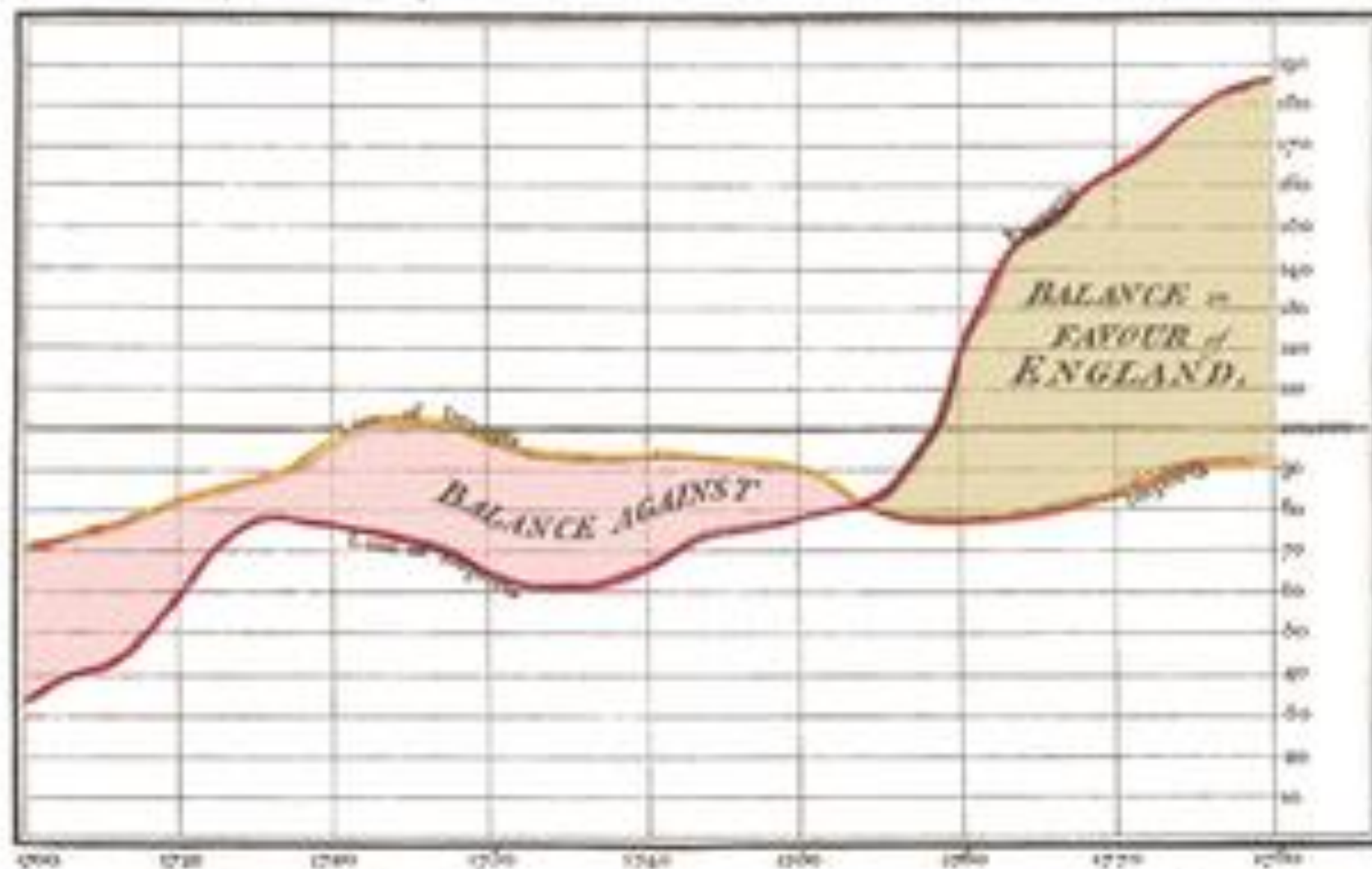# Thinking Visually

2016 Human Resources Training
February 2, 2016
Brian Williams

- Learn the fundamentals of **thinking visually**
- The Phenomenon of **Data Interaction**
- JCU and the **Tableau**-Visual Analytic roadmap

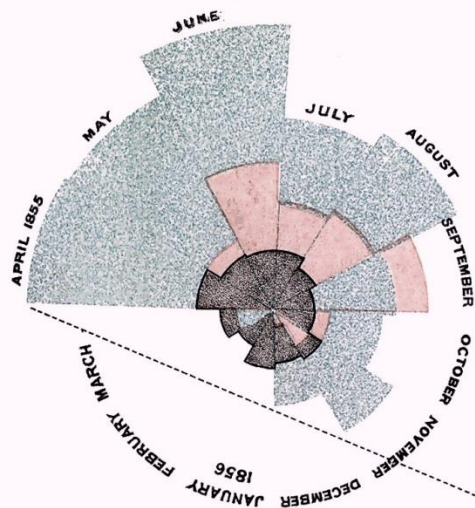# Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780

BALANCE in FAVOUR of ENGLAND.

BALANCE AGAINST

The Bottom line is divided into Years, the Right hand line into L10,000 each.

Published as the Act directs 1st May 1786 by Wm Playfair
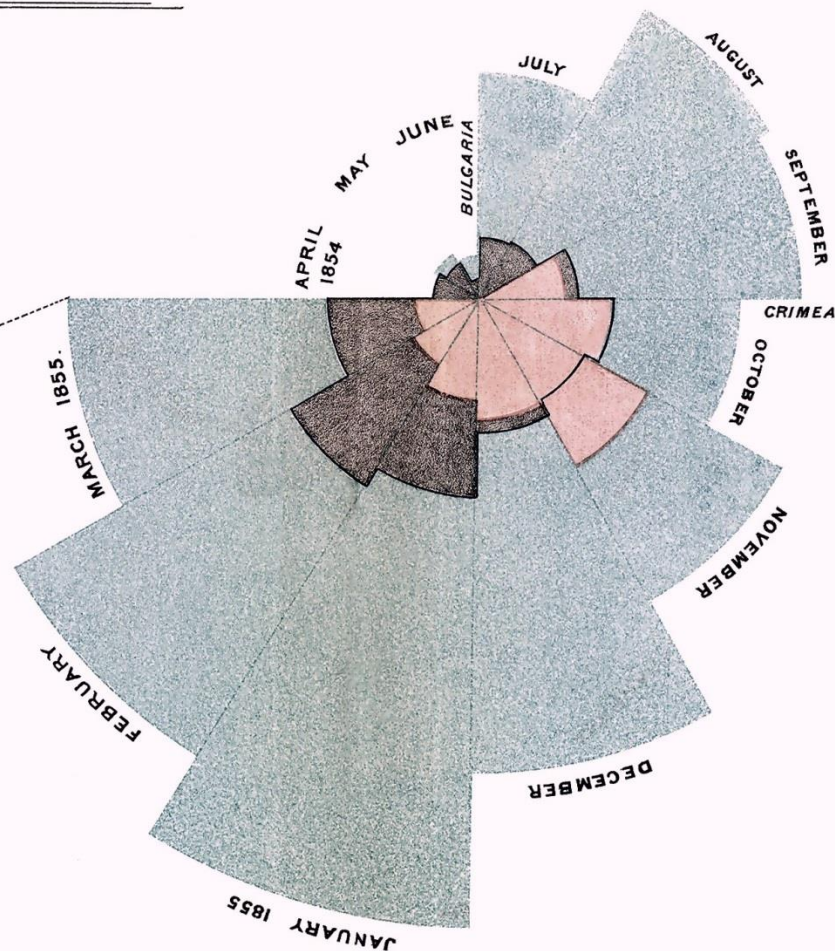
Neele sculpt 352 Strand, London

DIAGRAM of the CAUSES of MORTALITY
IN THE ARMY IN THE EAST.

2.
APRIL 1855 to MARCH 1856.

1.
APRIL 1854 to MARCH 1855.

The Areas of the blue, red, & black wedges are each measured from
the centre as the common vertex.

The blue wedges measured from the centre of the circle represent area
for area the deaths from Preventible or Mitigable Zymotic diseases; the
red wedges measured from the centre the deaths from wounds; & the
black wedges measured from the centre the deaths from all other causes.

The black line across the red triangle in Nov.r 1854 marks the boundary
of the deaths from all other causes during the month.

In October 1854, & April 1855, the black area coincides with the red;
in January & February 1856, the blue coincides with the black.

The entire areas may be compared by following the blue, the red & the
black lines enclosing them.

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812–1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. ——— Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de MM. Thiers, de Ségur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre. Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mobilow et sont rejoints vers Orscha et Witebsk, avaient toujours marché avec l'armée.

