



Visual Analytics

KJ Kim
Product Consultant



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RESEARCH MANAGER
MAUREEN STONE



SENIOR RESEARCH SCIENTIST
VIDYA SETLUR



SENIOR RESEARCH SCIENTIST
MELANIE TORY



SENIOR RESEARCH SCIENTIST
ROBERT KOSARA



SENIOR RESEARCH SCIENTIST
HEIDI LAM

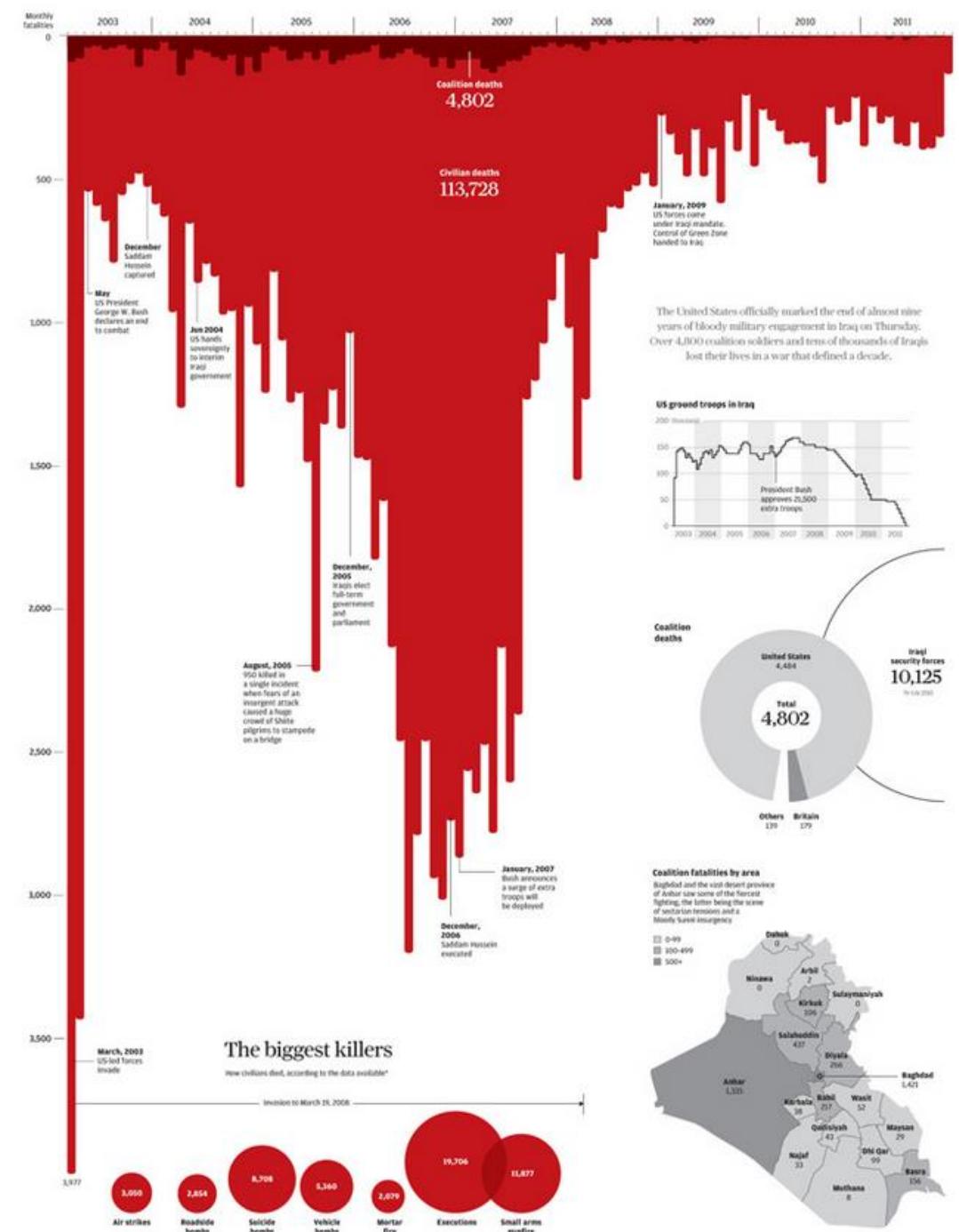


SENIOR RESEARCH SCIENTIST
SARAH BATTERSBY

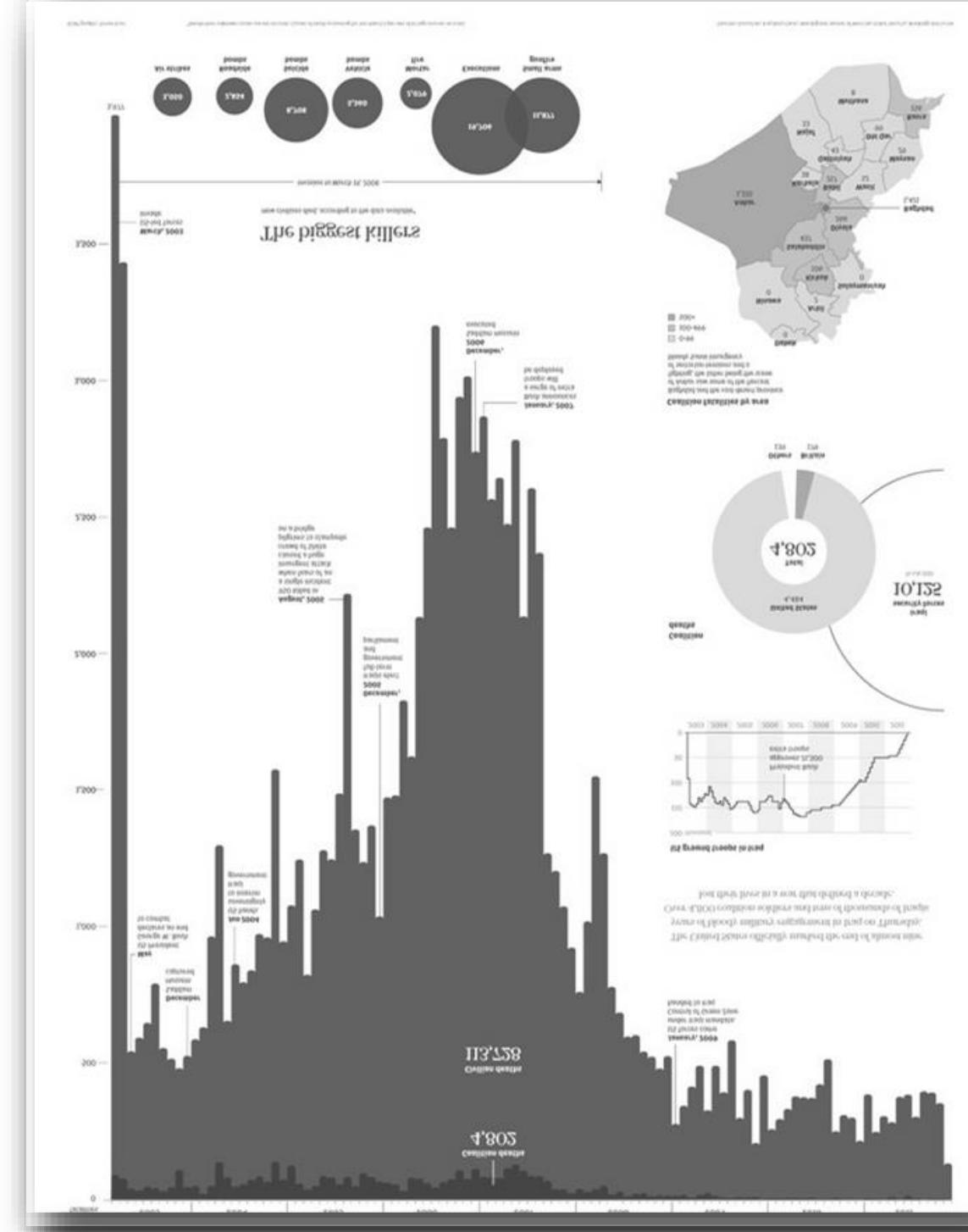
1. Human Visual Perception
2. Visual Best Practice
3. Visual Analysis
4. Guided Analytics
5. Good Dashboard Design



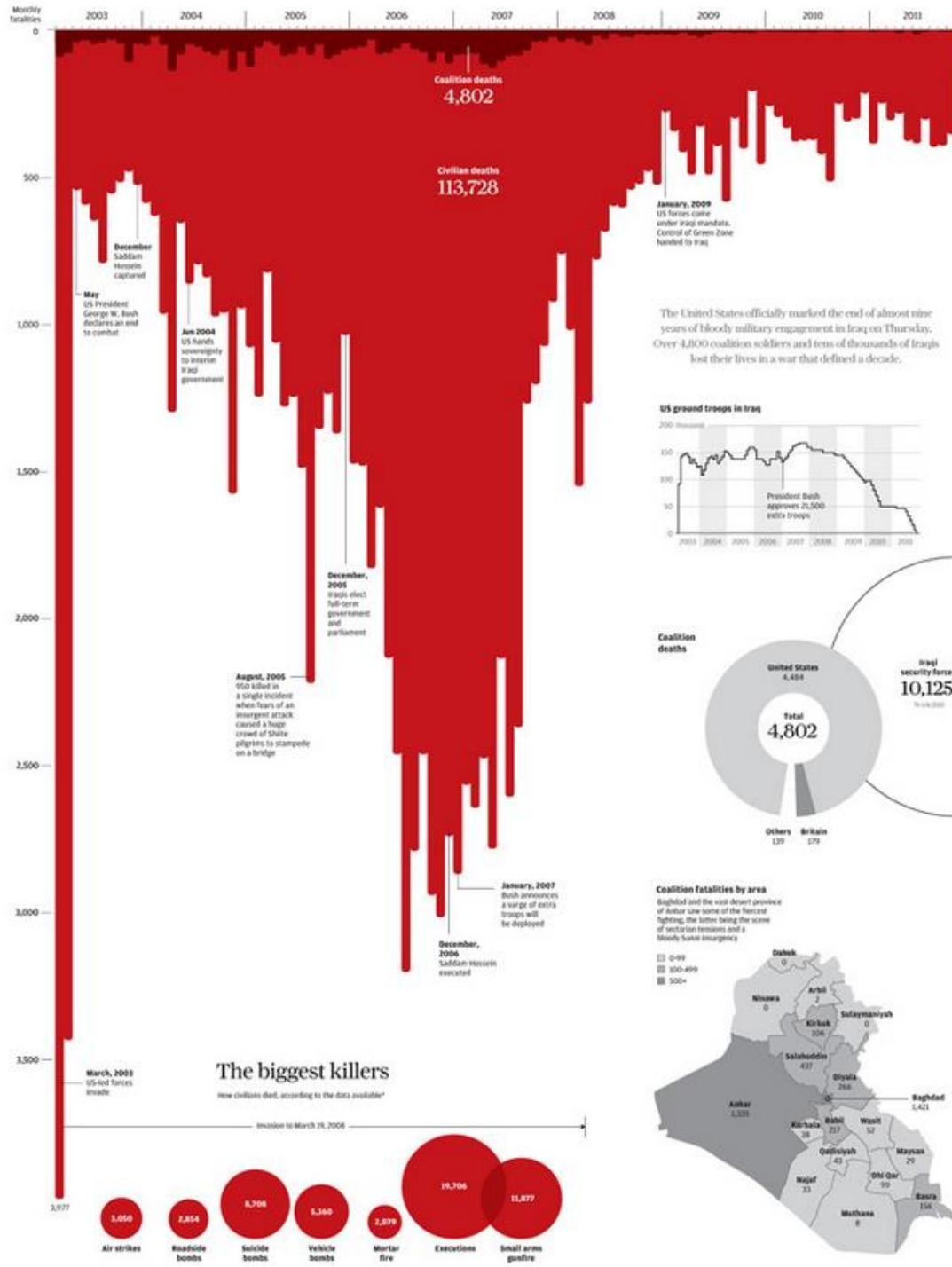
Iraq's bloody toll



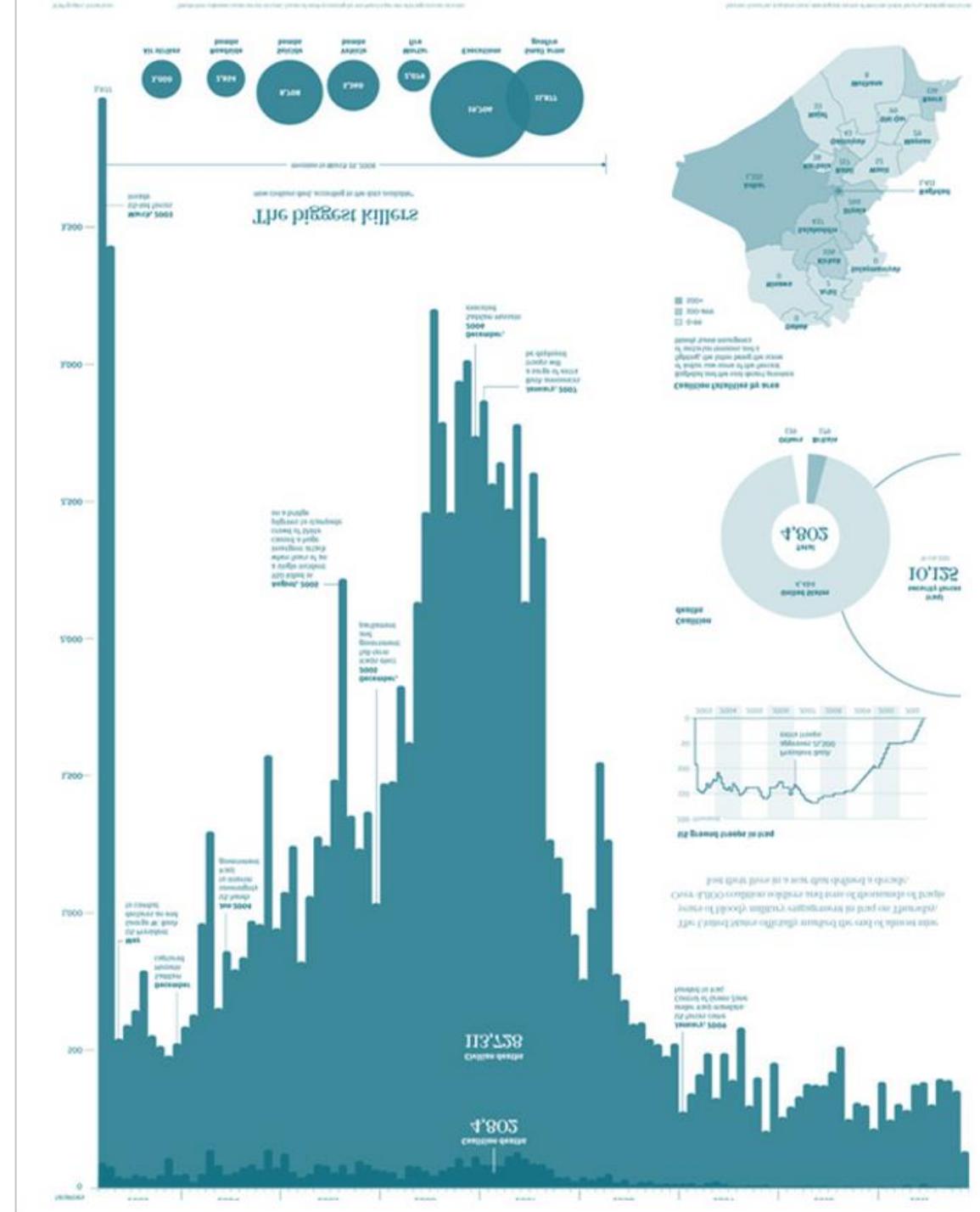
Iraq: Deaths on the decline



Iraq's bloody toll



Iraq: Deaths on the decline



1. Human Visual Perception

2. Visual Best Practice

3. Visual Analysis

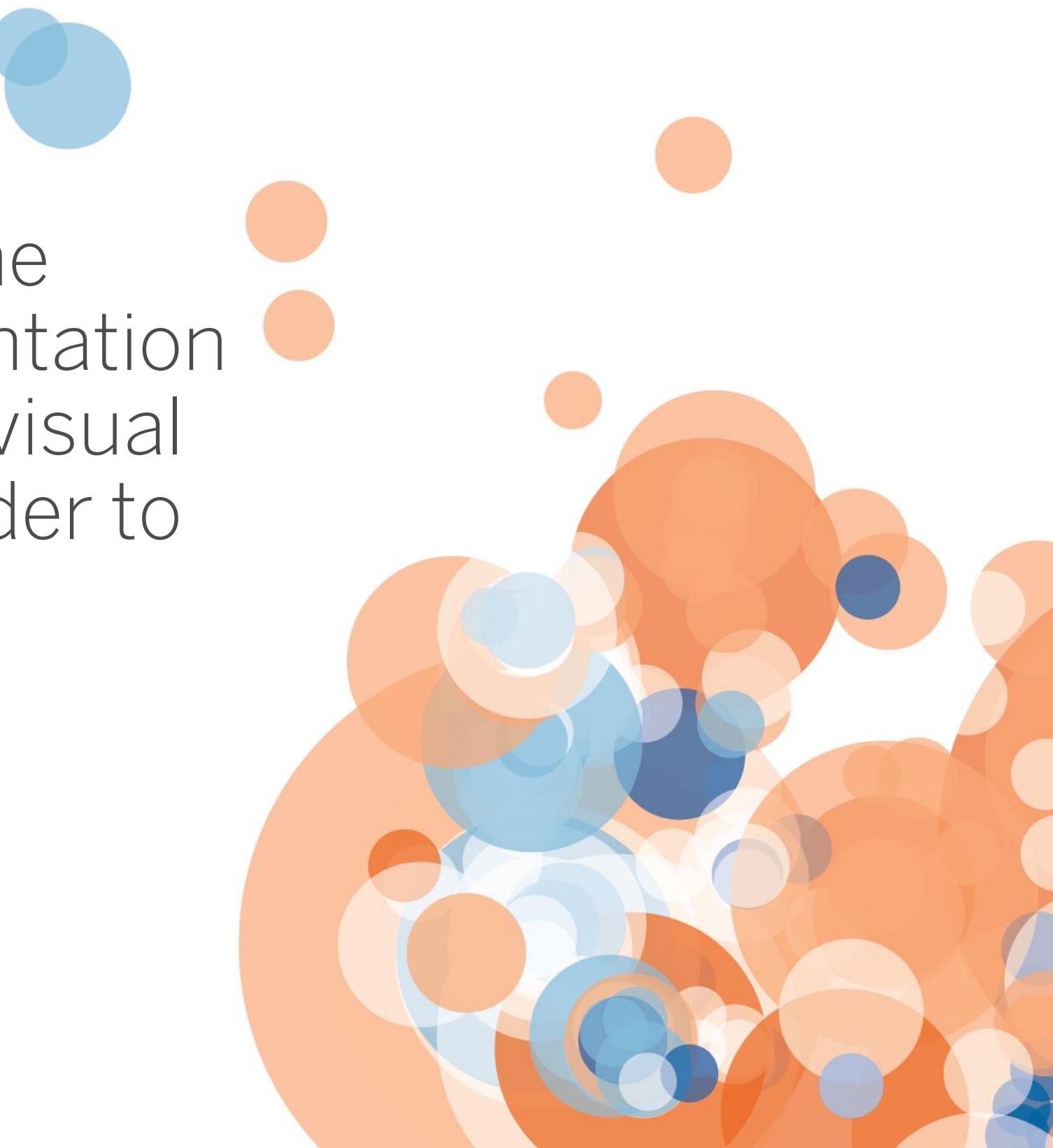
4. Good Dashboard Design

5. Guided Analytics



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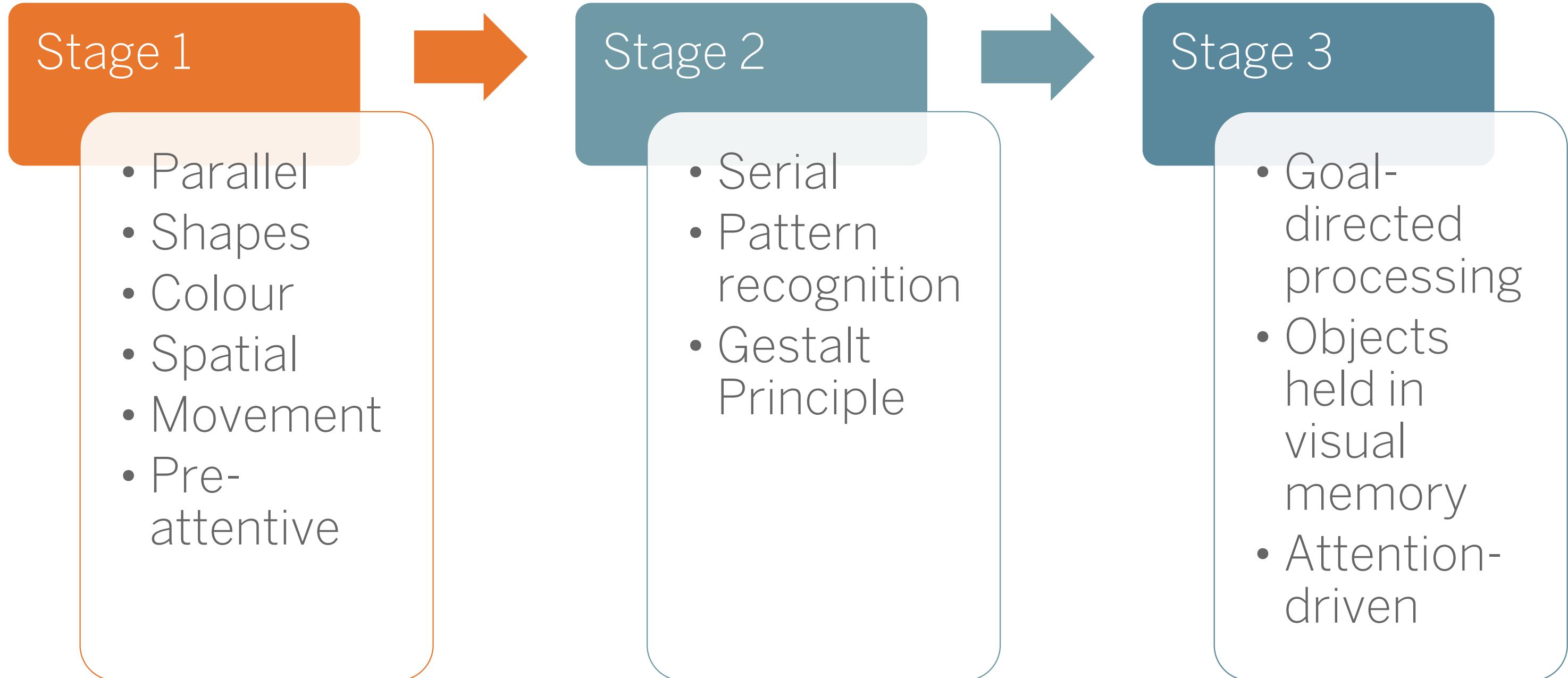
“Visual analytics is the representation and presentation of data that exploits our visual perception abilities in order to amplify cognition.”

