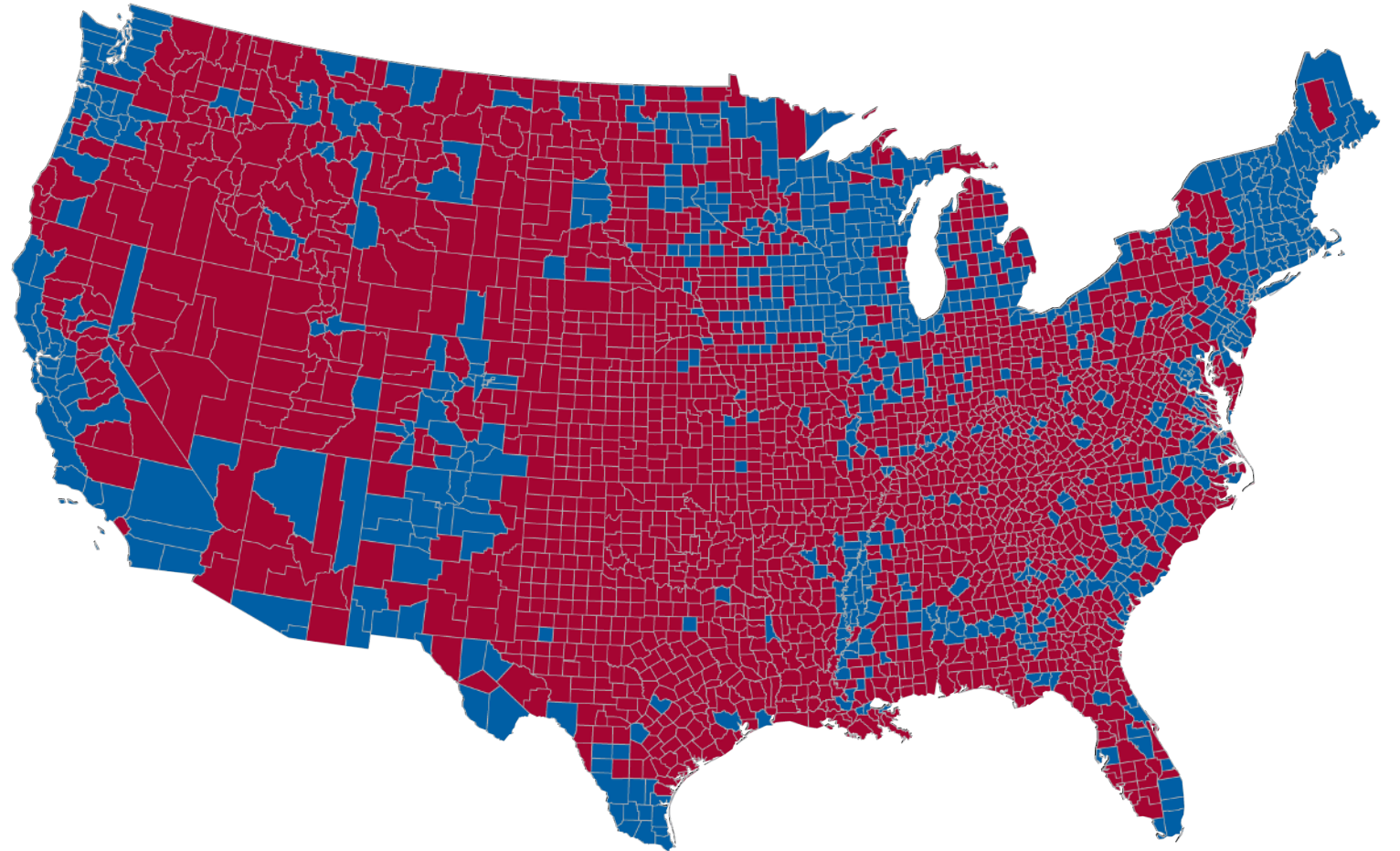


PET PEEVE #208:  
GEOGRAPHIC PROFILE MAPS WHICH ARE  
BASICALLY JUST POPULATION MAPS

# Dangers in Absolutes

---

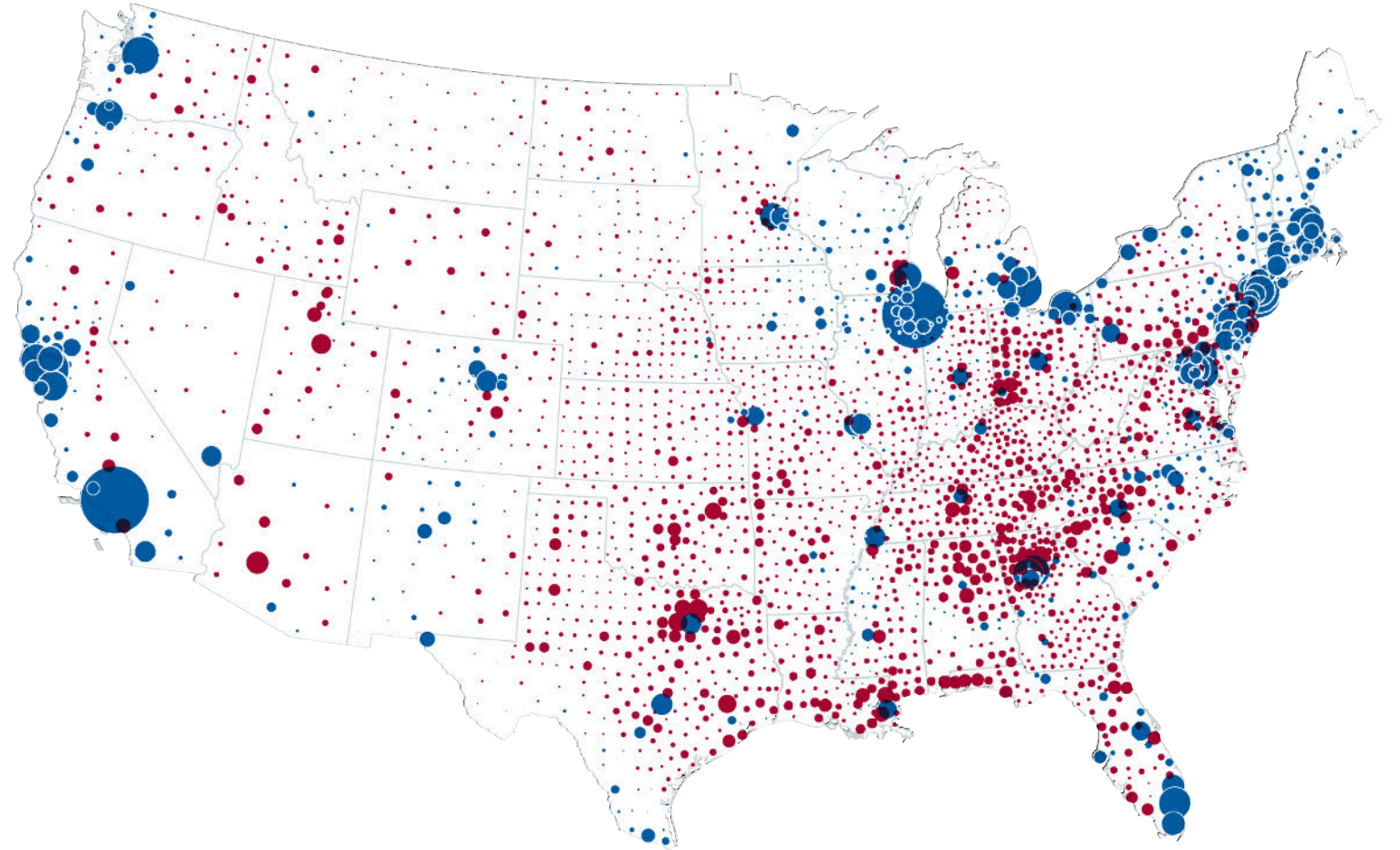
Hbr.org



# Dangers in Absolutes

---

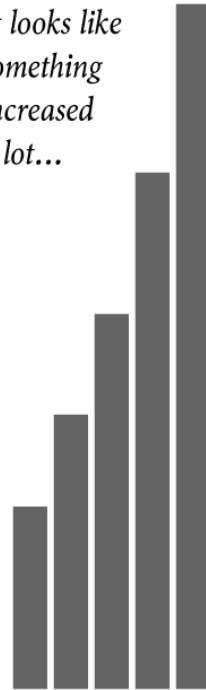
Hbr.org



# Limited Scope

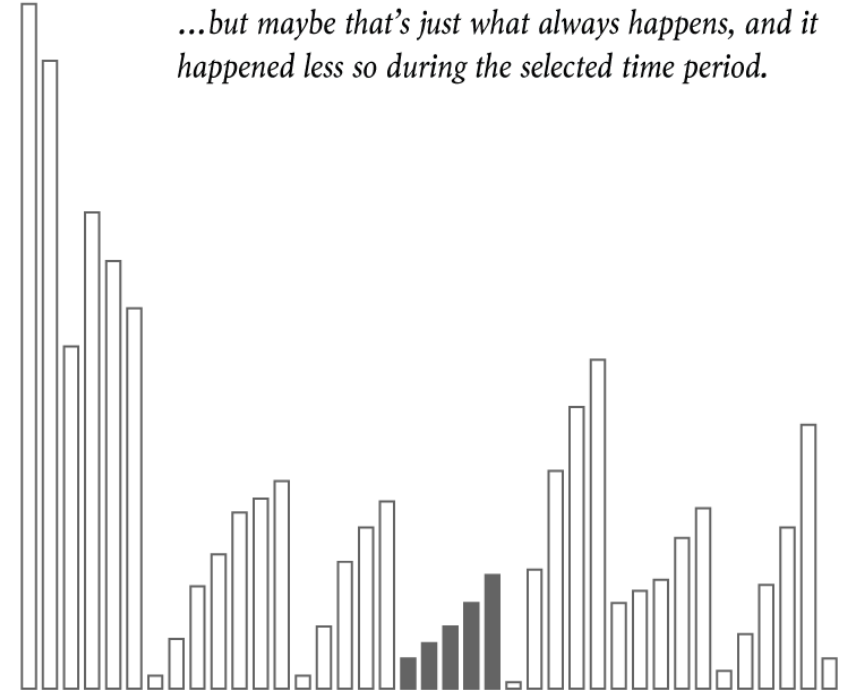
flowingdata.com

*It looks like something increased a lot...*



## LIMITED SCOPE

*...but maybe that's just what always happens, and it happened less so during the selected time period.*