MOSCOU

100.000

6.000 · 22.000 · 33.000 · Polotzk · Gloubokoe · 60.000 · Witebsk · 175.000 · Mojaisk · 127.100 · Chjat · 100.000 · Tarantino

422.000 · 400.000 · Wilna · Dorogobouge · Wizma · 87.000 · 37.000 · Malo-jarosewli · 36.000

Niemen R. · Kowno · Smolensk · 145.000 · 55.000

Smorgoni · 14.000 · Mojaisk · 24.000 · 55.000

Niemen R. · 10.000 · 4.000 · 8.000 · Molodezno · 12.000 · Bérézina R. · 28.000 · Orscha · 50.000 · Botr · 24.000 · 33.000

Studienska · 50.000 · Mohilow

Minsk

Lieues communes de France (Carte de M. de Fezensac)
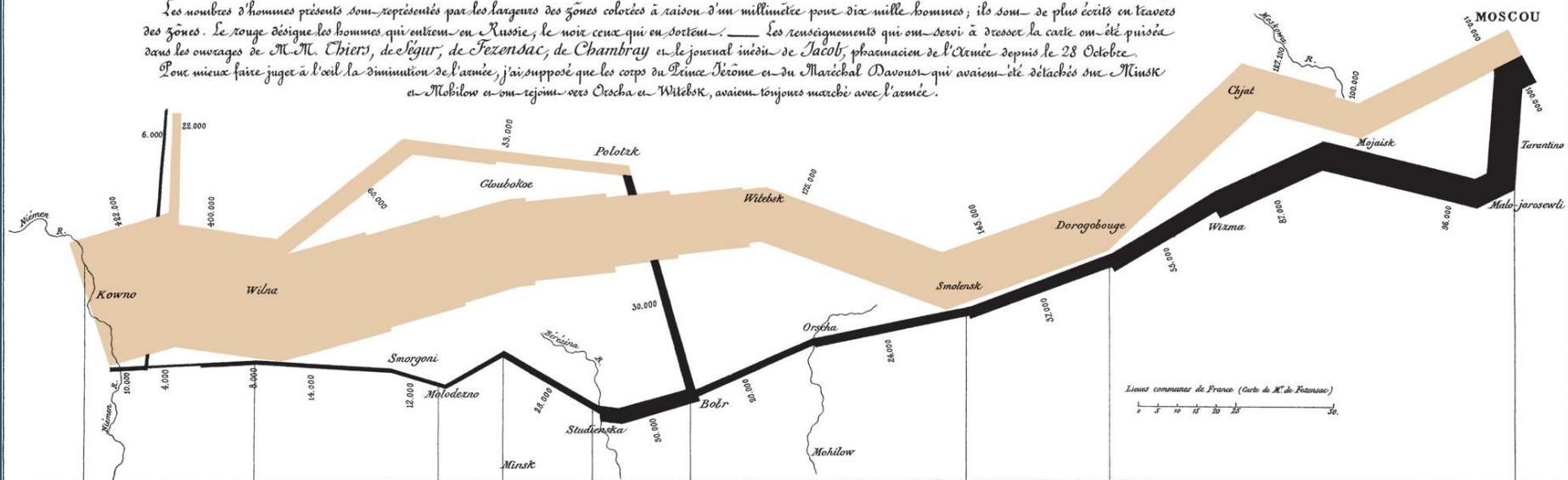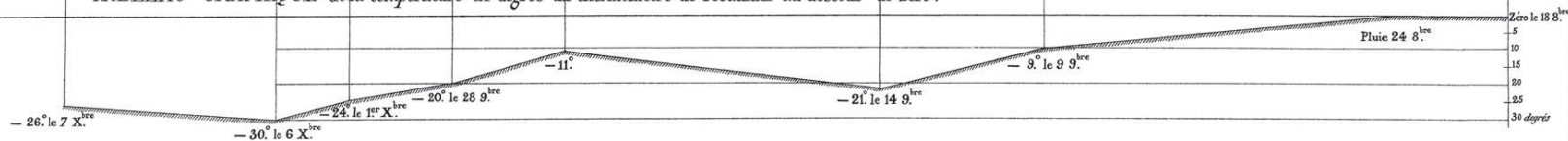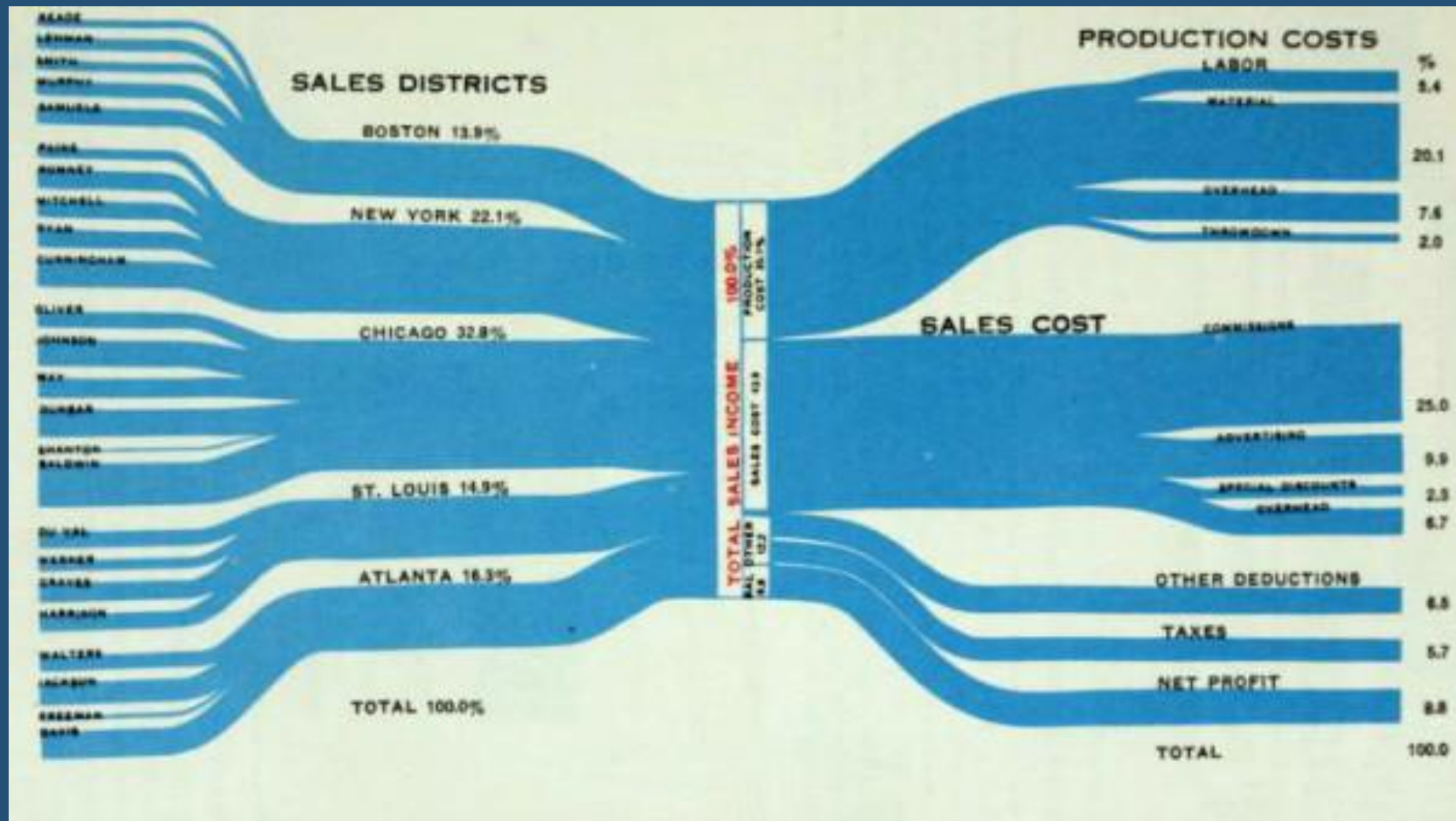0 · 5 · 10 · 15 · 20 · 25 · 30.

TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Cosaques passent au galop le Niémen gelé.

