A Bigger Boat

Data Visualization Lessons From the Movies

Mark Vaillancourt - Microsoft

Trish Vaillancourt – St. Catherine University

Our Cats

Agenda

https://imgflip.com/memetemplate/62844217/Princess-Bride-Miracle-Max

Agenda

Why Bother?

https://imgflip.com/memetemplate/62844217/Princess-Bride-Miracle-Max

Agenda

- Why Bother?
- Perception

https://imgflip.com/memetemplate/62844217/Princess-Bride-Miracle-Max

Agenda

- Why Bother?
- Perception
- Preattentive Attributes

https://imgflip.com/memetemplate/62844217/Princess-Bride-Miracle-Max

Agenda

- Why Bother?
- Perception
- Preattentive Attributes
- Attribute Encoding

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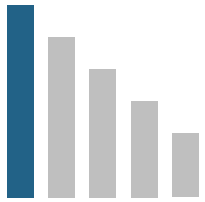
Agenda

- Why Bother?
- Perception
- Preattentive Attributes
- Attribute Encoding
- Gestalt Principles

https://imgflip.com/memetemplate/62844217/Princess-Bride-Miracle-Max

Why Bother?



VIDEO

A Bigger Boat

Why Data Visualization?

Jaws

https://www.youtube.com/watch?v=2I91DJZKRxs

Audience Participation Time!

On how many days did Crisp sales exceed 160 bars?

On how many days did Crisp sales exceed 160 bars?

Bar Flavor	9/15/2015	9/16/2015	9/17/2015	9/18/2015	9/19/2015	9/20/2015	9/21/2015	9/22/2015	9/23/2015	9/24/2015	9/25/2015	9/26/2015	9/27/2015	9/28/2015	9/29/2015	9/30/2015
Caramel	106	178	132	149	146	117	141	142	136	153	143	122	147	138	111	128
Crisp	114	151	130	120	131	138	146	148	180	127	152	138	137	131	131	156
Dark Chocolate	151	140	131	97	117	138	152	117	146	123	123	107	123	145	129	125
Milk Chocolate	132	173	94	147	111	147	119	110	175	132	108	111	121	129	106	140
Total	**503**	**642**	**487**	**513**	**505**	**540**	**558**	**517**	**637**	**535**	**526**	**478**	**528**	**543**	**477**	**549**

Bar Flavor	10/1/2015	10/2/2015	10/3/2015	10/4/2015	10/5/2015	10/6/2015	10/7/2015	10/8/2015	10/9/2015	10/10/2015	10/11/2015	10/12/2015	10/13/2015	10/14/2015	10/15/2015
Caramel	158	130	145	157	135	139	150	103	140	123	158	146	146	155	146
Crisp	147	130	116	118	124	133	140	119	114	100	140	143	135	133	125
Dark Chocolate	155	107	139	121	122	125	140	104	132	115	131	138	128	144	139
Milk Chocolate	132	131	148	129	146	131	143	175	122	168	140	112	165	161	145
Total	**592**	**498**	**548**	**525**	**527**	**528**	**573**	**501**	**508**	**506**	**569**	**539**	**574**	**593**	**555**

On how many days did Crisp sales exceed 160 bars?

Bar Flavor	9/15/2015	9/16/2015	9/17/2015	9/18/2015	9/19/2015	9/20/2015	9/21/2015	9/22/2015	9/23/2015	9/24/2015	9/25/2015	9/26/2015	9/27/2015	9/28/2015	9/29/2015	9/30/2015
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Dark Chocolate	151	140	131	97	117	138	152	117	146	123	123	107	123	145	129	125
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Caramel	158	130	145	157	135	139	150	103	140	123	158	146	146	155	146
Crisp	147	130	116	118	124	133	140	119	114	100	140	143	135	133	125
Dark Chocolate	155	107	139	121	122	125	140	104	132	115	131	138	128	144	139
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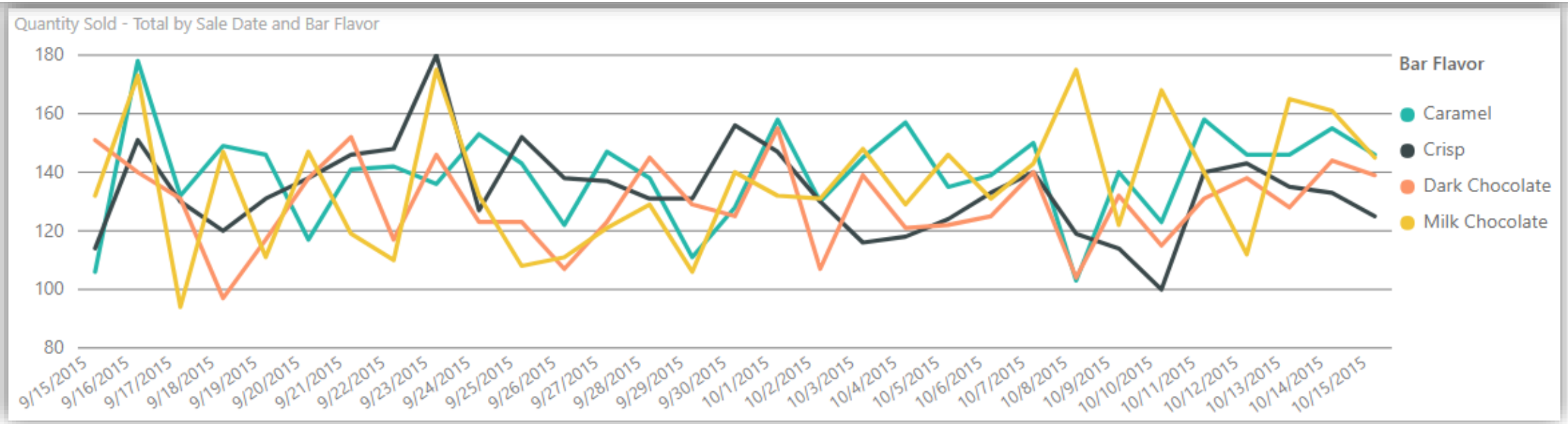

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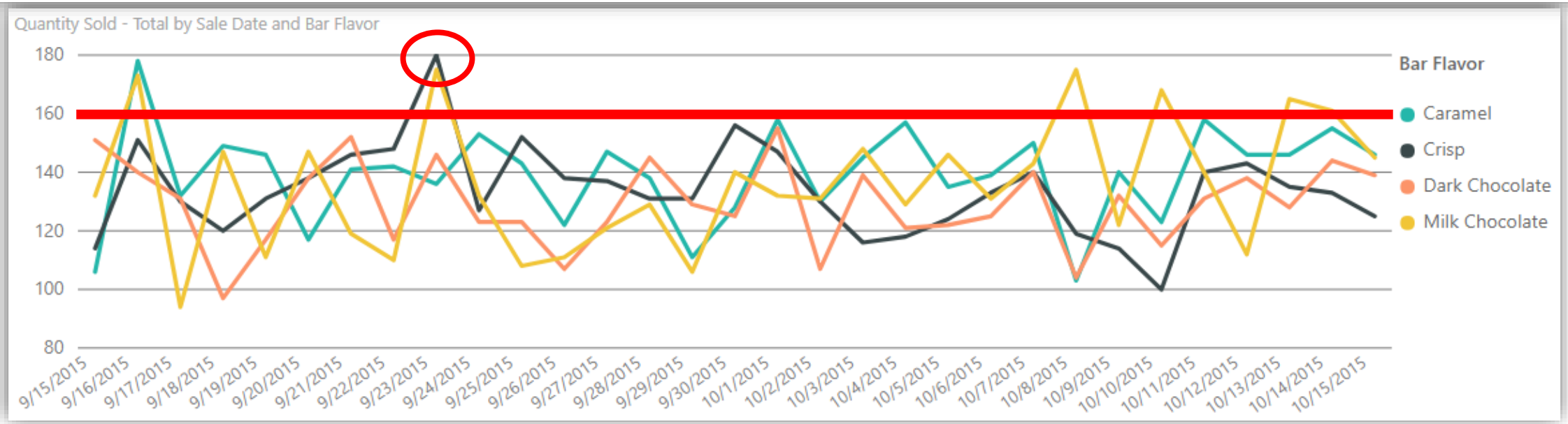
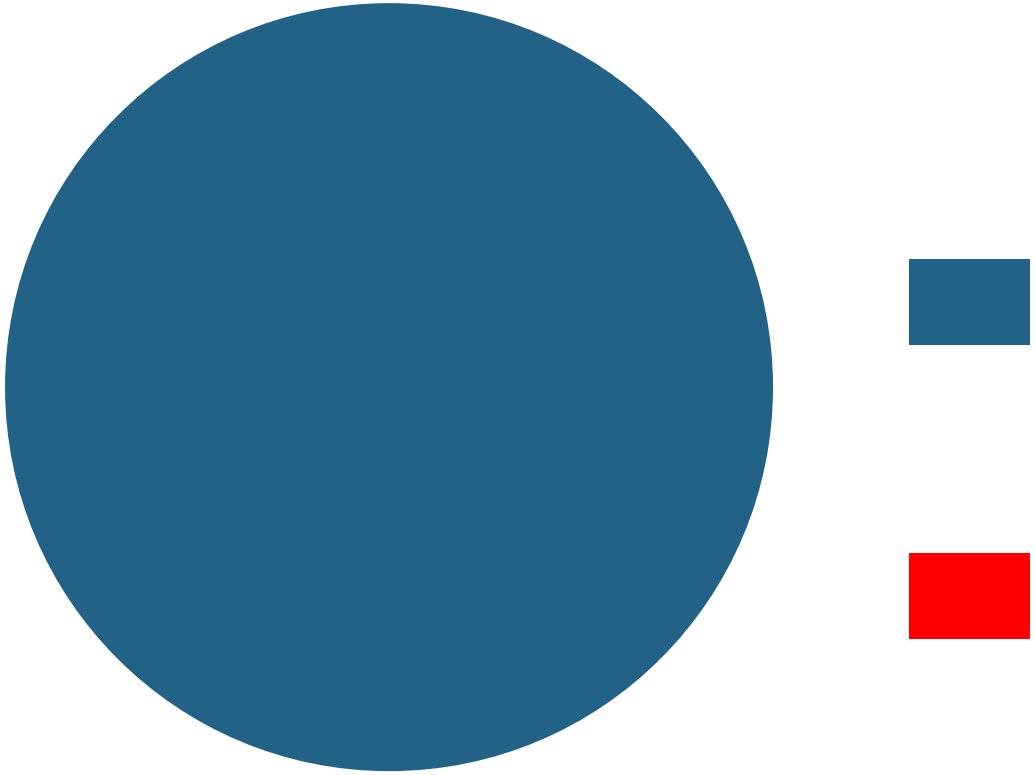


A Pie Chart



VIDEO

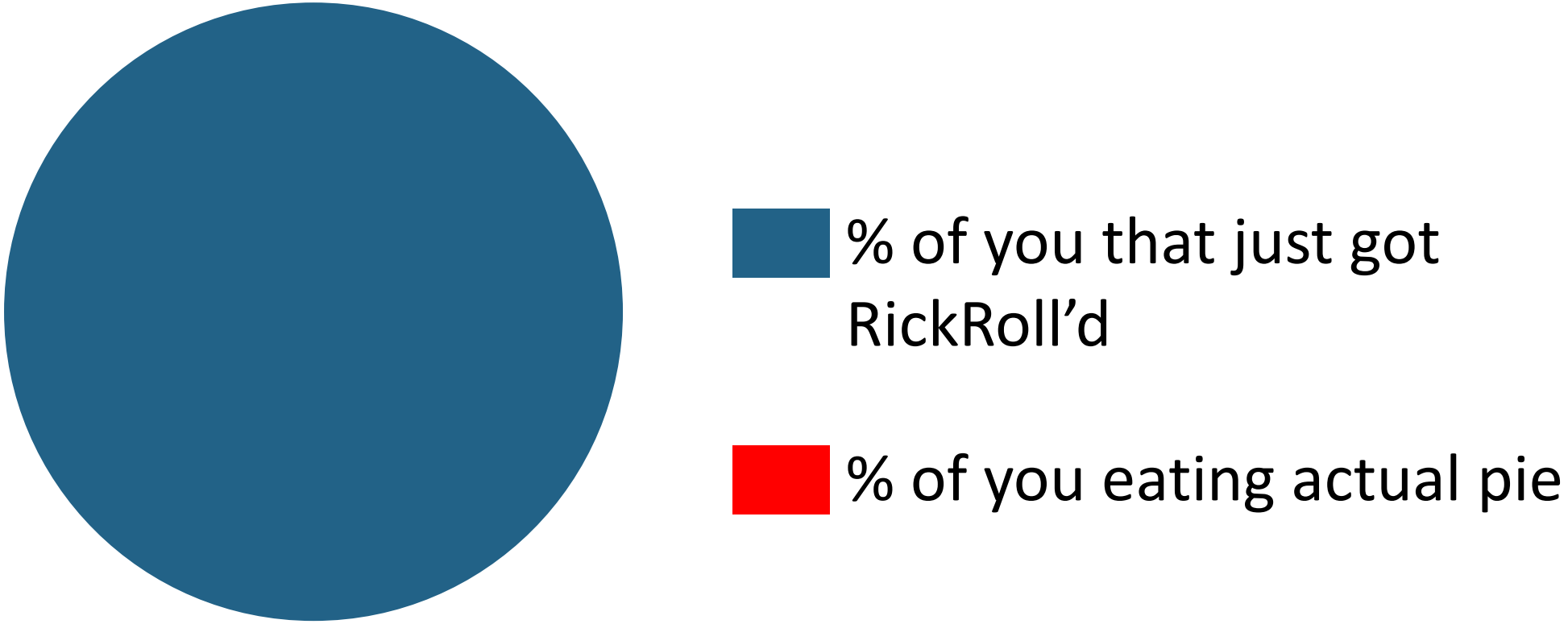
A Pie Chart

This is REALLY funny to us... mostly Mark

Never Gonna Give You Up, Rick Astley

https://www.youtube.com/watch?v=oHg5SJYRHA0

A Pie Chart



Why Should Librarians Care?