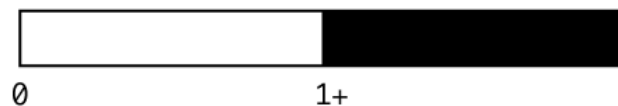
# Binning

---

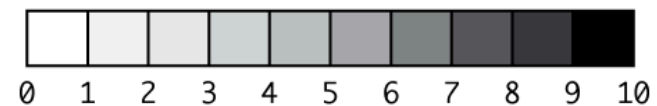
flowingdata.com

## ODD CHOICE OF BINNING

*Two bins. What's really in the 1+ category?  
Might be hiding something.*

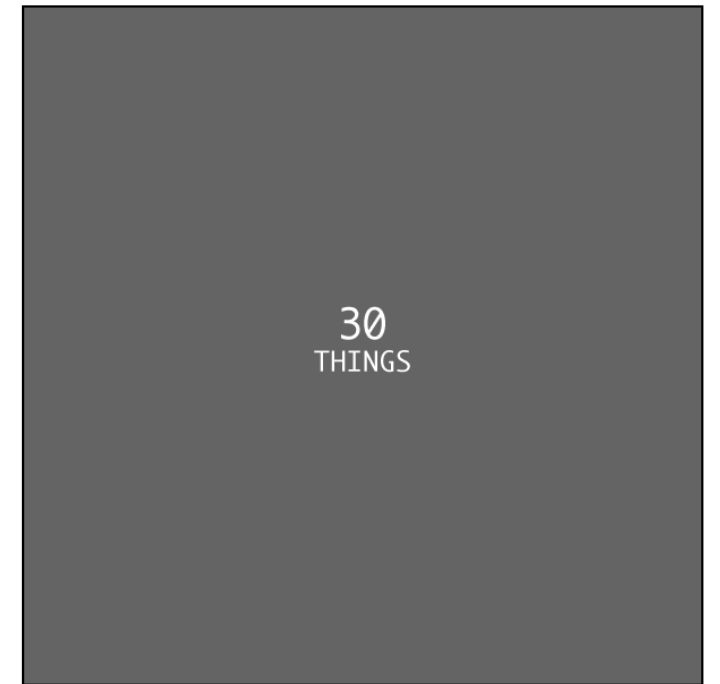
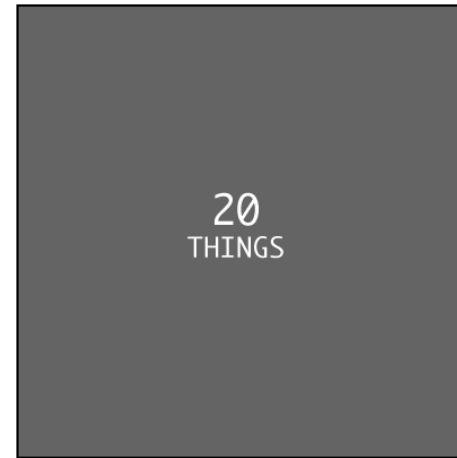


*That's better. It can show more variation.*



# Area Size

flowingdata.com



## AREA SIZED BY SINGLE DIMENSION

*Thirty is three times ten, but that third rectangle looks a lot bigger than the first.*

*Might be trying to inflate significance.*

# Dimensions

flowingdata.com

## PUTZING AROUND WITH AREA DIMENSIONS

*These fill the same amount of area, but they look very different.*



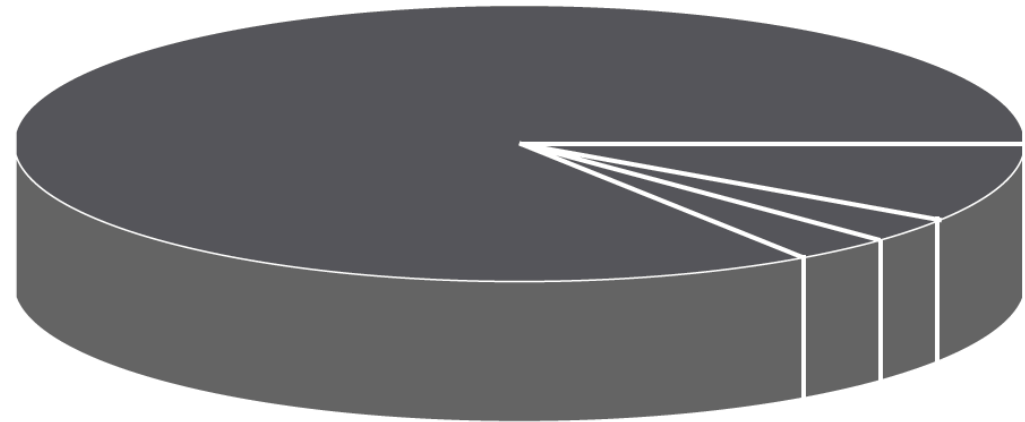
AREA = 100



AREA = 100

EXTRA DIMENSION JUST BECAUSE

*Just say no.*

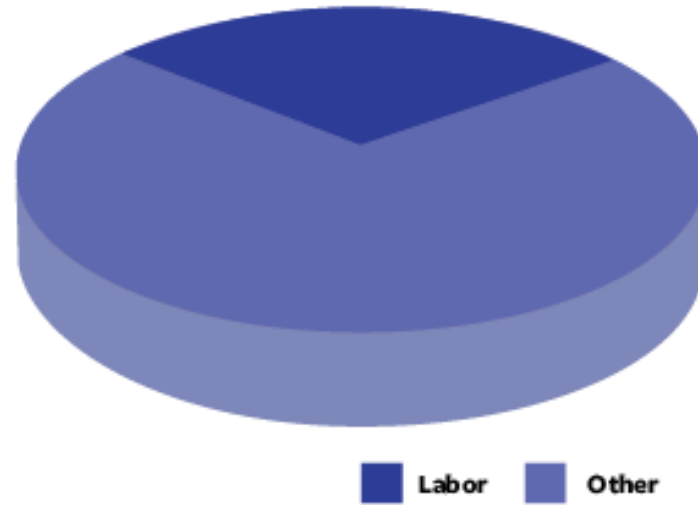


# Dimensions



# Dimensions

nautil.us

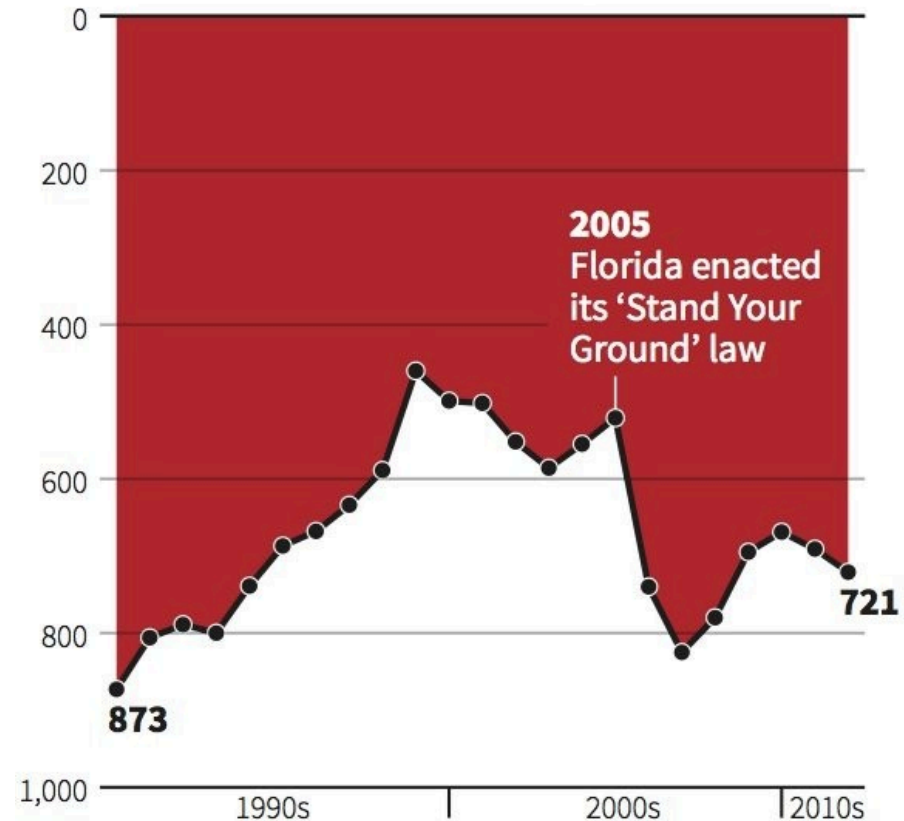


# Ignoring Conventions

---

## Gun deaths in Florida

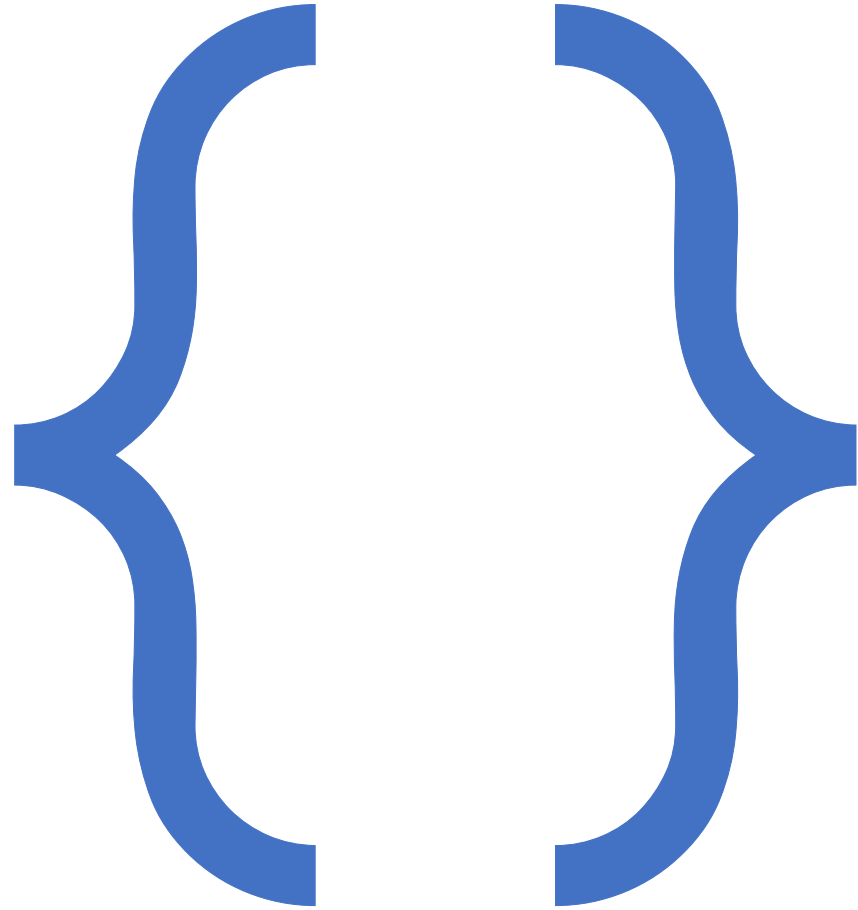
Number of murders committed using firearms



Source: Florida Department of Law Enforcement

# Biased Language

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# Biased Language

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- Age
- Politics
- Religion
- Gender
- Race
- Context
- Health and Abilities