Zéro le 18 8bre
Pluie 24 8bre

—11°
— 9° le 9 9bre
— 20° le 28 9bre
— 21° le 14 9bre
—24° le 1er X.
— 26° le 7 Xbre
—30° le 6 Xbre

5 · 10 · 15 · 20 · 25 · 30 degrés

Every day, we create 2.5 quintillion bytes of **data** — so much that 90% of the **data** in the world today has been created in the last two years alone
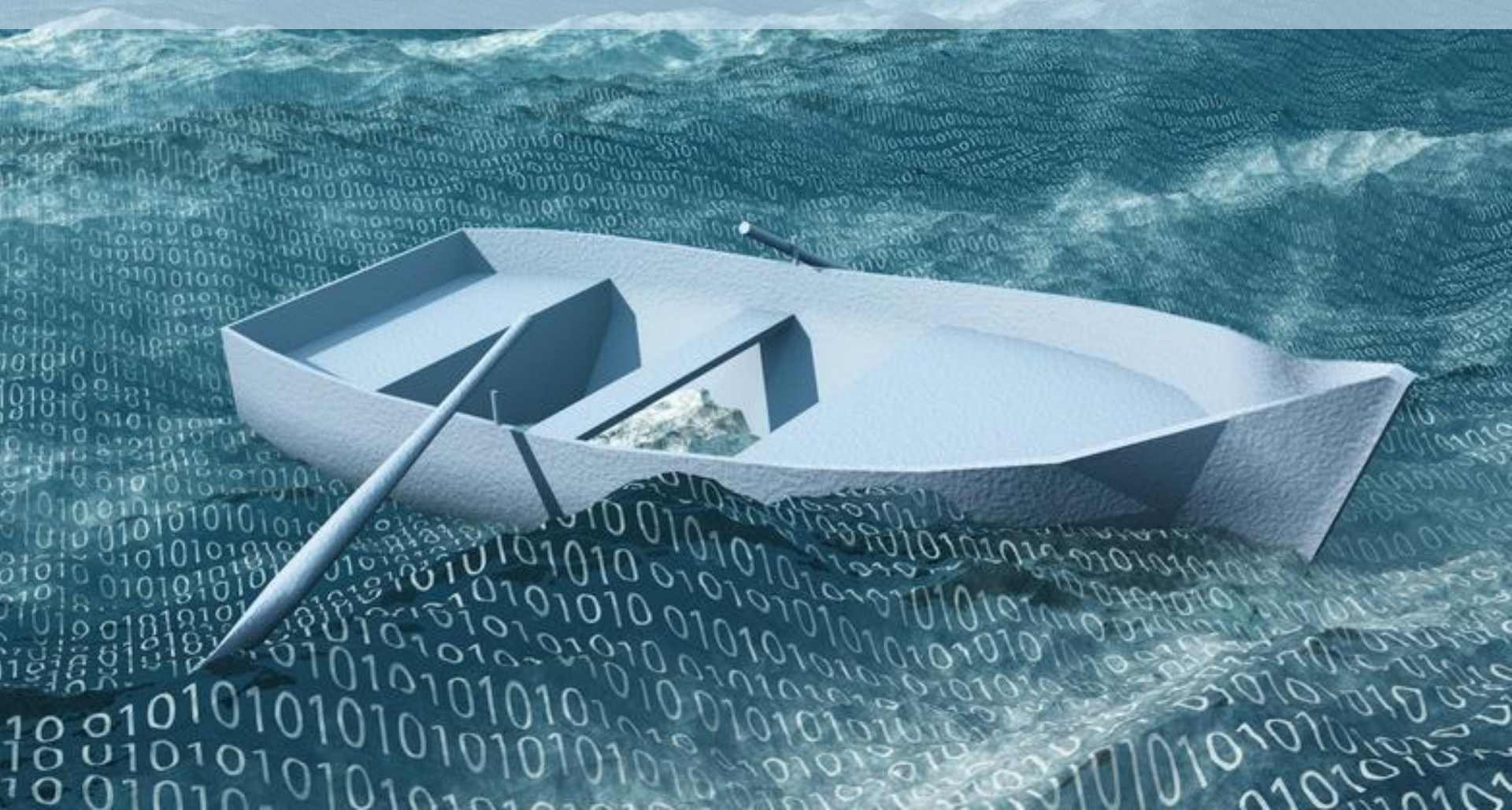
70074	70075	70076	70077	70078	70079	70080	70081	70082	70083	70084	**70085**	70086	70087	70088	70089
70108	70109	**70110**	**70111**	70112	70113	70114	70115	70116	70117	**70118**	70119	70120	70121	70122	70123
70142	**70143**	70144	70145	70146	70147	70148	70149	70150	**70151**	70152	70153	70154	70155	70156	70157
70176	70177	**70178**	70179	**70180**	70181	70182	70183	70184	70185	70186	70187	70188	**70189**	**70190**	70191
70210	70211	70212	70213	70214	**70215**	70216	70217	**70218**	70219	70220	**70221**	70222	70223	70224	**70225**
70244	70245	70246	70247	70248	70249	70250	**70251**	70252	**70253**	70254	70255	70256	70257	70258	70259
70278	70279	70280	70281	70282	70283	70284	70285	70286	70287	70288	70289	70290	70291	70292	70293
70312	70313	70314	70315	**70316**	70317	70318	70319	70320	70321	70322	70323	**70324**	70325	70326	70327
70346	70347	**70348**	**70349**	70350	70351	70352	**70353**	70354	70355	70356	70357	**70358**	70359	70360	70361
70380	**70381**	70382	70383	70384	70385	70386	70387	70388	70389	**70390**	70391	**70392**	70393	70394	70395
70414	**70415**	**70416**	70417	70418	70419	70420	70421	70422	70423	70424	**70425**	**70426**	70427	70428	70429
70448	70449	70450	**70451**	70452	70453	**70454**	70455	70456	70457	70458	**70459**	**70460**	70461	70462	70463
70482	70483	70484	70485	70486	70487	70488	70489	70490	70491	70492	70493	**70494**	70495	70496	70497
70516	70517	**70518**	**70519**	70520	70521	70522	70523	70524	**70525**	70526	70527	70528	70529	70530	70531
70550	70551	70552	70553	70554	70555	70556	70557	70558	70559	70560	70561	70562	70563	70564	70565
70584	**70585**	70586	70587	70588	70589	70590	70591	70592	70593	70594	70595	**70596**	70597	70598	70599
70618	70619	70620	70621	70622	70623	70624	70625	70626	70627	70628	70629	70630	70631	70632	**70633**
70652	70653	70654	70655	70656	70657	70658	70659	70660	70661	70662	70663	**70664**	70665	**70666**	**70667**
70686	70687	70688	70689	70690	70691	70692	70693	70694	70695	70696	**70697**	70698	70699	70700	70701
70720	70721	70722	70723	70724	70725	**70726**	**70727**	**70728**	**70729**	70730	70731	70732	70733	**70734**	70735
70754	**70755**	70756	70757	70758	70759	70760	**70761**	70762	70763	70764	70765	70766	70767	70768	70769
70788	70789	70790	70791	70792	70793	70794	70795	70796	70797	70798	**70799**	70800	70801	70802	**70803**
70822	70823	70824	70825	70826	70827	70828	70829	70830	70831	70832	70833	**70834**	**70835**	70836	**70837**
70856	**70857**	70858	70859	70860	70861	**70862**	70863	70864	**70865**	70866	**70867**	70868	70869	70870	**70871**
70890	70891	70892	70893	**70894**	70895	70896	70897	70898	70899	70900	70901	70902	70903	70904	70905
70924	70925	70926	70927	70928	70929	**70930**	70931	70932	70933	70934	70935	70936	70937	**70938**	70939
70958	**70959**	**70960**	70961	70962	70963	70964	**70965**	70966	70967	70968	70969	**70970**	**70971**	70972	70973
70992	70993	70994	70995	**70996**	70997	70998	70999	71000	71001	71002	71003	71004	71005	71006	71007
71026	71027	71028	71029	71030	**71031**	71032	71033	71034	71035	71036	71037	71038	**71039**	71040	**71041**
71060	71061	**71062**	71063	**71064**	71065	71066	71067	**71068**	71069	**71070**	71071	71072	71073	71074	71075
71094	71095	71096	71097	71098	**71099**	71100	**71101**	71102	71103	71104	71105	71106	71107	71108	**71109**
71128	71129	71130	**71131**	71132	71133	71134	71135	71136	71137	71138	71139	71140	**71141**	71142	**71143**
71162	71163	71164	71165	**71166**	71167	**71168**	71169	71170	71171	71172	71173	71174	71175	71176	71177
71196	**71197**	**71198**	71199	**71200**	71201	71202	71203	71204	71205	71206	**71207**	71208	71209	**71210**	71211
71230	71231	71232	71233	71234	71235	71236	71237	71238	71239	71240	71241	71242	71243	71244	71245
71264	71265	71266	71267	71268	71269	71270	71271	71272	71273	**71274**	**71275**	71276	71277	71278	71279
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71366	71367	71368	71369	71370	**71371**	71372	71373	**71374**	71375	71376	71377	71378	**71379**	71380	**71381**
71400	71401	71402	71403	71404	71405	**71406**	71407	71408	**71409**	**71410**	71411	**71412**	71413	71414	**71415**
71434	**71435**	**71436**	71437	71438	71439	71440	71441	71442	71443	71444	71445	71446	71447	71448	71449