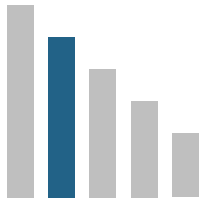
Research Studies

Presentations to funders

Well-displayed information is powerful

Answer questions quickly and easily

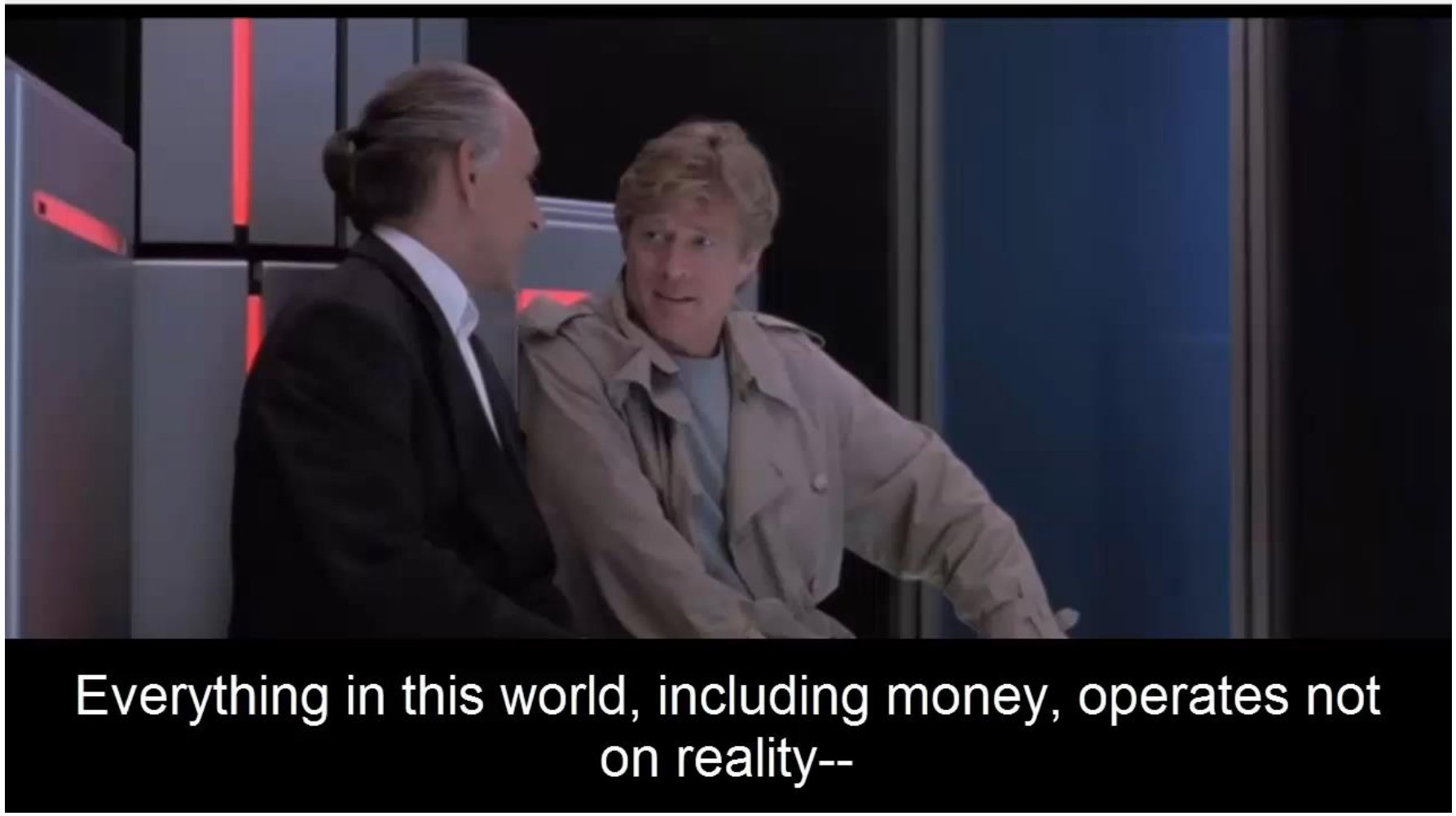
Perception



VIDEO

Perception vs Reality

Perception vs Reality



Sneakers

https://www.youtube.com/watch?v=coDtzN6bXAM

Perceptual Processing Types

Perceptual Processing Types

Preattentive

Attentive

Source: Stephen Few, *Show Me the Numbers*

Perceptual Processing Types

Preattentive

VERY fast

First type of processing that occurs

Like a snapshot

Attentive

Source: Stephen Few, *Show Me the Numbers*

Perceptual Processing Types

Preattentive	Attentive
VERY fast	Much slower
First type of processing that occurs	Sequential process that can result in Learning, Understanding, Remembering
Like a snapshot	

Source: Stephen Few, *Show Me the Numbers*

Audience Participation Time!

How many 5s do you see?

Source: Stephen Few, *Show Me the Numbers*

How many 5s do you see?

12356983124536984123063016

94258963124352178963000165

76489353200612034098763189

Source: Stephen Few, *Show Me the Numbers*

Preattentive Processing FTW!

1235698312453698412306301694258963124352178963000165
76489353200612034098763189

Source: Stephen Few, *Show Me the Numbers*

Perceptual Processing Types

Preattentive

VERY fast

First type of processing that occurs

Like a snapshot

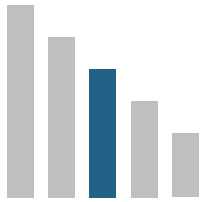
Attentive

Much slower

Sequential process that can result in Learning, Understanding, Remembering

Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes



I VOLUNTEER
AS ATTRIBUTE!
imgflip.com

Preattentive Attributes

Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes

Form

Length

Width

Orientation

Shape

Size

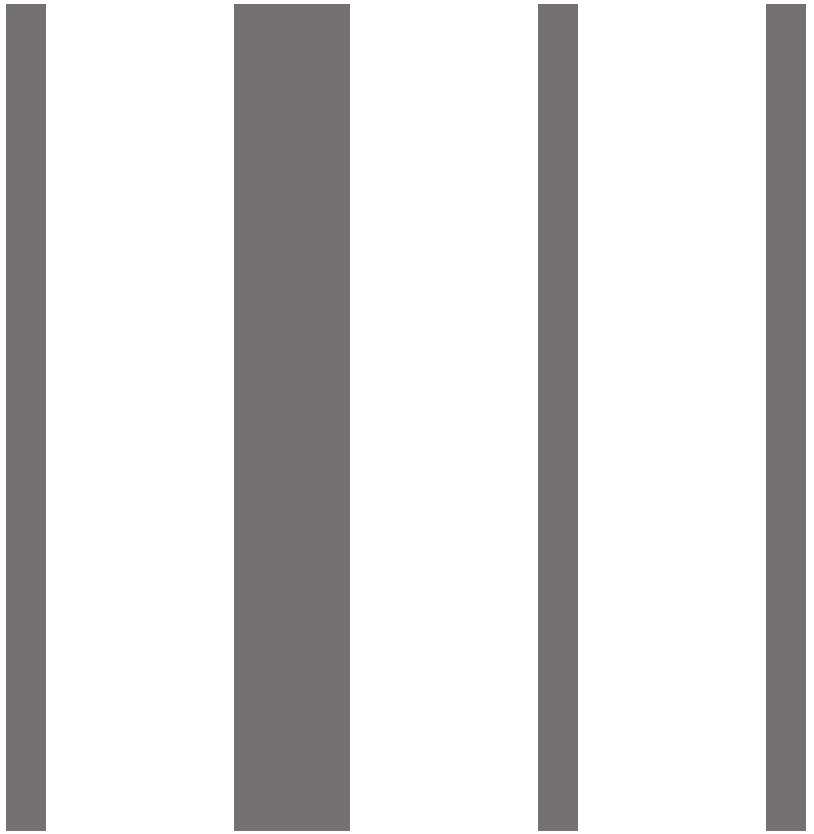
Enclosure

Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes

Form

- Length
- **Width**
- Orientation
- Shape
- Size
- Enclosure



Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes

Form

- Length
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- **Orientation**
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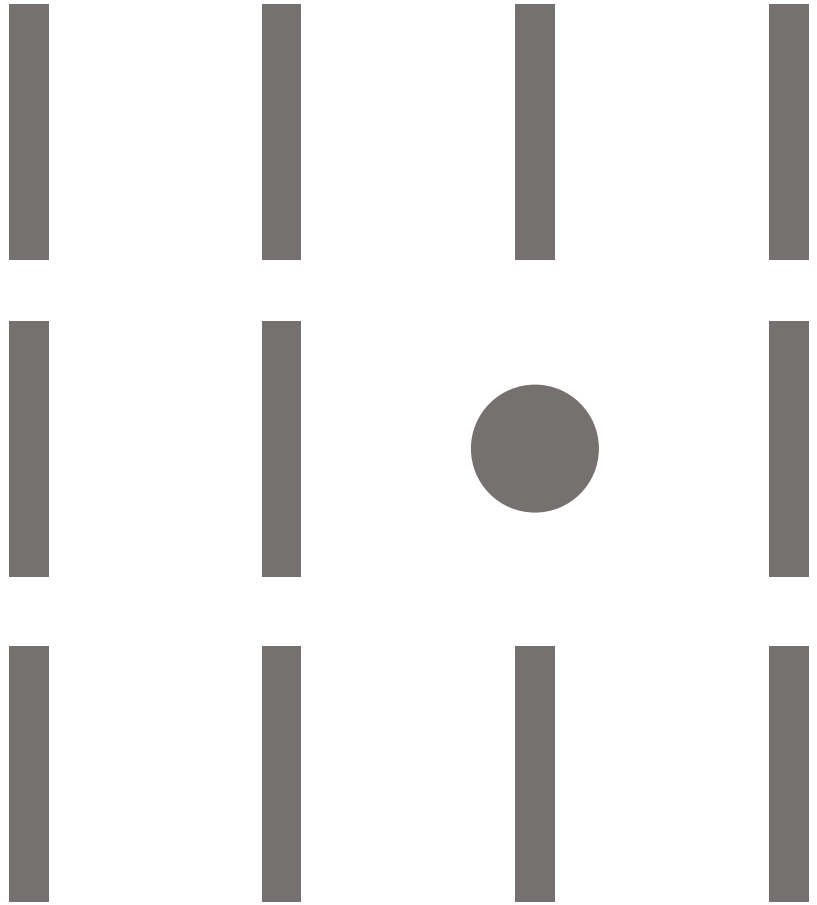

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Preattentive Attributes

Form

Length

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Orientation

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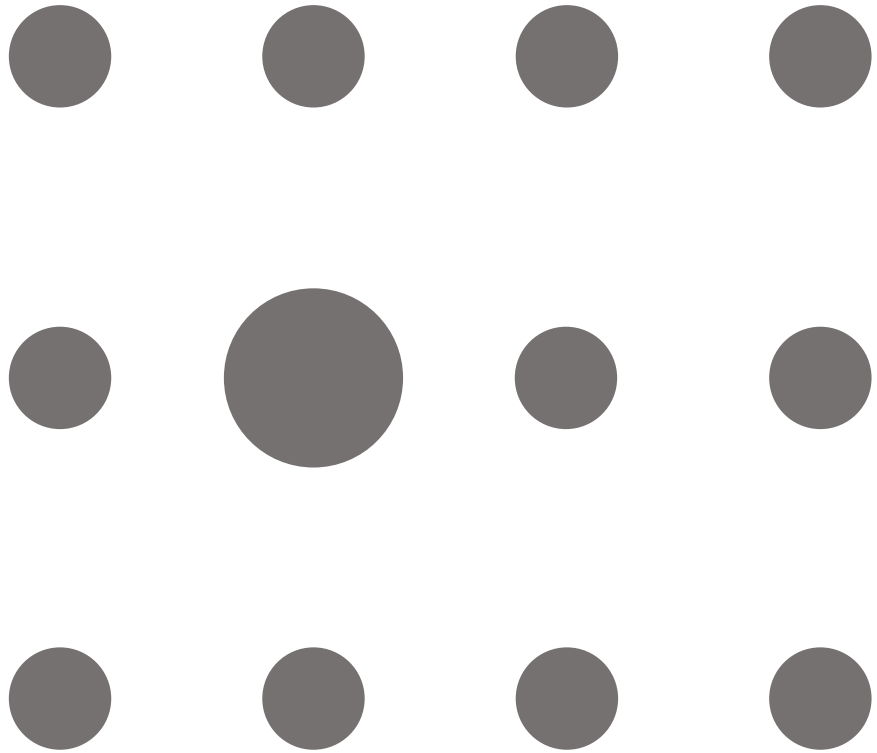

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Preattentive Attributes

Form

- Length
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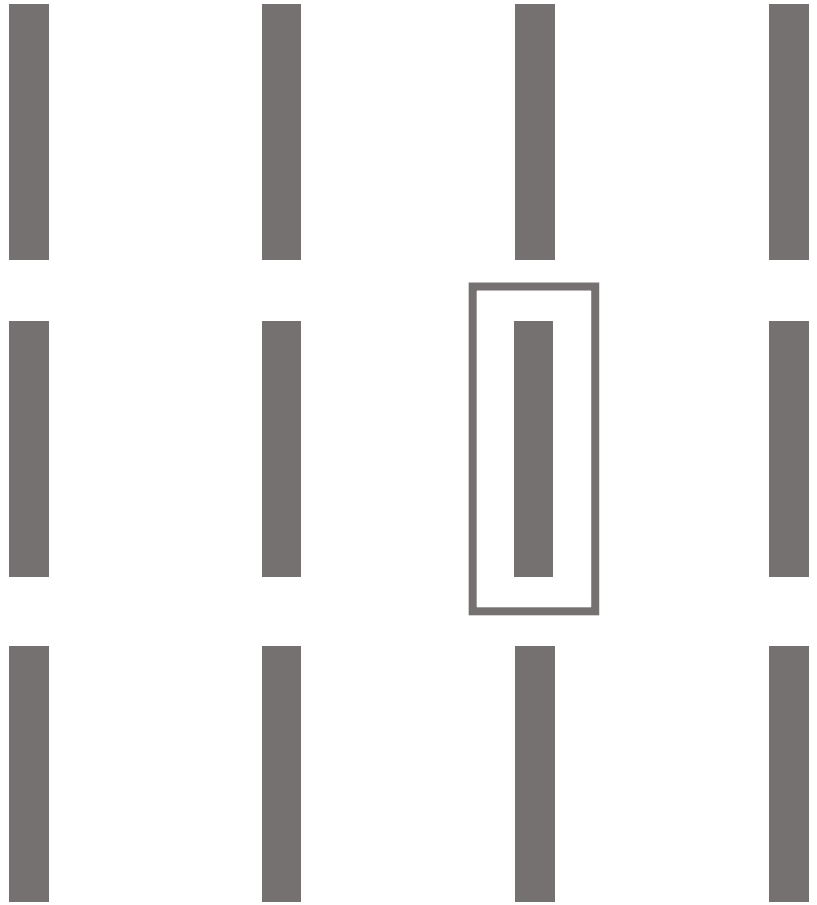
- **Enclosure**