# Biased Data Narrative

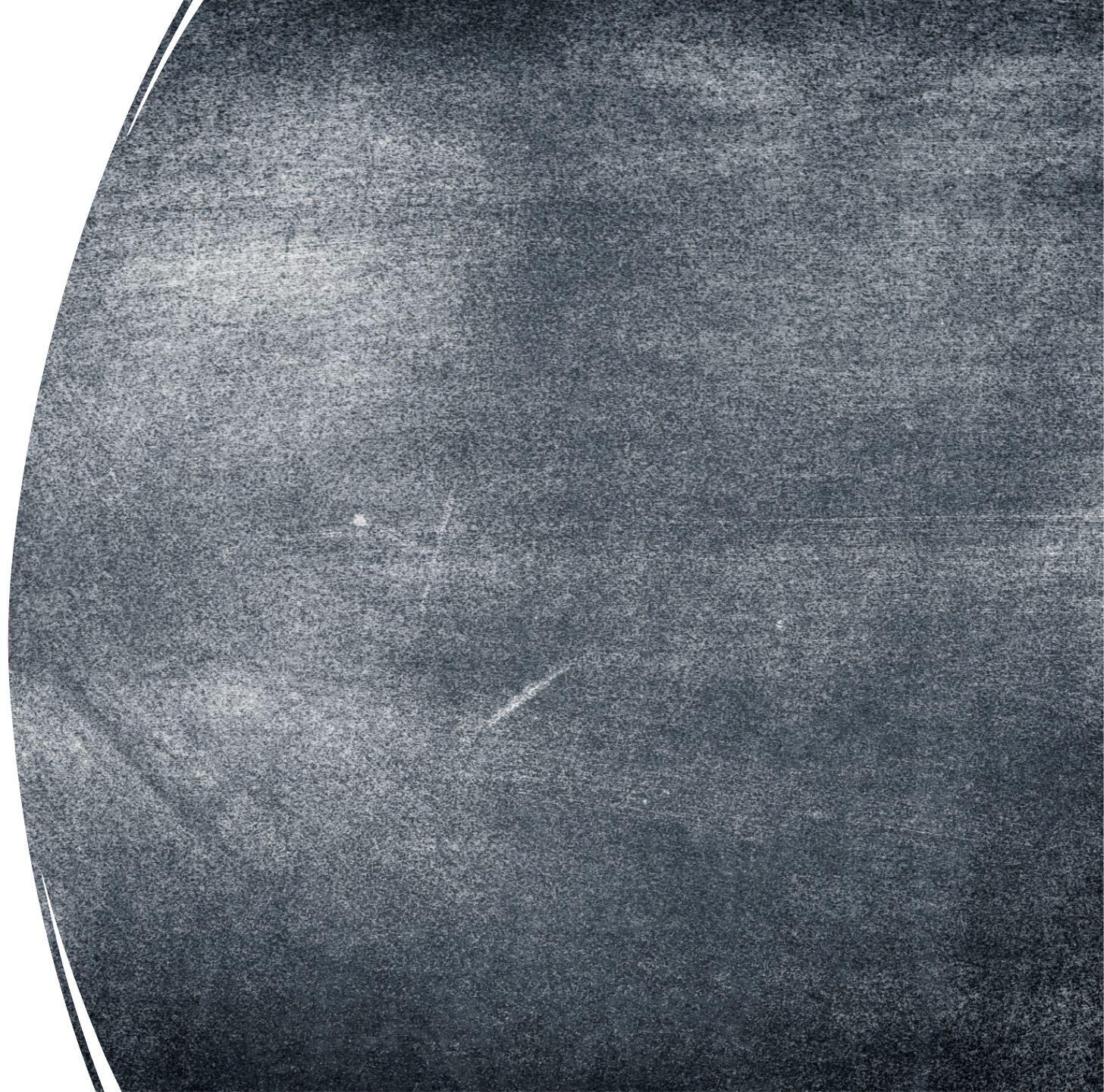
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# Priming

---



# Priming

---

- The terms positive and negative priming refer to when priming affects the speed of processing
- A positive prime speeds up processing, while a negative prime lowers the speed to slower than un-primed levels. Positive priming is caused by simply experiencing the stimulus, while negative priming is caused by experiencing the stimulus, and then ignoring it.





# Positive Priming

---

- Positive priming is thought to be caused by spreading activation. This means that the first stimulus activates parts of a particular representation or association in memory just before carrying out an action or task. The representation is already partially activated when the second stimulus is encountered, so less additional activation is needed for one to become consciously aware of it.

-Wikipedia



# Negative Priming

---

- Negative priming is an implicit memory effect in which prior exposure to a stimulus unfavorably influences the response to the same stimulus...Negative priming describes the slow and error-prone reaction to a stimulus that is previously ignored.

- Wikipedia

# Examples

---





# Examples



mitron  
CA'S WATCH  
mitron

# YANKEE STADIUM



RANGERS		
1 ANDRUS	.265	SS
10 YOUNG	.300	DH
32 HAMILTON	.311	LF
17 CRUZ	.272	RF
29 BELTRE	.274	3B
5 KINSLER	.280	2B
18 MORELAND	.255	1B
44 NAPOLI	.251	C
27 BORBON	.285	CF

YANKEES		
2 JETER	.313	
14 GRANDERSON	.268	
25 TEIXEIRA	.285	
13 RODRIGUEZ	.302	
24 CANO	.308	
33 SWISHER	.252	
20 POSADA	.275	
55 J. MARTIN	.272	
11 GARDNER	.267	

Bank of America



Drive one.  
tristateford.com



att.yankees.com

BURNETT 0.00

ANDRUS 0.00



4 3 5 7 17 8 8 16 15







you **SO** want  
**ONE**

**big mac<sup>®</sup> extra value meal<sup>™</sup>**



**i'm lovin' it<sup>™</sup>**

© 2005 McDonald's  
McDonald's is a registered trademark of The McDonald's Company.

# Fill in the missing word

---

1. Red
2. Blue
3. Orange
4. Yellow
5. Gr \_ \_ \_

# Fill in the missing word

---

1. Plum
2. Nectarine
3. Pear
4. Apple
5. Gr \_ \_ \_

# Pre-attentive Attributes

A pre-attentive visual property is one which is processed in spatial memory without our conscious action. In essence it takes less than 500 milliseconds for the eye and the brain to process a pre-attentive property of any image.

[www.interaction-design.org](http://www.interaction-design.org)

# Pre-attentive Processing

# Pre-attentive Processing

The Four Pre-attentive Visual Properties



Color



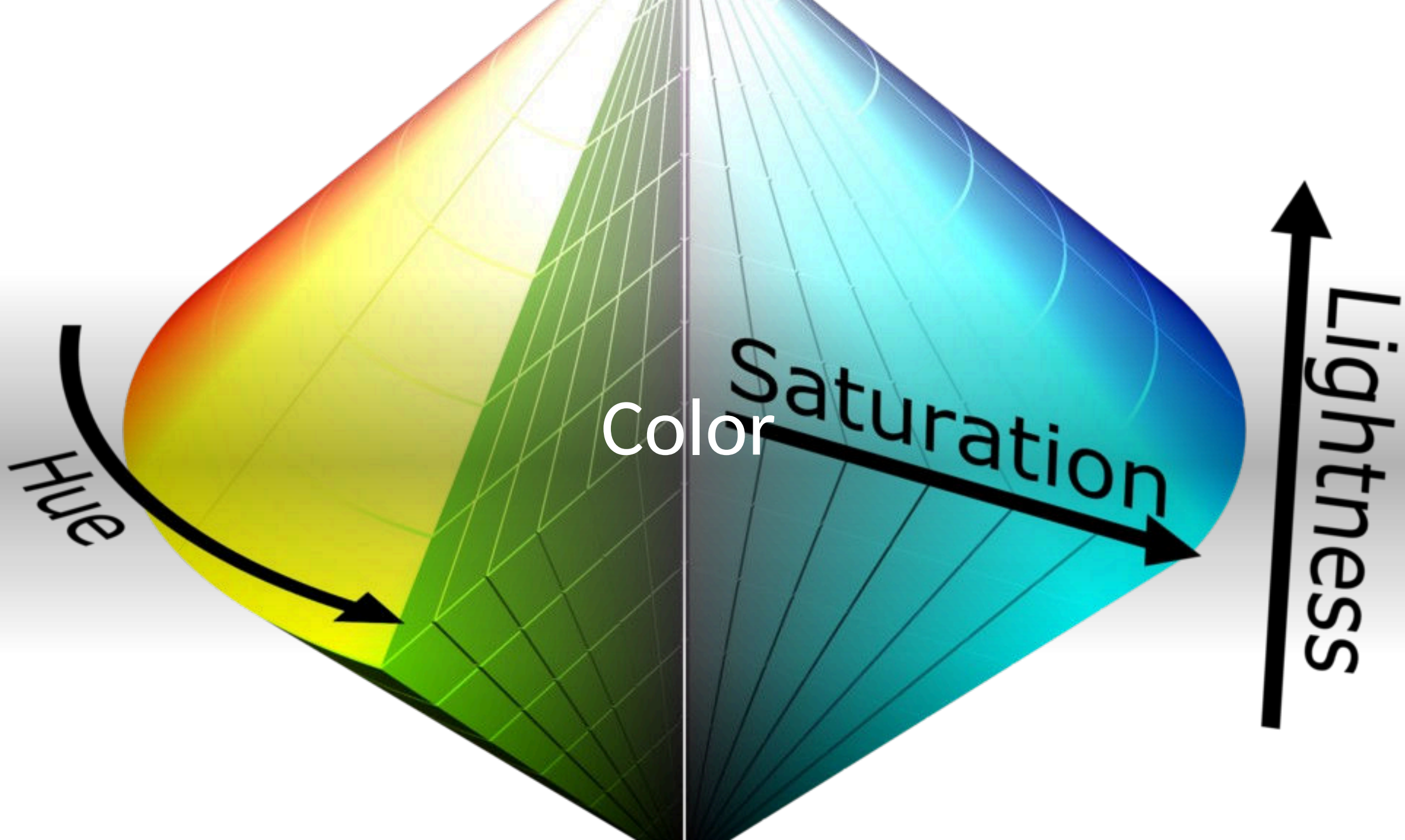
Form



Movement



Spatial Positioning



# Color



Color can be expressed in many different ways. From the RGB (Red, Green, Blue) scale to the CMYK (Cyan, Magenta, Yellow and Key) scale to the HSL (Hue, Saturation and Lightness) scale.



The HSL scale is useful to us when we examine color in terms of pre-attentiveness. Hue is a measure of the color that we normally give a name to such as “Red” or “Violet”. Saturation and lightness are a measure of the intensity of colors.



Hues and intensities are pre-attentively processed and can be used to separate visual elements from their surroundings. This saves the user from having to perform a visual search through data.