"Bigness" is only 20% of data's personality

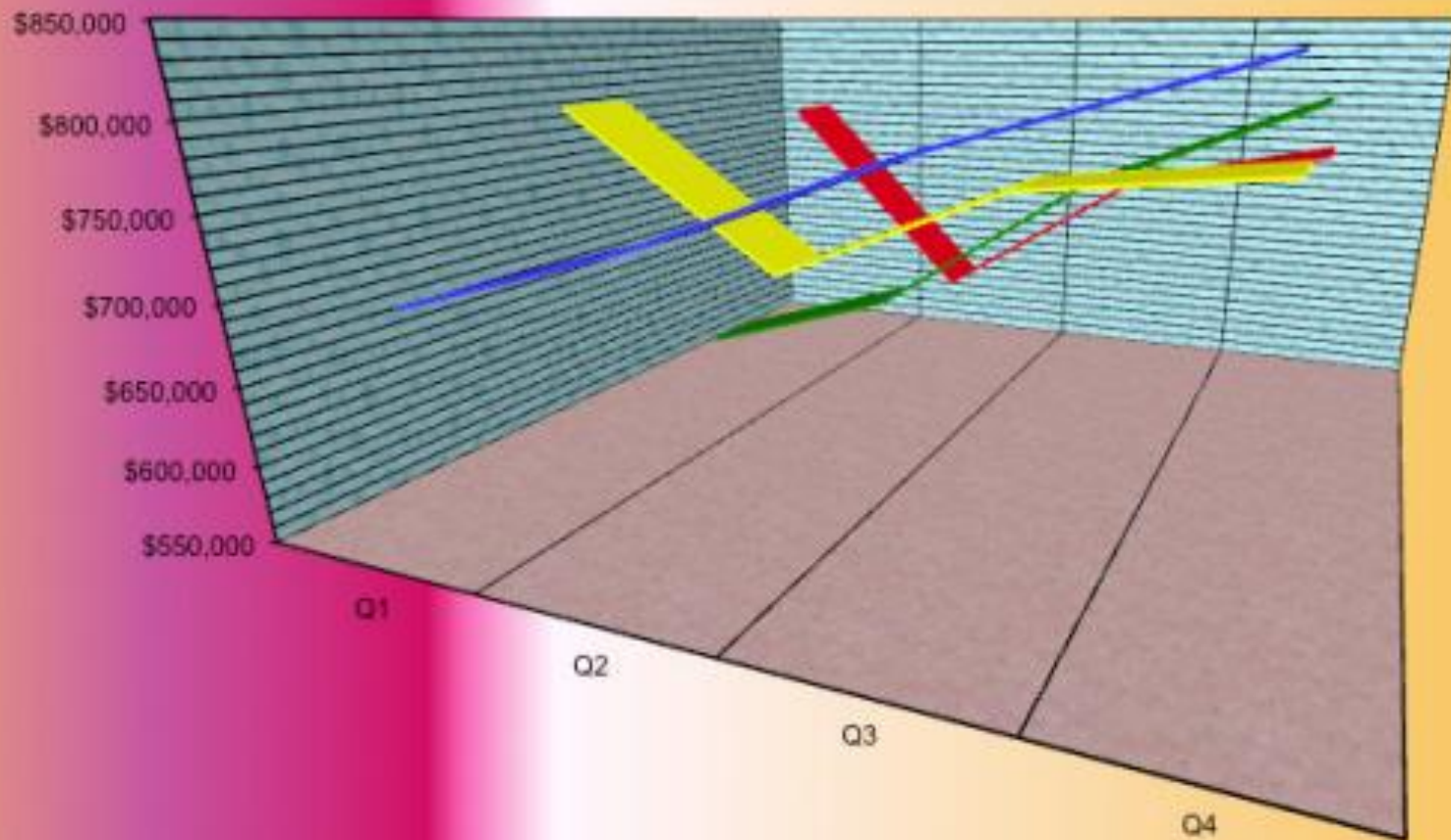| VOLUME	VELOCITY	VARIETY	VERACITY	VALUE
Data at Rest	Data in Motion	Data in Many Forms	Data in Doubt	**Data Quality**
Terabytes to exabytes of exsisting data to process	Streaming data, miliseconds to seconds to respond	structured, unstructured, text, multimedia	Uncertainty due to data inconsistency & incompleteness, ambiguities, latyency, deception and model approximations	The ability of the data to add value into the decision-making process.
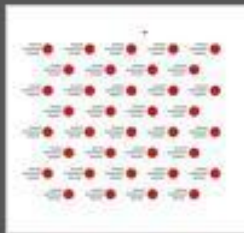
Visualization

Overload, clutter, and confusion are not attributes of information, they are failures of design. So if something is cluttered, fix your design; don't throw out the information.

If something is confusing, don't blame your victim (the audience). Instead, fix the design.

- Edward Tufte

2010 Sales

Witch

Princess (generic)

Pirate

Cat

Fairy

Ninja

Power Ranger

Vampire

Grim Reaper

Skeleton

Spider-Man

Angel

Devil

Cowboy/Cowgirl

Ghostface (Scream)

Knight

Snow White

Darth Vader

Ghost

Barbie

Eeyore (Winnie the Pooh)

Cheerleader

Buzz Lightyear (Toy Story)

Cinderella

Hermione Granger (Harry Potter)

Harry Potter

Aladdin

Jason Voorhees (Friday the 13th)

Ladybug

Lion

Oriental

Soldier

Tiger

Wizard

Aurora (Sleeping Beauty)

Belle (Beauty and the Beast)

Pumpkin

Frankenstein's Monster

Minnie Mouse

Horse

Monkey

Raggedy Ann

Tigger (Winnie the Pooh)

Barney the Dinosaur

Football (American)

King of Hearts

Luke Skywalker (Star Wars)

Mr. Incredible

Scooby-Doo

Peter Pan

Thomas the Tank Engine

Tinkerbell (Peter Pan)

Yu-Gi-Oh!

Bob the Builder

Cheer Bear (Care Bears)

Lightning McQueen

Nemo (Finding Nemo)

SpongeBob SquarePants

The Tweenies

Al Borland

The Grinch

Pie I have eaten

Pie I have not yet eaten

Visual analytics is *the science of analytical reasoning facilitated by interactive visual interfaces*