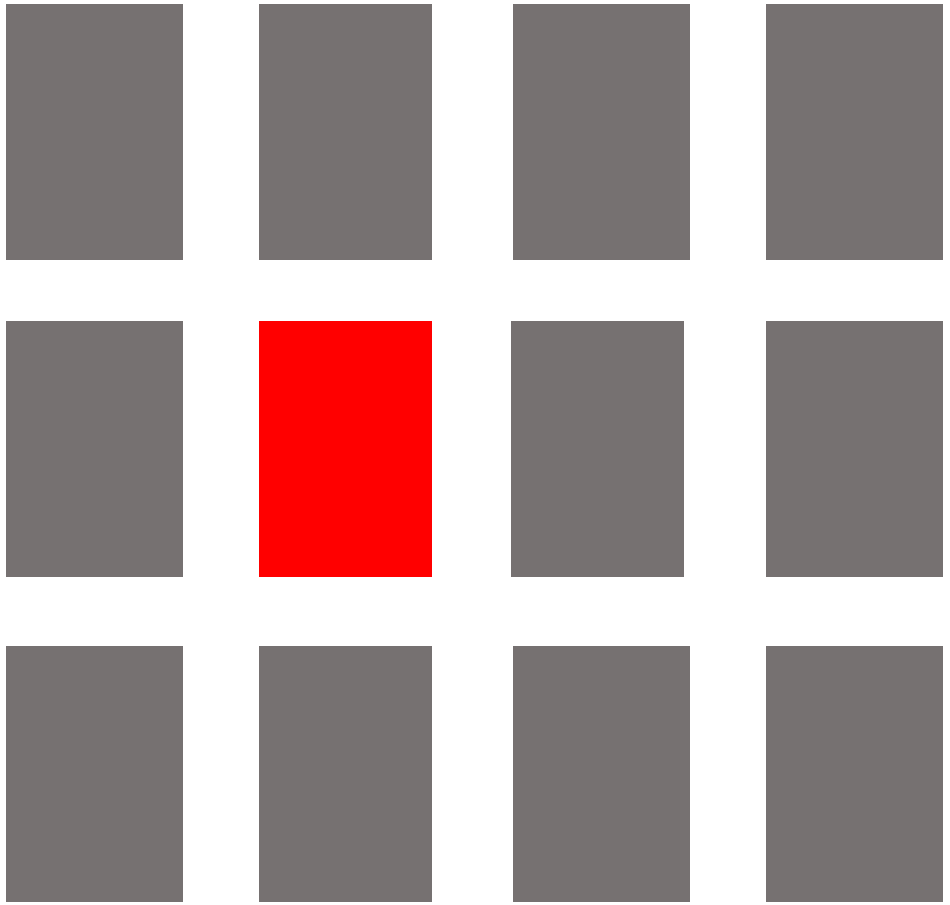
Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes

Color

Hue

Intensity



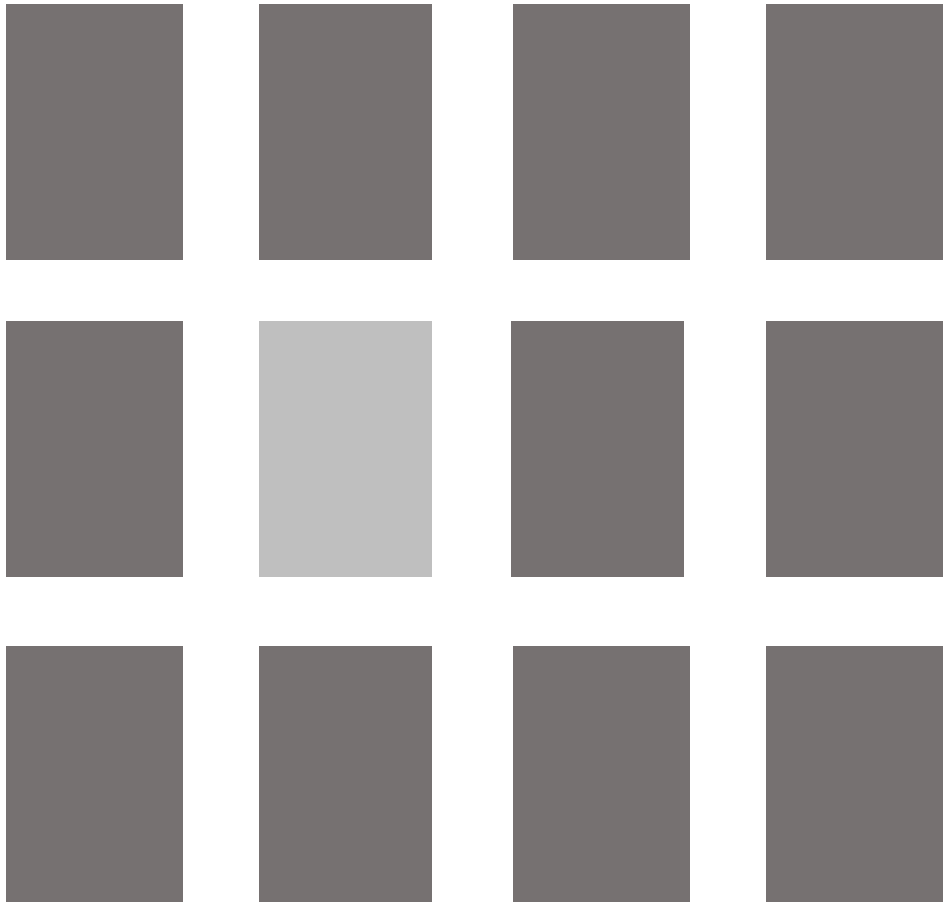
Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes

Color

Hue

Intensity

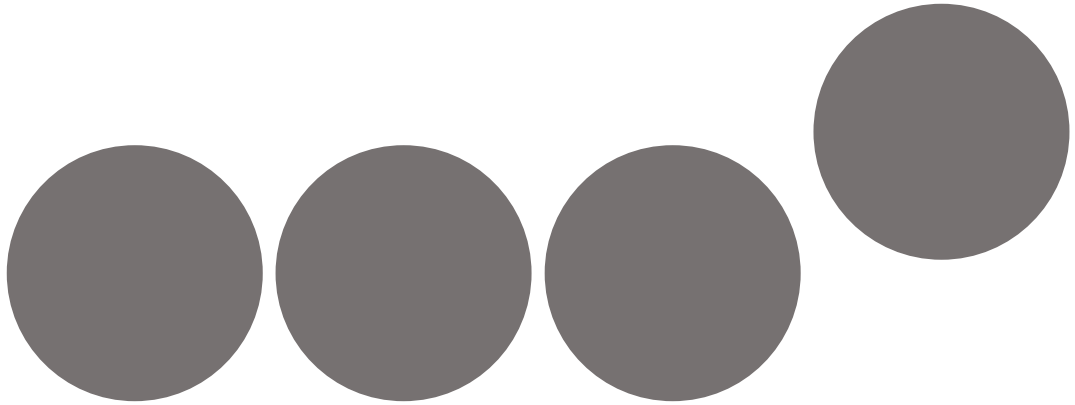


Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes

Spatial Position

2-D Position



Source: Stephen Few, *Show Me the Numbers*

VIDEO

2-Dimensional Thinking

2-Dimensional Thinking

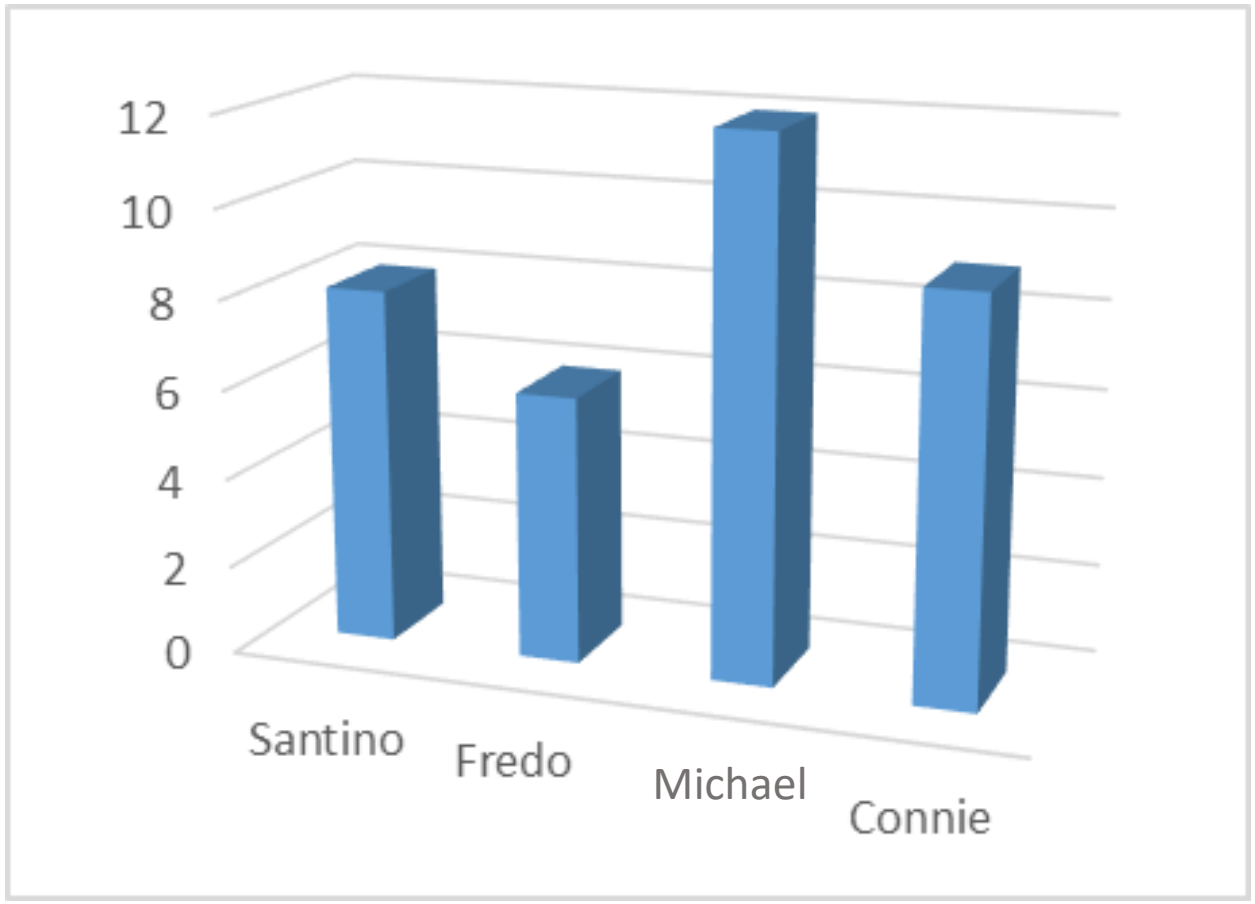
Star Trek II: The Wrath of Khan

https://www.youtube.com/watch?v=RbTUTNenvCY

Audience Participation Time!

What is the value for Santino?

What is the value for Santino?



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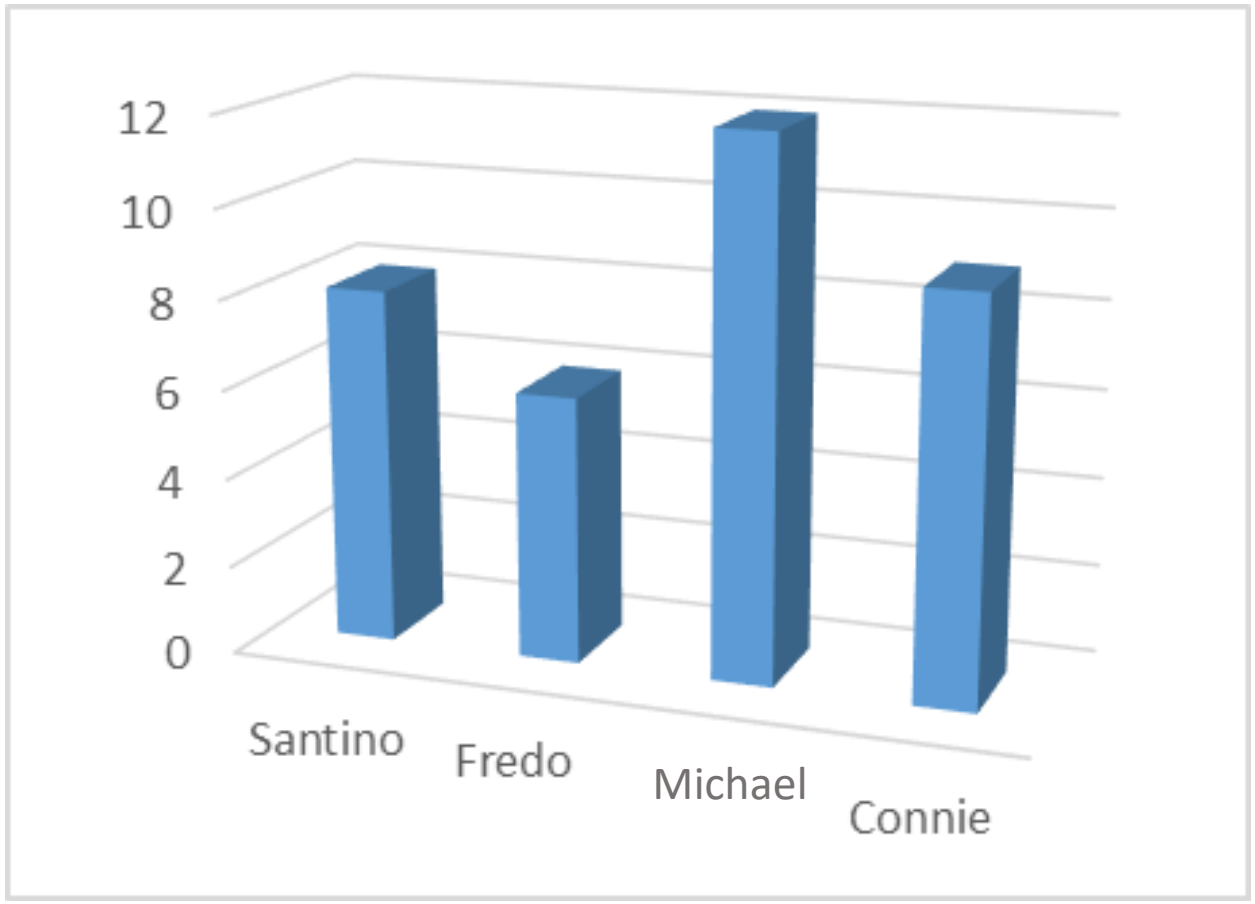