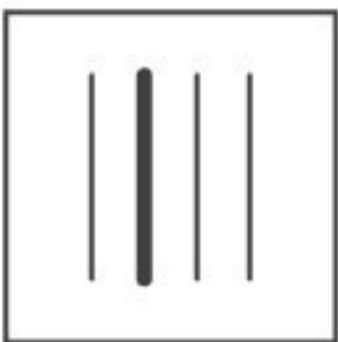
Orientation and collinearity



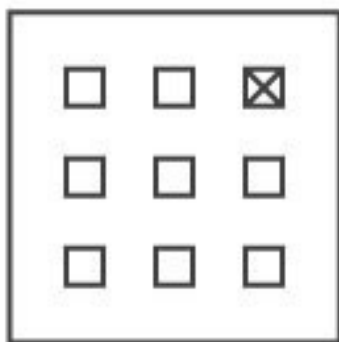
Curvature



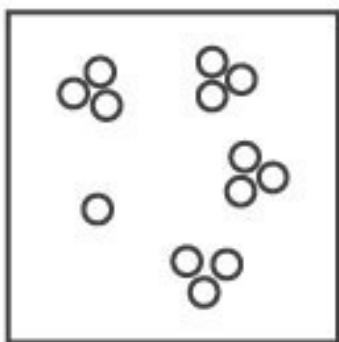
Length



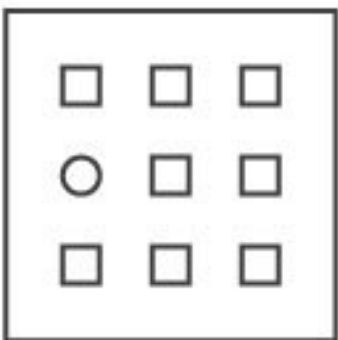
Width



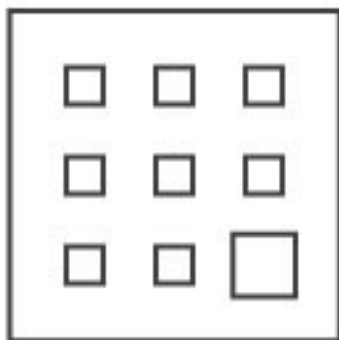
Added marks



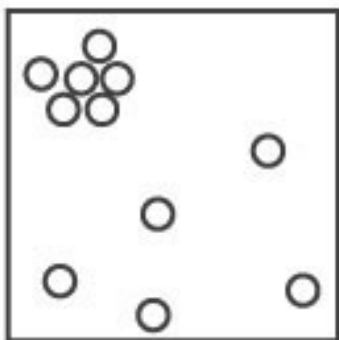
Numerosity



Shapes



Size



Spatial grouping

# Form

# Form



Form applies to a set of attributes (listed below) and form can be manipulated to either call attention to a member of the data set or to reduce our attention on it.



Conversely you could make it smaller and reduce its importance.

# Motion

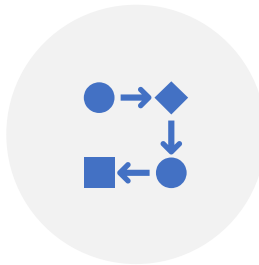
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# Motion



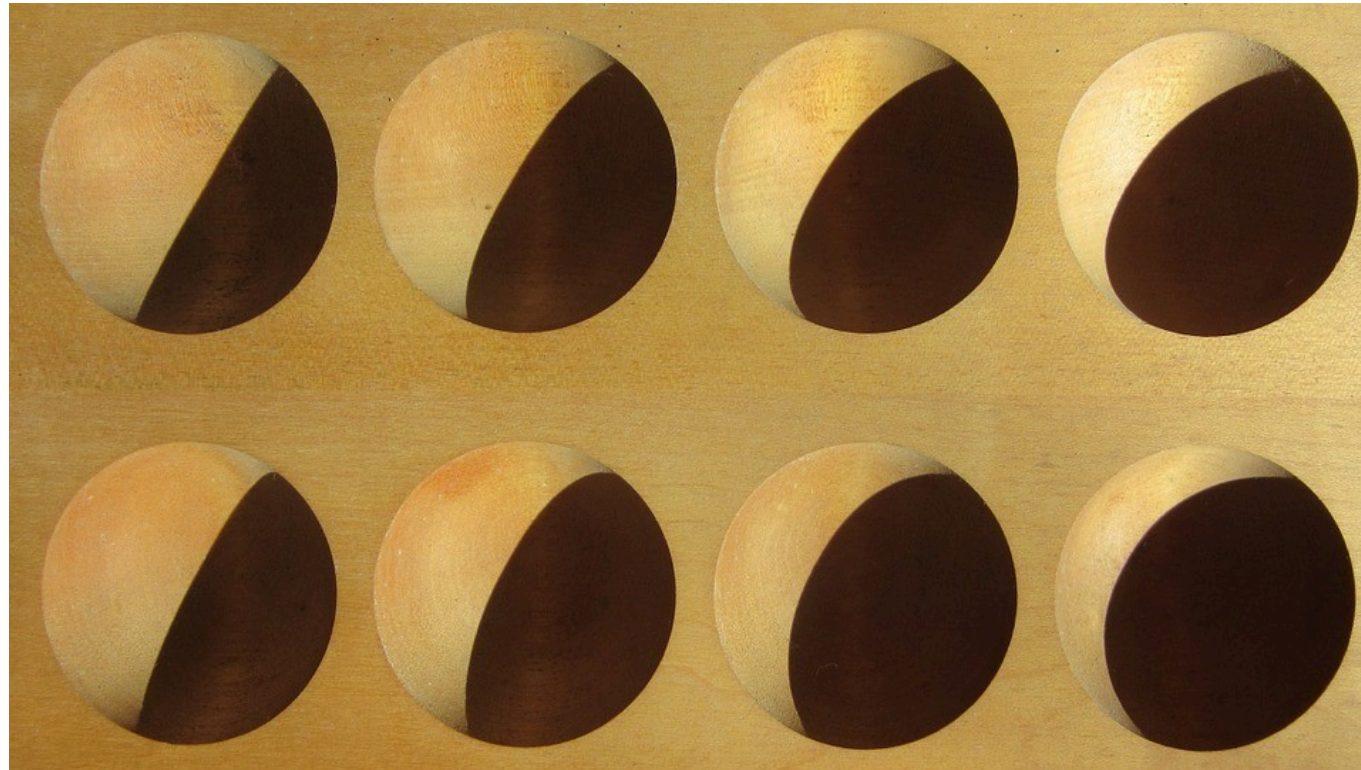
MOVEMENT HAS TWO SUB-ATTRIBUTES FLICKER AND MOTION. THEY CAN BE USED VERY EFFECTIVELY TO CALL SOMEONE'S ATTENTION.



HOWEVER, CARE SHOULD ALWAYS BE TAKEN WHEN EMPLOYING MOTION IN INFORMATION VISUALIZATIONS AND OTHER DESIGNS.



THIS IS BECAUSE THE MOTION CAN RAPIDLY BECOME ANNOYING OR DISTRACTING FROM THE REST OF THE INFORMATION THAT IS BEING PRESENTED.



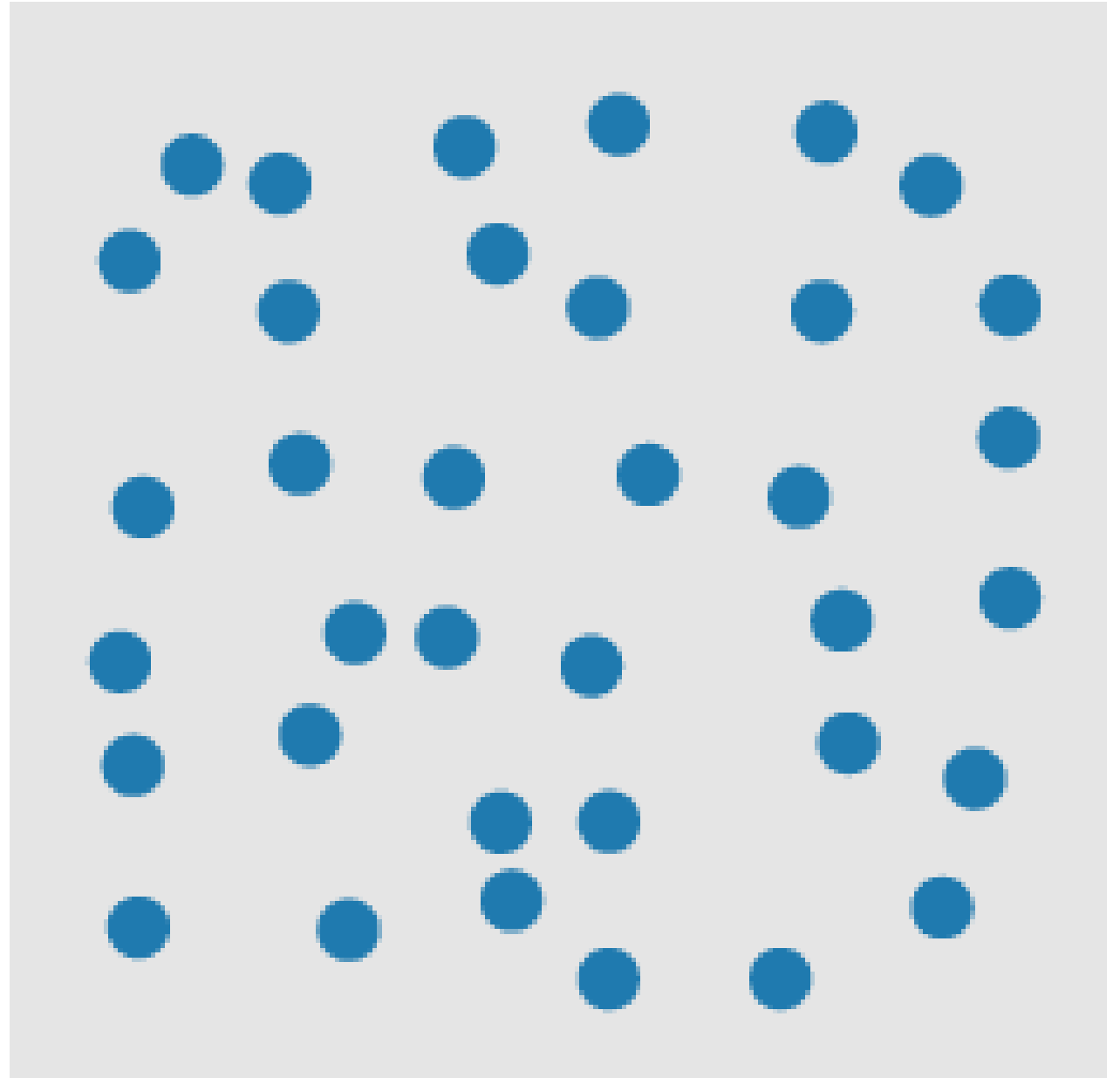
[www.interaction-design.org](http://www.interaction-design.org)