Thomas & Cook, 2005

Anscombe's Quartet

	Set A		Set B		Set C		Set D	
	X	Y	X	Y	X	Y	X	Y
0	10	8.04	10	9.14	10	7.46	8	6.58
1	8	6.95	8	8.14	8	6.77	8	5.76
2	13	7.58	13	8.74	13	12.74	8	7.71
3	9	8.81	9	8.77	9	7.11	8	8.84
4	11	8.33	11	9.26	11	7.81	8	8.47
5	14	9.96	14	8.10	14	8.84	8	7.04
6	6	7.24	6	6.13	6	6.08	8	5.25
7	4	4.26	4	3.10	4	5.39	19	12.50
8	12	10.84	12	9.13	12	8.15	8	5.56
9	7	4.82	7	7.26	7	6.42	8	7.91
10	5	5.68	5	4.74	5	5.73	8	6.89
mean	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
std	3.32	2.03	3.32	2.03	3.32	2.03	3.32	2.03
corr	0.82		0.82		0.82		0.82	
lin. reg.	$y = 3.00 + 0.500x$		$y = 3.00 + 0.500x$		$y = 3.00 + 0.500x$		$y = 3.00 + 0.500x$	
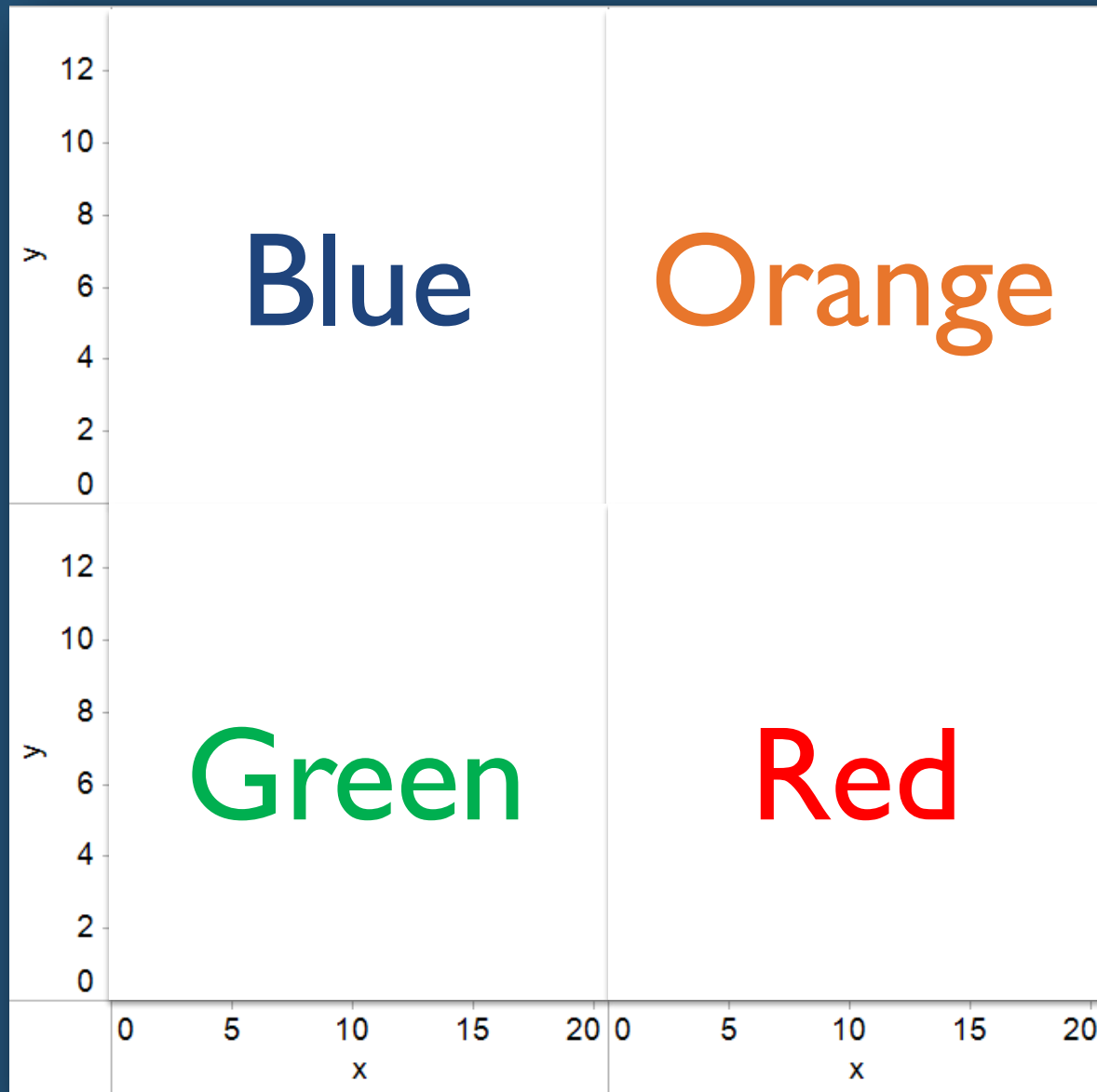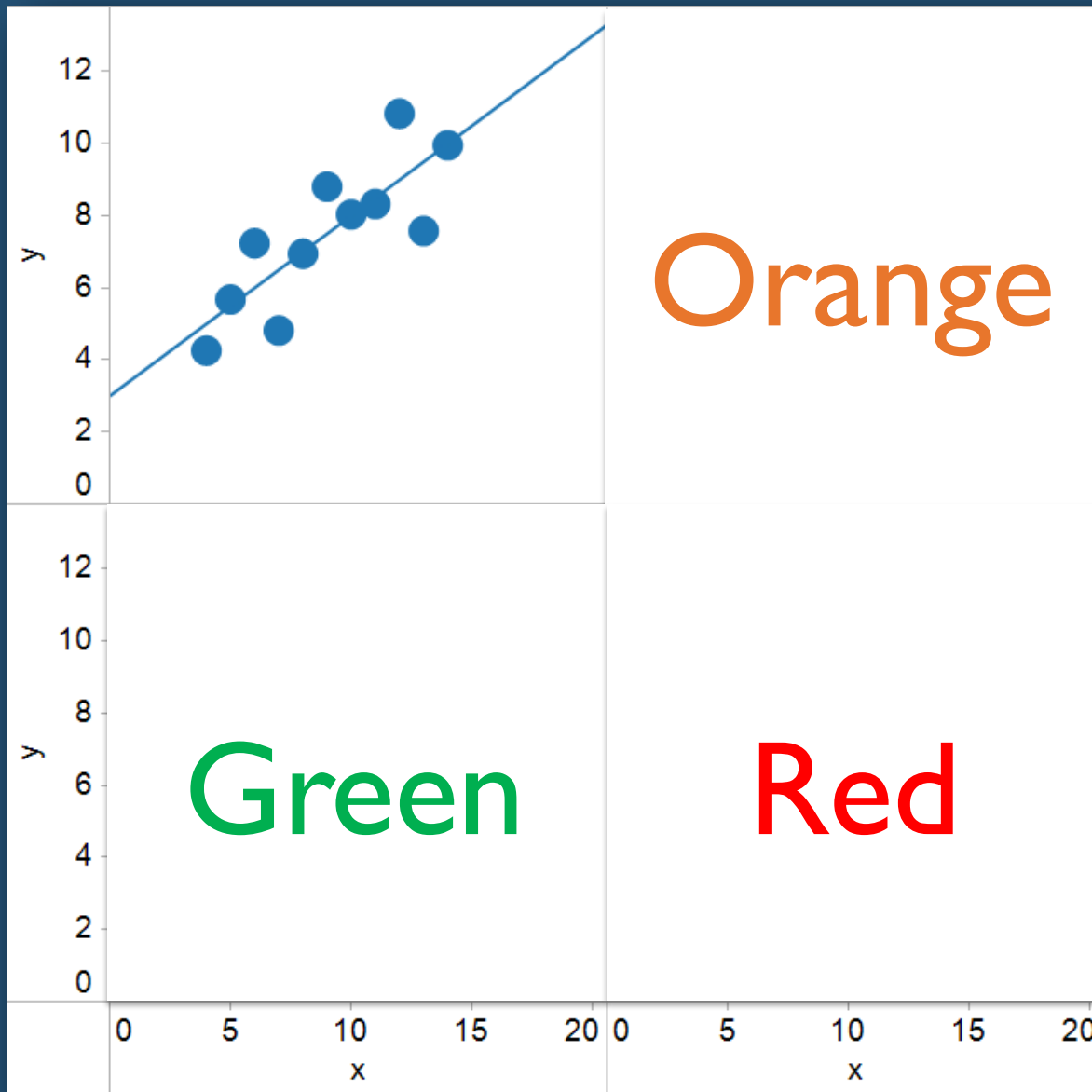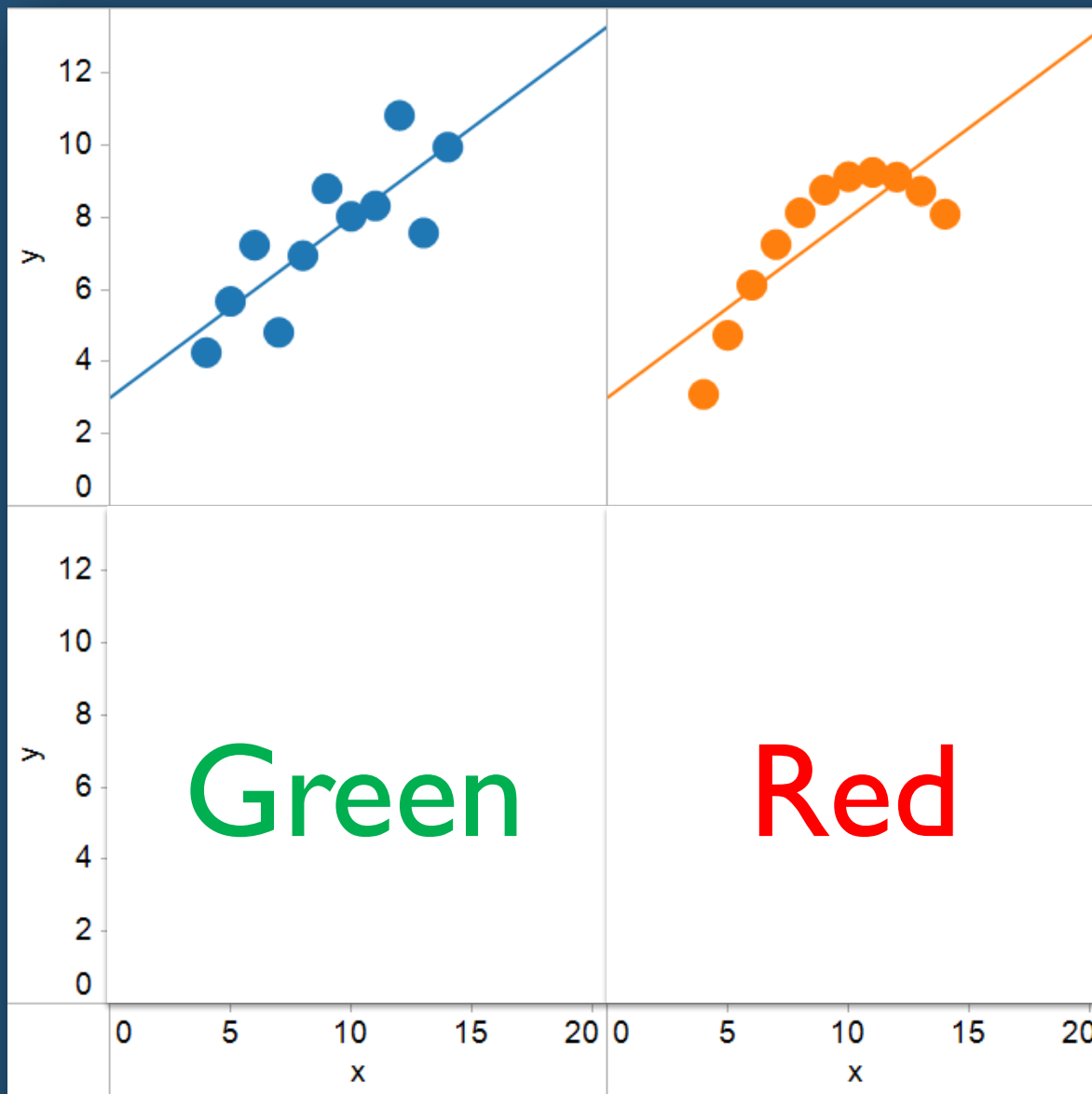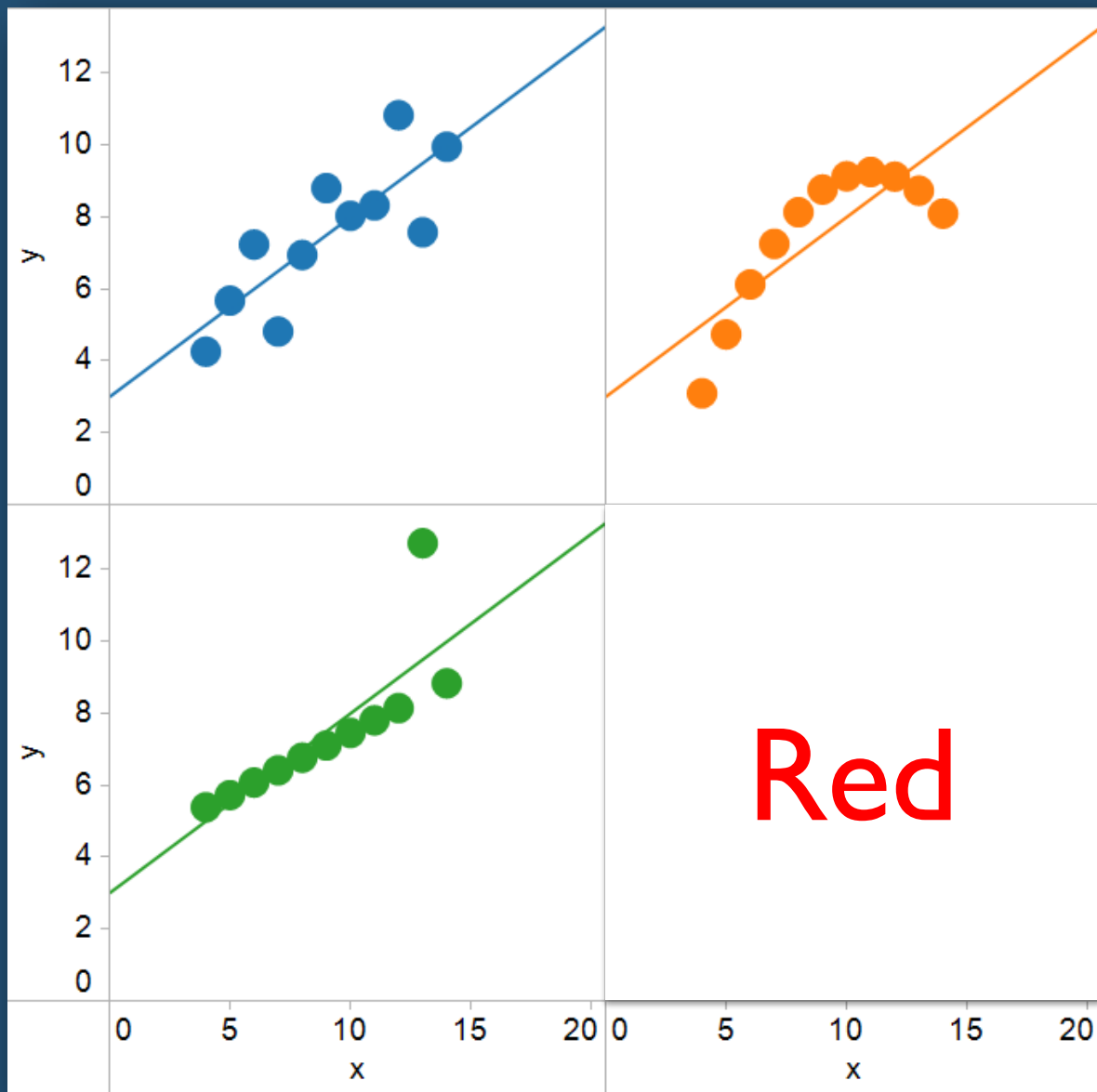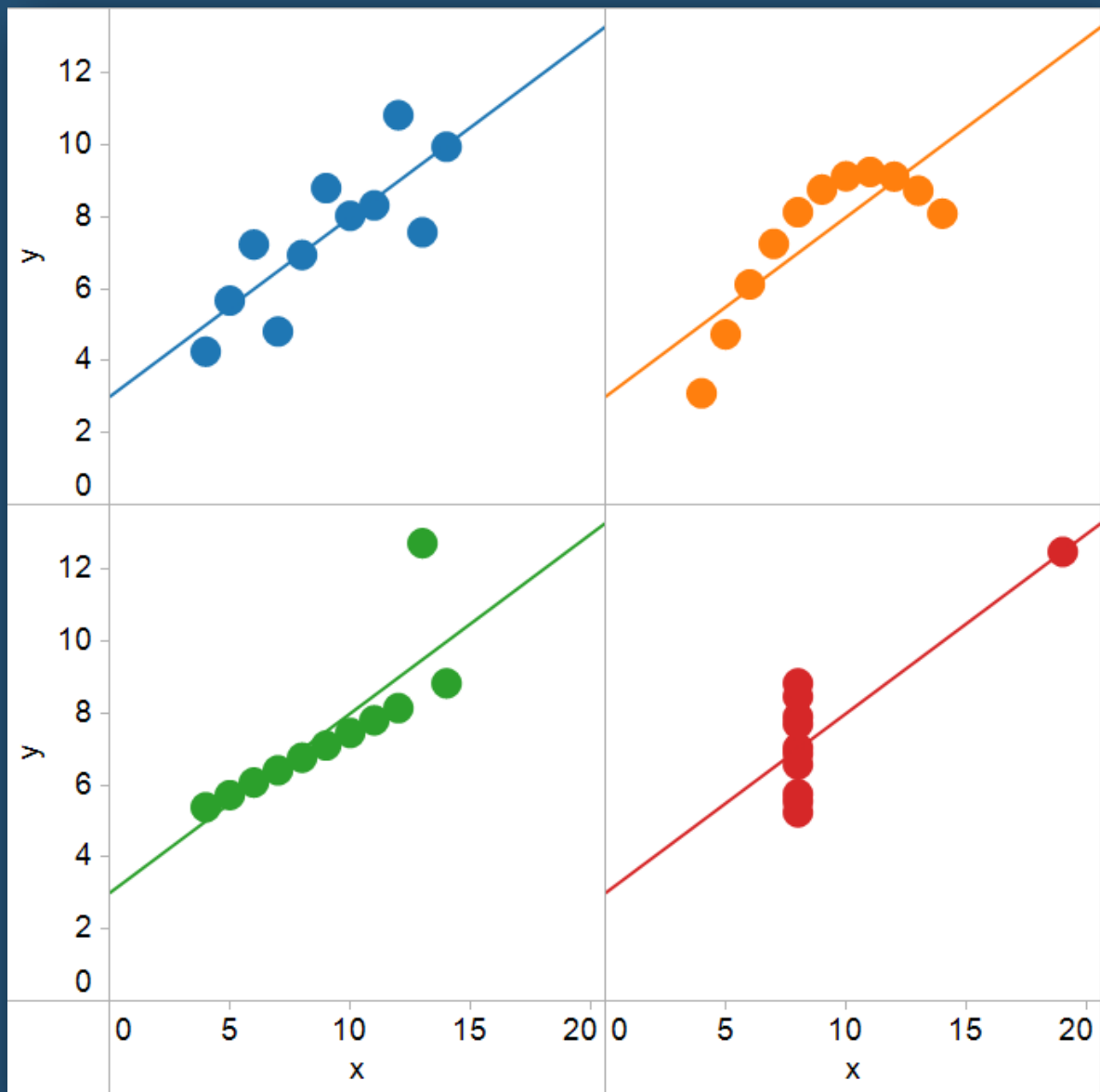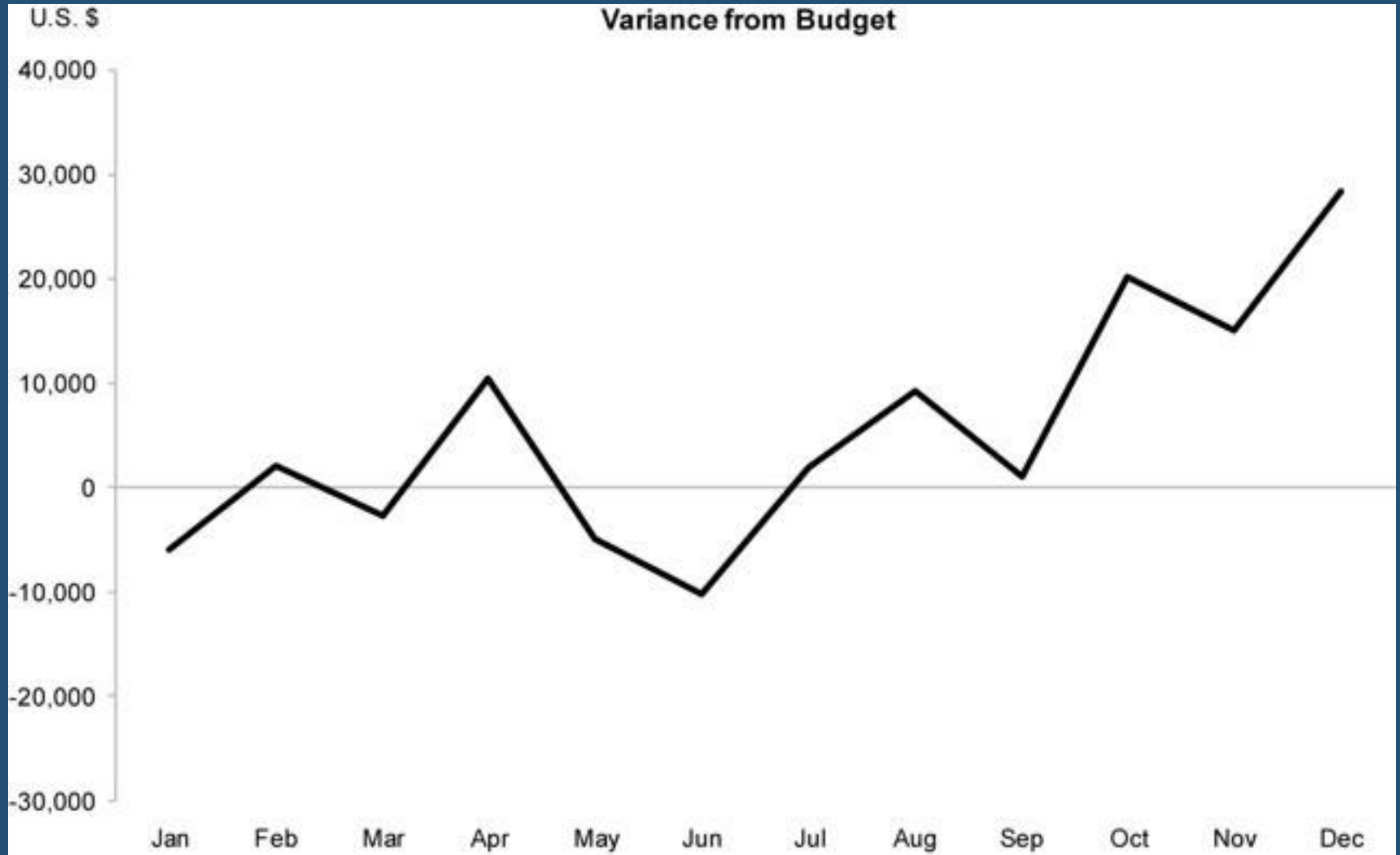
Form