Andy Kirk

Author

“Data Visualization: a successful design process”

Perception Process



What is Pre-attentive Processing?

- Occurs before consciousness
- Pops out

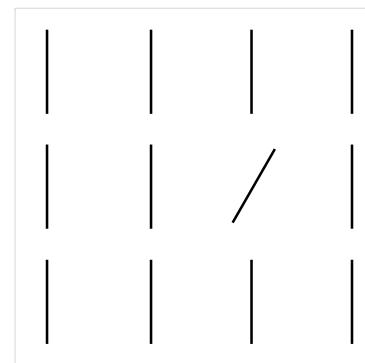
078

Change Blindness

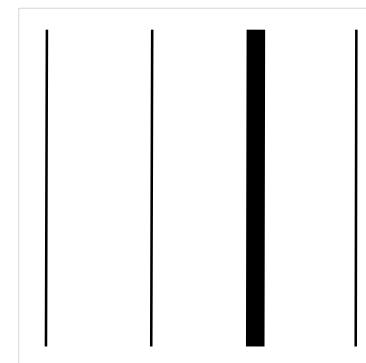


Pre-attentive visual attribute

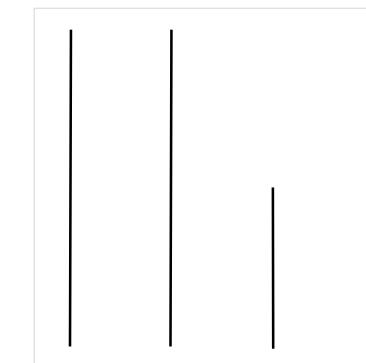
Orientation



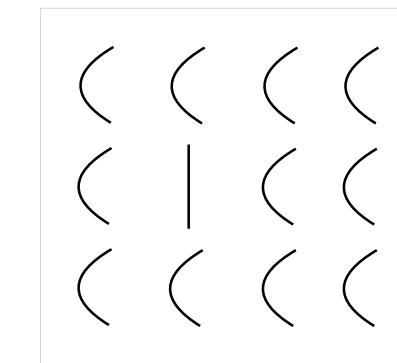
Line Width



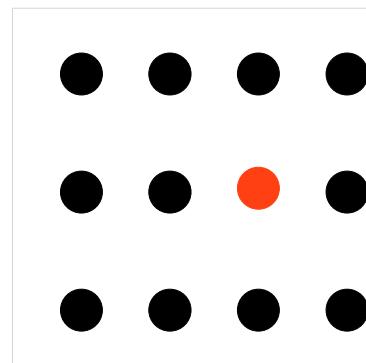
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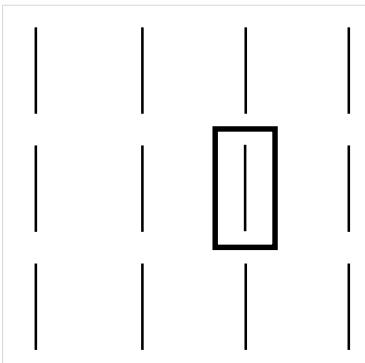
Curved/Straight



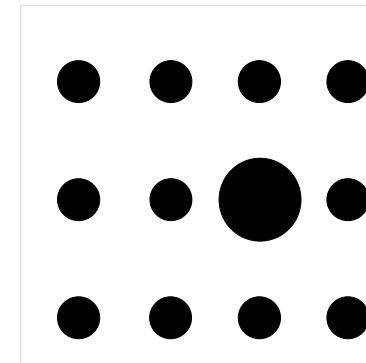
Colour/Hue



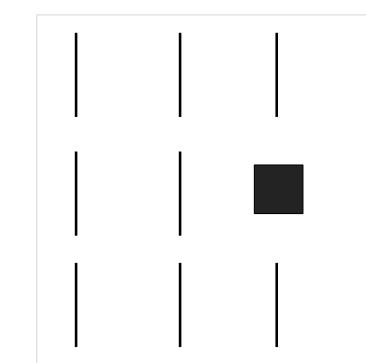
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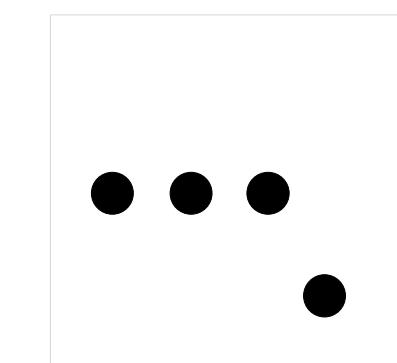
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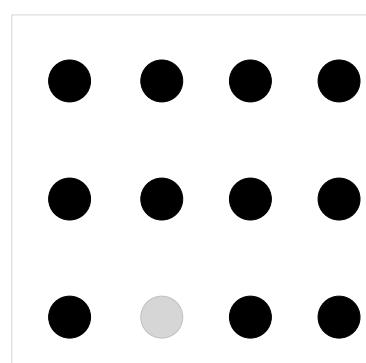
Shape



2D Position



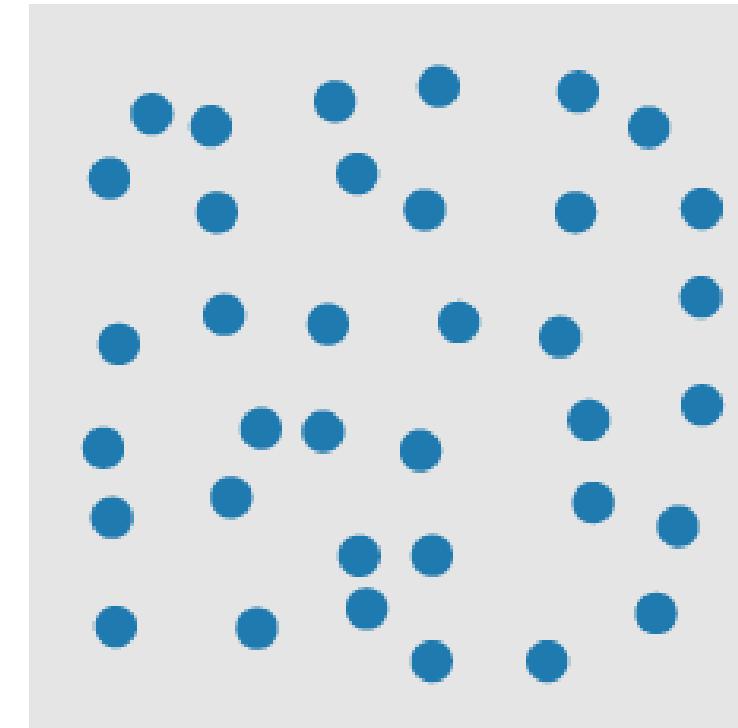
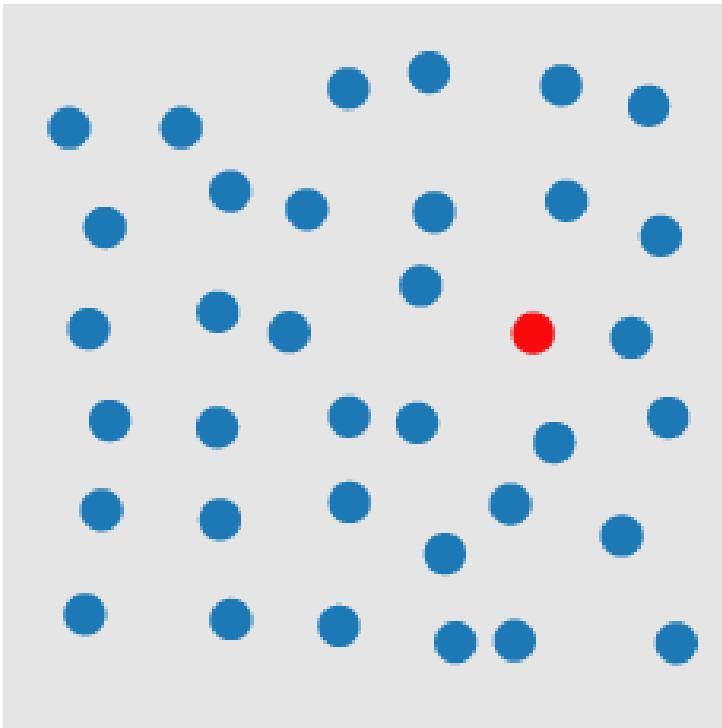
Intensity



Text is not pre-attentive

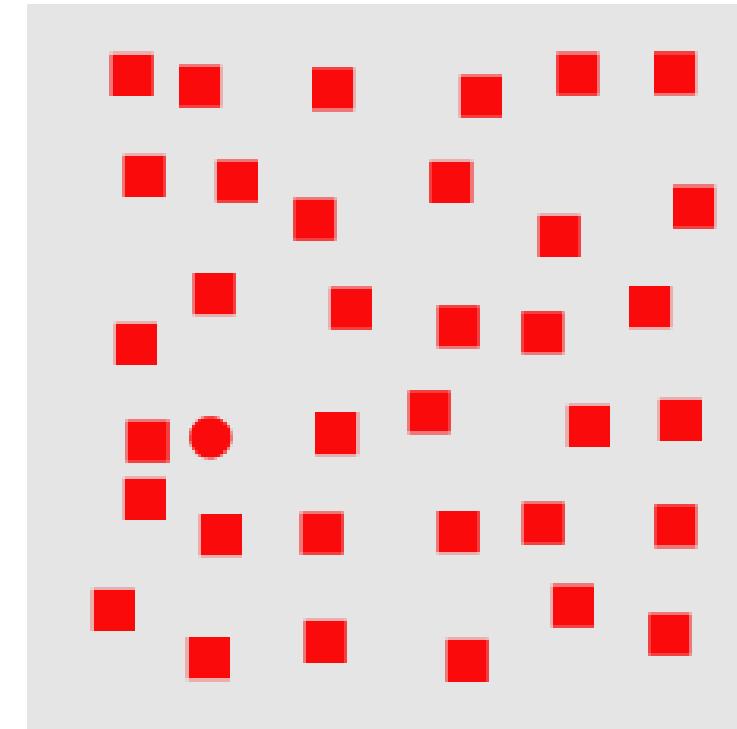
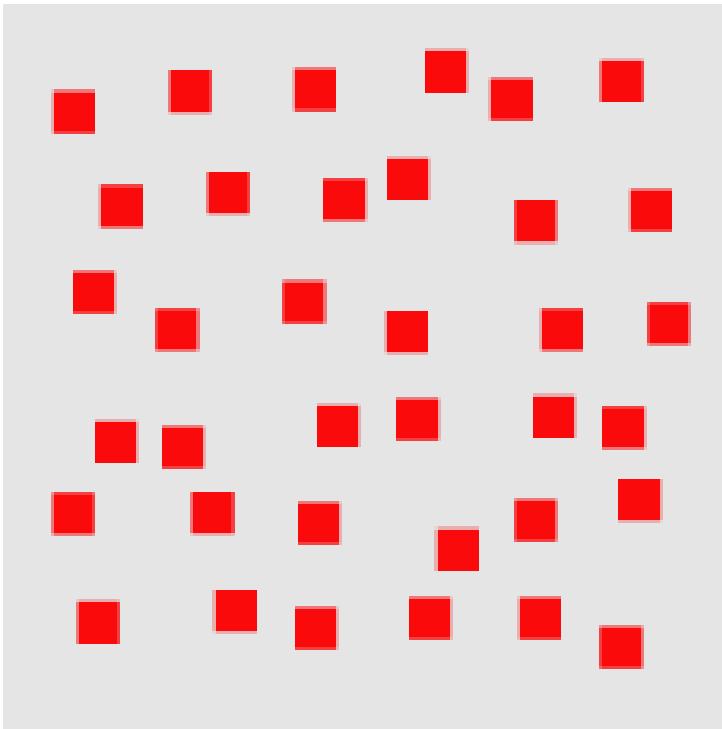
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CERTAIN QUICKLY PUNCHED METHODS NIATREC YLKCIUQ DEHCNUP SDOHTEM
SCIENCE ENGLISH RECORDS COLUMNS ECNEICS HSILGNE SDROCER SNMULOC
GOVERNS PRECISE EXAMPLE MERCURY SNREVOG ESICERP ELPMAXE YRUCREM
CERTAIN QUICKLY PUNCHED METHODS NIATREC YLKCIUQ DEHCNUP SDOHTEM
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CERTAIN QUICKLY PUNCHED METHODS NIATREC YLKCIUQ DEHCNUP SDOHTEM
SCIENCE ENGLISH RECORDS COLUMNS ECNEICS HSILGNE SDROCER SNMULOC

Can you see the red dot?



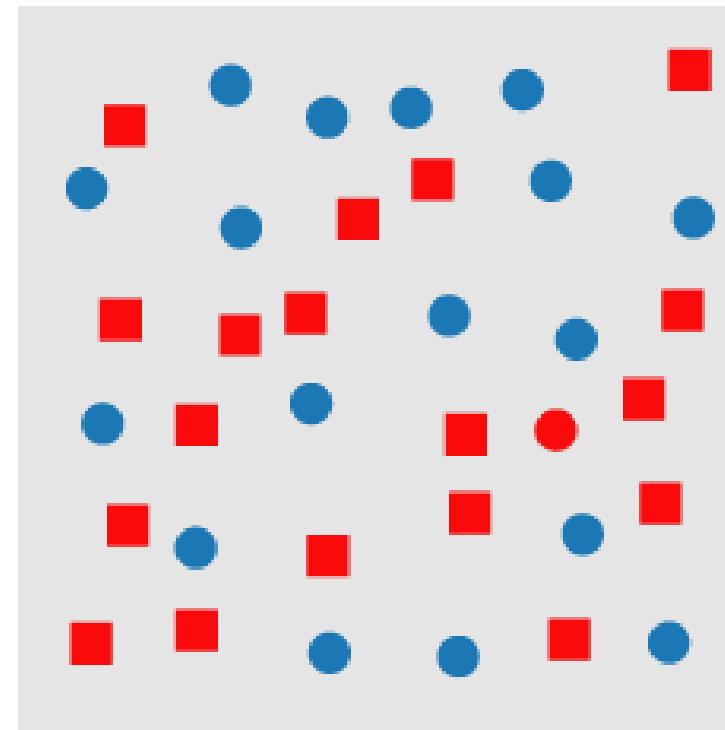
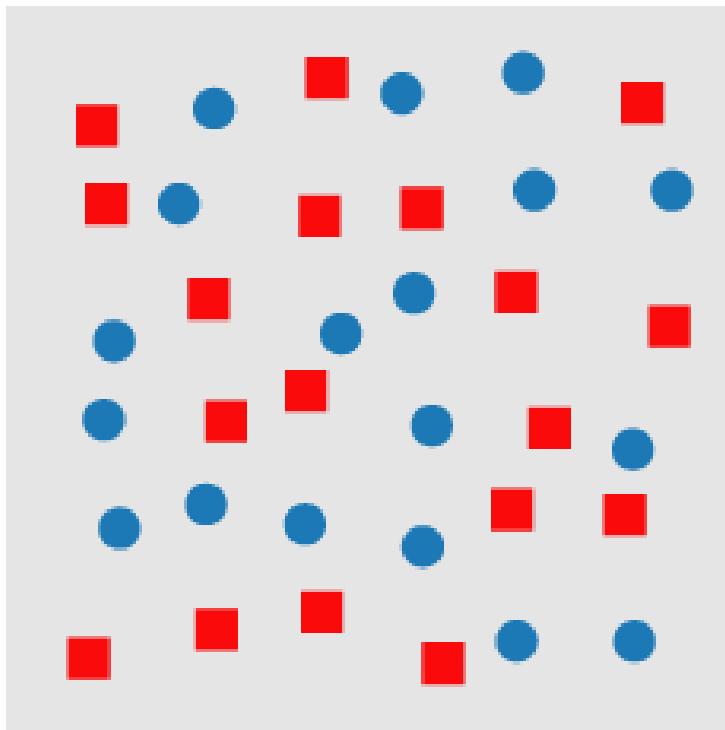
Colour is pre-attentively processed

Can you see the red dot?



Shape is pre-attentively processed

Can you see the red dot?

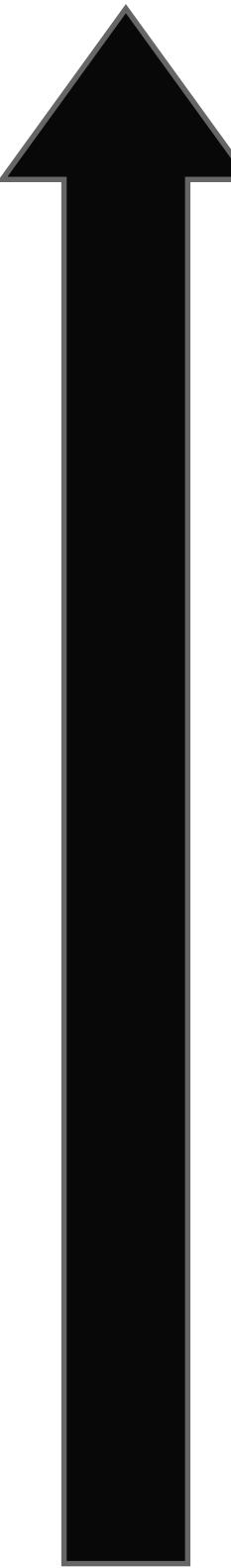


Conjunction of 2 properties is
usually not pre-attentive

Judging Magnitudes

Less
Accurate

More
Accurate



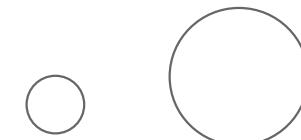
Position



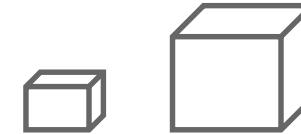
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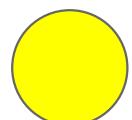
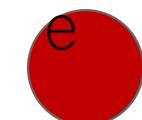
Size



Volume



Color/Hu



Length



Slope



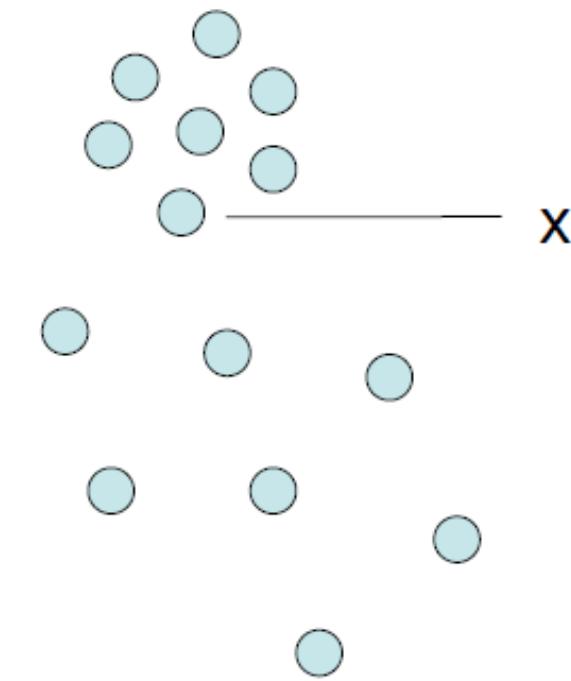
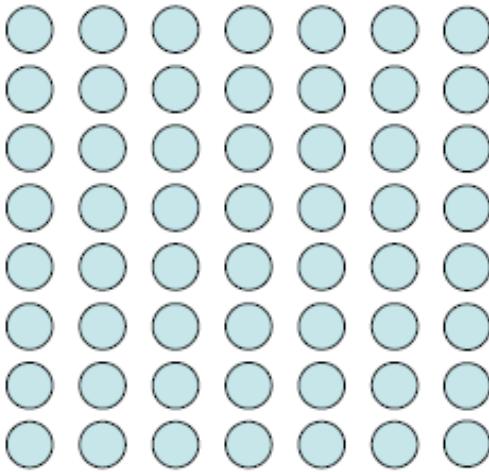
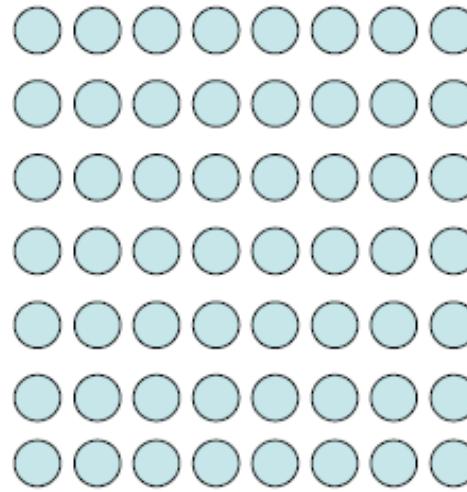
← Gap