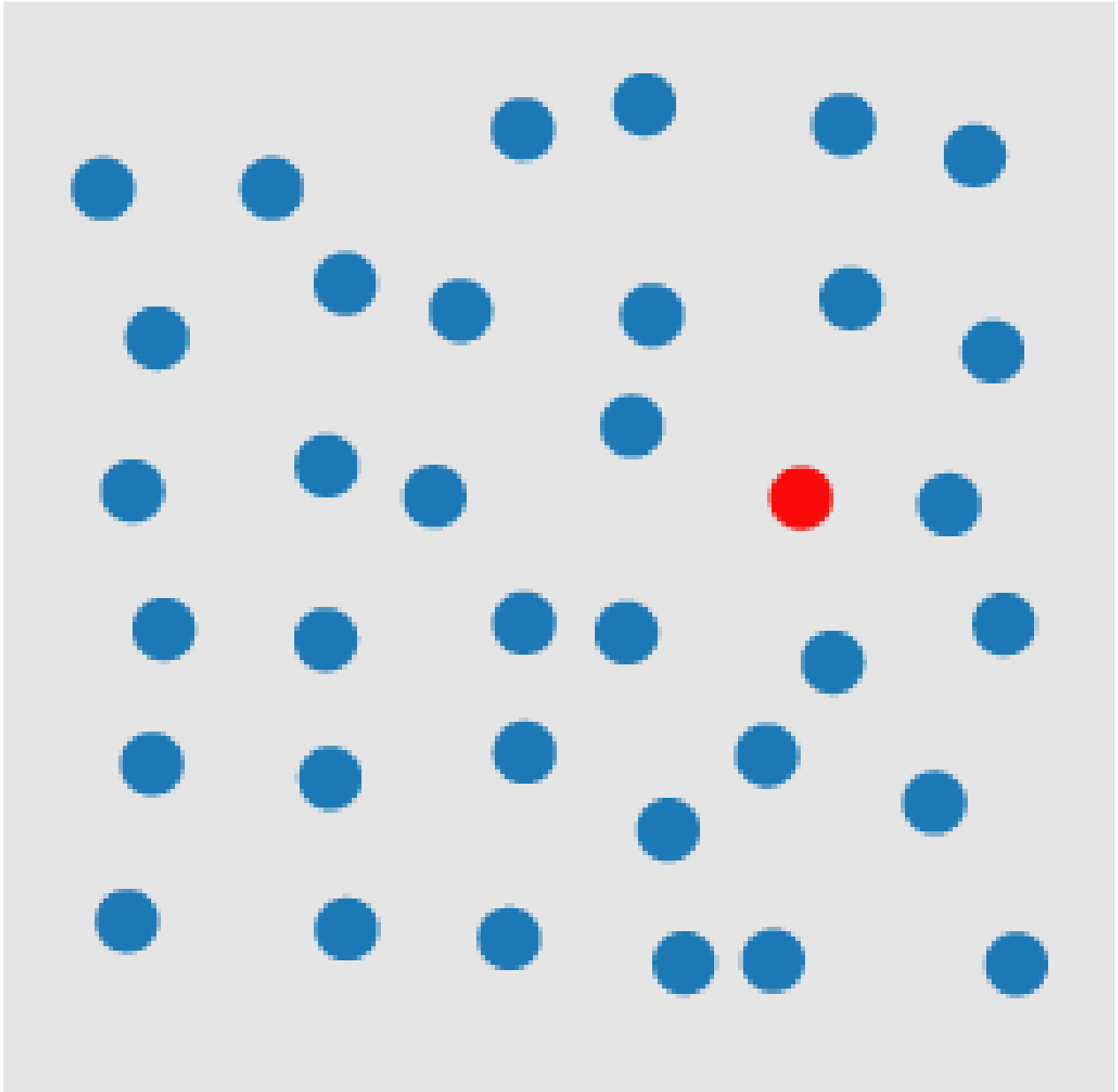
# Pre-attentive Processing

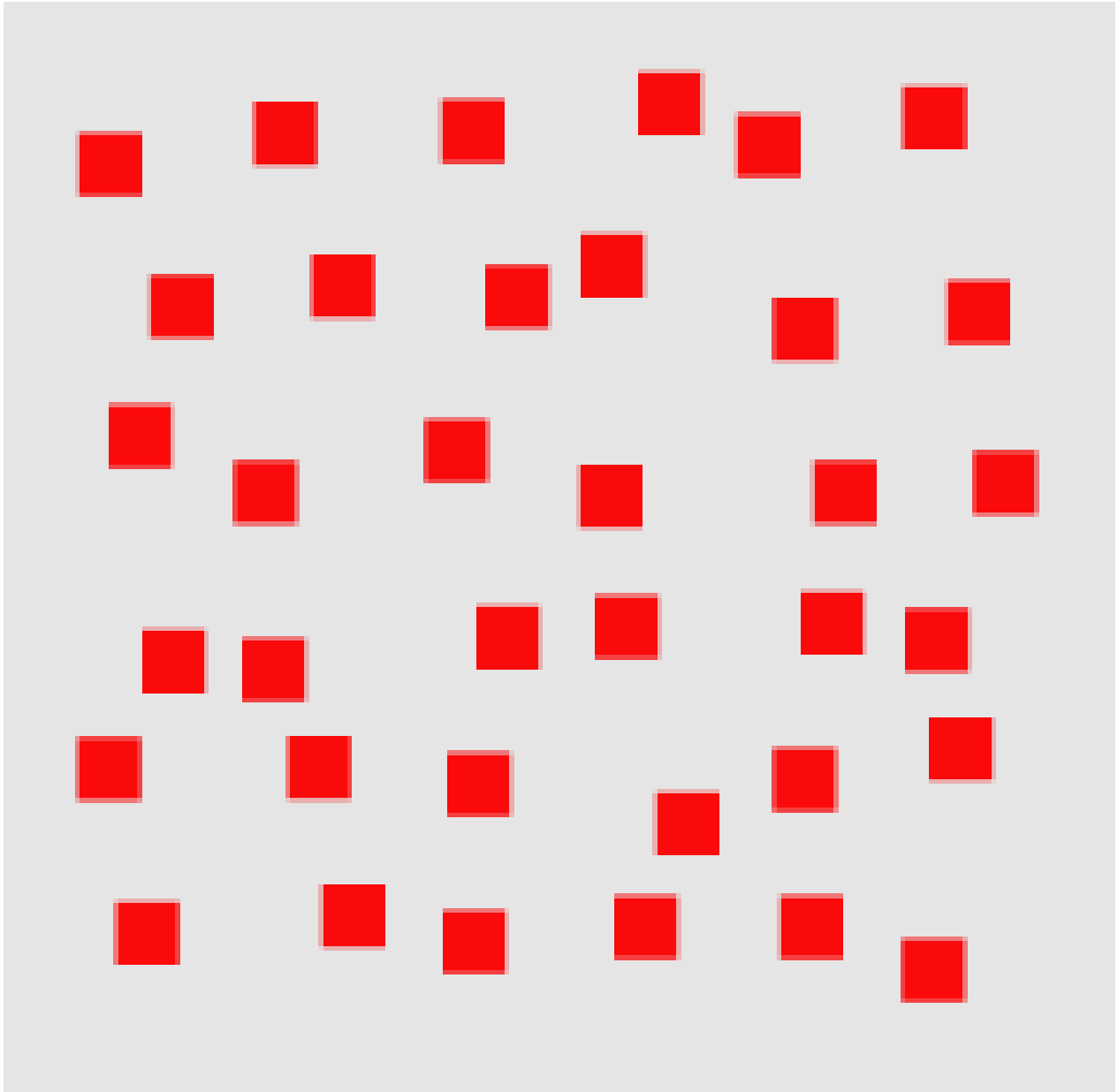
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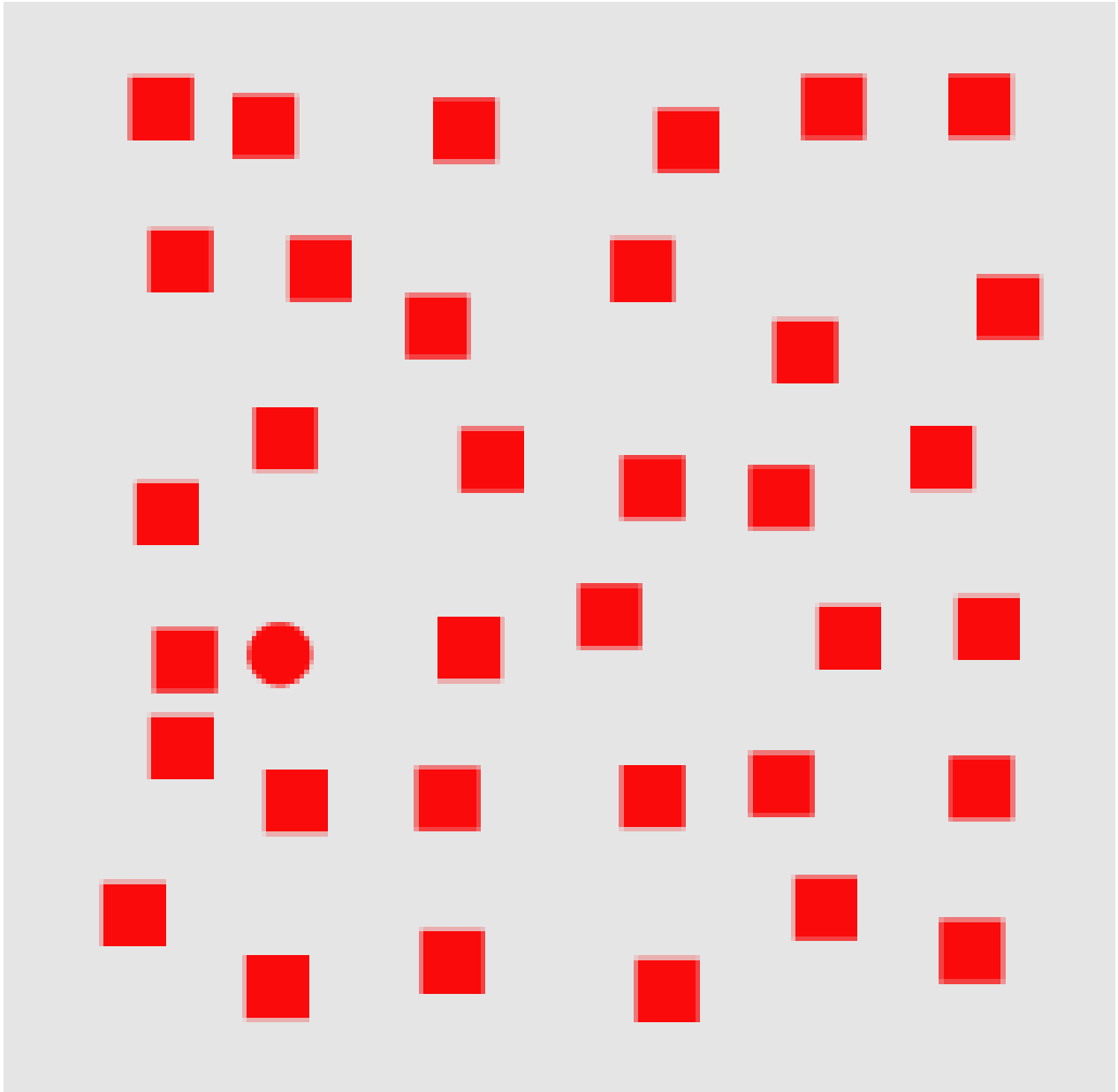
Spatial Positioning