Orientation
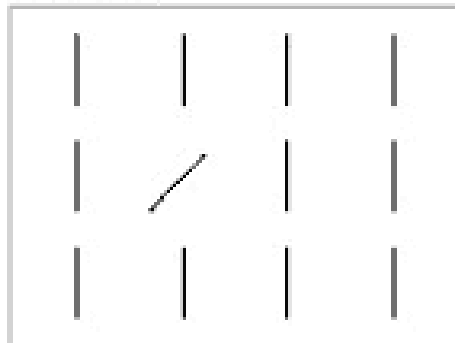
Line Length
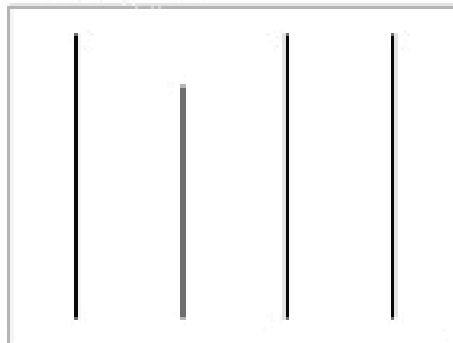
Line Width
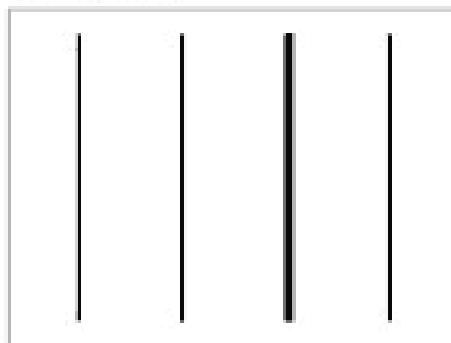
Size
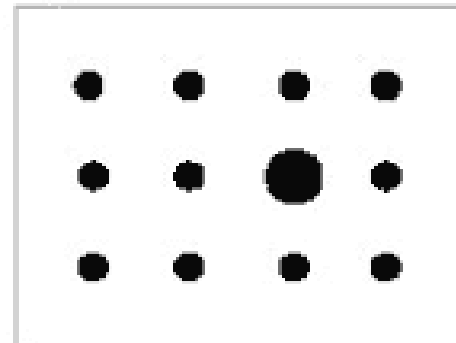
Shape
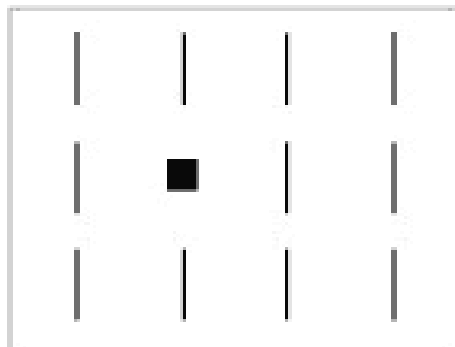
Curvature
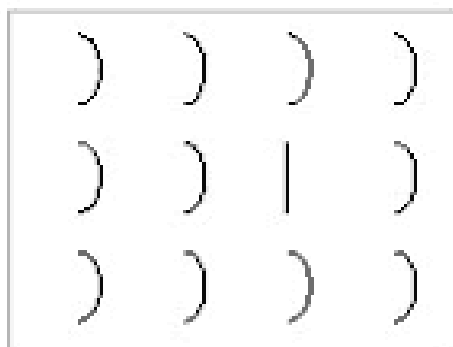
Added Marks
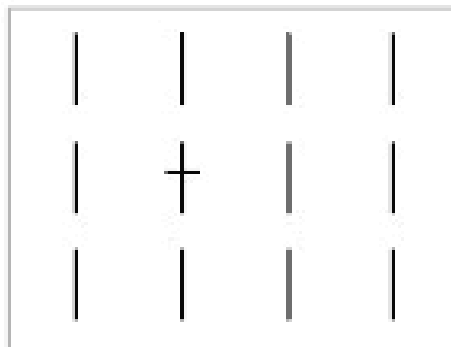
Enclosure
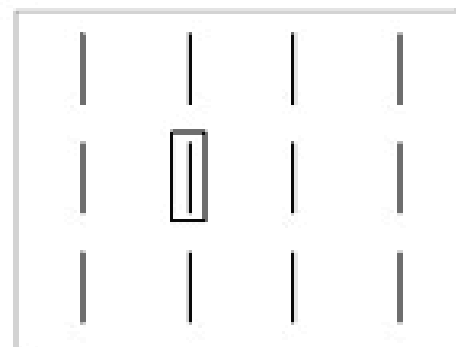
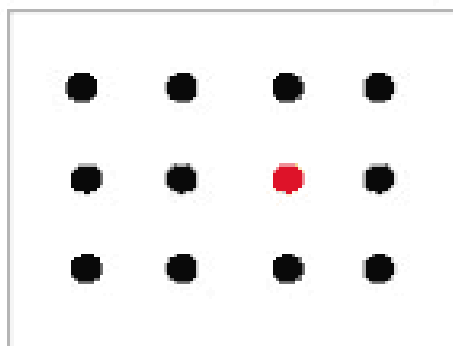# Color