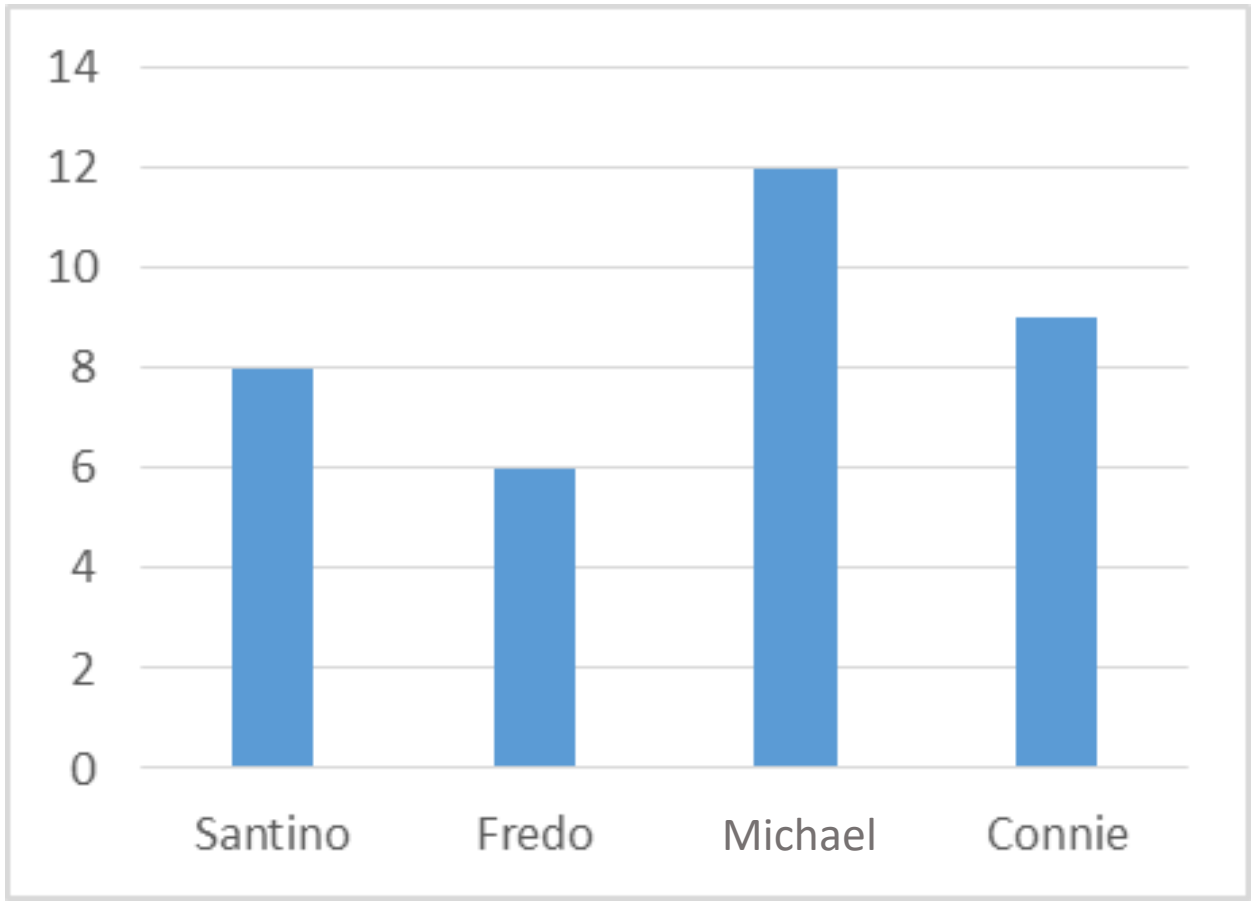

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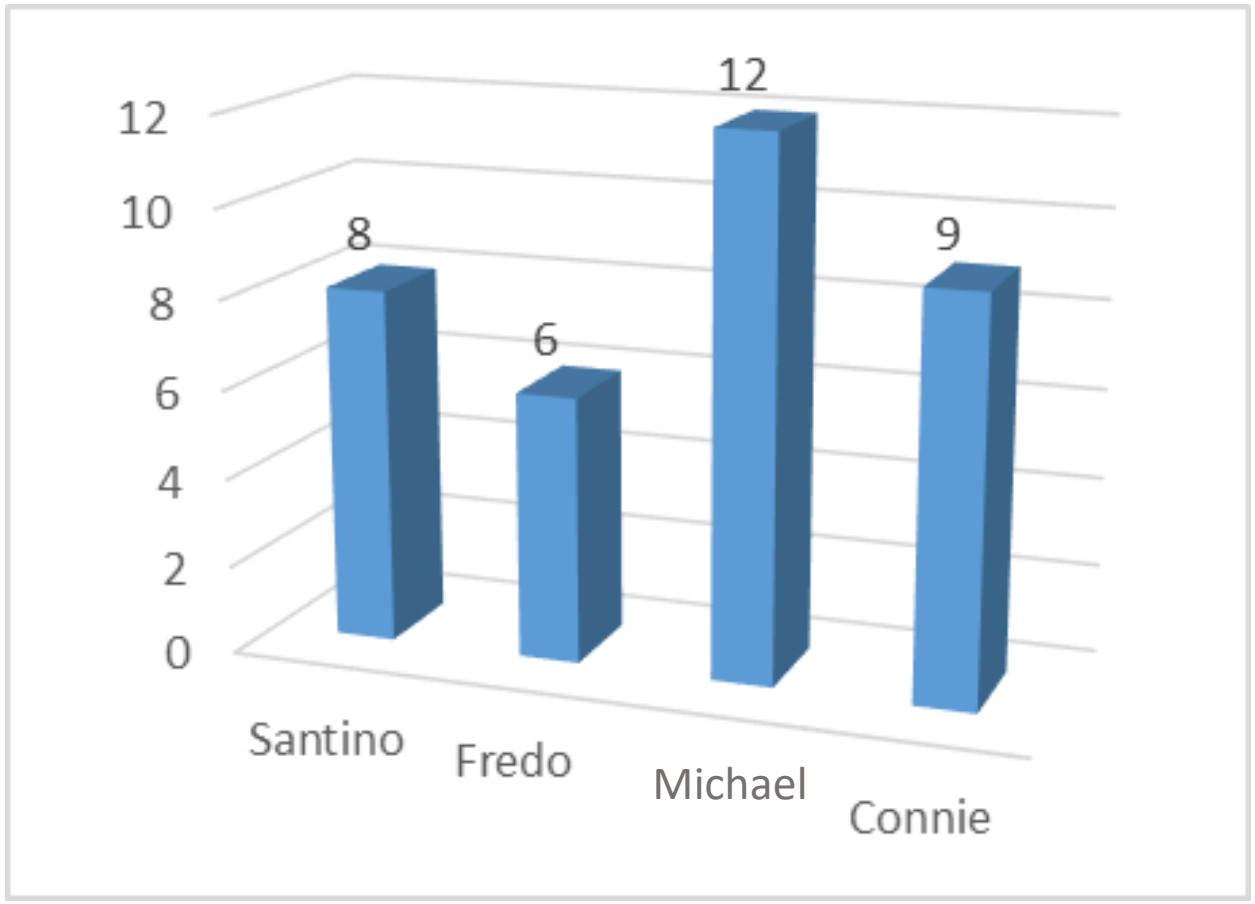
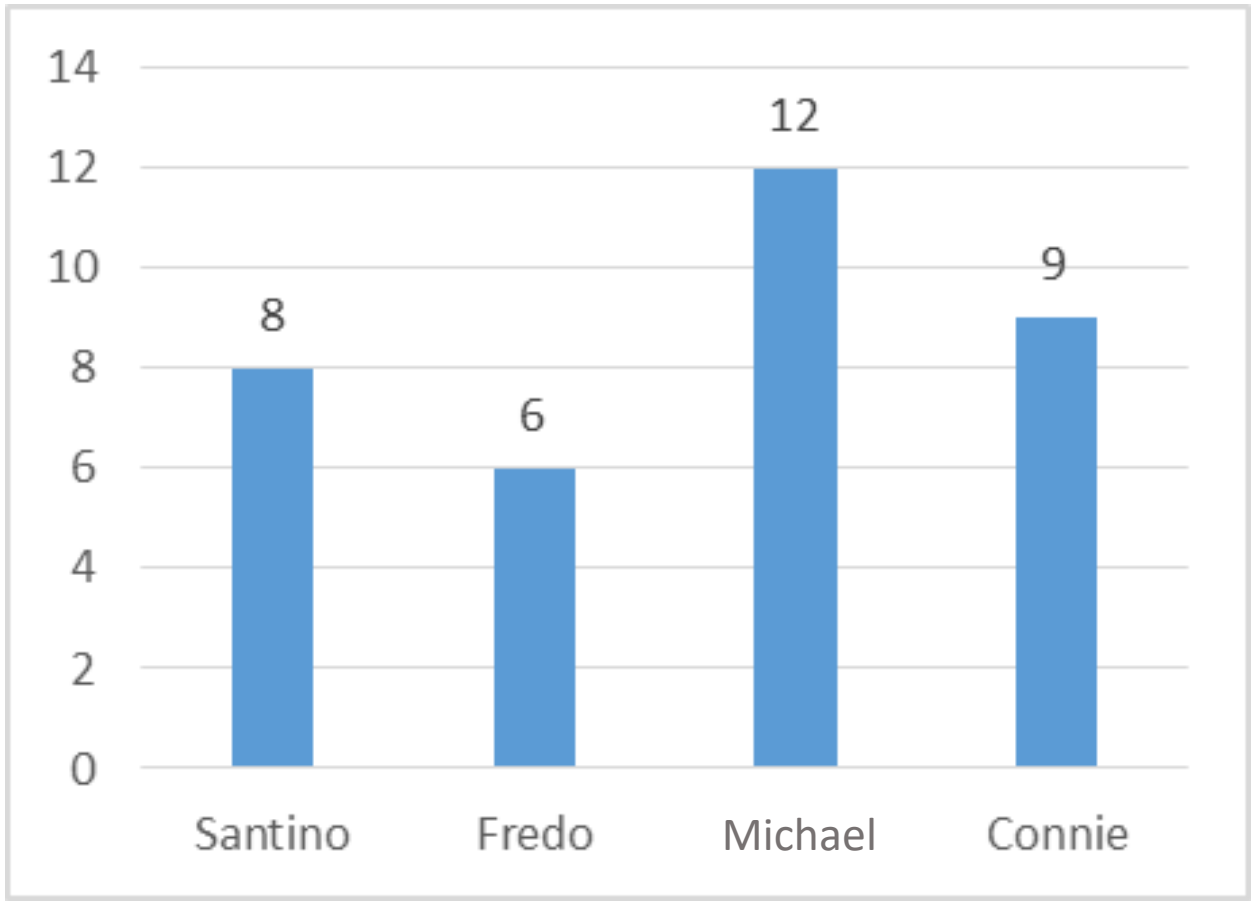




3-Dimensional Thinking

Our perception of Depth is weak

Source: Stephen Few, *Show Me the Numbers*

3-D charts and graphs are GREAT, right?

3-Dimensional??

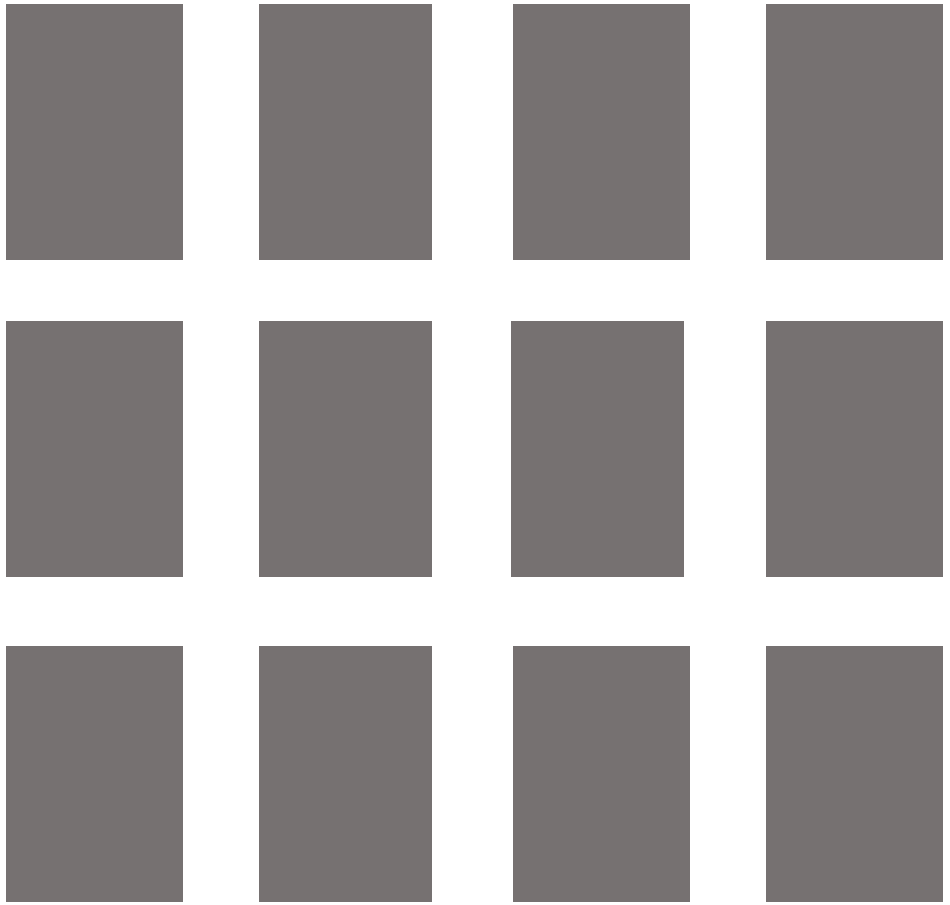
Star Wars: The Empire Strikes Back

https://www.youtube.com/watch?v=FSWiMoO8zNE

Preattentive Attributes

Motion

Flicker



Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes

Source: Stephen Few, *Show Me the Numbers*

Preattentive Attributes: Who Cares?

The Breakfast Club

https://www.youtube.com/watch?v=6sxdm5ktwqk

Preattentive Attributes: Who Cares?