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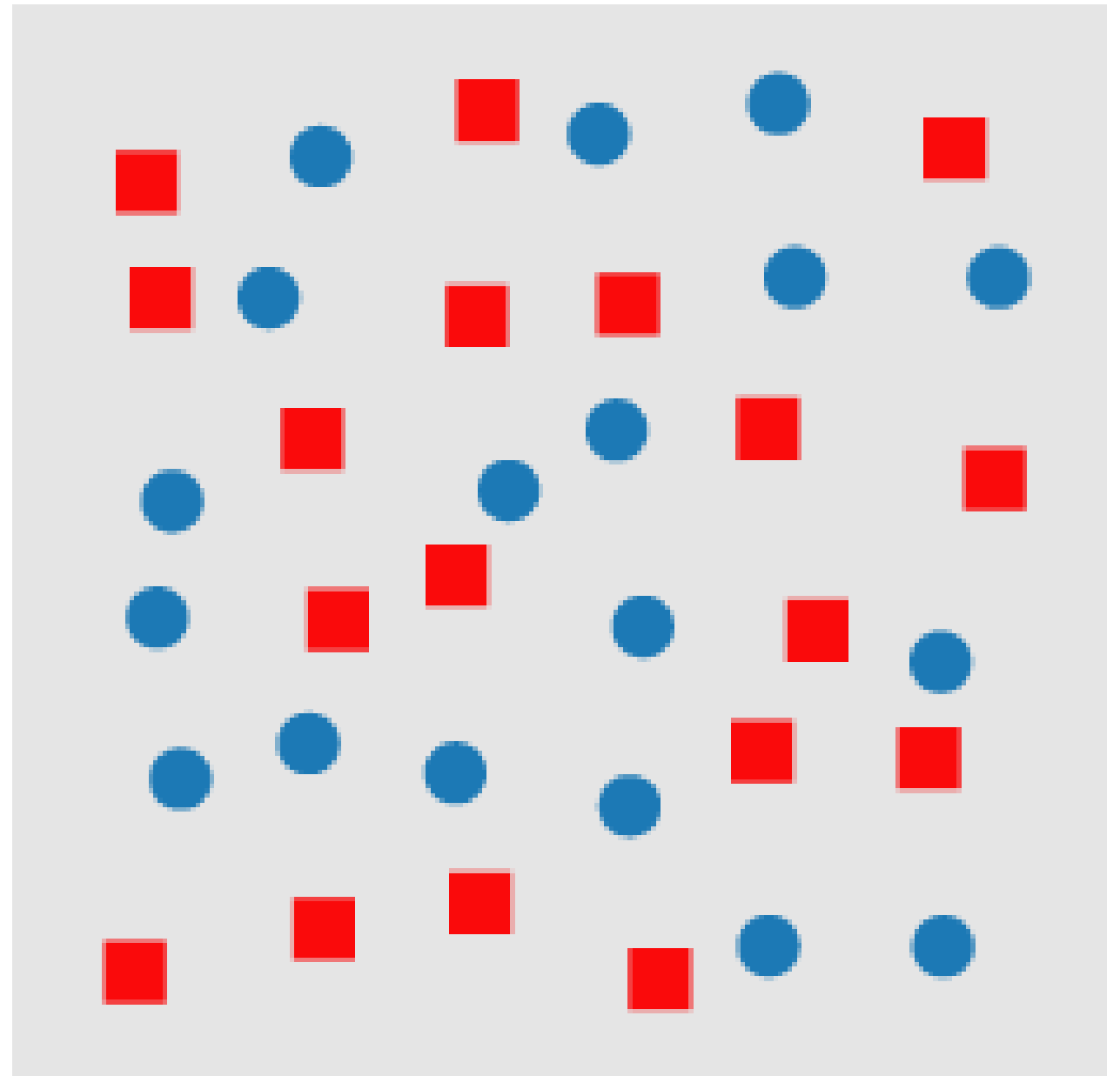




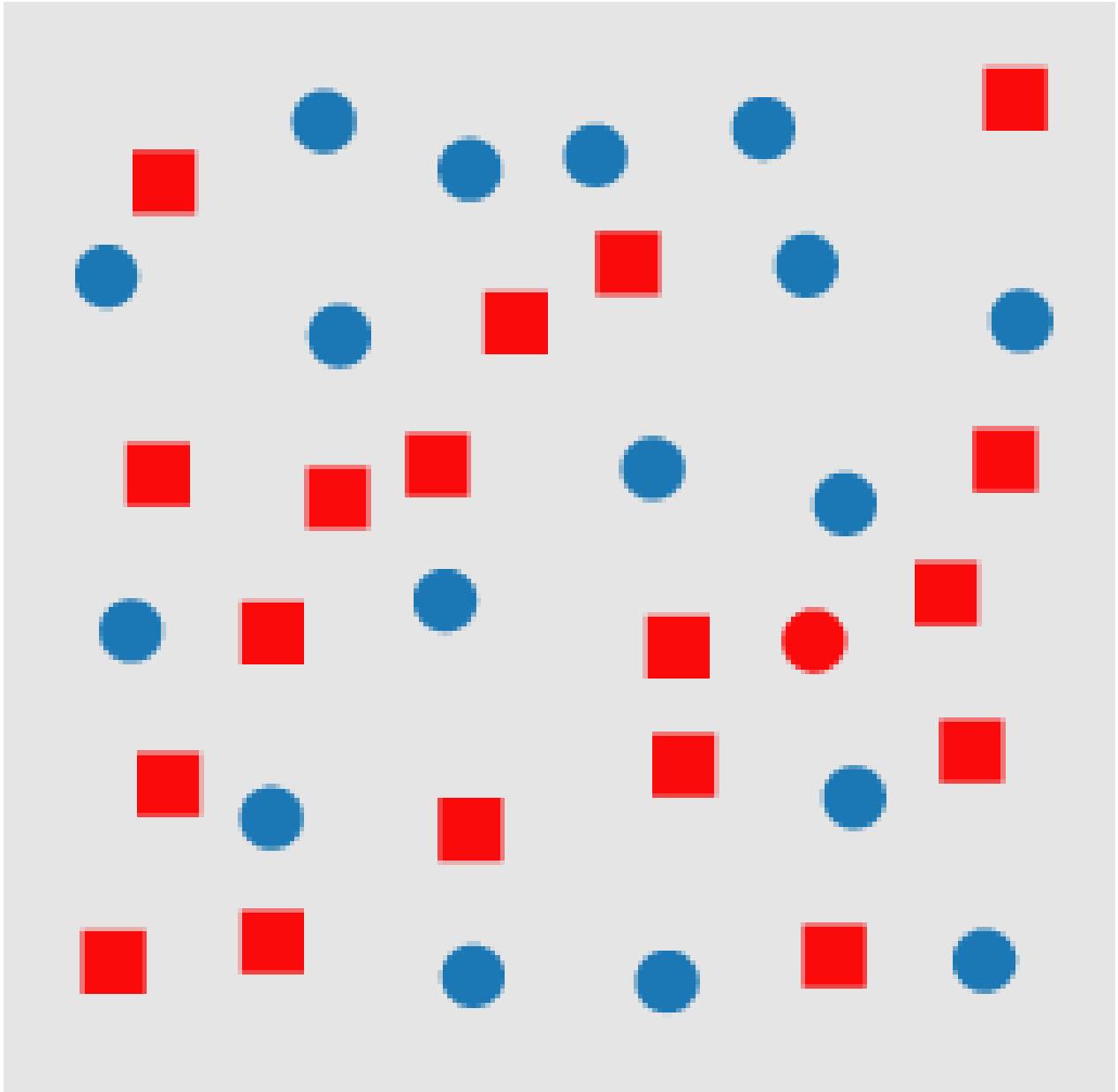




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25747072354745666142018774072849875310665

Find the number 3

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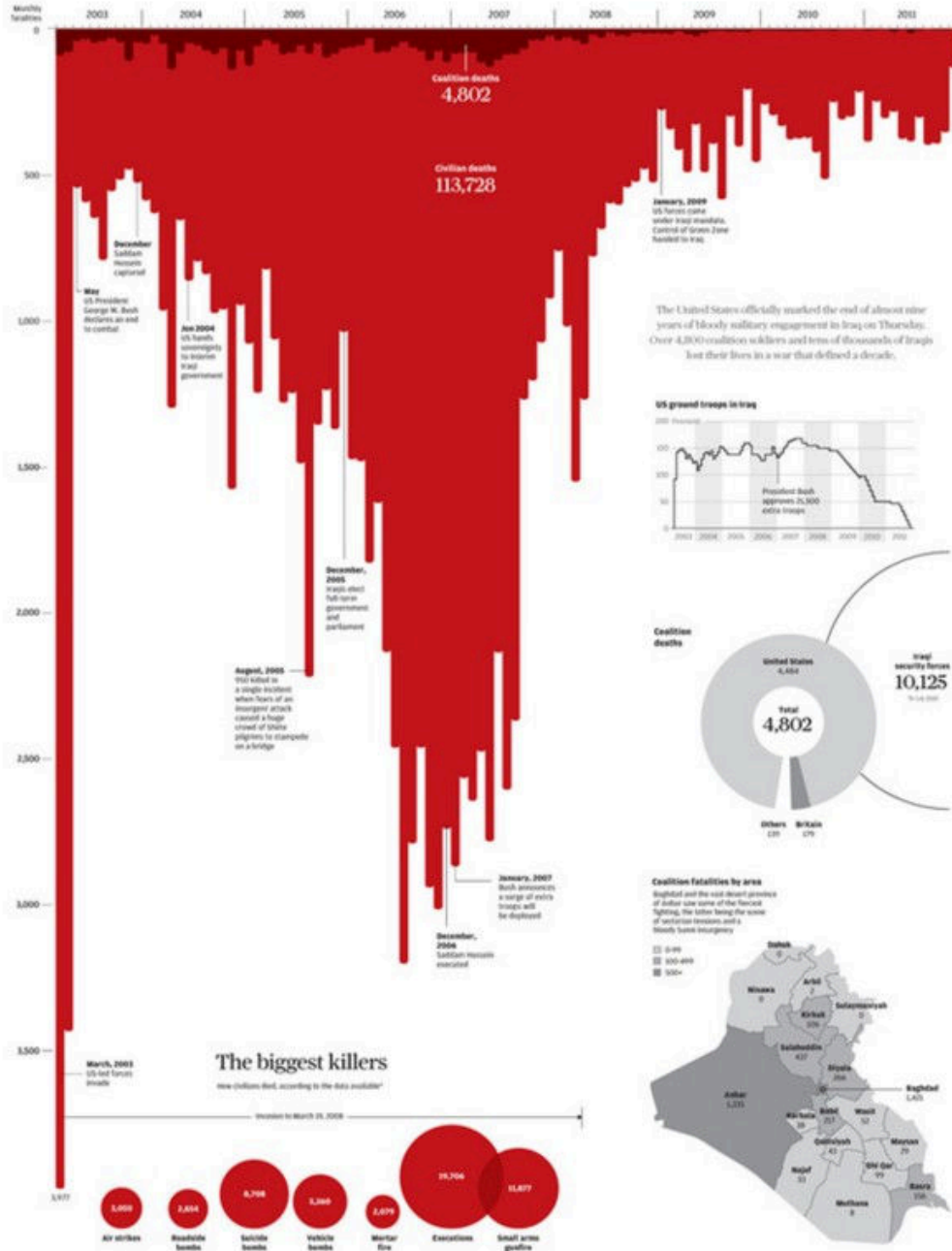
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Find the number 3