Color/Density



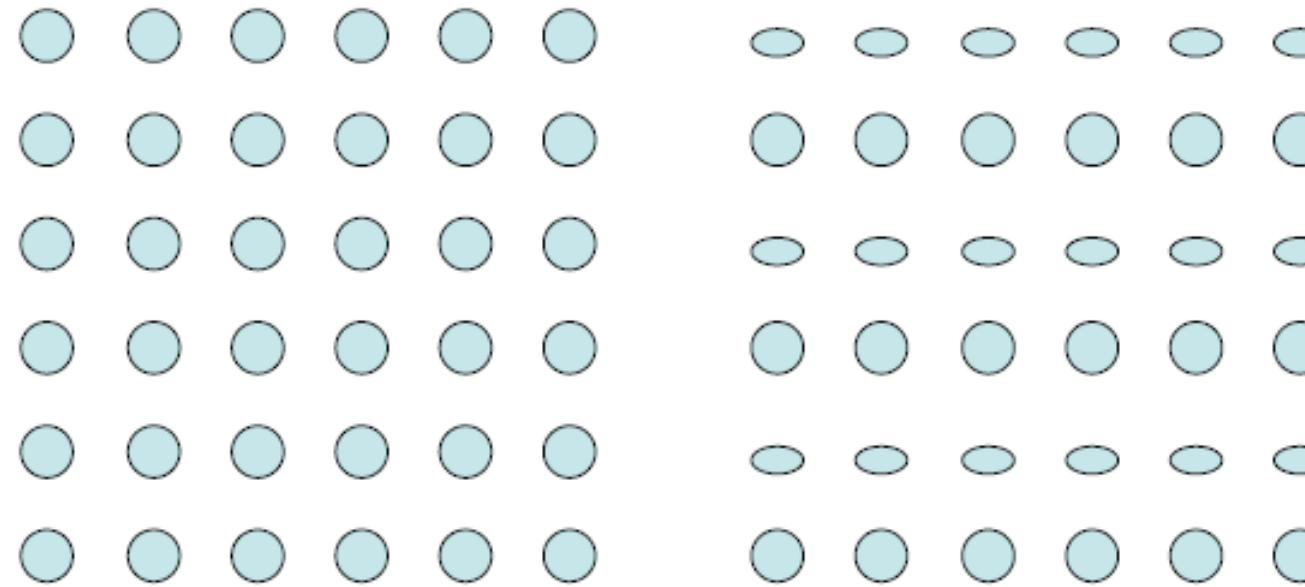
← Large Gap

Gestalt Principle



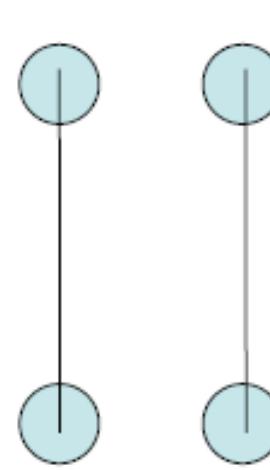
Proximity

Gestalt Principle

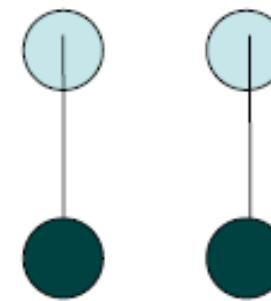


Similarity

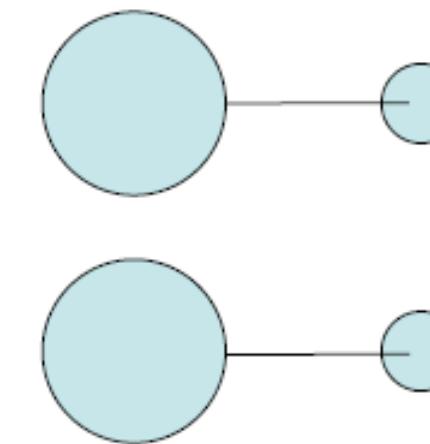
Gestalt Principle



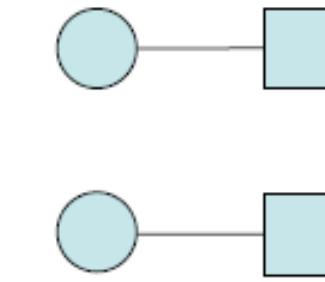
proximity



color



size



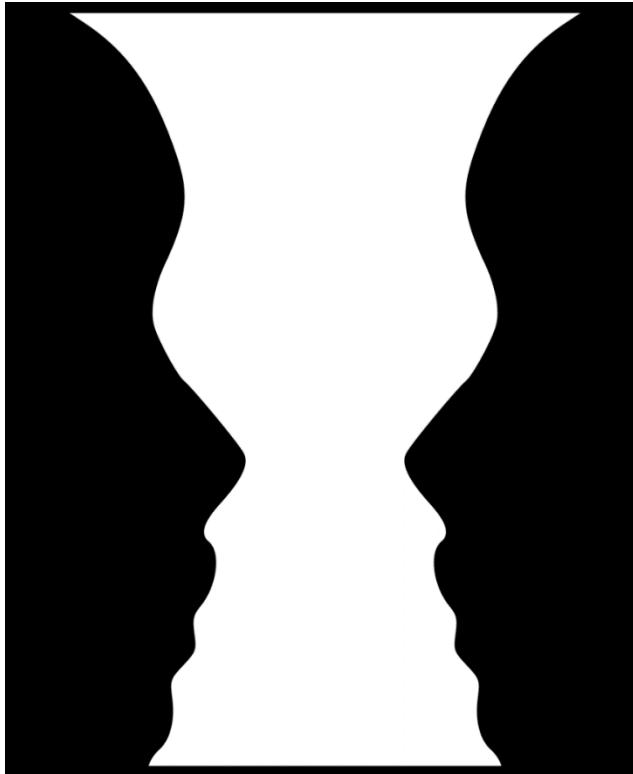
shape

Connectedness

Gestalt Principle



Continuity



Symmetry



Contour

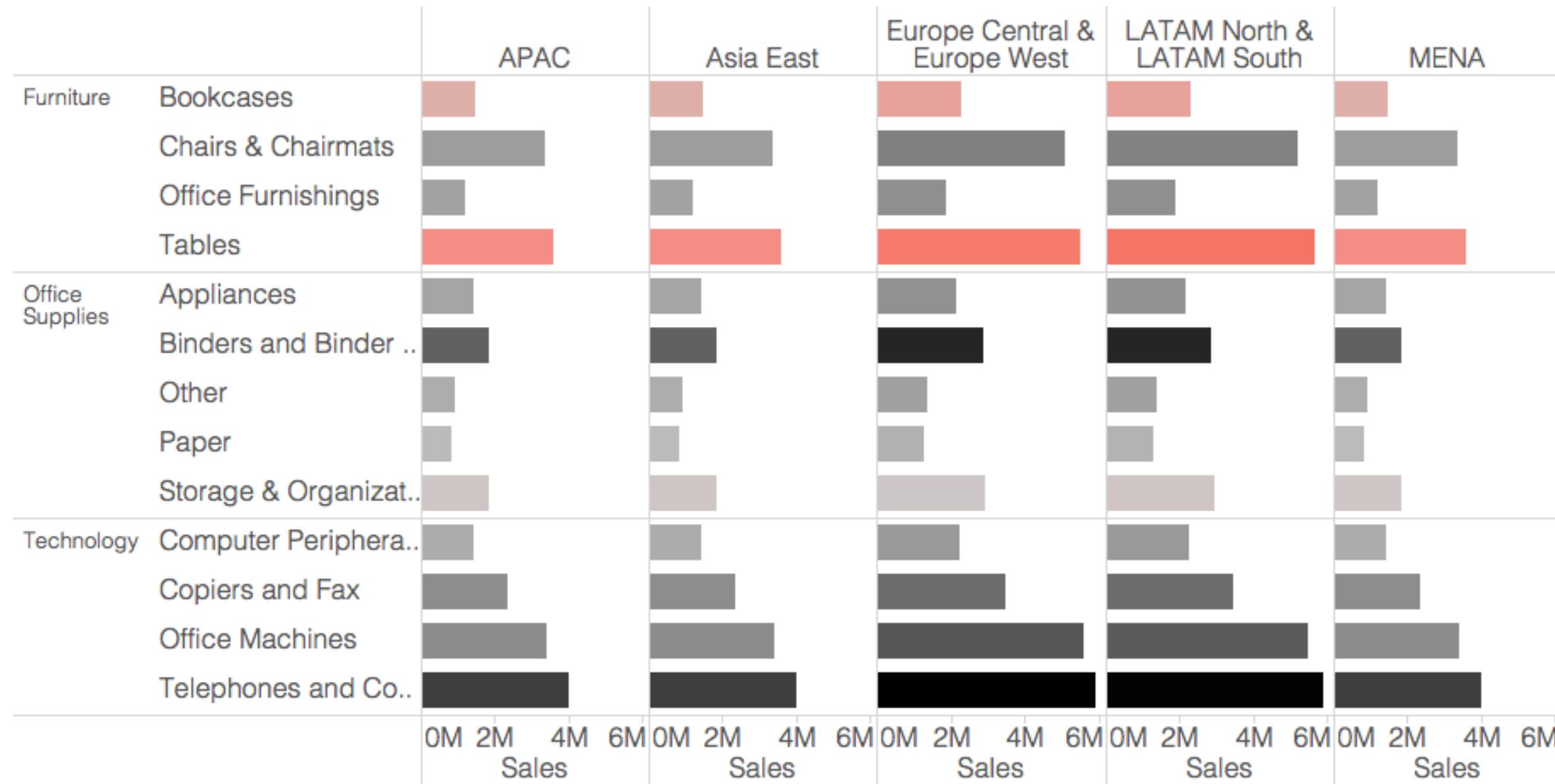
Text is **not** a pre-attentive attribute

		APAC	Asia East	Europe Central & Europe West	LATAM North & LATAM South	MENA
Furniture	Bookcases	-80,568	-80,568	-113,739	-113,739	-80,568
	Chairs & Chairmats	228,586	228,586	378,524	368,044	228,586
	Office Furnishings	203,704	203,704	300,583	300,583	203,704
	Tables	-174,287	-174,287	-235,558	-261,545	-174,287
Office Supplies	Appliances	190,362	190,362	288,385	285,179	190,362
	Binders and Binder ..	533,196	533,196	840,370	840,370	533,196
	Envelopes	120,262	120,262	168,973	168,973	120,262
	Labels	19,527	19,527	33,216	32,999	19,527
	Paper	77,188	77,188	123,176	120,215	77,188
	Pens & Art Supplies	21,524	21,524	29,076	29,076	21,524
	Rubber Bands	-69	-69	-147	-147	-69
	Scissors, Rulers an..	-11,291	-11,291	-19,090	-19,090	-11,291
	Storage & Organizat..	-9,924	-9,924	-7,407	-13,236	-9,924
Technology	Computer Periphera..	154,976	154,976	249,510	249,510	154,976
	Copiers and Fax	310,495	310,495	477,857	477,857	310,495
	Office Machines	315,009	315,009	591,600	566,600	315,009
	Telephones and Co..	711,997	711,997	1,028,949	1,020,291	711,997

We are faster at ‘seeing’ data

		APAC	Asia East	Europe Central & Europe West	LATAM North & LATAM South	MENA
Furniture	Bookcases	(80,568)	(80,568)	(113,739)	(113,739)	(80,568)
	Chairs & Chairmats	228,586	228,586	378,524	368,044	228,586
	Office Furnishings	203,704	203,704	300,583	300,583	203,704
	Tables	(174,287)	(174,287)	(235,558)	(261,545)	(174,287)
Office Supplies	Appliances	190,362	190,362	288,385	285,179	190,362
	Binders and Binder ..	533,196	533,196	840,370	840,370	533,196
	Envelopes	120,262	120,262	168,973	168,973	120,262
	Labels	19,527	19,527	33,216	32,999	19,527
	Paper	77,188	77,188	123,176	120,215	77,188
	Pens & Art Supplies	21,524	21,524	29,076	29,076	21,524
	Rubber Bands	(69)	(69)	(147)	(147)	(69)
	Scissors, Rulers an..	(11,291)	(11,291)	(19,090)	(19,090)	(11,291)
	Storage & Organizat..	(9,924)	(9,924)	(7,407)	(13,236)	(9,924)
Technology	Computer Periphera..	154,976	154,976	249,510	249,510	154,976
	Copiers and Fax	310,495	310,495	477,857	477,857	310,495
	Office Machines	315,009	315,009	591,600	566,600	315,009
	Telephones and Co..	711,997	711,997	1,028,949	1,020,291	711,997

Color to highlight a problem



Let's Look at Some Data

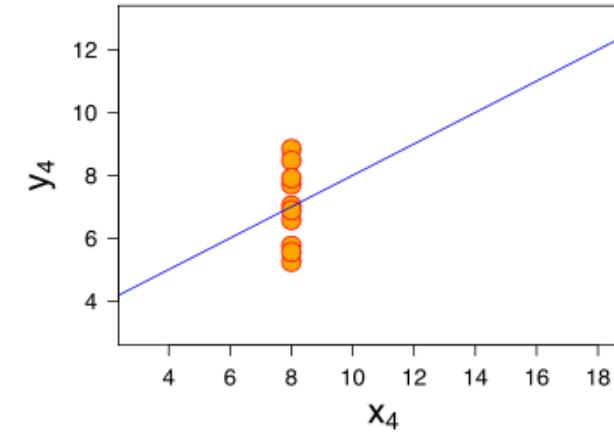
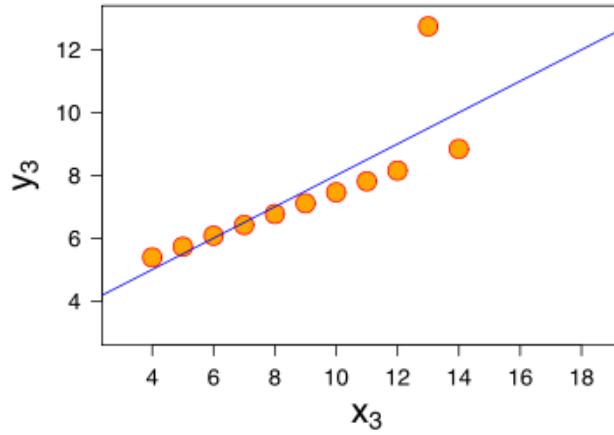
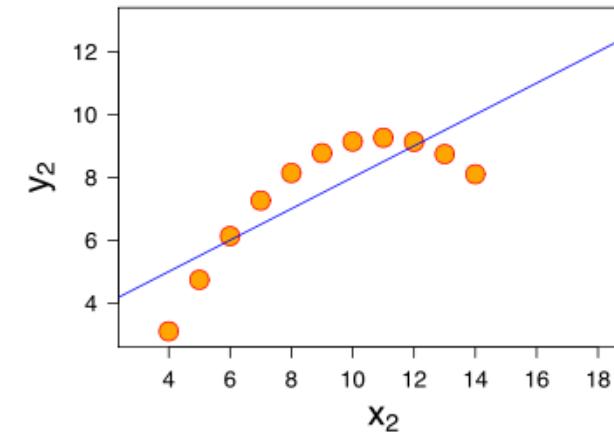
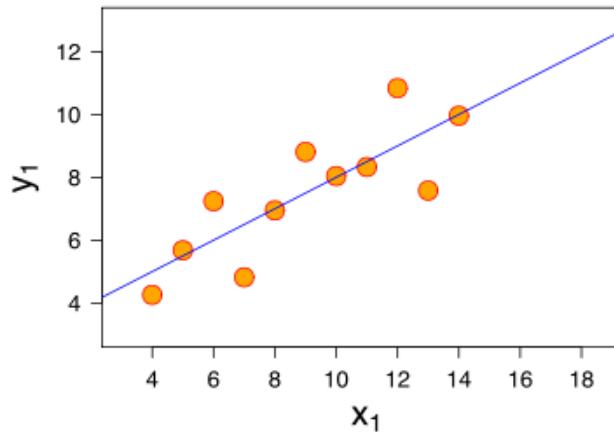
I		II		III		IV	
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8	6.95	8	8.14	8	6.77	8	5.76
13	7.58	13	8.74	13	12.74	8	7.71
9	8.81	9	8.77	9	7.11	8	8.84
11	8.33	11	9.26	11	7.81	8	8.47
14	9.96	14	8.1	14	8.84	8	7.04
6	7.24	6	6.13	6	6.08	8	5.25
4	4.26	4	3.1	4	5.39	19	12.5
12	10.84	12	9.13	12	8.15	8	5.56
7	4.82	7	7.26	7	6.42	8	7.91
5	5.68	5	4.74	5	5.73	8	6.89

Let's Analyze Some Data

I		II		III		IV	
x	y	x	y	x	y	x	y
10	8.04	10	9.14	10	7.46	8	6.58
8	6.95	8	8.14	8	6.77	8	5.76
13	7.58	13	8.74	13	12.74	8	7.71
9	8.81	9	8.77	9	7.11	8	8.84
11	8.33	11	9.26	11	7.81	8	8.47
14	9.96	14	8.1	14	8.84	8	7.04
6	7.24	6	6.13	6	6.08	8	5.25
4	4.26	4	3.1	4	5.39	19	12.5
12	10.84	12	9.13	12	8.15	8	5.56
7	4.82	7	7.26	7	6.42	8	7.91
5	5.68	5	4.74	5	5.73	8	6.89

Property	Value
Mean of x in each case	9 (exact)
Variance of x in each case	11 (exact)
Mean of y in each case	7.50 (to 2 decimal places)
Variance of y in each case	4.122 or 4.127 (to 3 decimal places)
Correlation between x and y in each case	0.816 (to 3 decimal places)
Linear regression line in each case	$y = 3.00 + 0.500x$ (to 2 and 3 decimal places, respectively)

Let's Look at Some Data...Visually



“Anscombe’s Quartet”

Source: Wikipedia

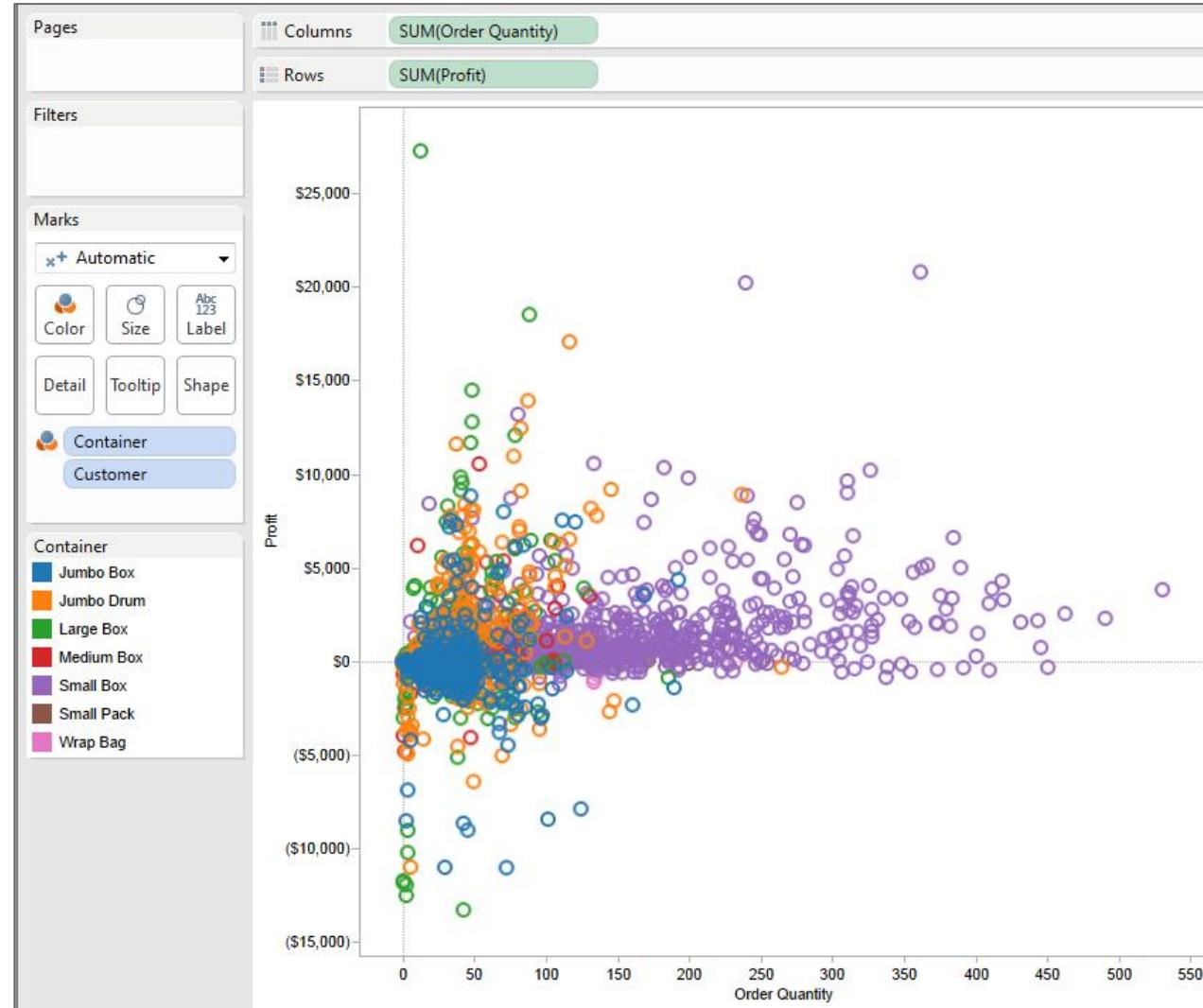
"It's a common mistake to think that charts are just a fancy way of showing numbers.