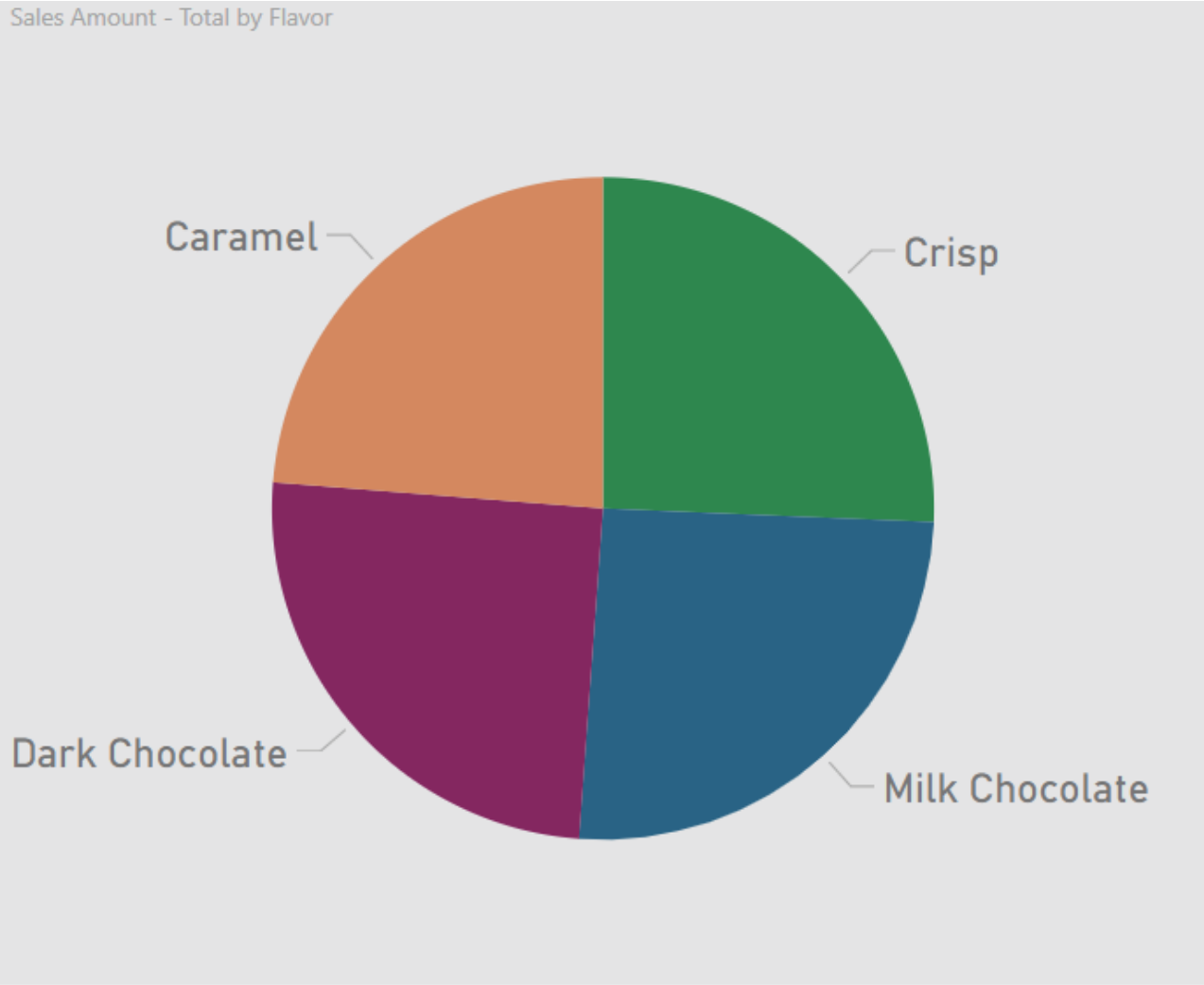
*"Understanding these attributes enables us to design tables and graphs that **visually emphasize the most important information** they contain."*

~ Stephen Few, Show Me the Numbers

Audience Participation Time!

Which flavor had the highest sales?

Which flavor had the highest sales?



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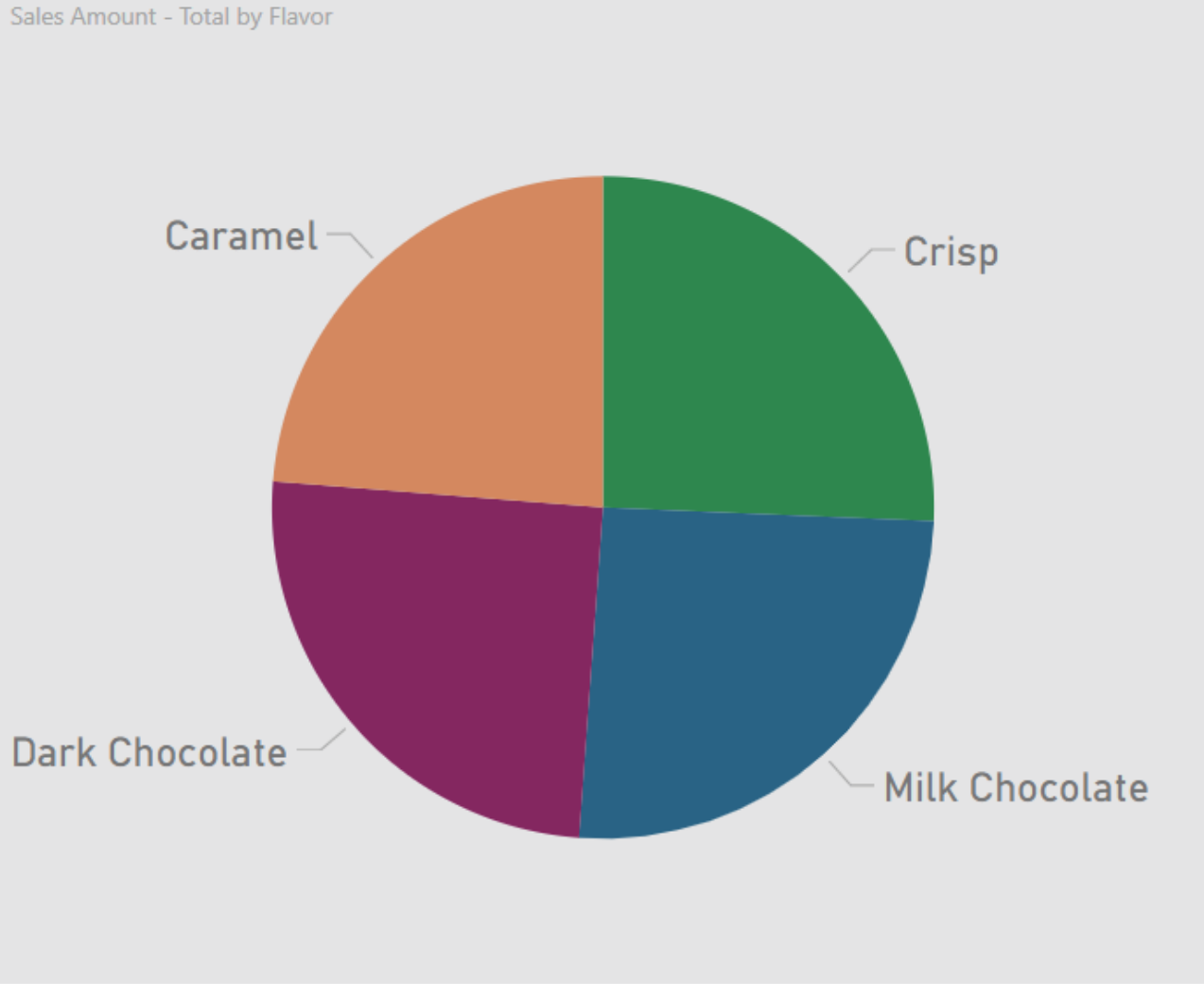
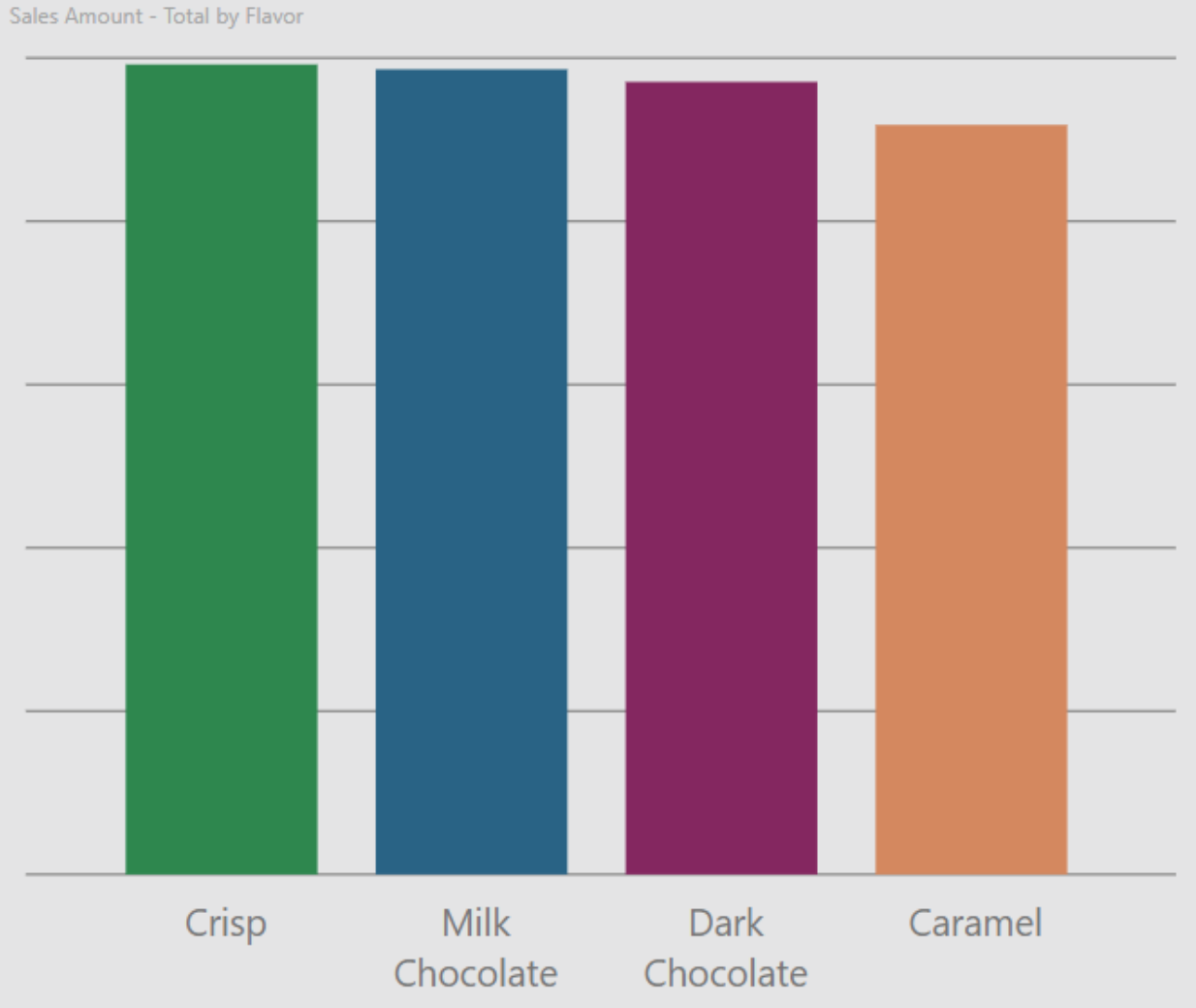
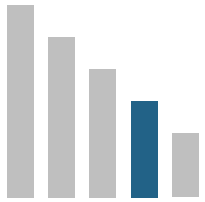




Attribute Encoding



Attribute Encoding

Attribute Encoding

Quantitative

Categorical

Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Quantitative

Values across a continuum

Not just difference, but degree of difference

Categorical

Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Quantitative	Categorical
Values across a continuum	Difference alone
Not just difference, but degree of difference	

Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Form

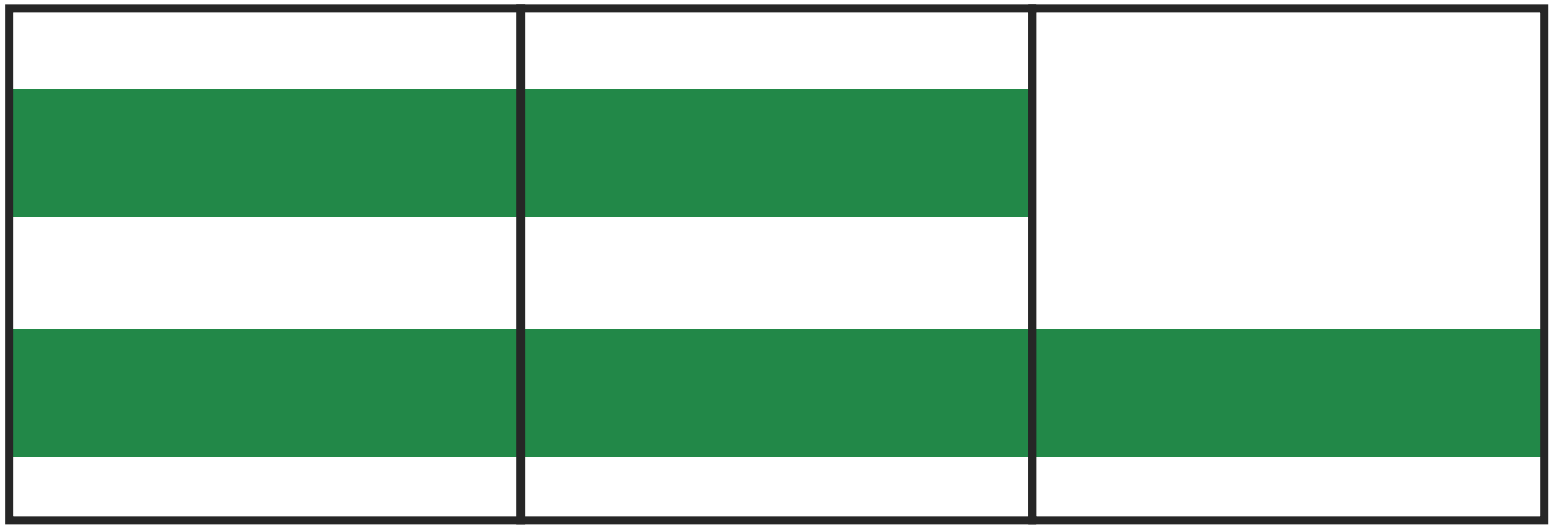
Length

Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Form

Length



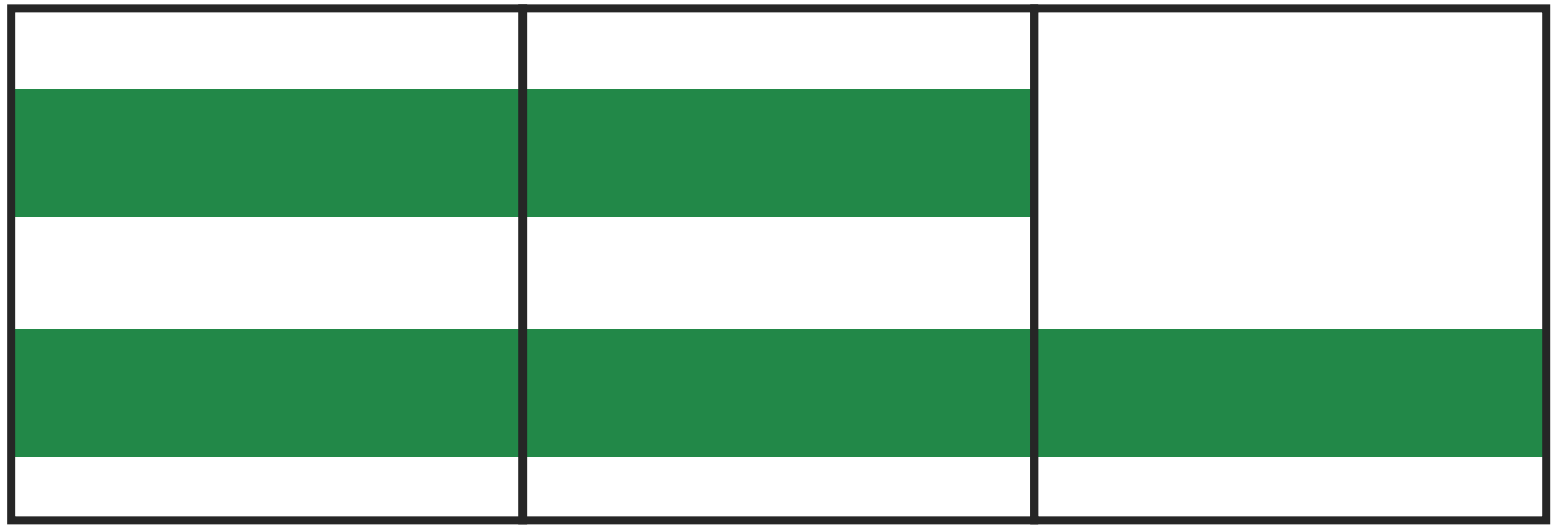
Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Form