---

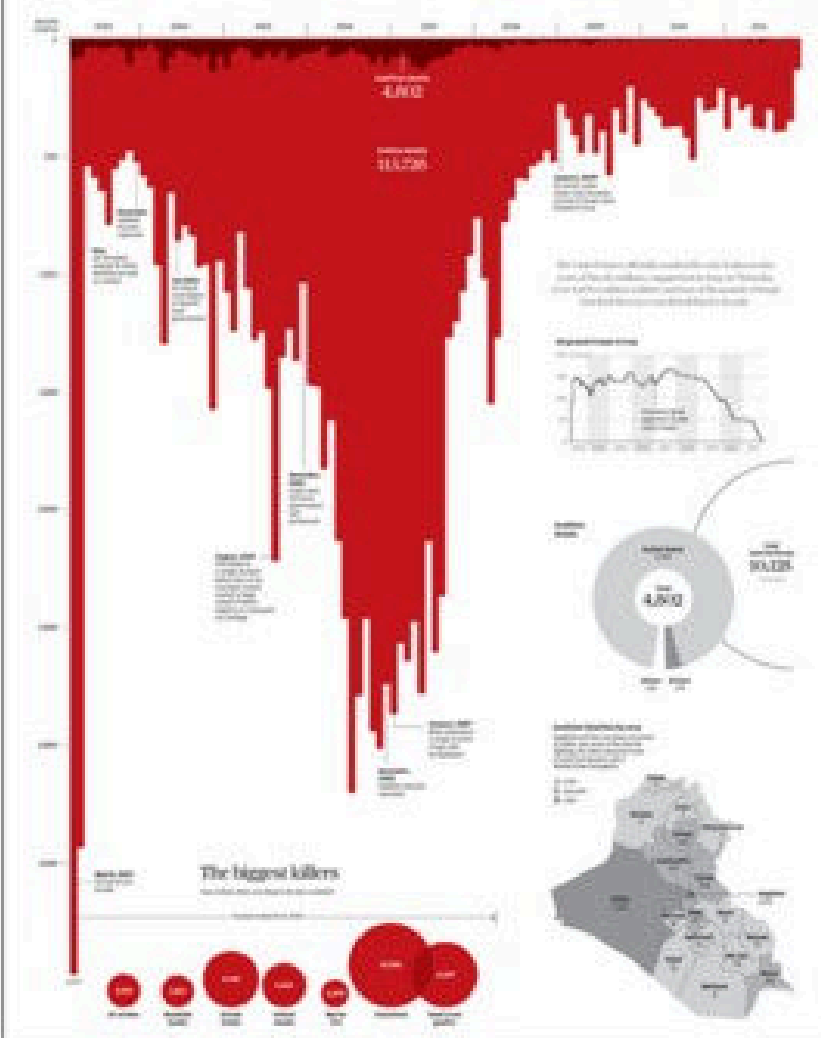
Example

# Iraq's bloody toll

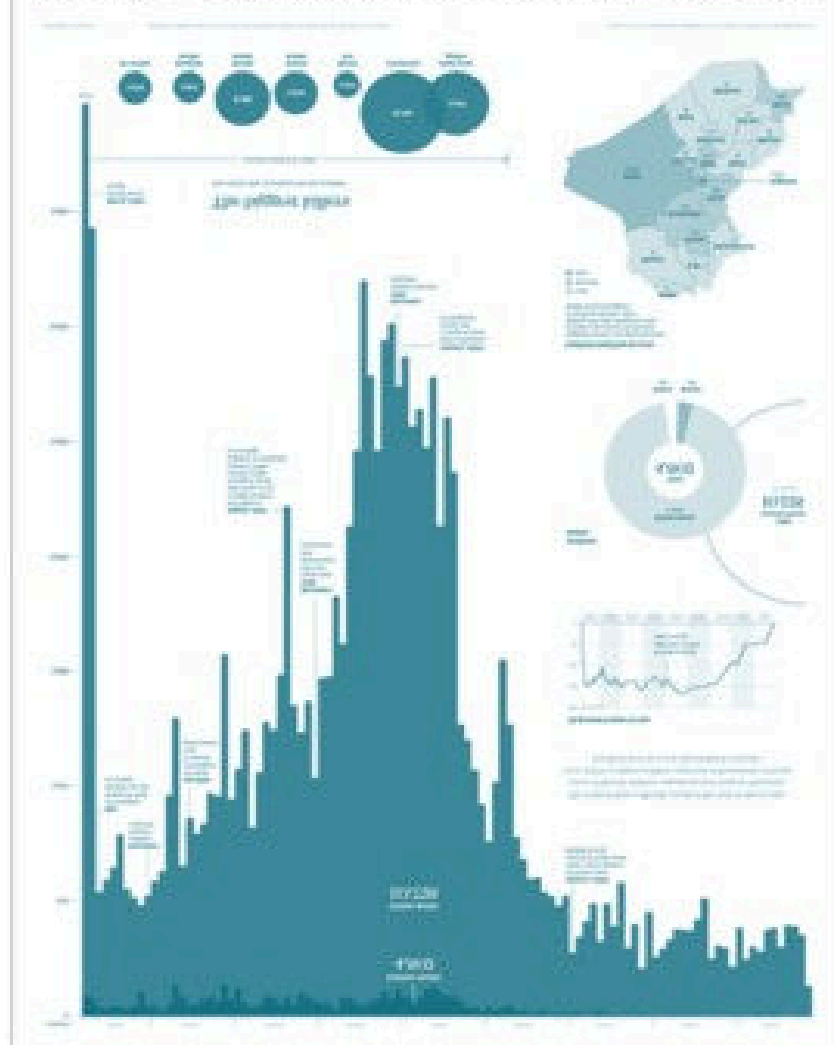




# Iraq's bloody toll



# Iraq: Deaths on the decline

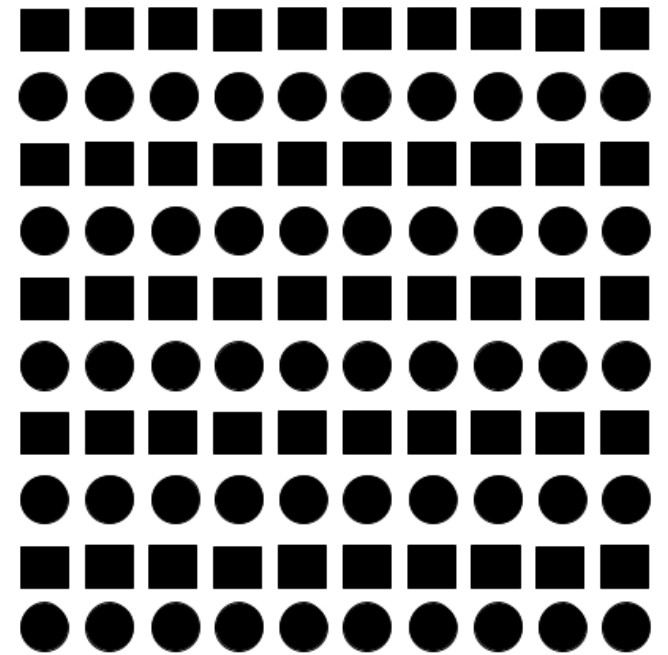
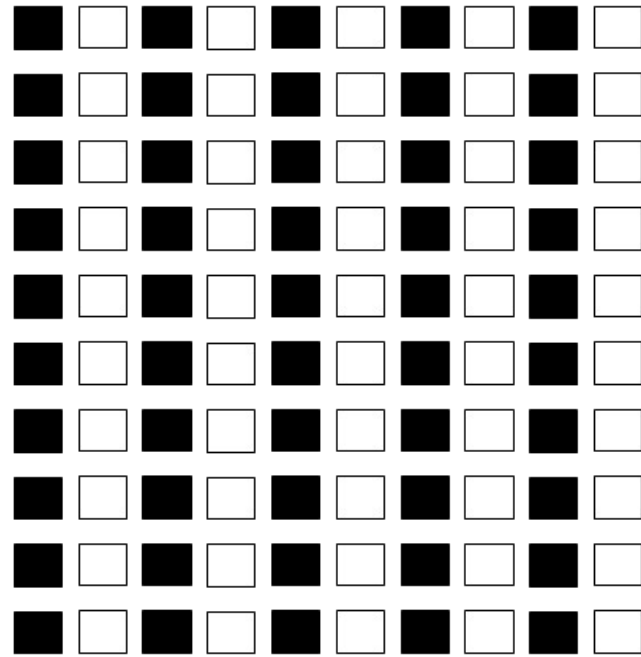