They're not. They're tools for understanding."

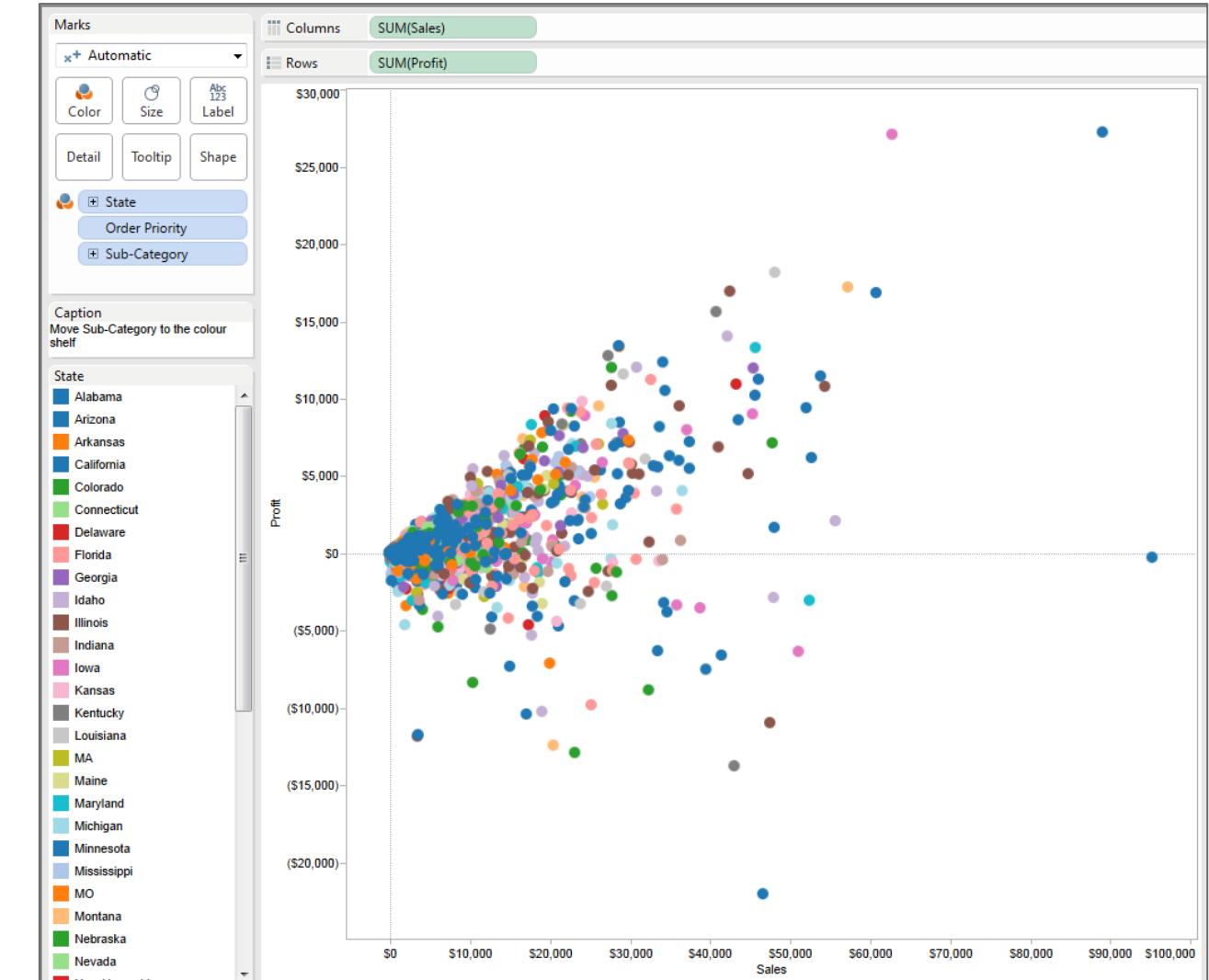
Robert Kosara

Senior Research Scientist
Tableau

Color 6 is manageable; 8 is the maximum

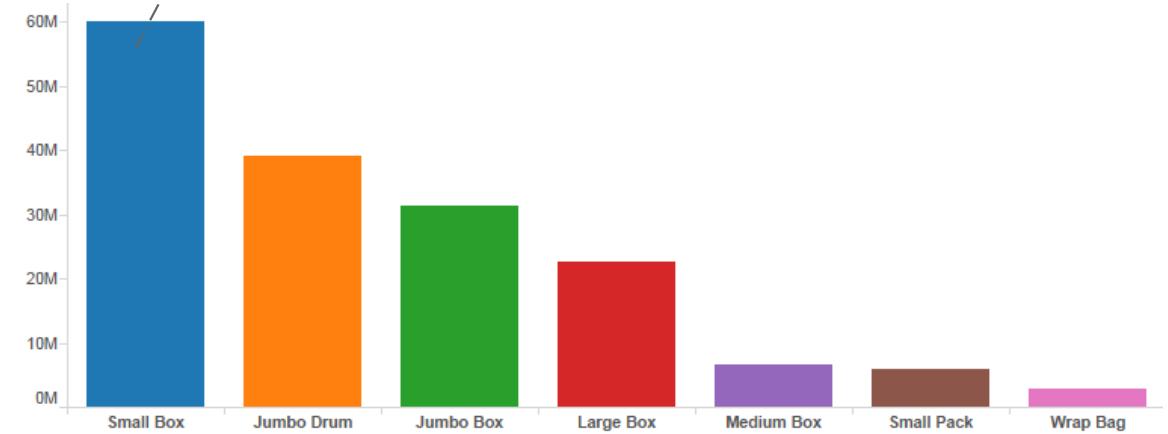
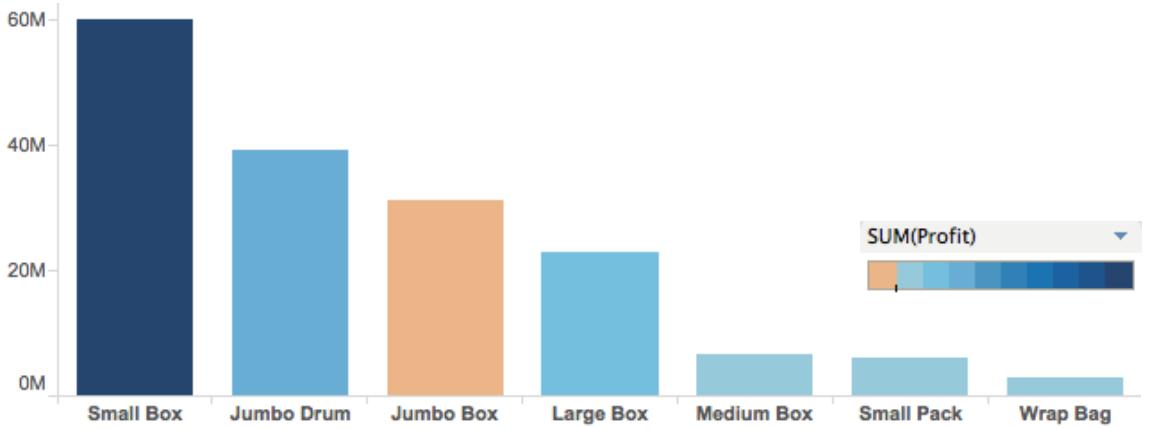
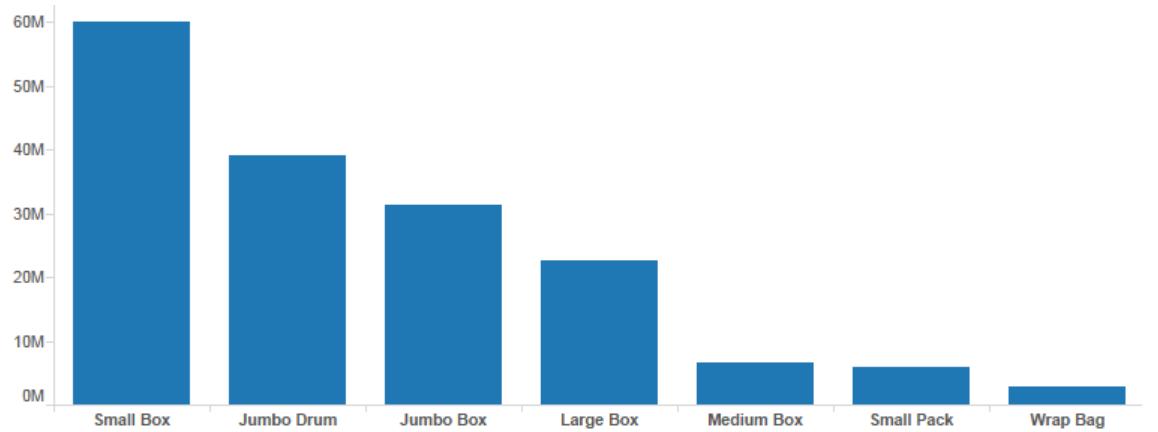


Useful



Useless

Color encoding

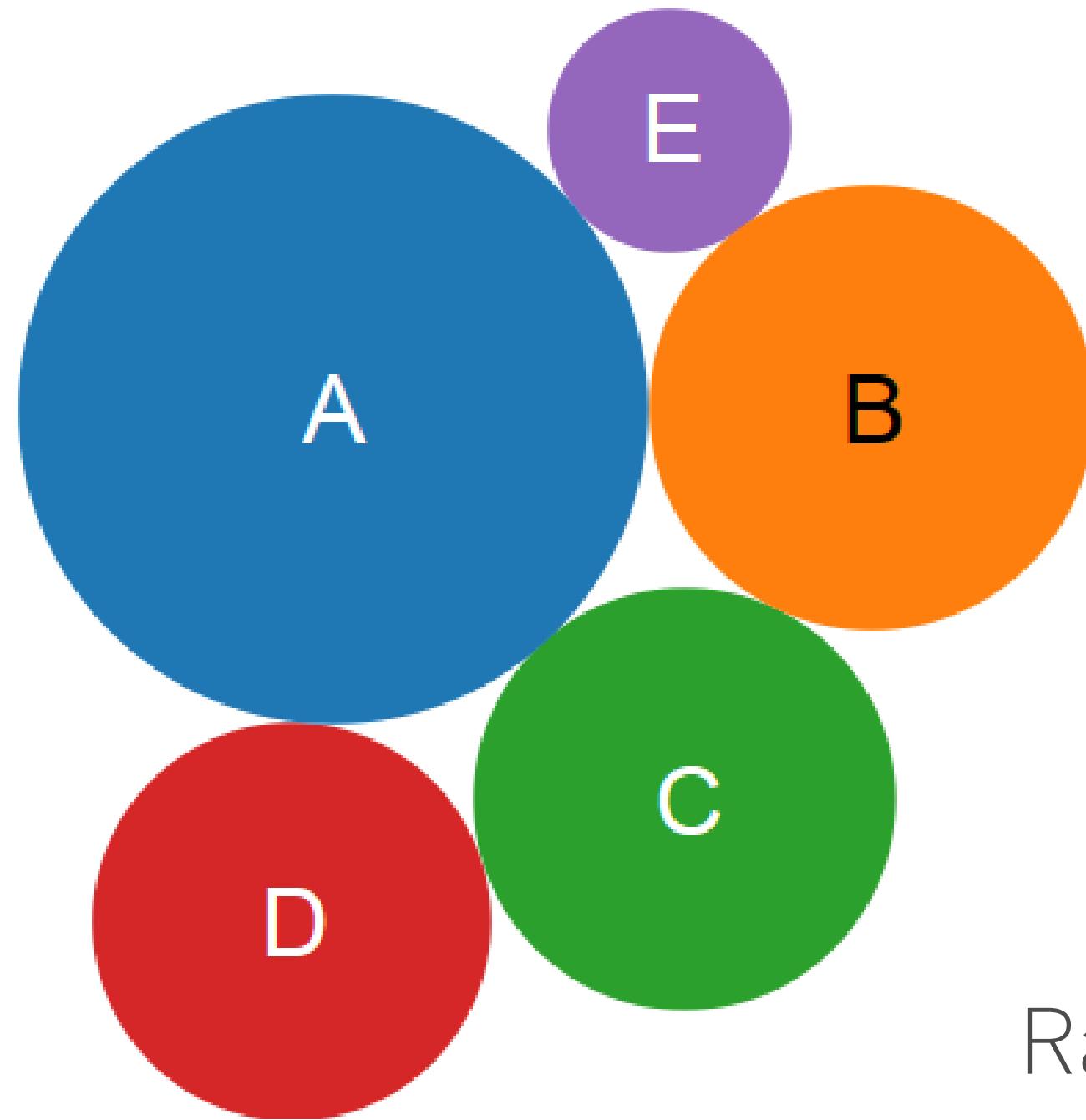


Double encoding (labels and color) is a bad idea to distinguish categorical elements

Useful

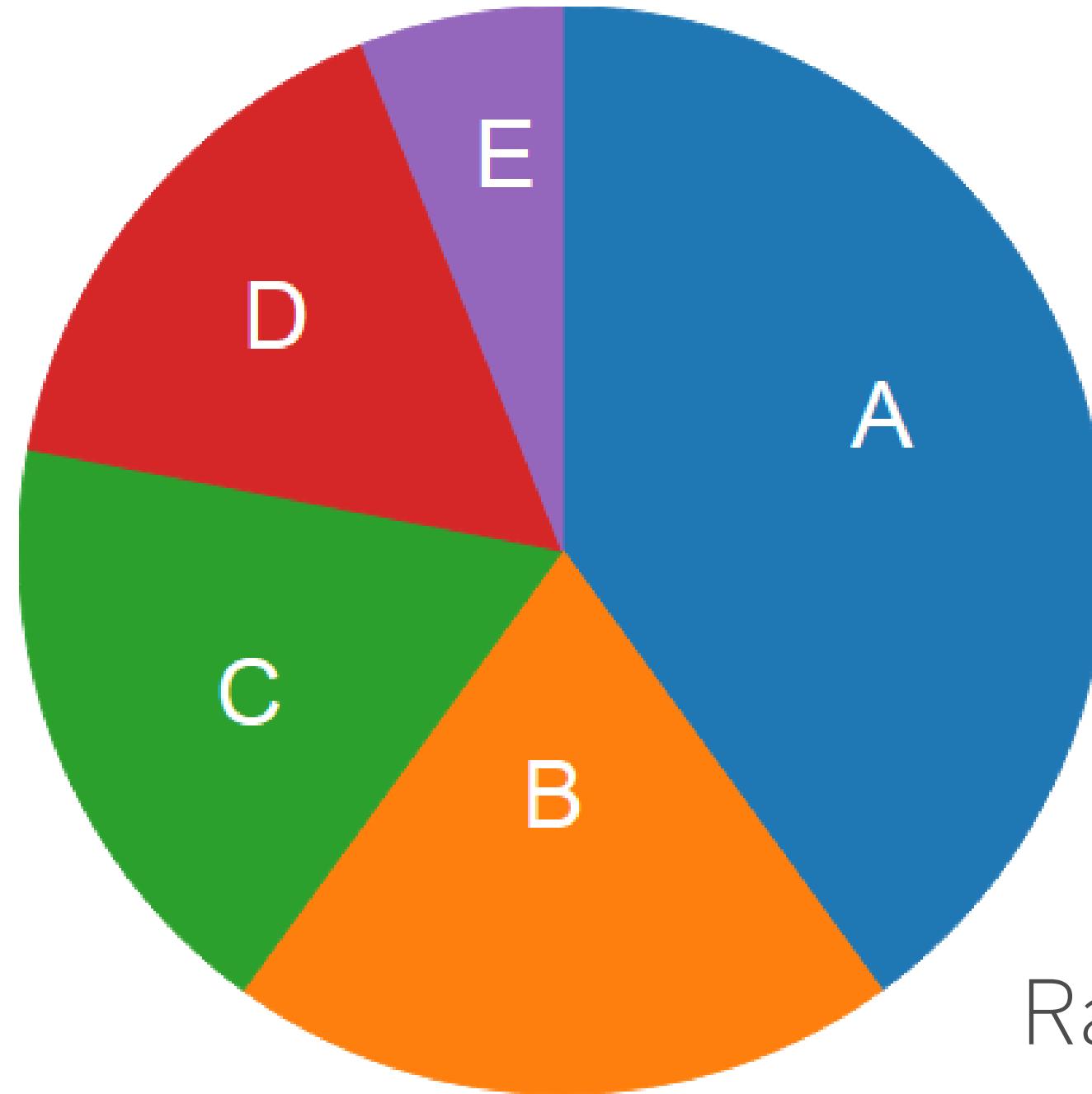
Useless

Size



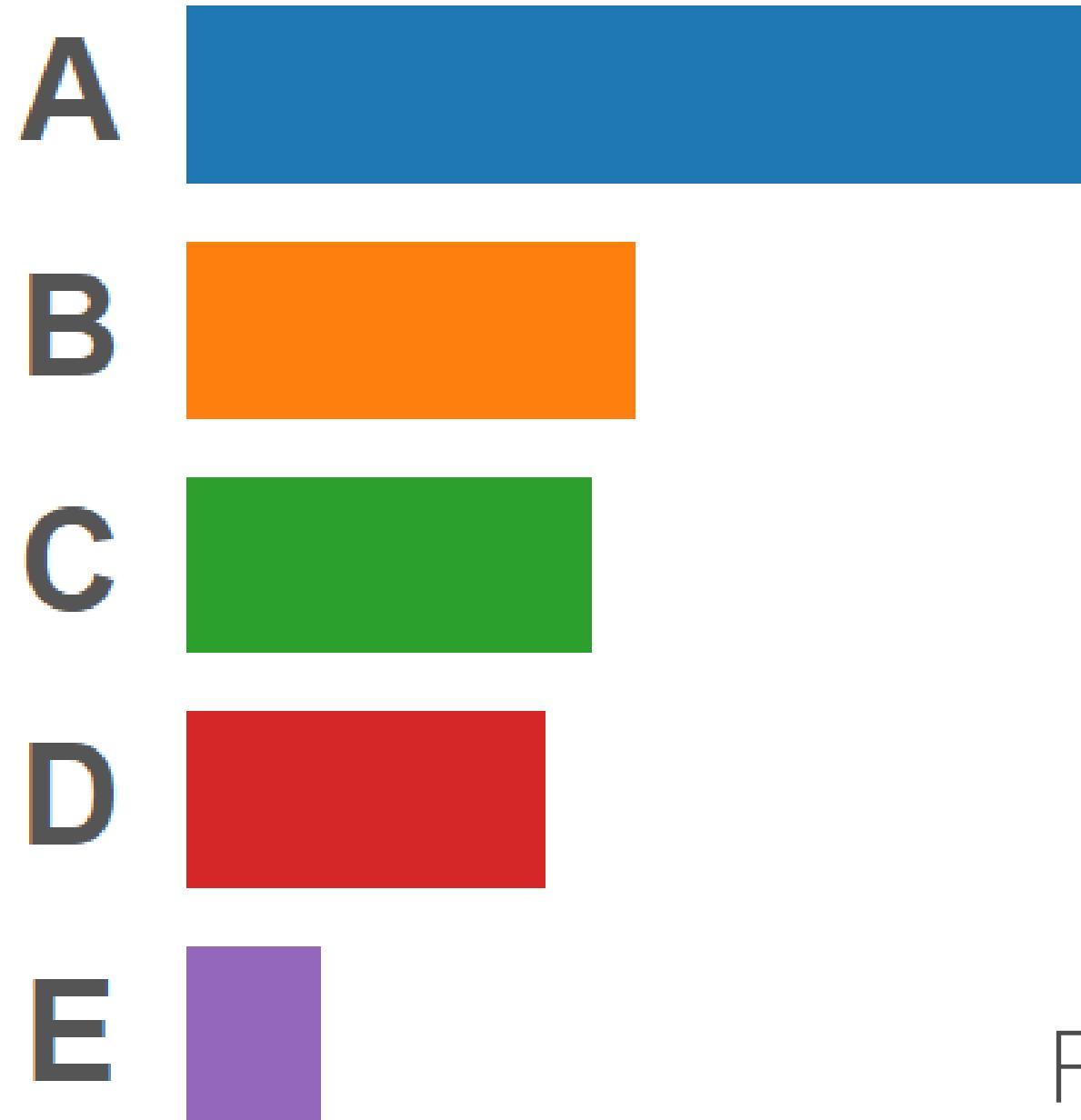
Rank B, C and D?