Length

Quantitative

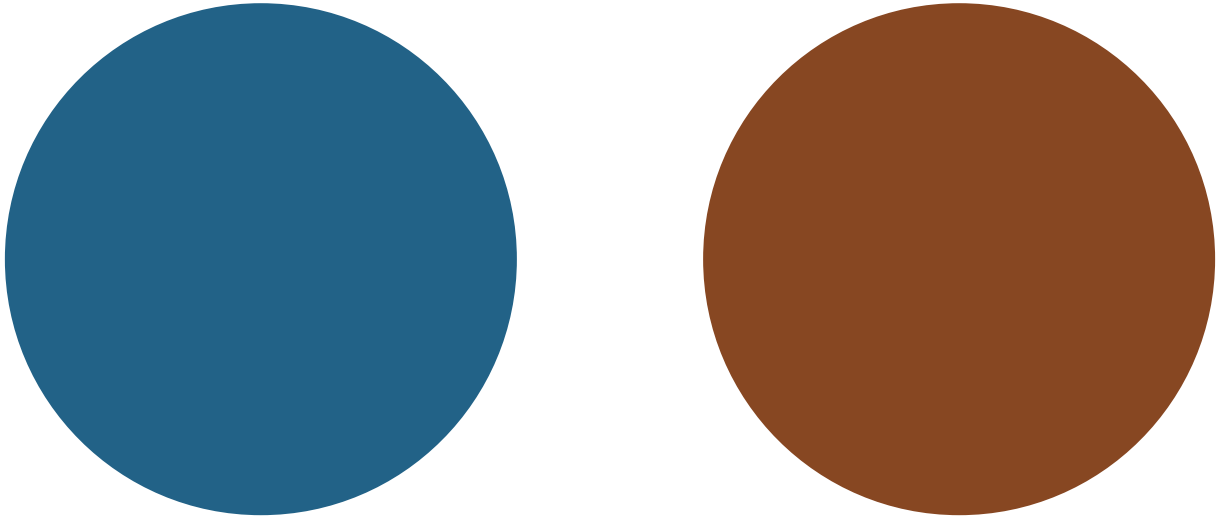


Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Color

Hue



Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

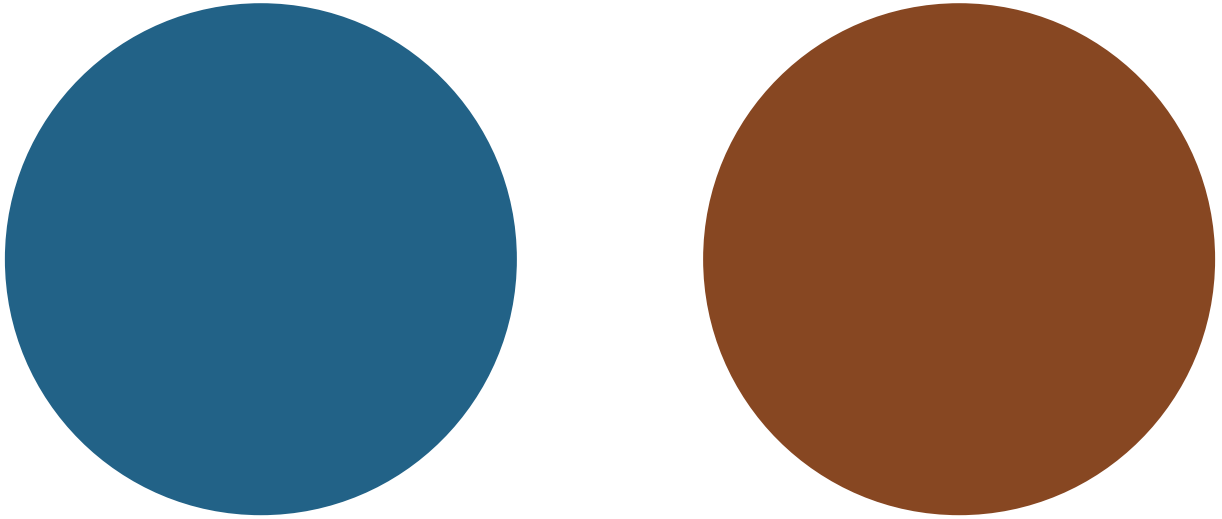
Kung Fu Panda

https://www.youtube.com/watch?v=lp2blBW5yWw

Attribute Encoding

Color

Hue



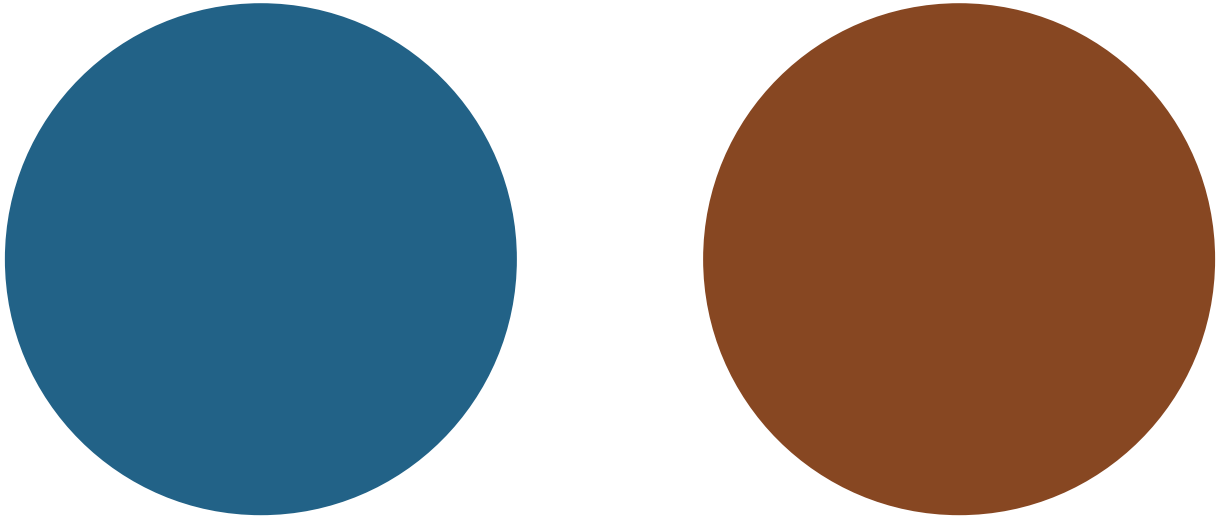
Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Color

Hue

Categorical



Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Category	Attribute	Quantitatively Perceived
Form	Length	
	Width	
	Orientation	
	Shape	
	Size	
	Enclosure	
Color	Hue	
	Intensity	
Spatial Position	2-D Position	

Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Category	Attribute	Quantitatively Perceived
Form	Length	
	Width	
	~~Orientation~~	No
	~~Shape~~	No
	Size	
	~~Enclosure~~	No
Color	~~Hue~~	No
	Intensity	
Spatial Position	2-D Position	

Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Category	Attribute	Quantitatively Perceived
Form	Length	
	Width	Yes, but limited
	~~Orientation~~	No
	~~Shape~~	No
	Size	Yes, but limited
	~~Enclosure~~	No
Color	~~Hue~~	No
	Intensity	Yes, but limited
Spatial Position	2-D Position	

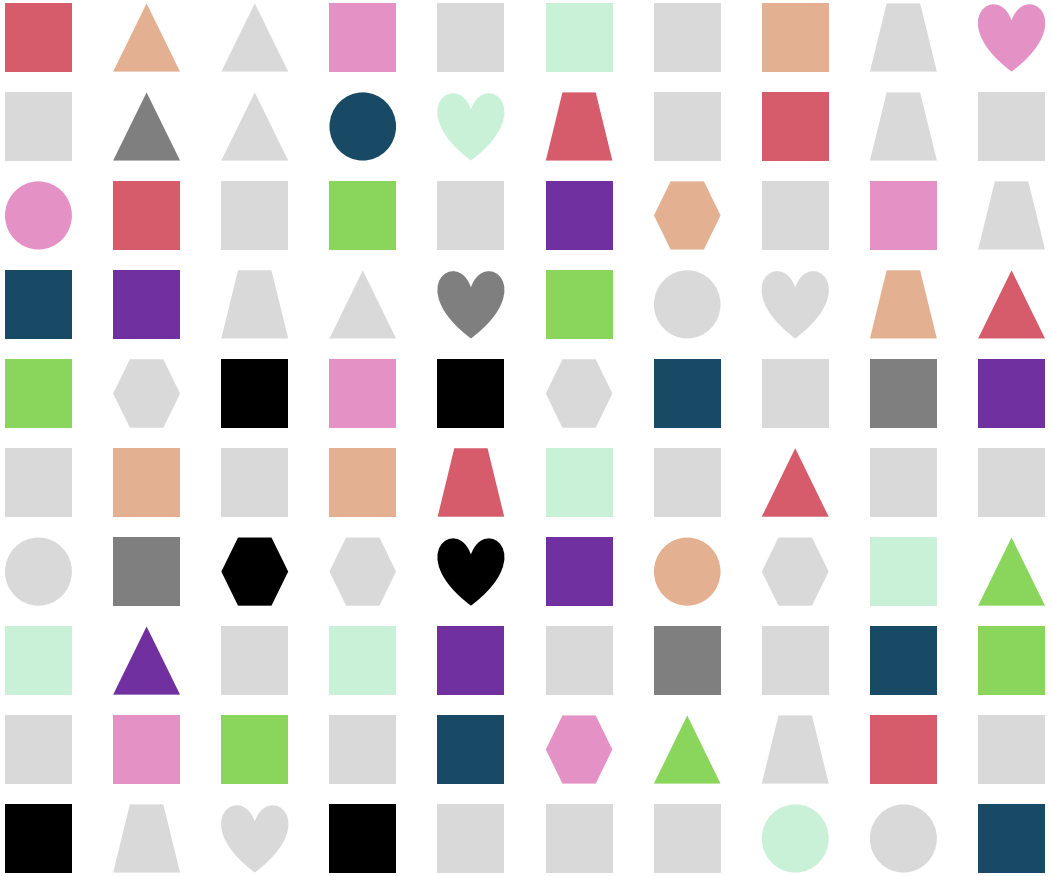
Source: Stephen Few, *Show Me the Numbers*

Attribute Encoding

Category	Attribute	Quantitatively Perceived
Form	Length	Yes
	Width	Yes, but limited
	~~Orientation~~	No
	~~Shape~~	No
	Size	Yes, but limited
	~~Enclosure~~	No
Color	~~Hue~~	No
	Intensity	Yes, but limited
Spatial Position	2-D Position	Yes

Source: Stephen Few, *Show Me the Numbers*

Too Much Variety



Too Much Variety

Return of the Jedi

https://www.youtube.com/watch?v=HWUQzbYUqGA

Attribute Encoding

Category	Attribute	Quantitatively Perceived	Max Variations
Form	Length	Yes	4
	Width	Yes, but limited	4
	~~Orientation~~	No	4
	~~Shape~~	No	4
	Size	Yes, but limited	4
	~~Enclosure~~	No	4
Color	~~Hue~~	No	8
	Intensity	Yes, but limited	4
Spatial Position	2-D Position	Yes	4