# Gestalt Principles



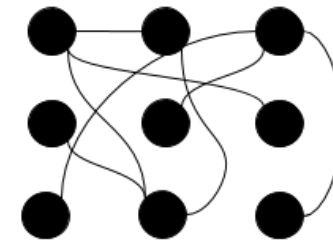
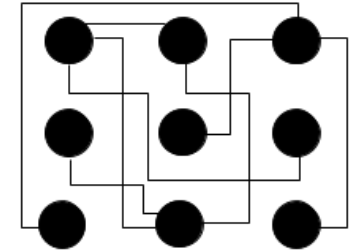
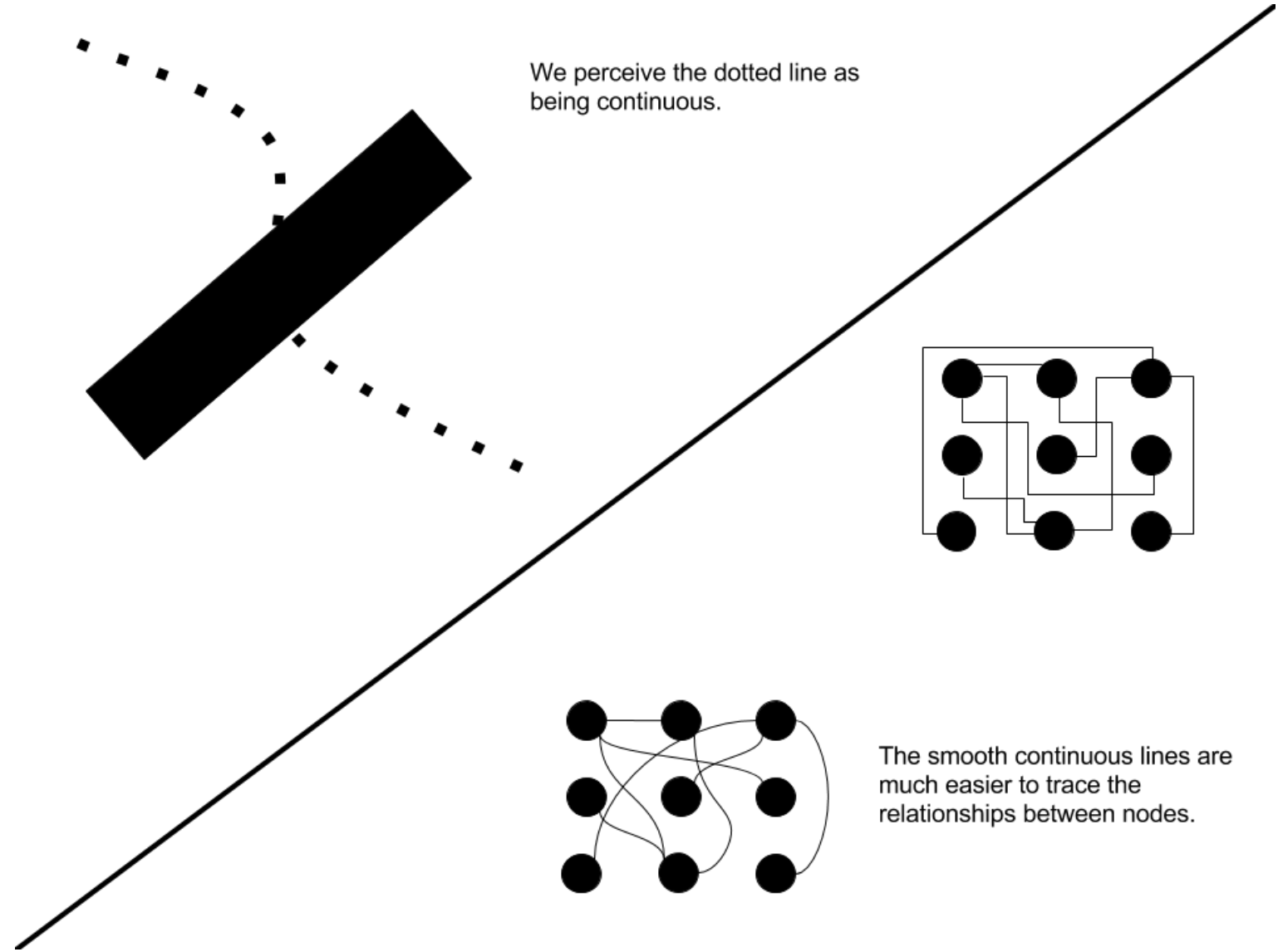
# Similarity

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# Continuity

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The smooth continuous lines are much easier to trace the relationships between nodes.

We tend to see three pairs of different brackets, as opposed to six brackets.

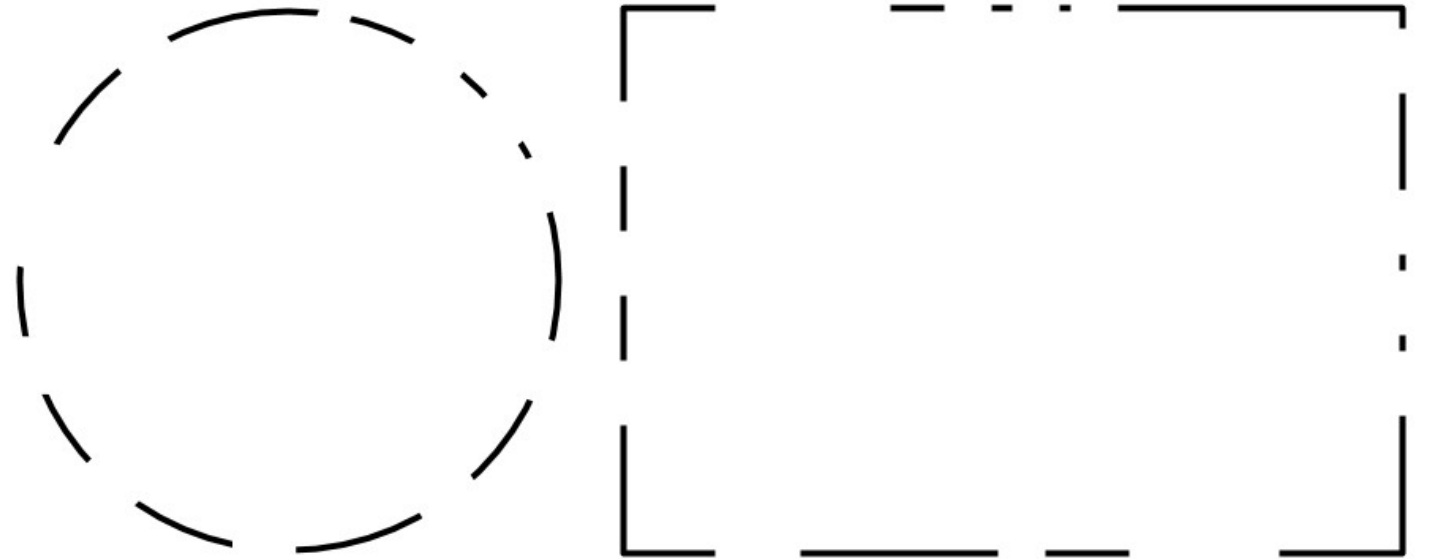
# Symmetry

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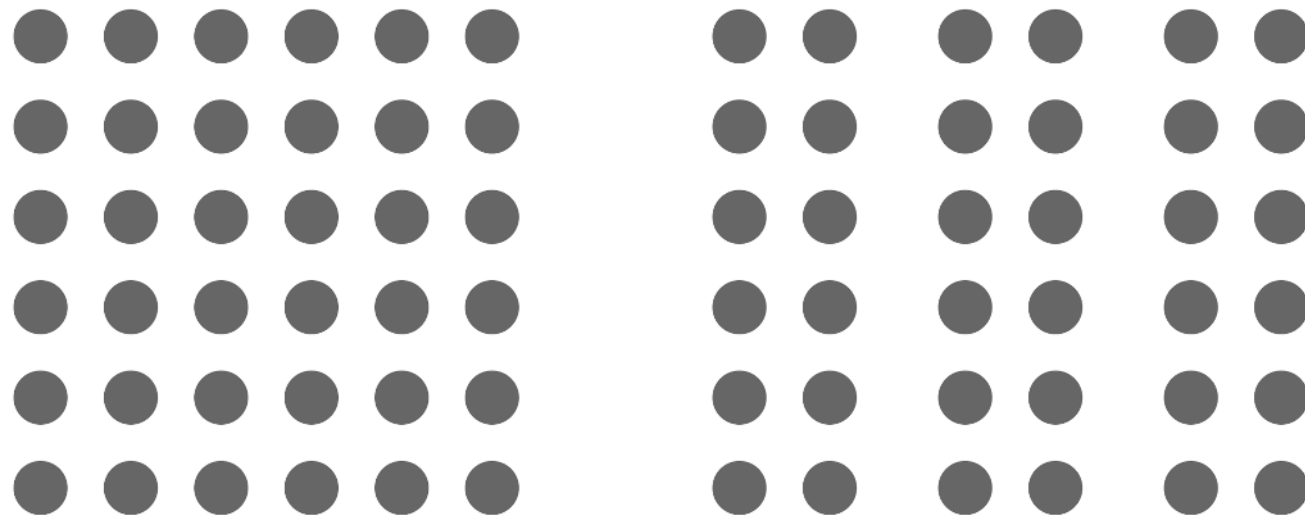
# Closure

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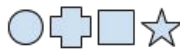





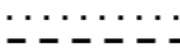
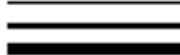
# Proximity

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Summary

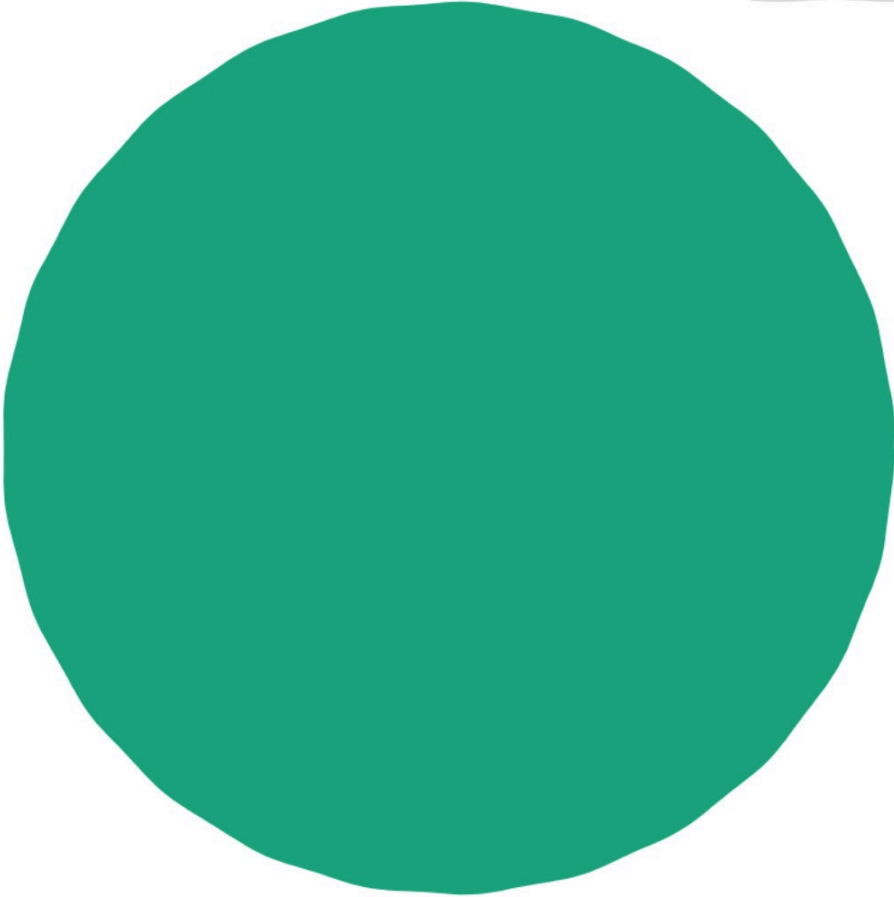


Feature/Object	Example	Notes	Nominal	Ordinal	Quantitative
Position		Powerful and accurate			✓
Length		Powerful and accurate			✓
Size		Less accurate, but still useful			✓
Angle/Slope		Less accurate, but still useful			✓
Shape		Can only use a few different shapes.	✓		
Colour - Hue		Can only use a few different hues.	✓		
Colour - Sequential		Can only use a few different ordered levels.		✓	
Colour - Diverging		Can only use a few different ordered levels.		✓	
Colour - Continuous		Less accurate than other quantitative encodings			✓
Texture		Bygone feature, but may still have applications.	✓		
Line - Type		Can only use a very limited number of types.	✓		
Line - Weight/Boldness		Not very accurate, but still useful.			✓

You

Should I use a Pie Chart?

 NO



NO



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FIN