Angle



Rank B, C and D?

Length



Rank B, C and D?

1. Human Visual Perception

2. Visual Best Practice

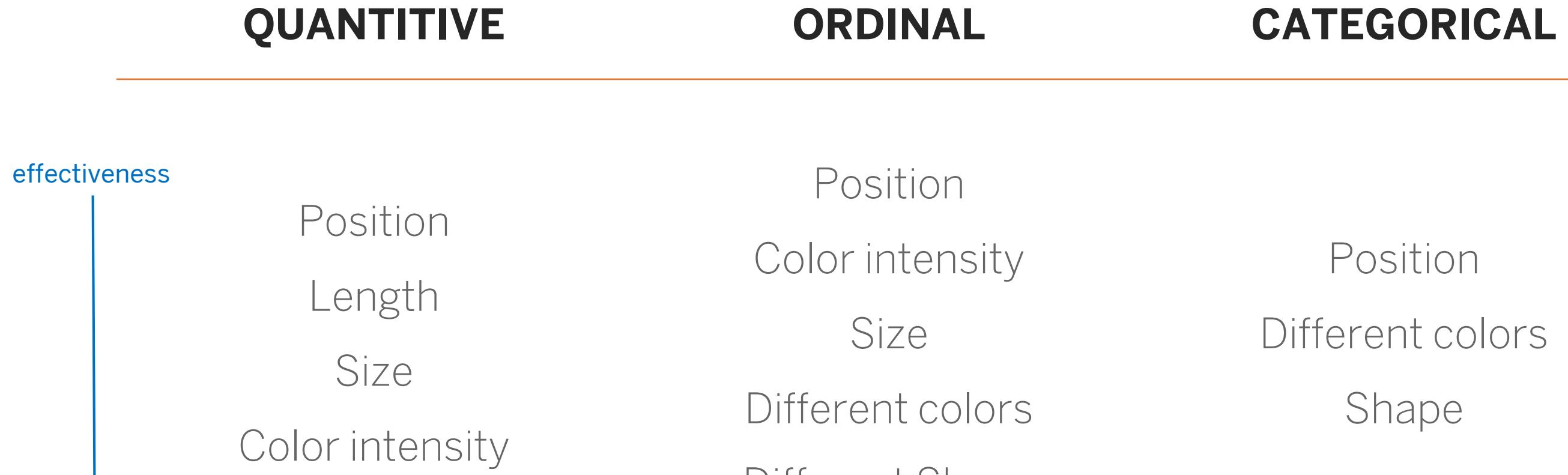
3. Visual Analysis

4. Good Dashboard Design

5. Guided Analytics



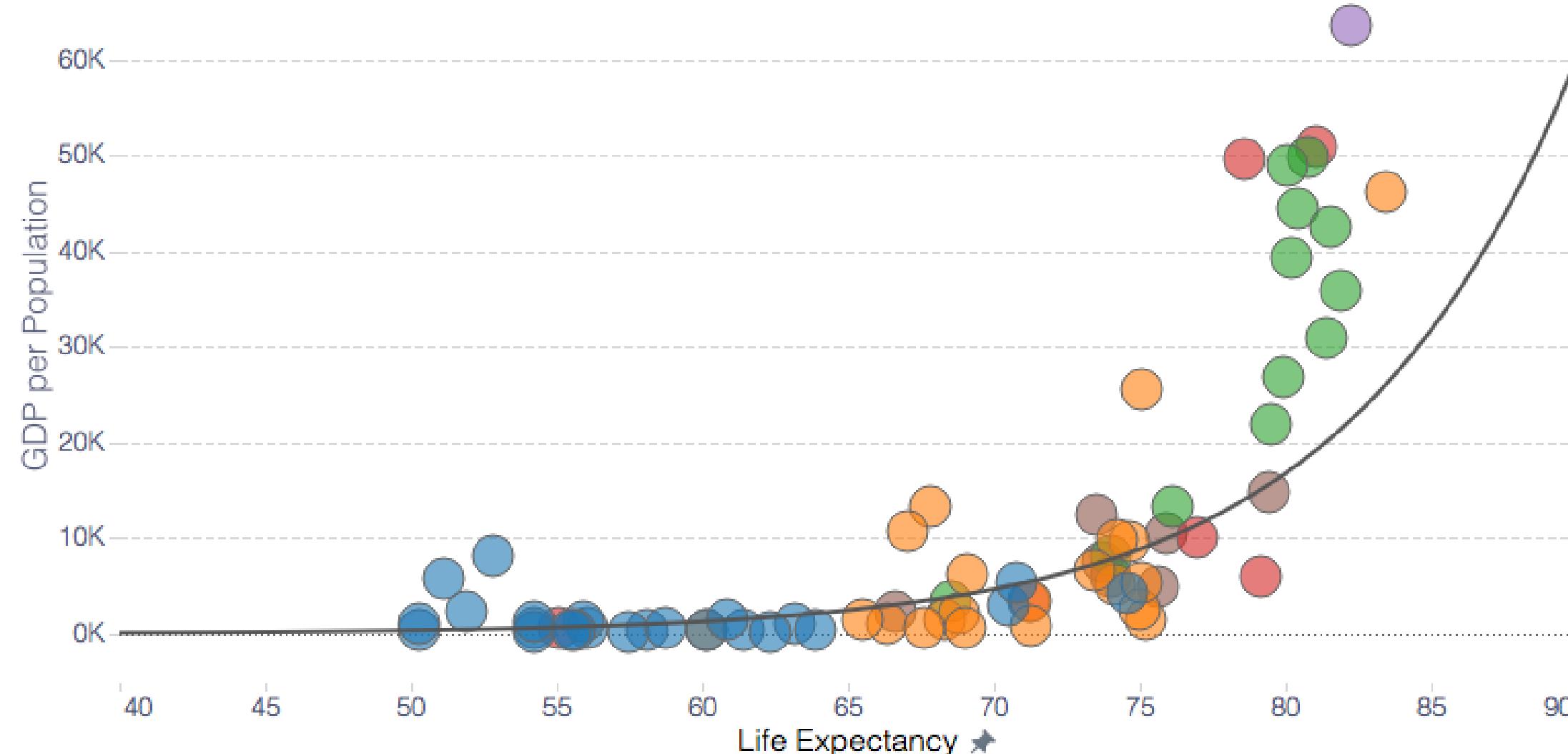
Research tells us...



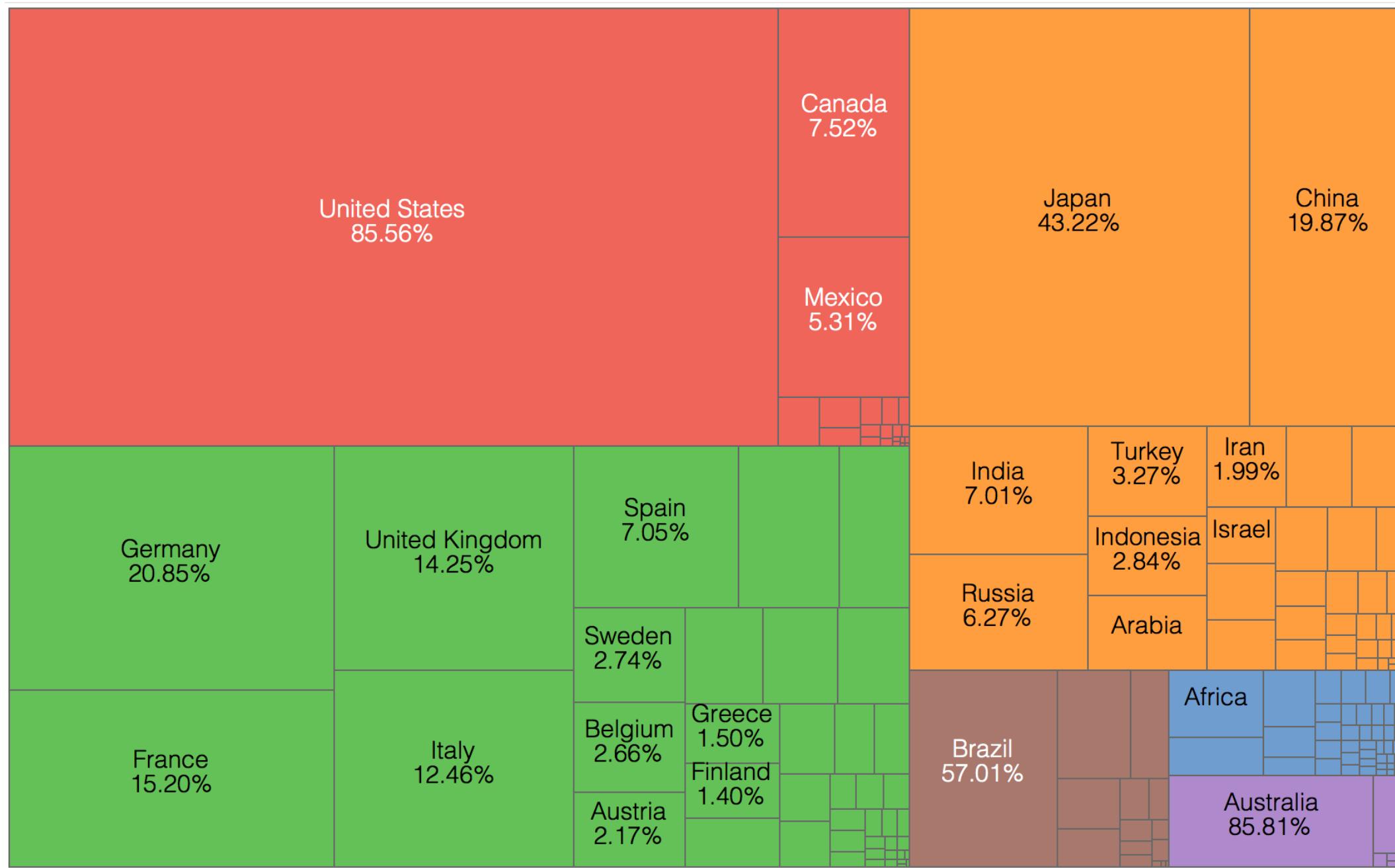
How do humans like their data?

City	Country	Customer Name	Customer Segment	Order Date	Order ID	Order Priority	Postcode	Product Category	Product Container	Product Sub-Category	Region	Profit	Ship Mode
Masbate	Philippines	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	APAC	(\$335.24)	Regular Air
Xinji	China	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	Asia East	(\$335.24)	Regular Air
La Chapelle-sur-Erdre	France	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	Europe West	(\$335.24)	Regular Air
Santiago	Mexico	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	LATAM North	(\$335.24)	Regular Air
Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	LATAM South	(\$335.24)	Regular Air
Bismil	Turkey	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	MENA	(\$335.24)	Regular Air
Cababdan	Philippines	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	APAC	\$667.45	Regular Air
Huayuan Chengguanzhen	China	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	Asia East	\$667.45	Regular Air
Dukinfield	United Kingdom	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	Europe West	\$667.45	Regular Air
Santiago	Mexico	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	LATAM North	\$667.45	Regular Air
Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	LATAM South	\$667.45	Regular Air
Tavsanli	Turkey	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	MENA	\$667.45	Regular Air
Pukekohe East	New Zealand	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	APAC	(\$131.31)	Delivery Truck
Nishinomiya	Japan	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	Asia East	(\$131.31)	Delivery Truck
Amersfoort	Netherlands	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	Europe West	(\$131.31)	Delivery Truck
Texcoco	Mexico	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	LATAM North	(\$131.31)	Delivery Truck
Trés Coroas	Brazil	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	LATAM South	(\$131.31)	Delivery Truck
Horasan	Turkey	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	MENA	(\$131.31)	Delivery Truck
Wiset Chaichan	Thailand	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	APAC	(\$154.62)	Regular Air
Puning	China	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	Asia East	(\$154.62)	Regular Air
Tours	France	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	Europe West	(\$154.62)	Regular Air
Santiago	Mexico	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	LATAM North	(\$154.62)	Regular Air
Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	LATAM South	(\$154.62)	Regular Air
Kazan	Turkey	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	MENA	(\$154.62)	Regular Air
Alur Gajah	Malaysia	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	APAC	\$1.74	Regular Air
Dongtai	China	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Wrap Bag	Rubber Bands	Asia East	\$1.74	Regular Air
Gillingham	United Kingdom	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Wrap Bag	Rubber Bands	Europe West	\$1.74	Regular Air
Santiago	Mexico	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Wrap Bag	Rubber Bands	LATAM North	\$1.74	Regular Air
Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Wrap Bag	Rubber Bands	LATAM South	\$1.74	Regular Air
Izmit	Turkey	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Wrap Bag	Rubber Bands	MENA	\$1.74	Regular Air
Paciran	Indonesia	Dorris Love	Home Office	1/01/08	290	Not Specified		Office Supplies	Wrap Bag	Paper	APAC	(\$32.48)	Regular Air
Puyang	China	Dorris Love	Home Office	1/01/08	290	Not Specified		Office Supplies	Wrap Bag	Paper	Asia East	(\$32.48)	Regular Air
Loos	France	Dorris Love	Home Office	1/01/08	290	Not Specified		Office Supplies	Wrap Bag	Paper	Europe West	(\$32.48)	Regular Air
Malcau	Colombia	Dorris Love	Home Office	1/01/08	290	Not Specified		Office Supplies	Wrap Bag	Paper	LATAM North	(\$32.48)	Regular Air
Baixo Guandu	Brazil	Dorris Love	Home Office	1/01/08	290	Not Specified		Office Supplies	Wrap Bag	Paper	LATAM South	(\$32.48)	Regular Air
Elazığ	Turkey	Dorris Love	Home Office	1/01/08	290	Not Specified		Office Supplies	Wrap Bag	Paper	MENA	(\$32.48)	Regular Air
Keningau	Malaysia	Matti Collins	Consumer	1/01/08	1028	High		Technology	Small Pack	Computer Peripherals	APAC	(\$28.46)	Regular Air
furukawa	Japan	Matti Collins	Consumer	1/01/08	1028	High		Technology	Small Pack	Computer Peripherals	Asia East	(\$28.46)	Regular Air
La Garenne-Colombes	France	Matti Collins	Consumer	1/01/08	1028	High		Technology	Small Pack	Computer Peripherals	Europe West	(\$28.46)	Regular Air
Fusagasa	Colombia	Matti Collins	Consumer	1/01/08	1028	High		Technology	Small Pack	Computer Peripherals	LATAM North	(\$28.46)	Regular Air
Avaré	Brazil	Matti Collins	Consumer	1/01/08	1028	High		Technology	Small Pack	Computer Peripherals	LATAM South	(\$28.46)	Regular Air
İskilip	Turkey	Matti Collins	Consumer	1/01/08	1028	High		Technology	Small Pack	Computer Peripherals	MENA	(\$28.46)	Regular Air
Pingtan	Indonesia	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Storage & Organization	APAC	(\$335.24)	Delivery Truck
Pingshan	China	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Storage & Organization	Asia East	(\$335.24)	Delivery Truck
Hartlepool	United Kingdom	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Storage & Organization	Europe West	(\$335.24)	Delivery Truck
Santiago	Mexico	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Storage & Organization	LATAM North	(\$335.24)	Delivery Truck
Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Storage & Organization	LATAM South	(\$335.24)	Delivery Truck
Ofragim	Israel	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Storage & Organization	MENA	(\$335.24)	Delivery Truck
Matale	Philippines	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	APAC	(\$335.24)	Delivery Truck
İzmir	China	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	Asia East	(\$335.24)	Delivery Truck
La Chapelle-sur-Erdre	France	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	Europe West	(\$335.24)	Delivery Truck
Santiago	Mexico	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	LATAM North	(\$335.24)	Delivery Truck
Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	LATAM South	(\$335.24)	Delivery Truck
Bismil	Turkey	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Large Box	Storage & Organization	MENA	(\$335.24)	Delivery Truck
Cababdan	Philippines	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	APAC	(\$131.31)	Delivery Truck
Huayuan Chengguanzhen	China	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	Asia East	(\$131.31)	Delivery Truck
Dukinfield	United Kingdom	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	Europe West	(\$131.31)	Delivery Truck
Santiago	Mexico	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	LATAM North	(\$131.31)	Delivery Truck
Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	LATAM South	(\$131.31)	Delivery Truck
Tavsanli	Turkey	Darren Budd	Consumer	1/01/08	57253	Critical		Technology	Small Box	Telephones and Communication	MENA	(\$131.31)	Delivery Truck
Pukekohe East	New Zealand	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	APAC	(\$131.31)	Delivery Truck
Nishinomiya	Japan	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	Asia East	(\$131.31)	Delivery Truck
Amersfoort	Netherlands	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	Europe West	(\$131.31)	Delivery Truck
Texcoco	Mexico	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	LATAM North	(\$131.31)	Delivery Truck
Trés Coroas	Brazil	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	LATAM South	(\$131.31)	Delivery Truck
Horasan	Turkey	Marina Lichtenstein	Corporate	1/01/08	32418	Not Specified		Furniture	Jumbo Drum	Chairs & Charms	MENA	(\$131.31)	Delivery Truck
Wiset Chaichan	Thailand	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	APAC	(\$154.62)	Regular Air
Puning	China	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	Asia East	(\$154.62)	Regular Air
Loos	France	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	Europe West	(\$154.62)	Regular Air
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Pedro Leopoldo	Brazil	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	LATAM South	(\$154.62)	Regular Air
Kazan	Turkey	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Small Box	Binders and Binder Accessories	MENA	(\$154.62)	Regular Air
Alur Gajah	Malaysia	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Wrap Bag	Rubber Bands	APAC	\$1.74	Regular Air
Dongtai	China	Darren Budd	Consumer	1/01/08	57253	Critical		Office Supplies	Wrap Bag	Rubber Bands	Asia East	\$1.74	Regular Air
Gillingham	United Kingdom	Dar											