Source: Stephen Few, *Show Me the Numbers*

VIDEO

Everybody’s Special

Everybody's Special

The Incredibles

https://www.youtube.com/watch?v=1E9pKU_N15A

Everybody's Special

Option 1

Everybody's Special

Option 1

Option 2

Everybody's Special

Option 1

Option 2

VIDEO

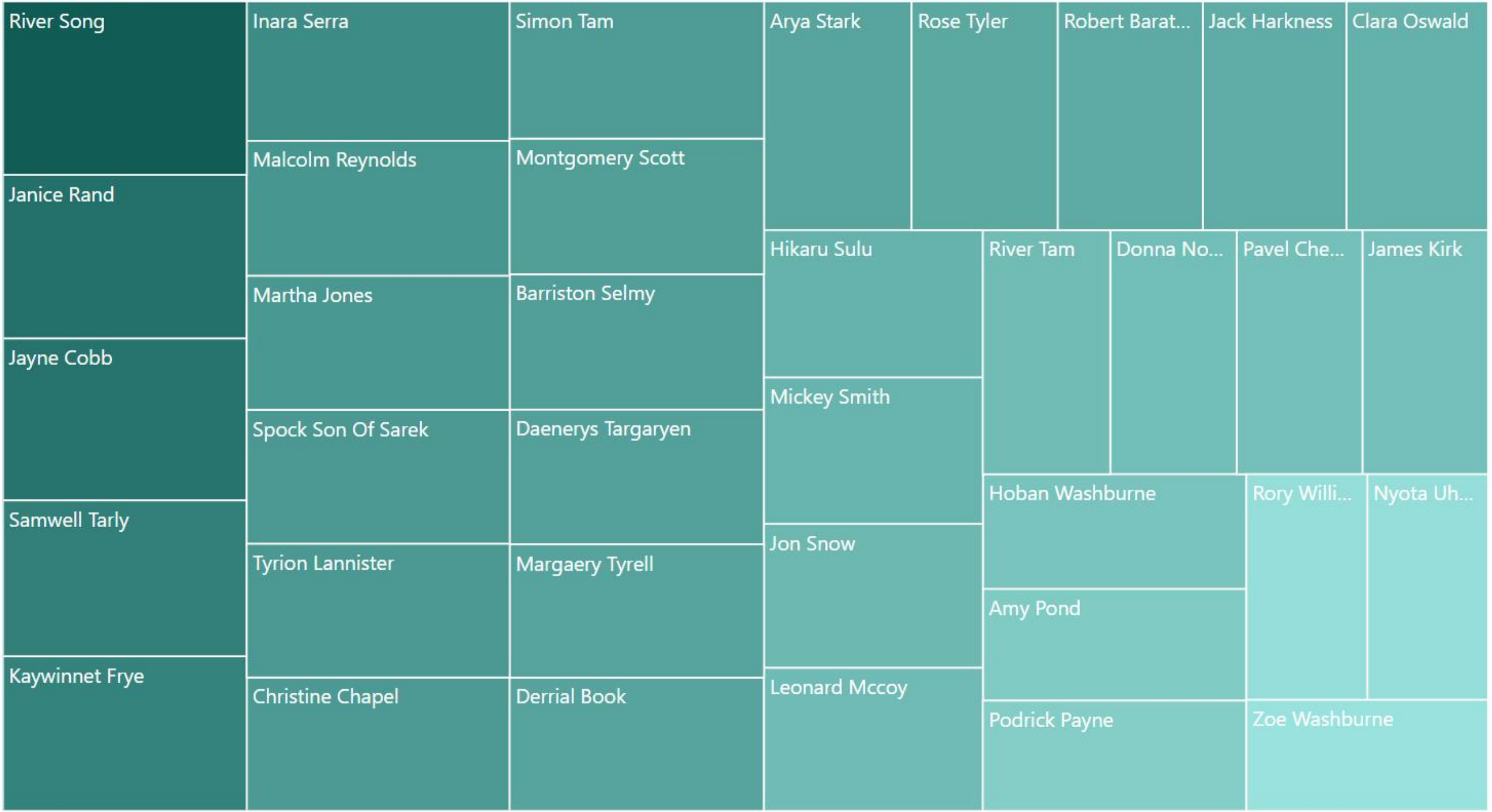
A World of Color

A World of Color

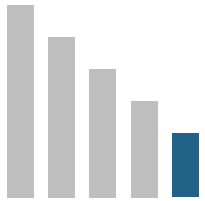
The Wizard of Oz

https://www.youtube.com/watch?v=8lik-qTakrs

Sales Amount - Total by Student Name First Last



Gestalt Principles



Gestalt Principles

Proximity

Similarity

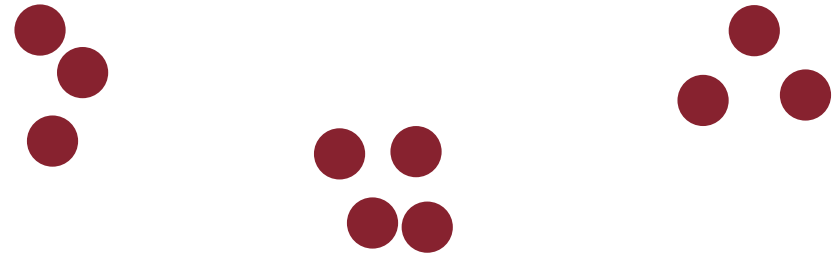
Enclosure

Closure

Continuity

Connection

Principle



Source: Stephen Few, *Show Me the Numbers*

Gestalt Principles

Proximity

Similarity

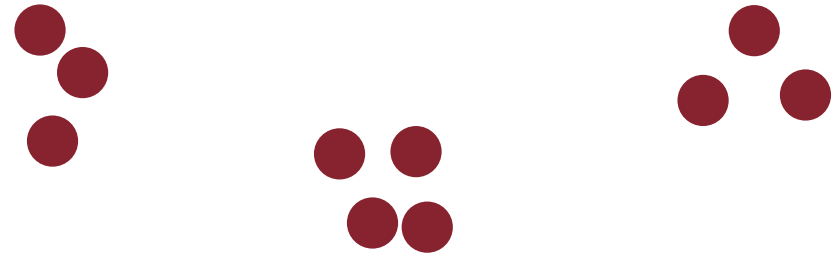
Enclosure

Closure

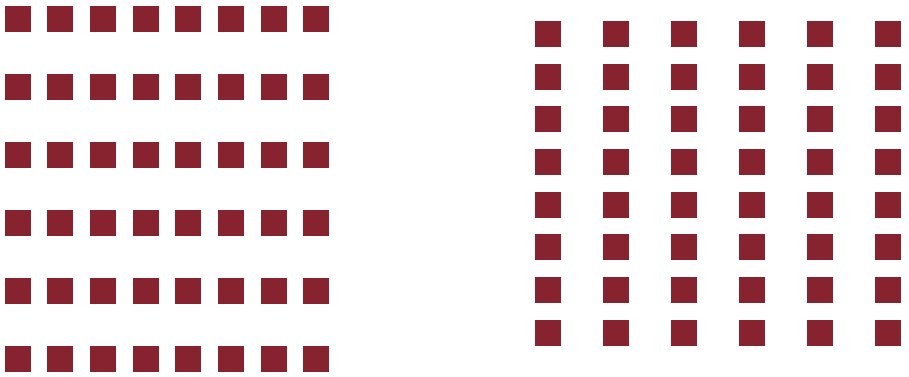
Continuity

Connection

Principle



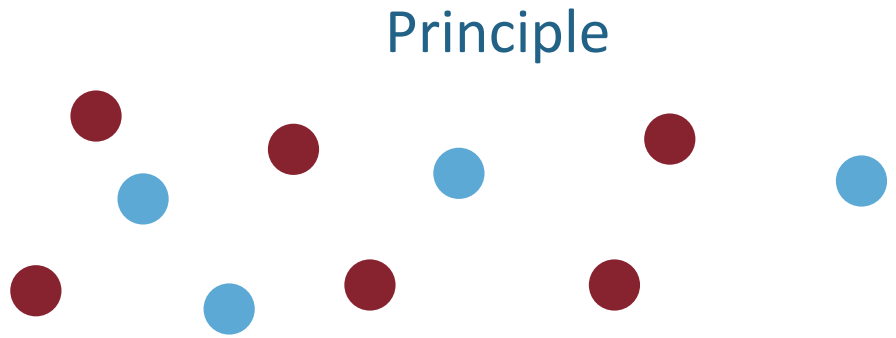
Application



Source: Stephen Few, *Show Me the Numbers*

Gestalt Principles

- Proximity
- **Similarity**
- Enclosure
- Closure
- Continuity
- Connection

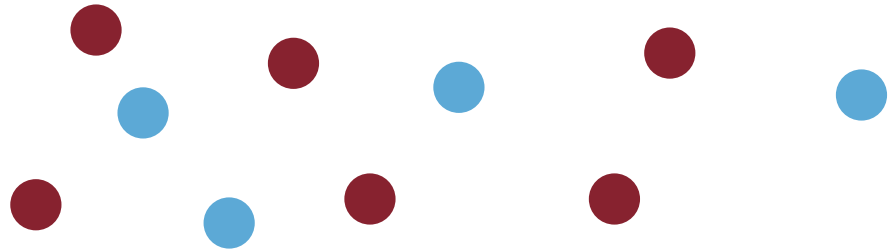


Source: Stephen Few, *Show Me the Numbers*

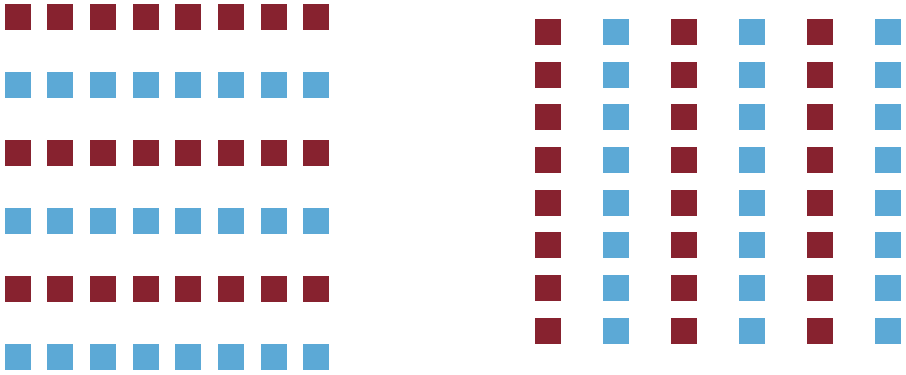
Gestalt Principles

- Proximity
- **Similarity**
- Enclosure
- Closure
- Continuity
- Connection

Principle



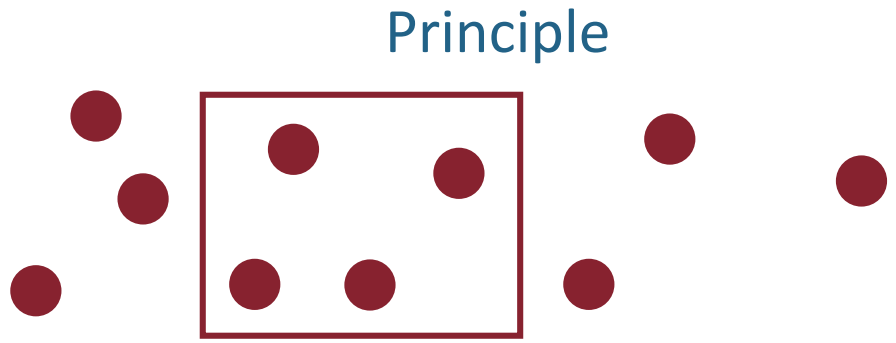
Application



Source: Stephen Few, *Show Me the Numbers*

Gestalt Principles

- Proximity
- Similarity
- **Enclosure**
- Closure
- Continuity
- Connection

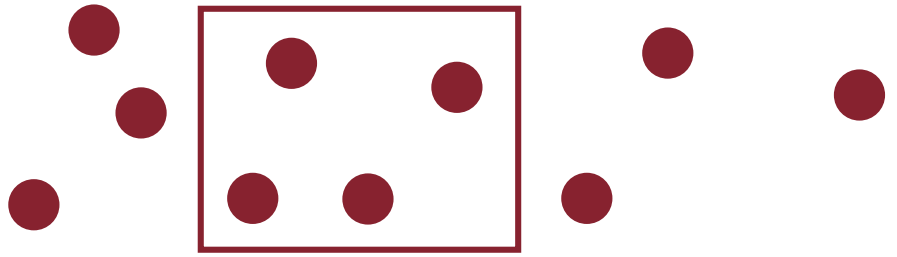


Source: Stephen Few, *Show Me the Numbers*

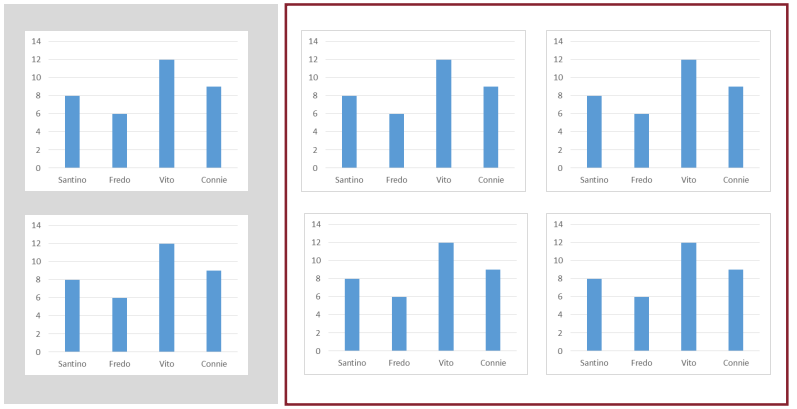
Gestalt Principles

- Proximity
- Similarity
- **Enclosure**
- Closure
- Continuity
- Connection

Principle



Application



Source: Stephen Few, *Show Me the Numbers*

Gestalt Principles

- Proximity
- Similarity
- Enclosure
- **Closure**
- Continuity
- Connection

Principle

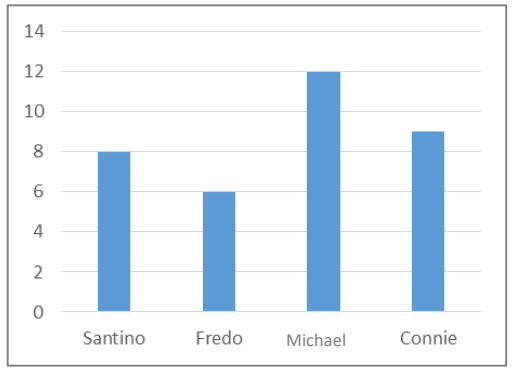
Source: Stephen Few, *Show Me the Numbers*

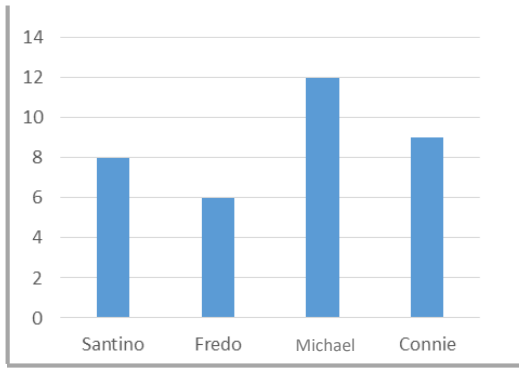
Gestalt Principles

- Proximity
- Similarity
- Enclosure
- **Closure**
- Continuity
- Connection

Principle

Application





Source: Stephen Few, *Show Me the Numbers*

Gestalt Principles

- Proximity
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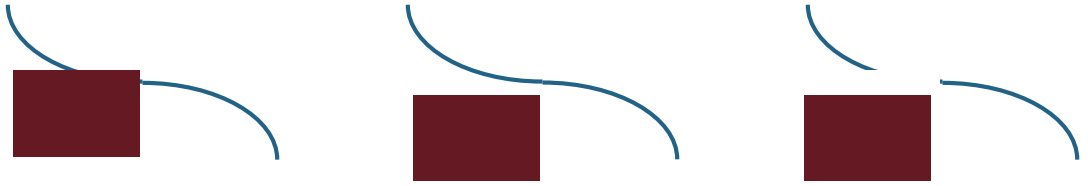
- Enclosure
- Closure
- **Continuity**
- Connection

Principle



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Gestalt Principles

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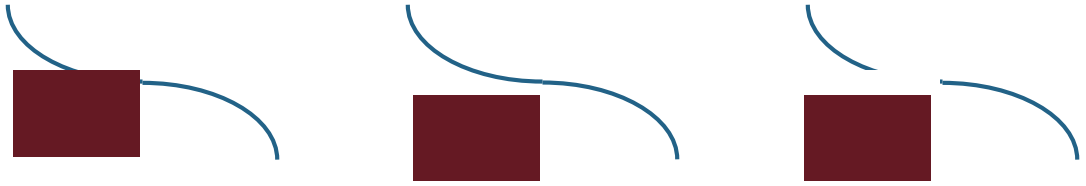
Principle



Application

Fruit	Color	Sales
Apple	Red	4
	Green	6
	Yellow	2
Grape	Red	6
	Green	8
	Black	3

Source: Stephen Few, *Show Me the Numbers*

Gestalt Principles

- Proximity
- Similarity
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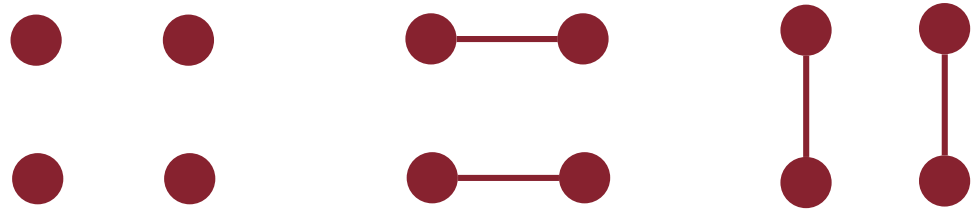
- Continuity
- **Connection**