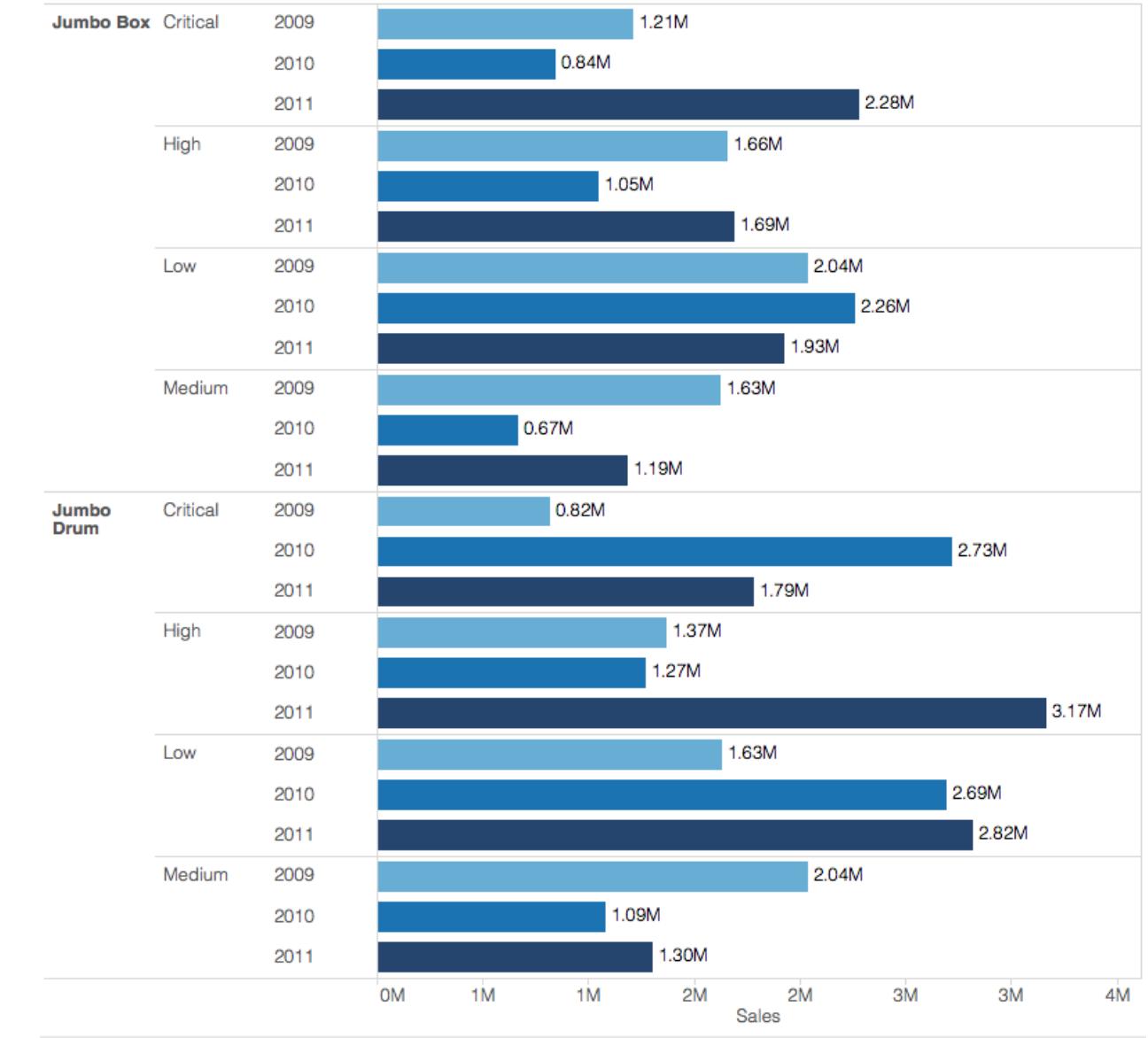
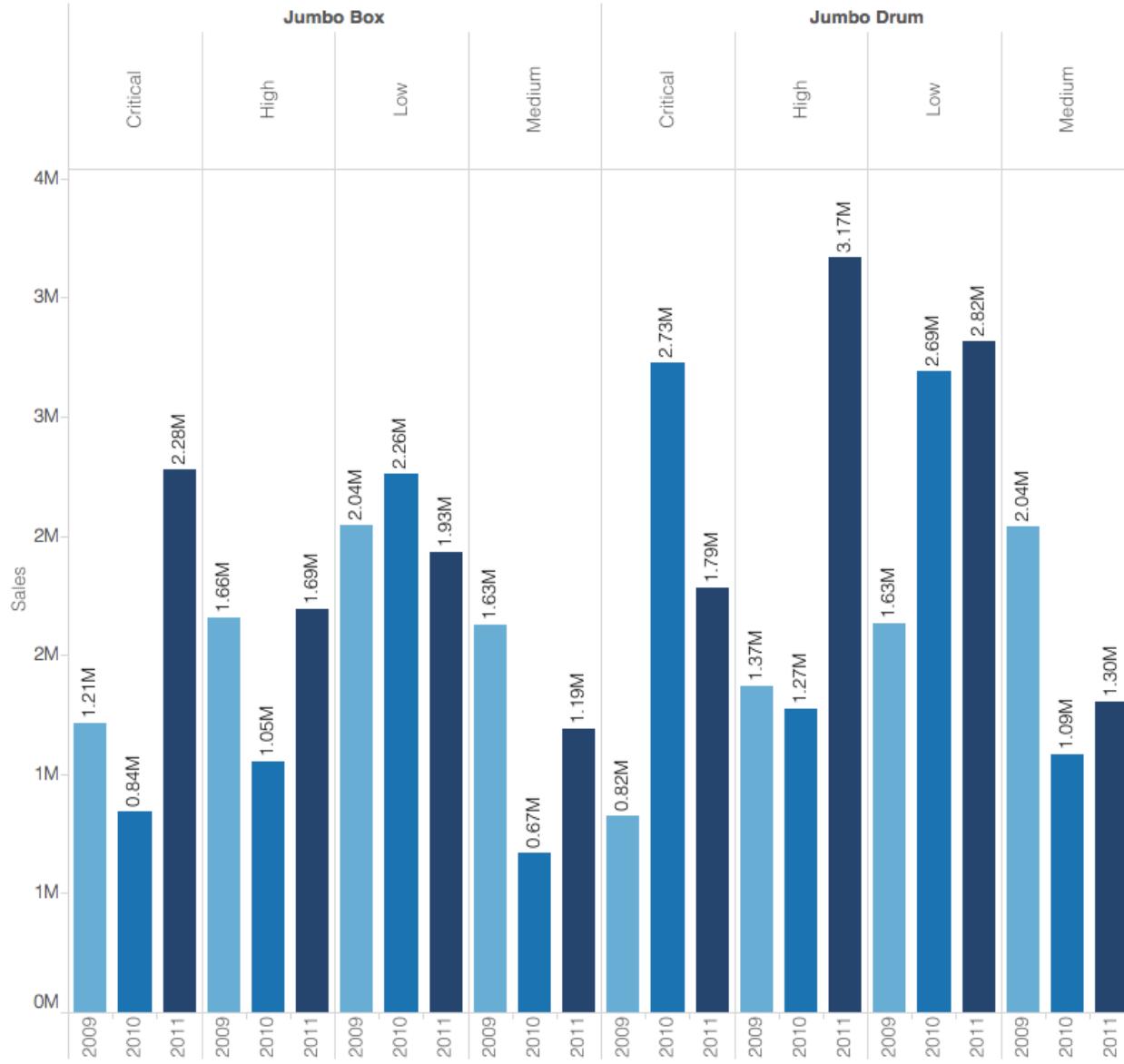
Relationship on scatter plot



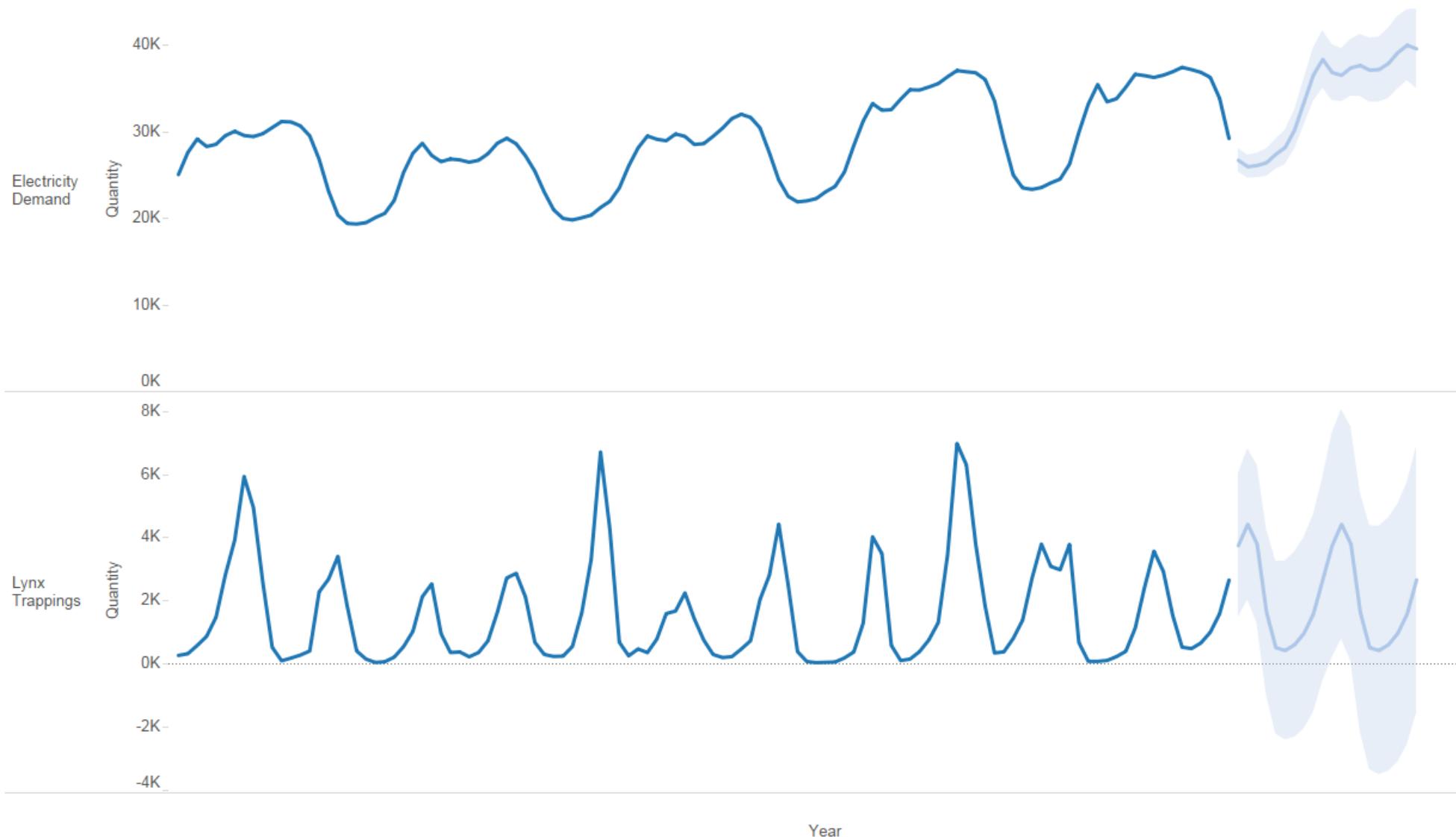
Relative proportion on tree map



Text orientation horizontal



Trends, patterns, outliers on line chart

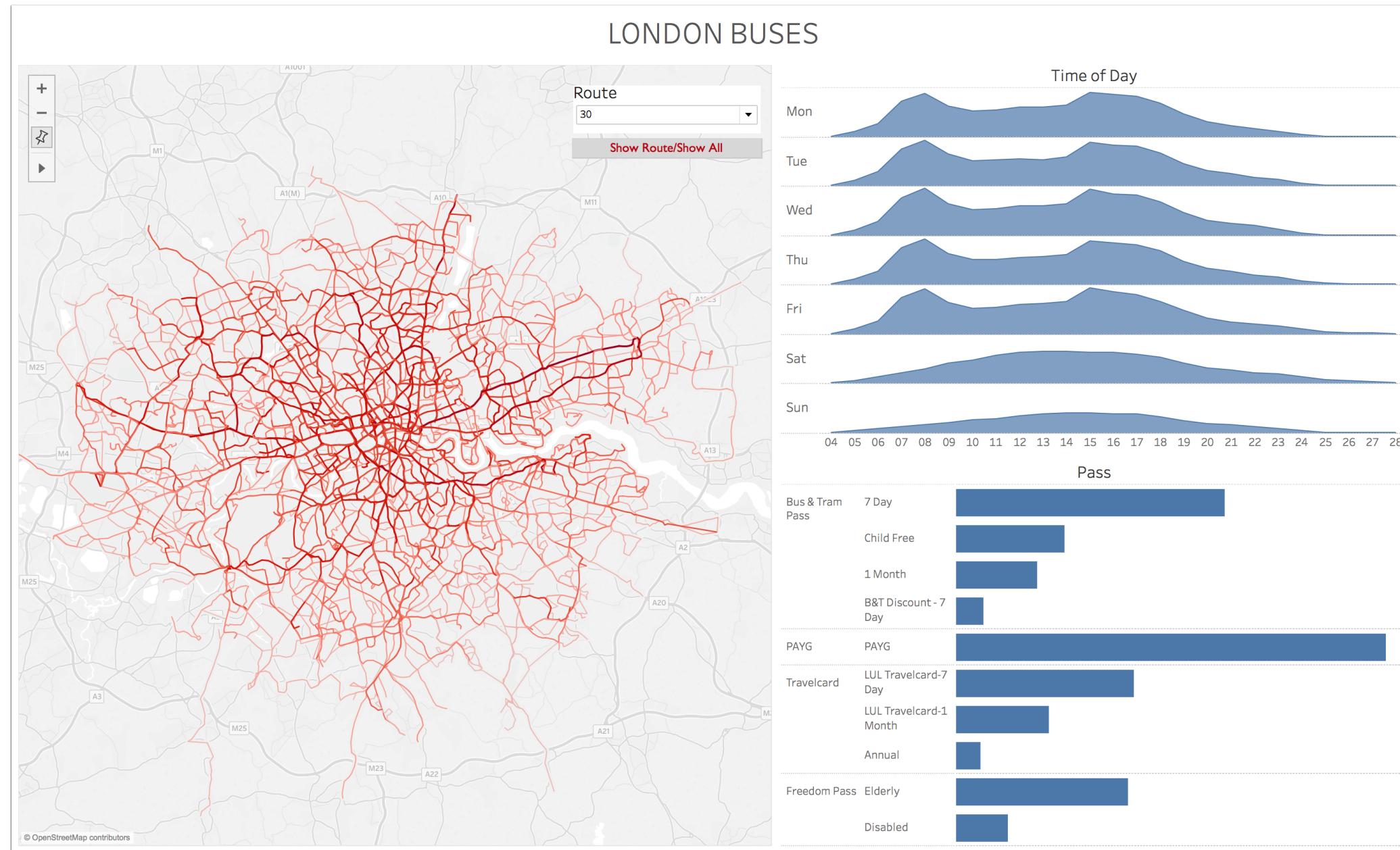


Compare on small multiples



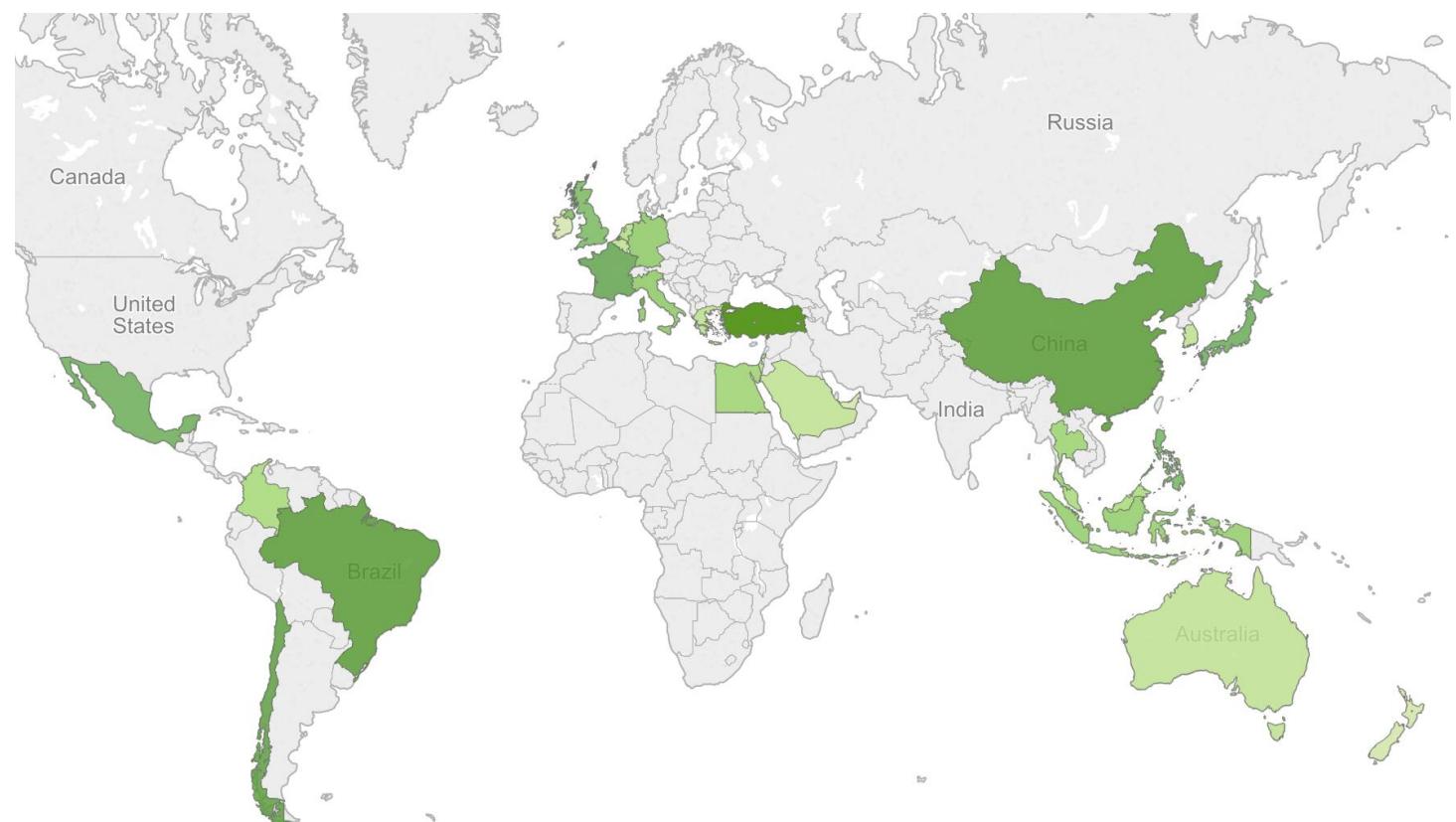
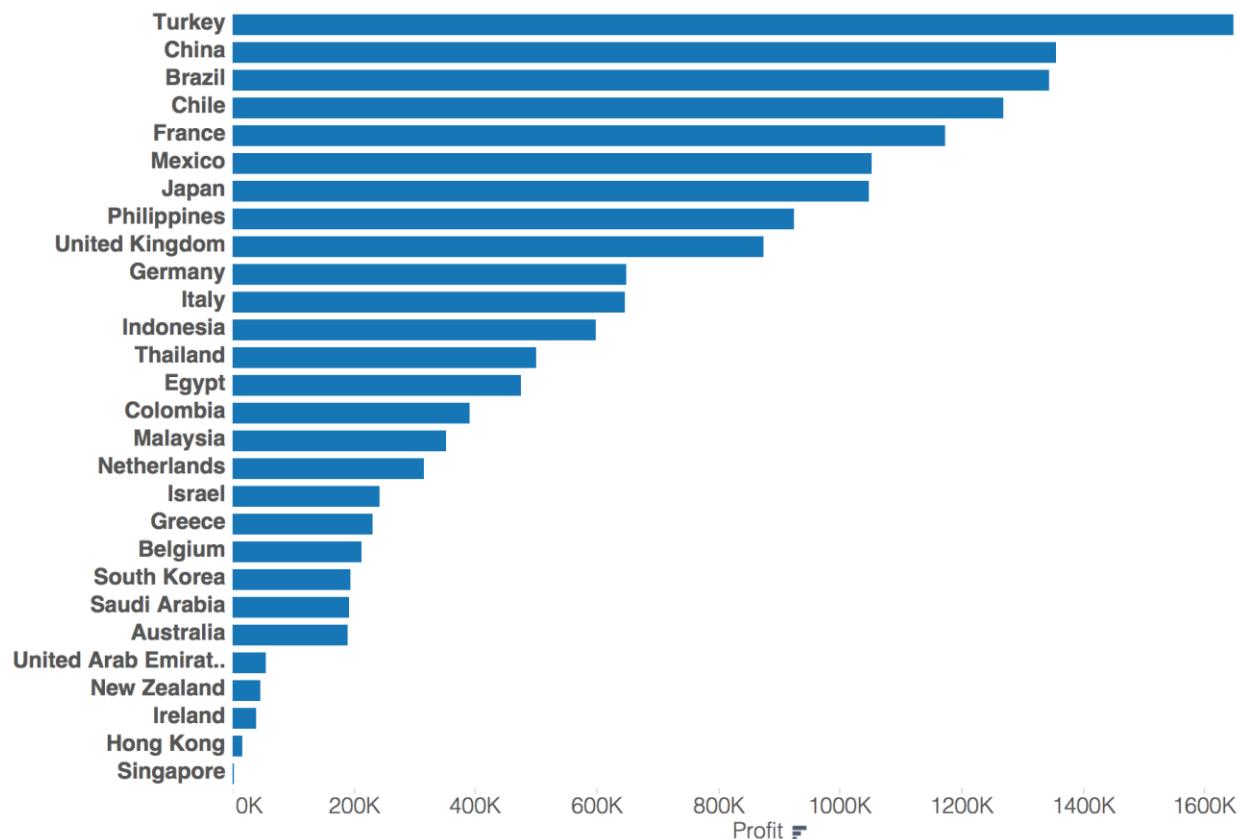
Location on map Compare values on bar chart

Time on horizontal axis



Location on map Compare values on bar chart

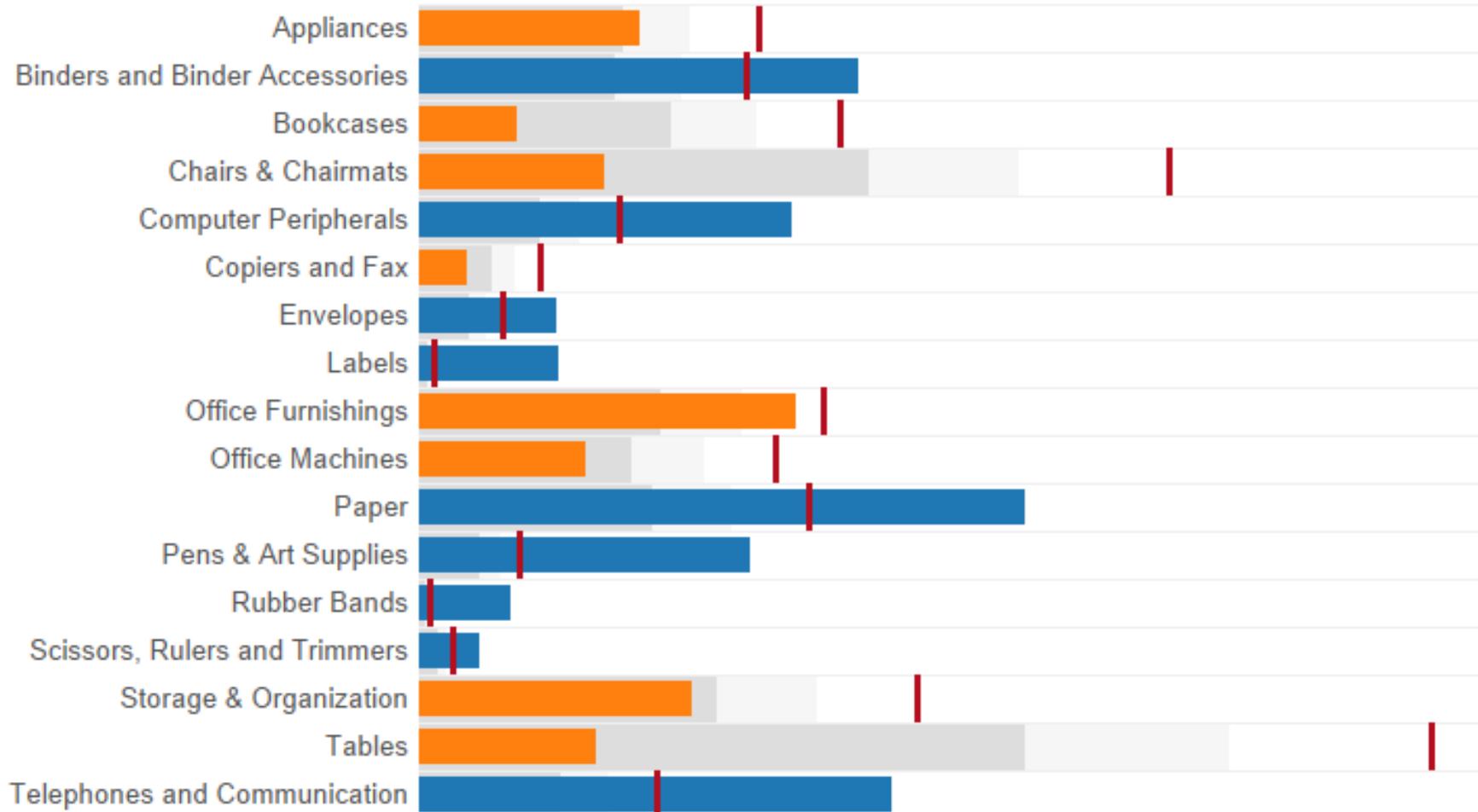
Use a bar chart instead of map if order is important



Context: comparing 2 values on bullet chart

	Time to Ship	Target	Difference	
Appliances	6,325	9,691	3,366	
Binders and Binder Accessories	12,529	9,355	-3,174	
Bookcases	2,819	12,034	9,215	
Chairs & Chairmats	5,289	21,394	16,105	
Computer Peripherals	10,631	5,697	-4,934	
Copiers and Fax	1,350	3,426	2,076	
Envelopes	3,926	2,401	-1,525	
Labels	3,990	406	-3,584	
Office Furnishings	10,782	11,515	733	
Office Machines	4,742	10,147	5,405	
Paper	17,294	11,128	-6,166	
Pens & Art Supplies	9,447	2,868	-6,579	
Rubber Bands	2,614	318	-2,296	
Scissors, Rulers and Trimmers	1,713	939	-774	
Storage & Organization	7,791	14,209	6,418	
Tables	5,048	28,866	23,818	
Telephones and Communication	13,475	6,778	-6,697	

forcing users to read



visually see by how far we met or missed the target

1. Human Visual Perception

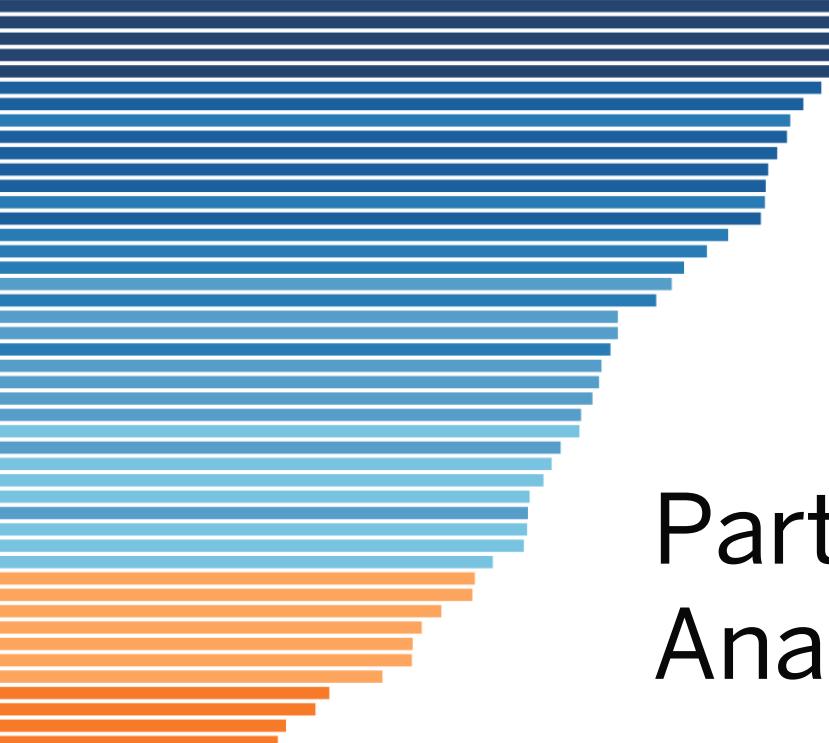
2. Visual Best Practice

3. Visual Analysis

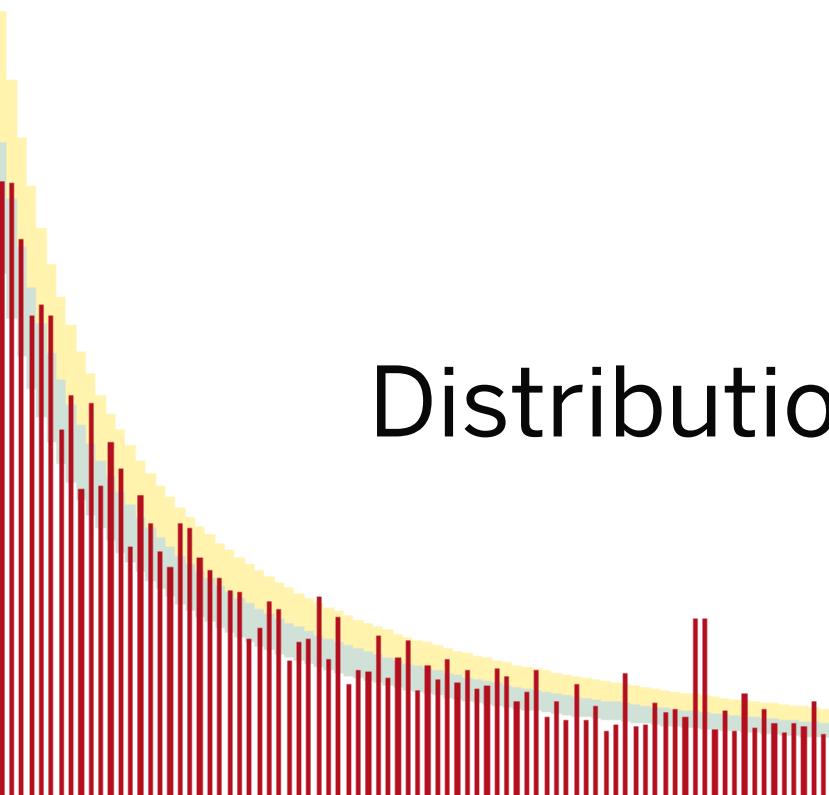
4. Good Dashboard Design

5. Guided Analytics





Part to Whole
Analysis

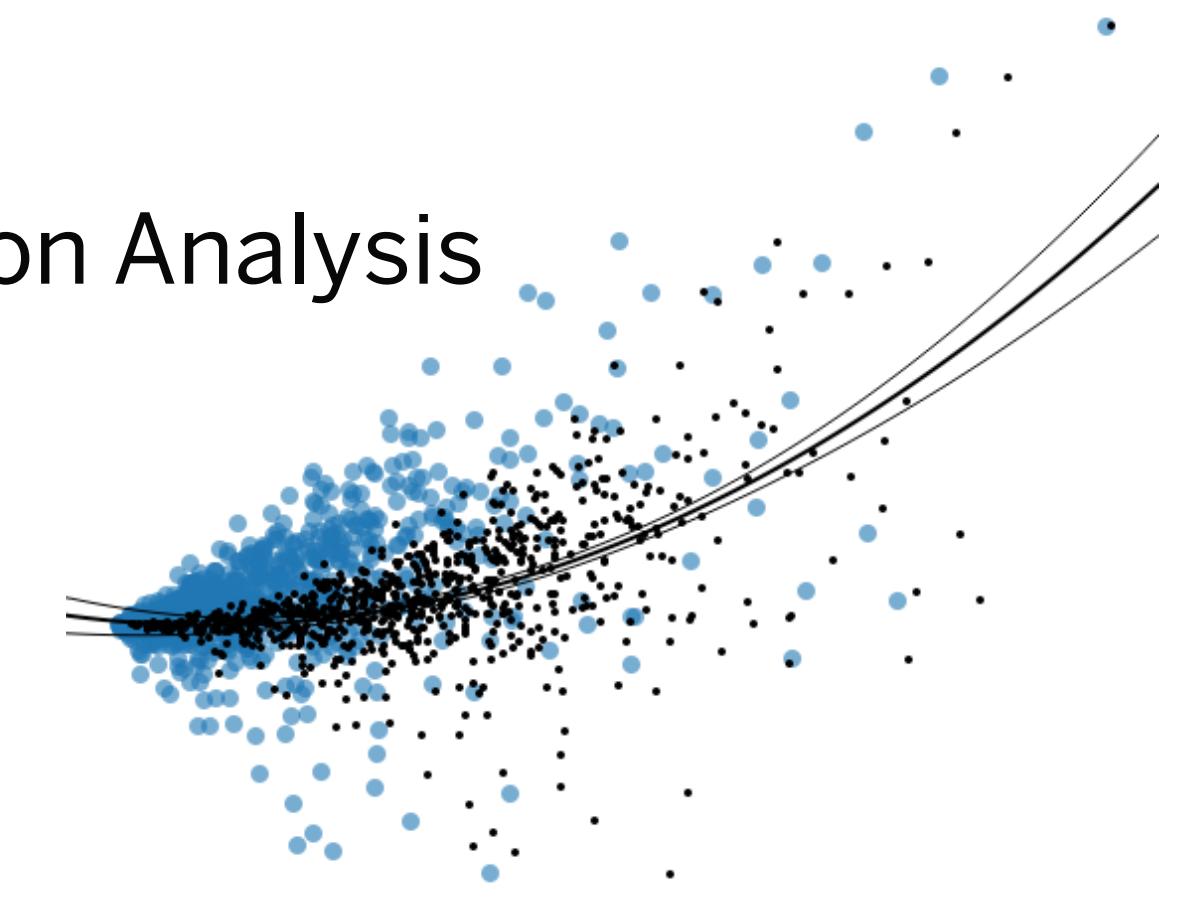


Distribution Analysis

Time Series Analysis

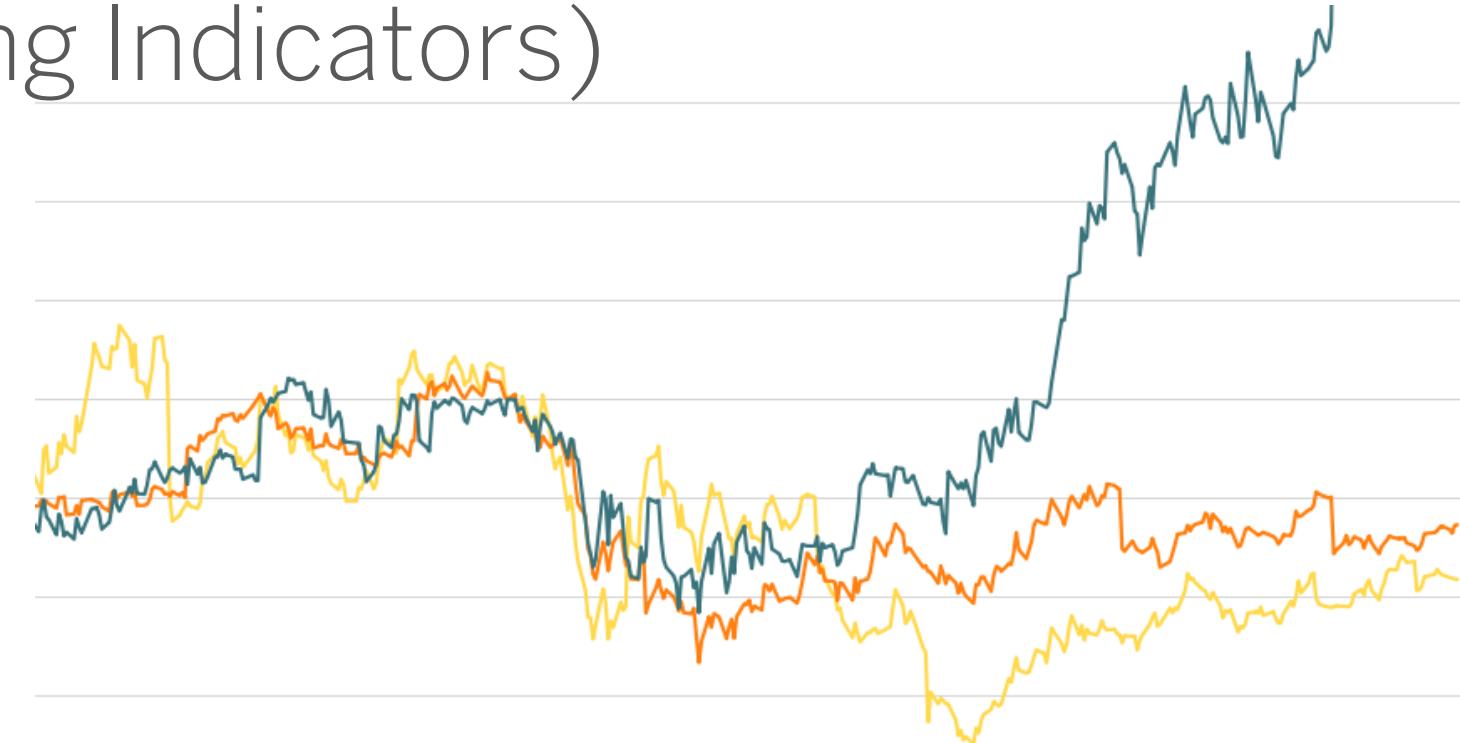


Correlation Analysis



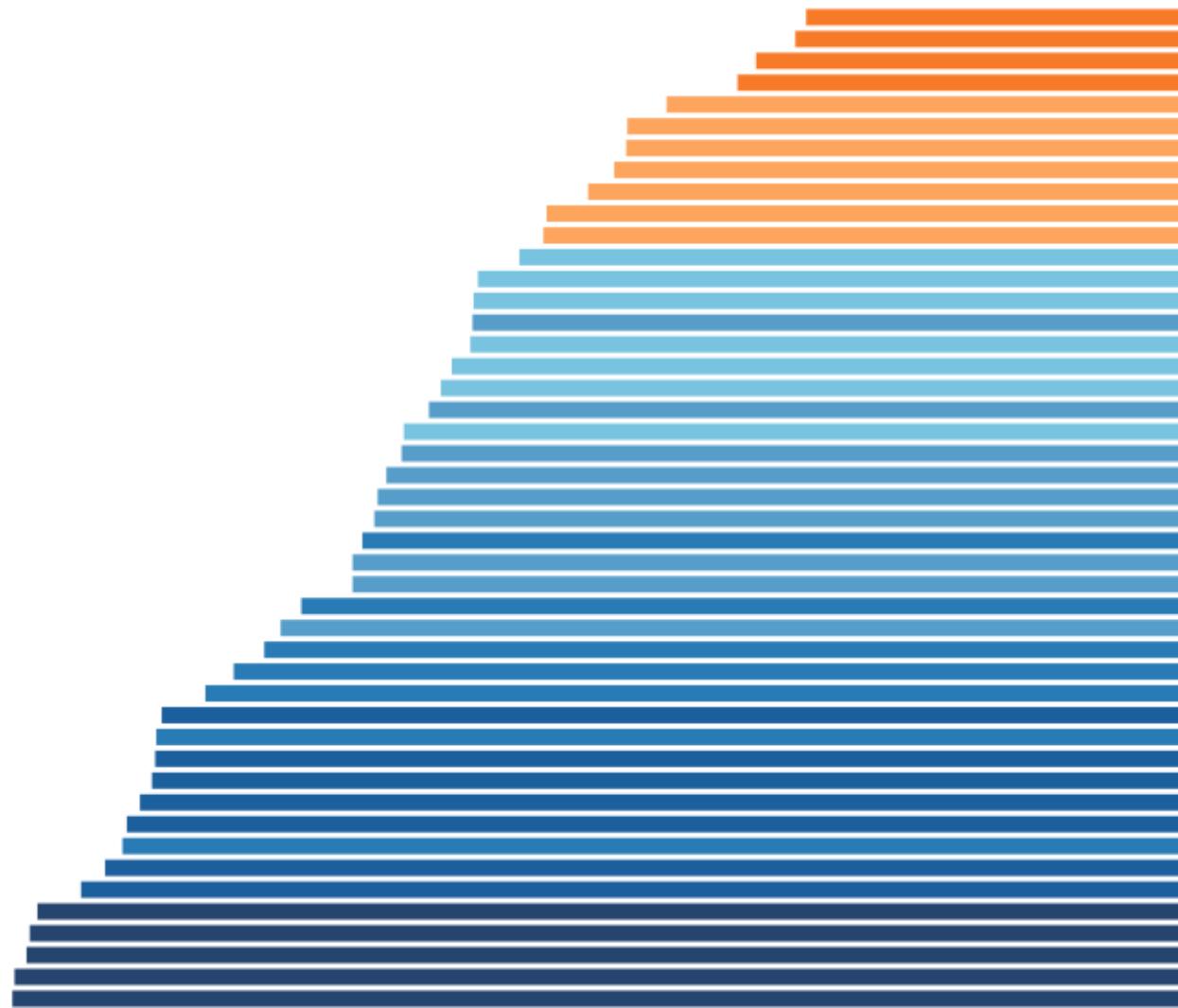
Time Series Analysis

- Trends
- Variations/Exceptions
- Rate of Change
- Co-variation (Leading/Lagging Indicators)
- Line Charts (or Line + Bar)