Principle



Source: Stephen Few, *Show Me the Numbers*

Gestalt Principles

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- Similarity
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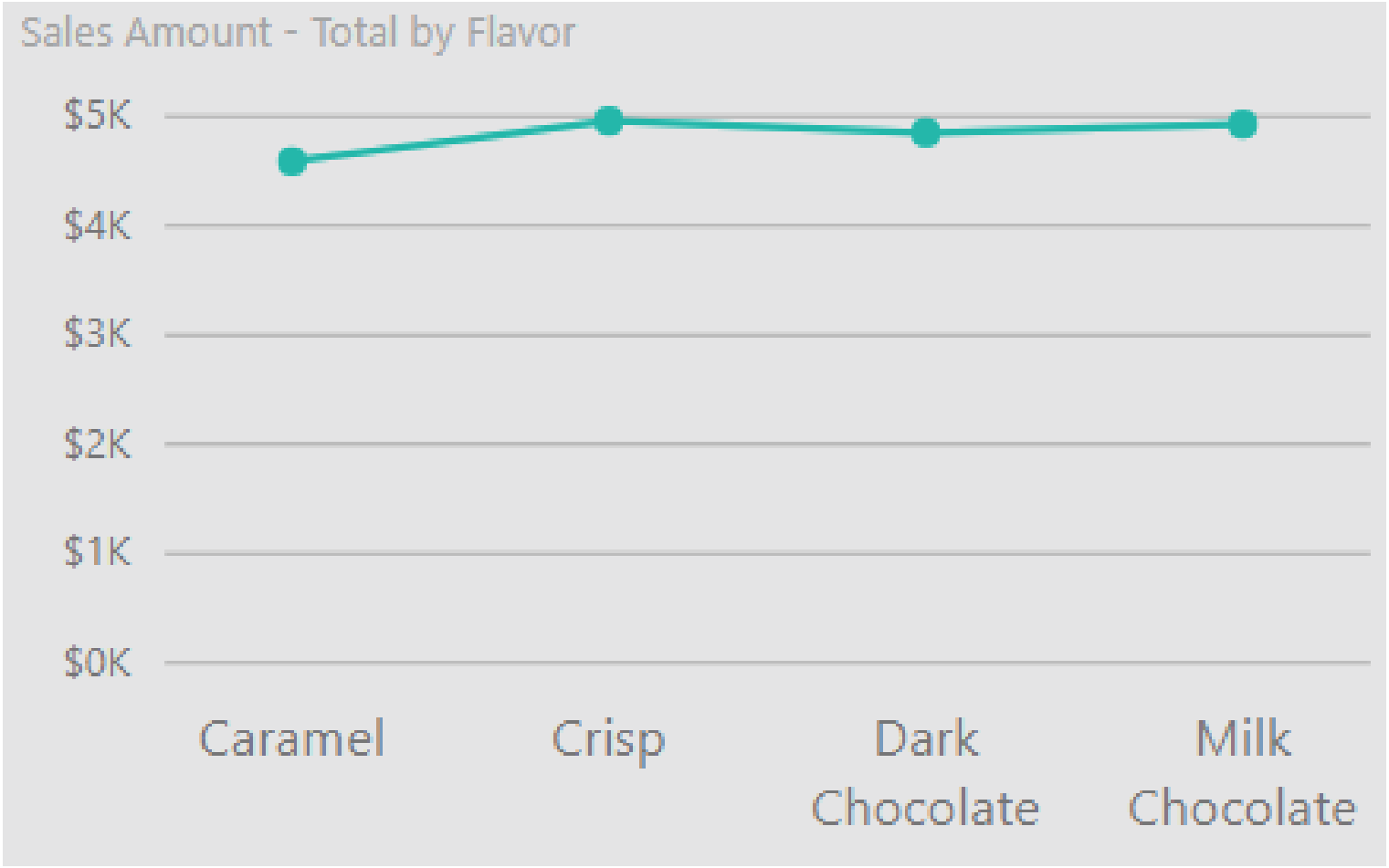
- **Connection**

Application



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Gestalt Principles

- Proximity
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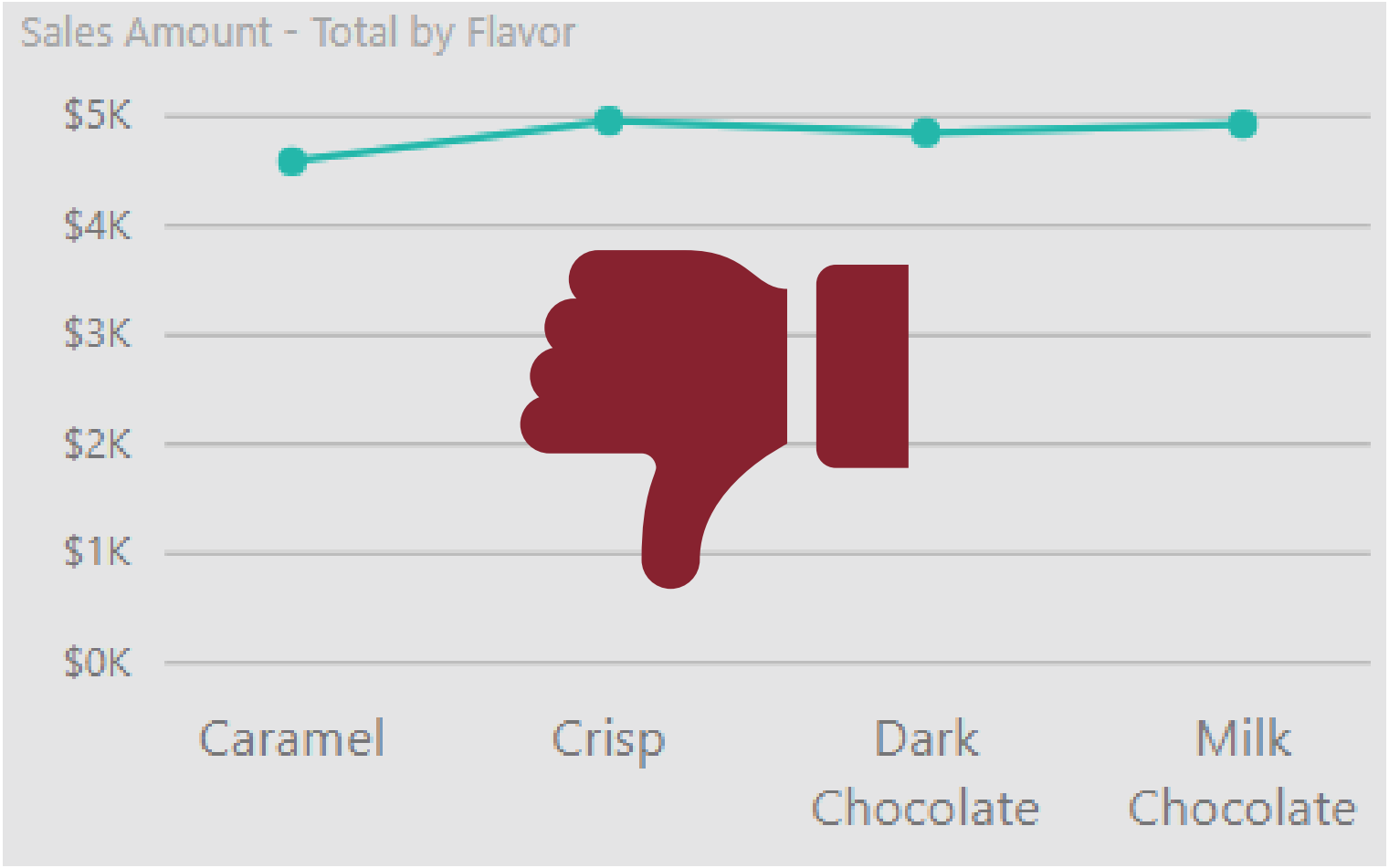
- **Connection**

Application



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Gestalt Principles

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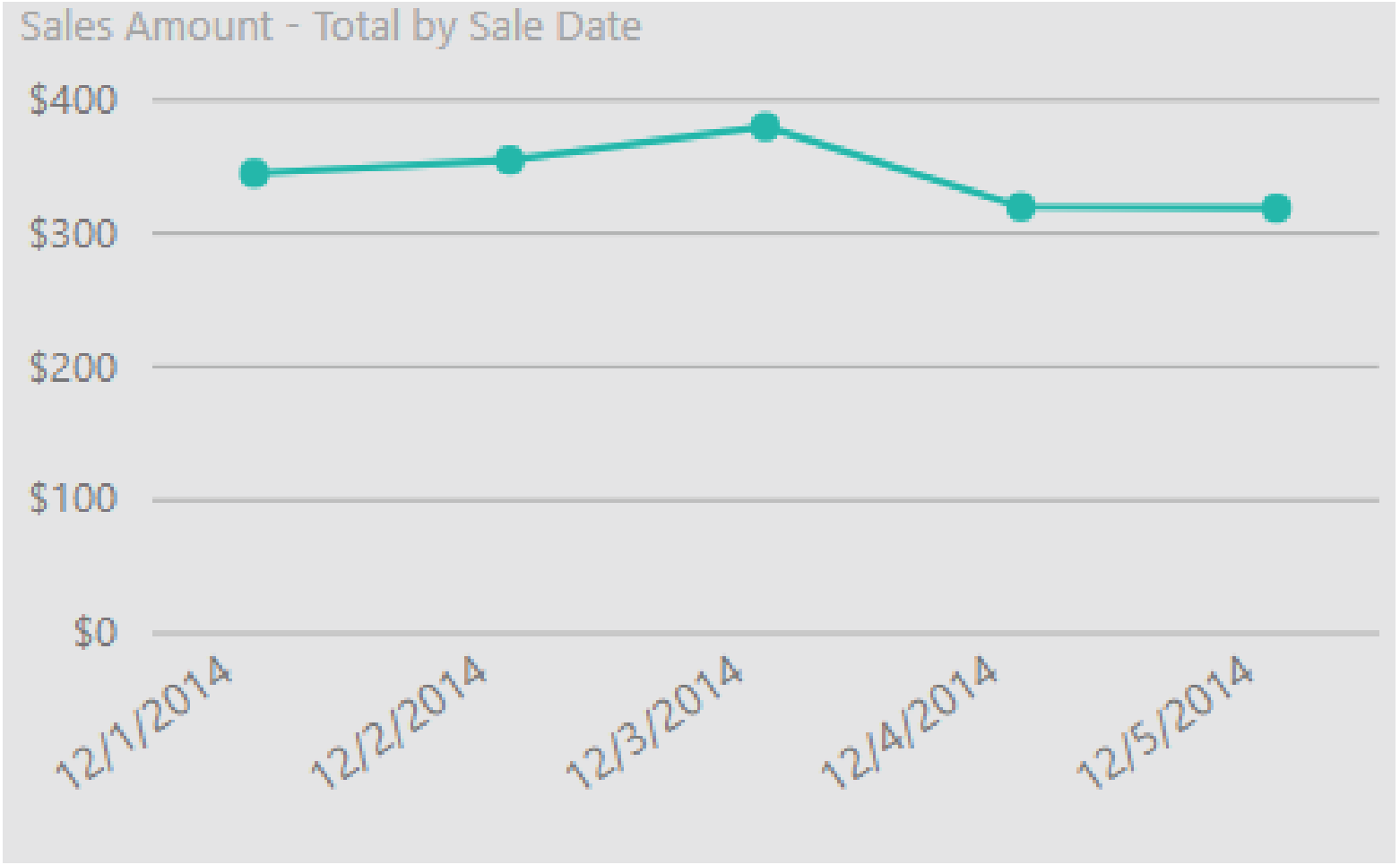
- **Connection**

Application



Source: Stephen Few, *Show Me the Numbers*

VIDEO

The Power of Proximity

The Power of Proximity

Jaws

https://www.youtube.com/watch?v=CwdGYMM2bHM

Audience Participation Time!

Which square is the lightest?

Source: Stephen Few, *Show Me the Numbers*

Which square is the lightest?

Source: Stephen Few, *Show Me the Numbers*

Which square is the lightest?

Return of the Jedi

https://www.youtube.com/watch?v=4F4qzPbcFiA

Which square is the lightest?

Source: Stephen Few, *Show Me the Numbers*

Which square is the lightest?

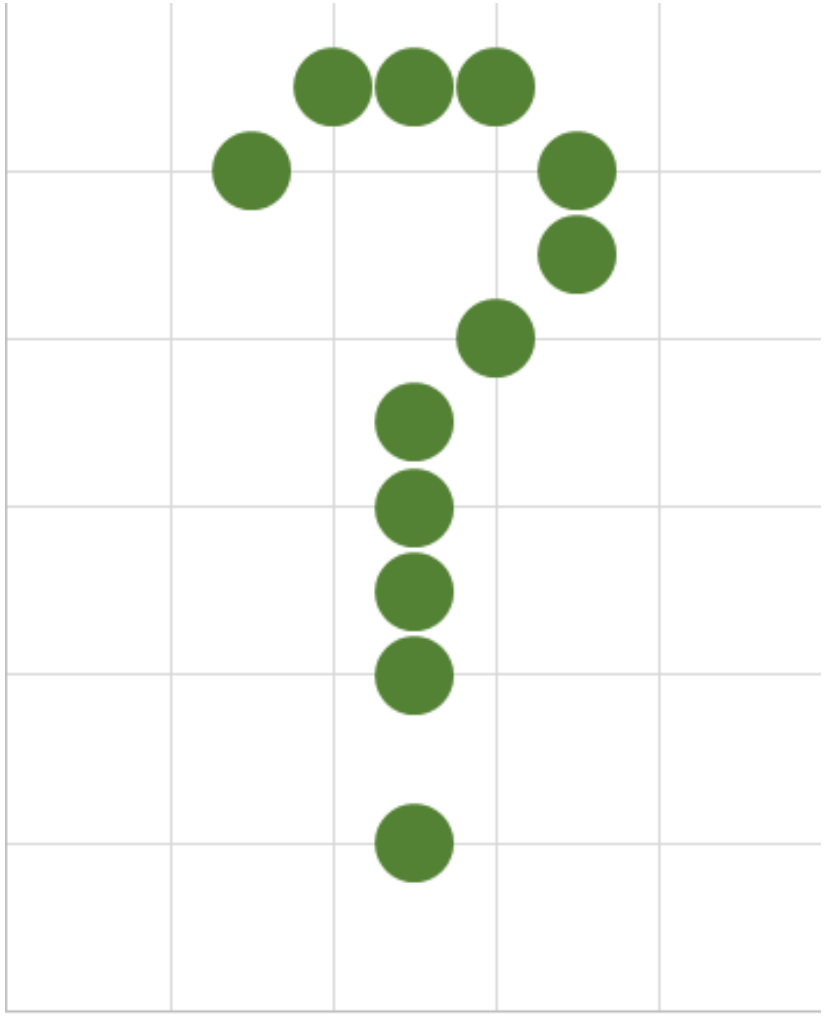
They are identical.

Source: Stephen Few, *Show Me the Numbers*

“It is not how much information there is, but rather how effectively it is arranged.”

~ Edward Tufte

Questions?



Mark Vaillancourt

Blog: markvsql.com

Twitter: @markvsql

Trish Vaillancourt

Twitter: @trishzv

Slide Deck Download:

https://github.com/markvsql/LibTech2018