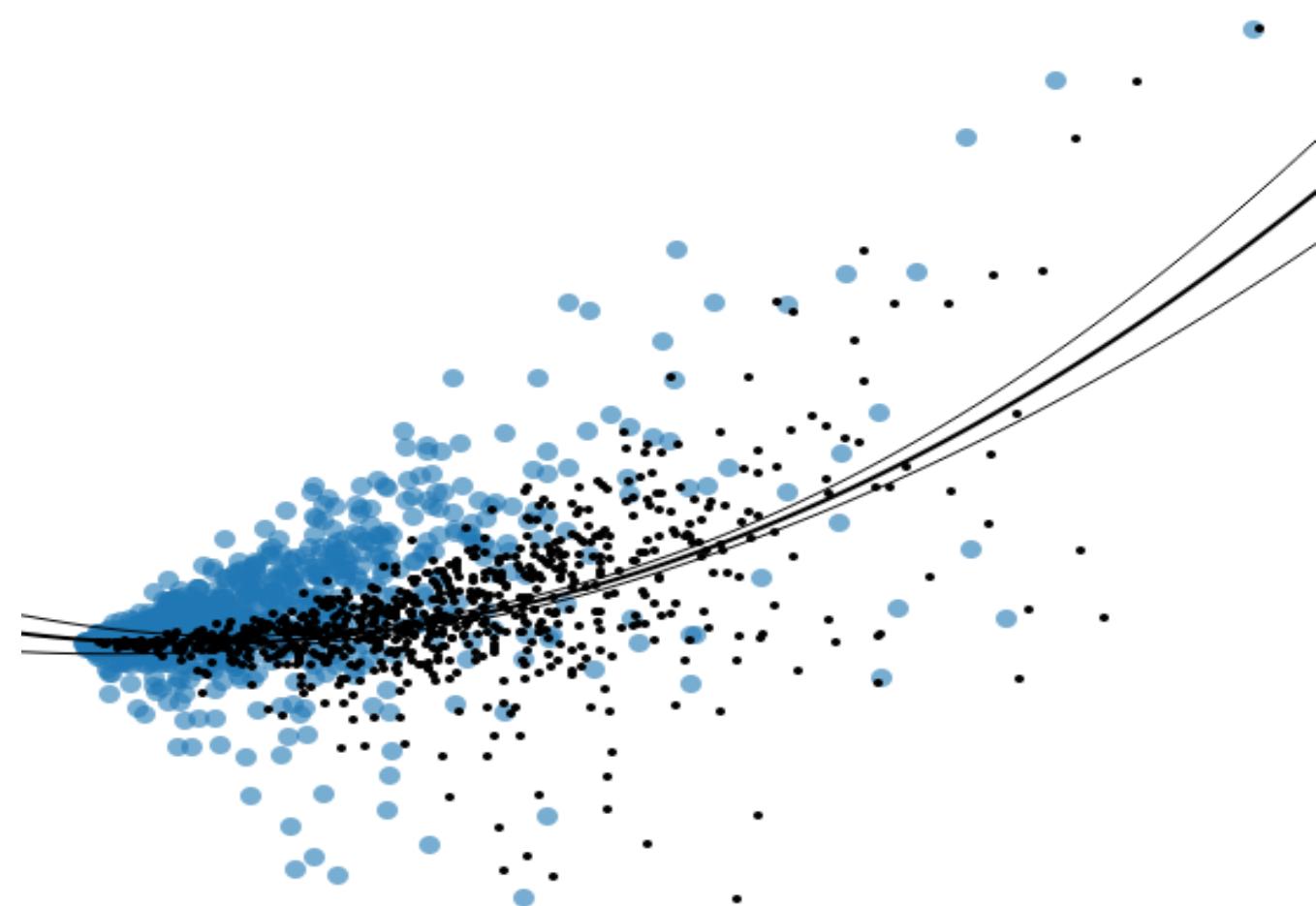
Part to Whole Analysis

- Parts and Whole
- Ranks
- Pie Charts vs Bar
- Pareto



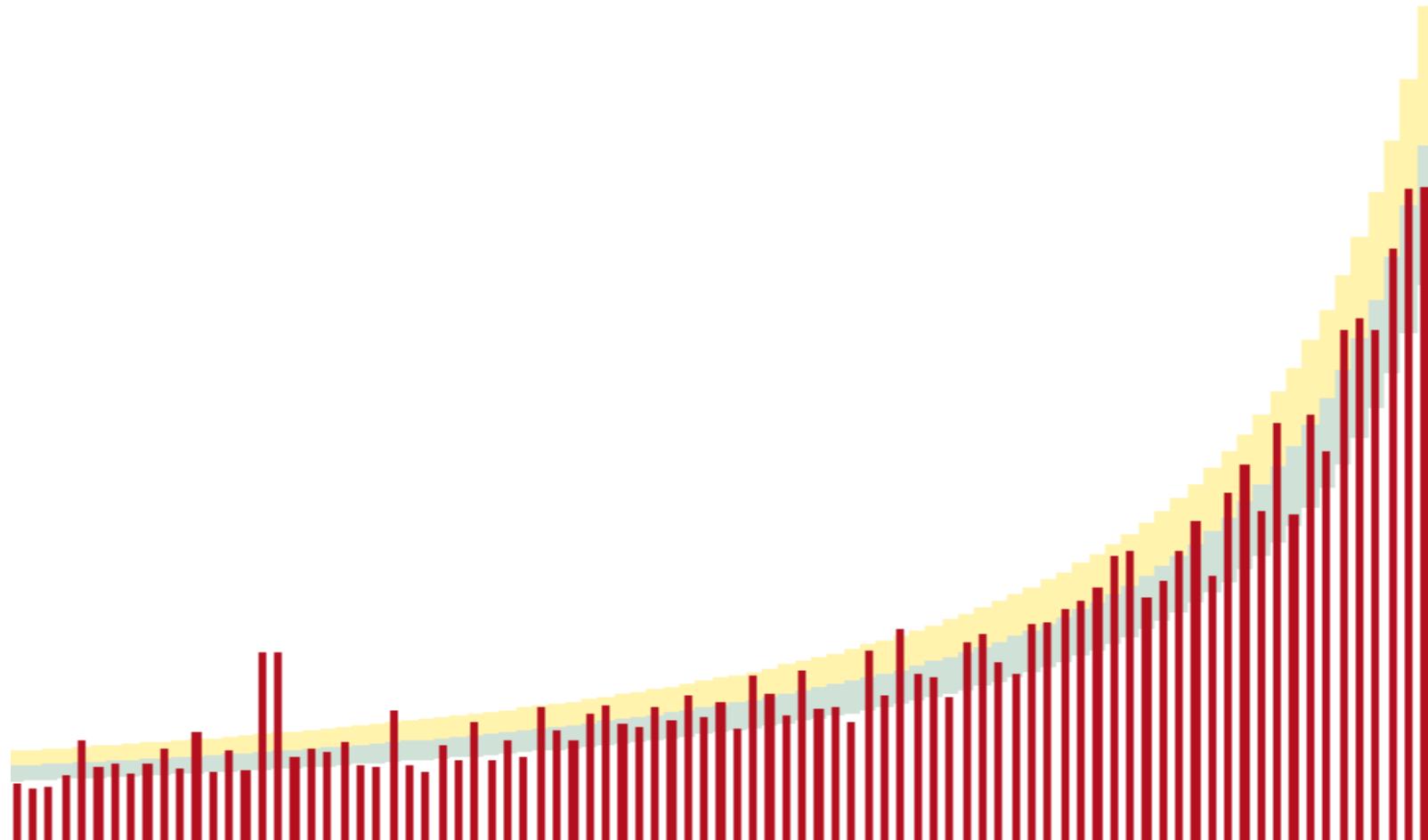
Correlation Analysis

- Direction – Positive/Negative
- Strength – Correlation Coefficient
- Shape – Linear/Curved/Outliers
- Scatter Plots



Distribution Analysis

- Spread
- Center
- Shape
- Histograms and Box Plots



Summary

Analysis	Visualizations
Time Series	Line, Line + Bar, Circle
Part in Whole	Bar, Bullet Chart
Correlation	Scatter Plot
Distribution	Histogram, Box Plots



Market Basket Analysis

- See buying patterns
- Create a self-join
- Heat map or Highlight map



Cohort Analysis

- Analyze the trend of a cohort or group of consumers
- Create a cohort group, for example first time customers



1. Human Visual Perception

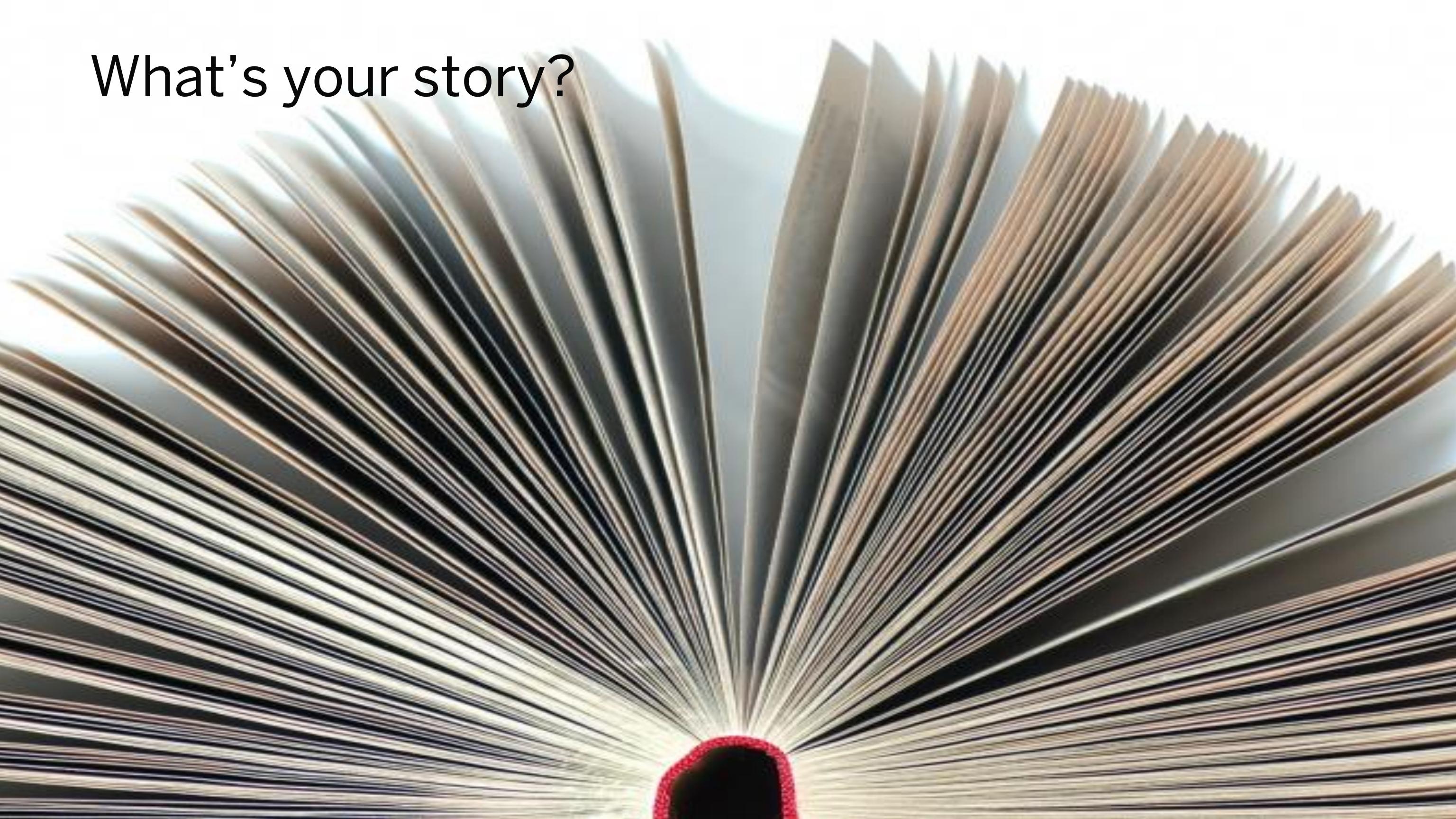
2. Visual Best Practice

3. Visual Analysis

4. Good Dashboard Design

5. Guided Analytics





What's your story?

“A dashboard is a visual display of the most important information needed to **achieve one or more objectives**; consolidated and arranged on a single screen so the information can be monitored at a glance”

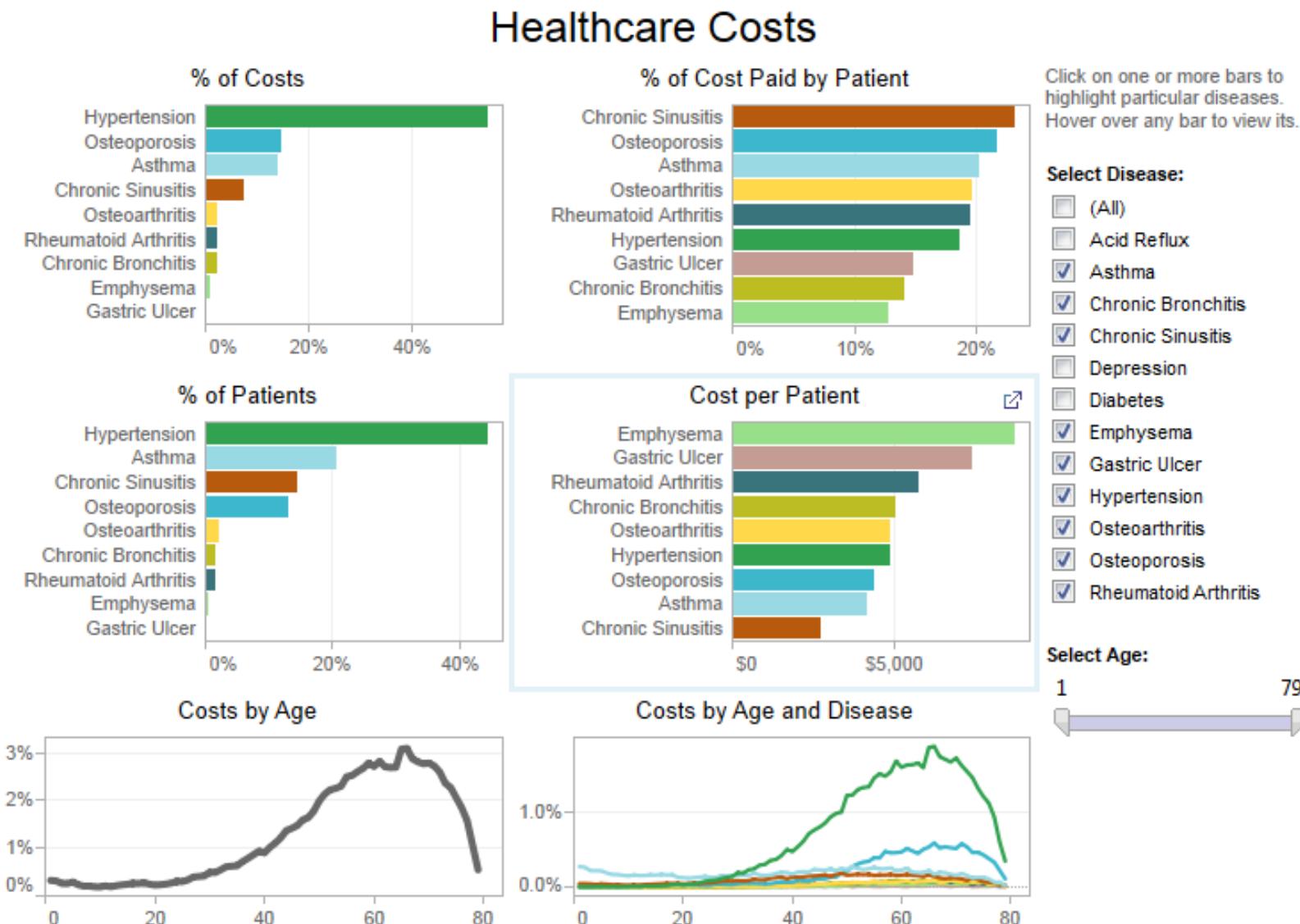
Stephen Few

Author

Information Dashboard Design

Dashboards

Dashboards should pass the 5-second test



1

Most important view goes on top or top-left

2

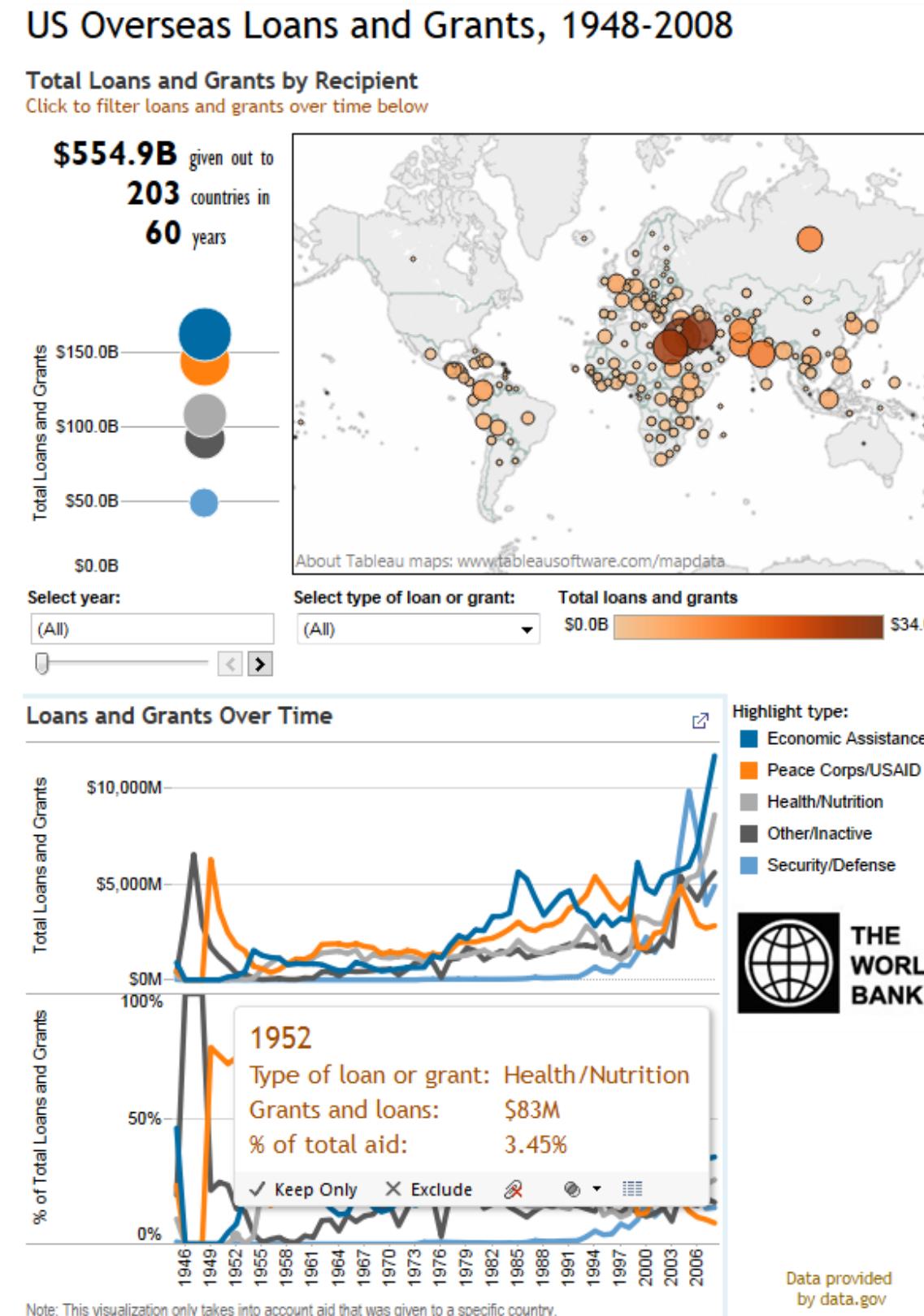
Provide interactivity for user discovery

3

At-a-glance : no scroll

4

Data Ink Ratio
Minimal color



5

Proper header and instructions

6

Use 5 views or fewer in dashboards

7

Legends go near their views

8

Consistent colors

9

Make use of tooltips

1. Human Visual Perception

2. Visual Best Practice

3. Visual Analysis

4. Good Dashboard Design

5. Guided Analytics



Telling a story to drive a point

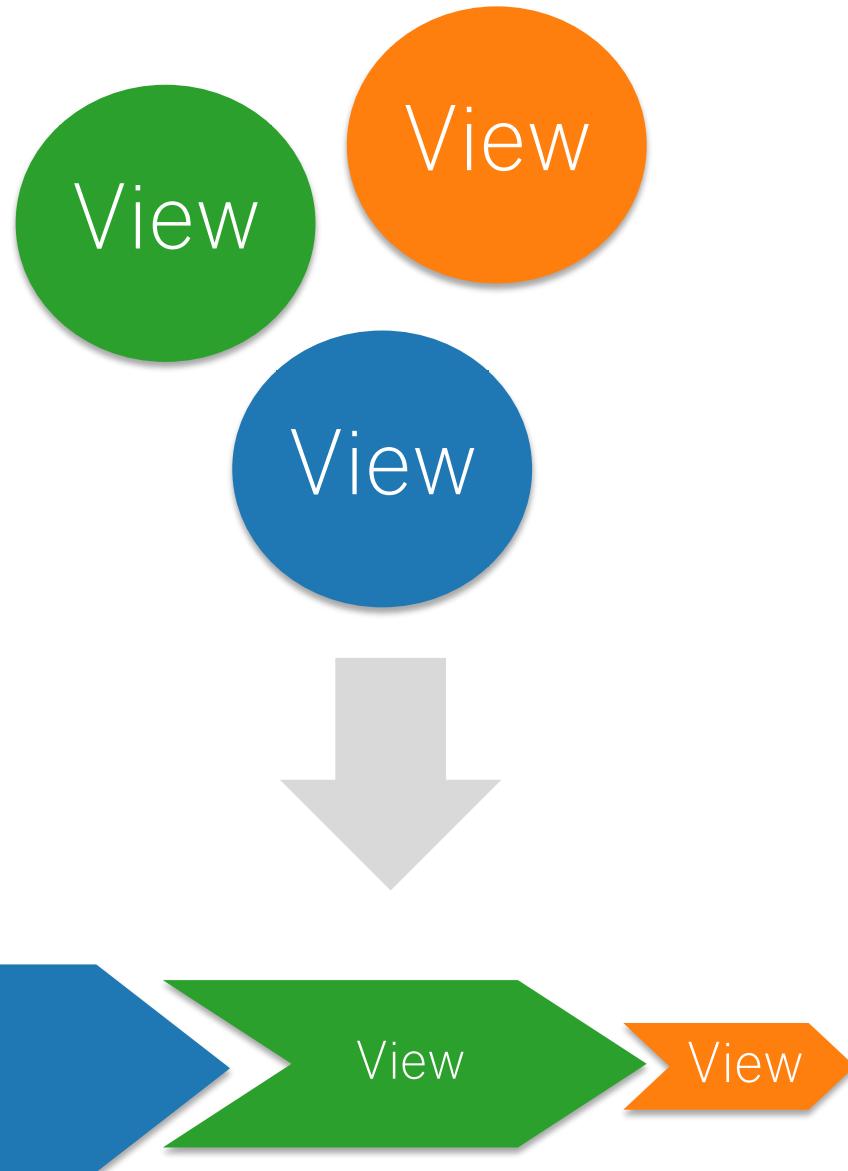


Guided Analytics – Tell your story

Weaving the story



- Trends
- Outliers
- Correlation



- Drill-in /through
- Filter
- Annotations
- URL
- Highlight

Reduce.



Your
Point

A classroom scene showing several students from behind, all with their hands raised towards a chalkboard. The student in the foreground is wearing a red shirt and has a pink hair tie. The student to their left is wearing a light blue shirt and an orange wristband. The chalkboard behind them is covered in faint, illegible chalk writing.

Questions?

Workshop