Intensity
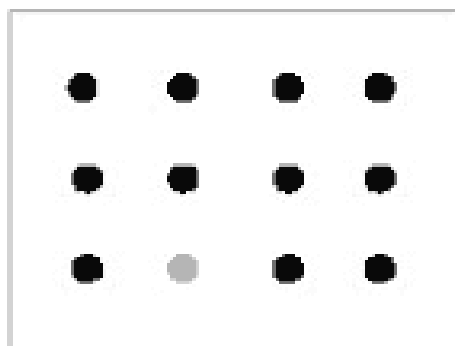
Hue
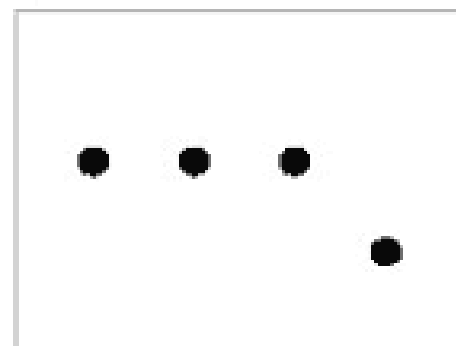

Spatial Position

2-D Position
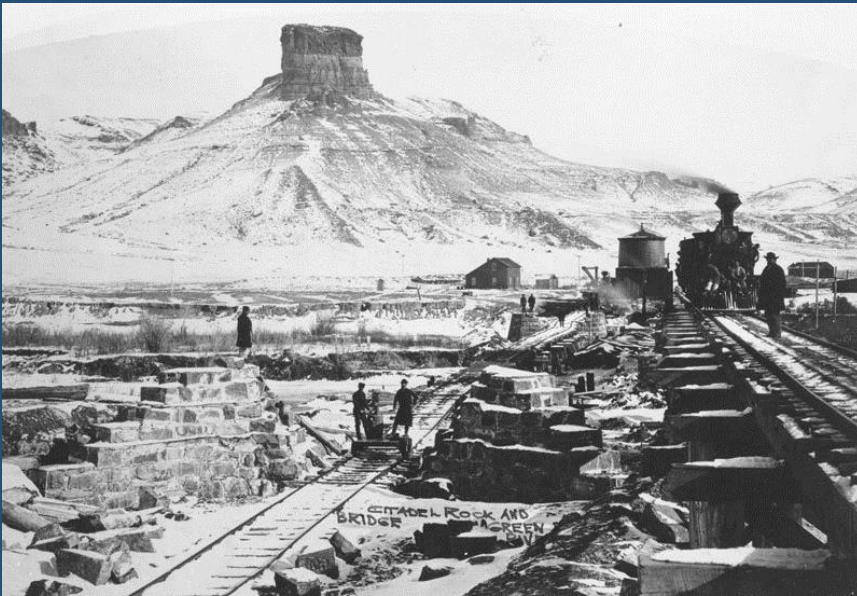
Tableau uses **data, graphics, and interactive analysis** in order to enable people to better analyze data using their natural ability to think visually.

Traditional
Business Intelligence

Tableau

Tableau Strategy

- Tableau Desktop (Design Tool)
- Tableau Server
  - Everyone with @jcu account can logon
- Consumers and Creators

Right Tools at Right Time

- **Data**
  - 10+ Years of Data in Banner/Oracle
  - IPEDS Open Data
  - Delaware, NSSE
  - Blackboard, Adirondack, Google, OneCard, more!
- **Tools**
  - Operational   Banner and other systems
  - Tactical   Argos
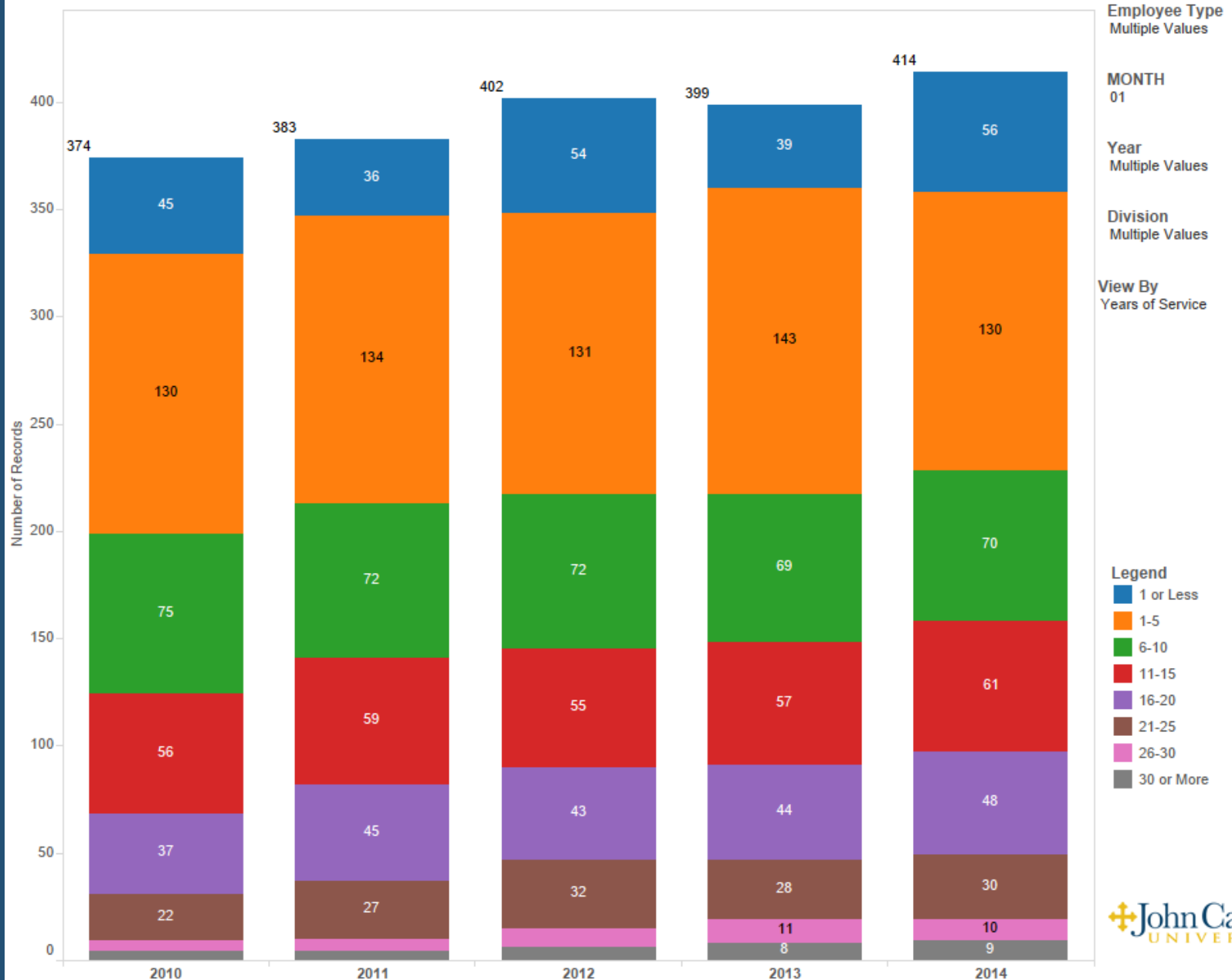 - Strategic   Tableau
- **People**
  - End users with increasing data needs (and competence)

John Carroll University-Employee Demographics

Attributes of Visual Organizations

1. Encourage self-service and enable the exploration of data
2. Be curious and ask lots of questions
3. Chose a direction of analysis first, gain precision later
4. Gain a healthy skepticism of decisions without data
5. Trust the process over the result
6. Avoid silos and specialization
7. Visualize whenever possible
8. Seek hybrid talent when hiring
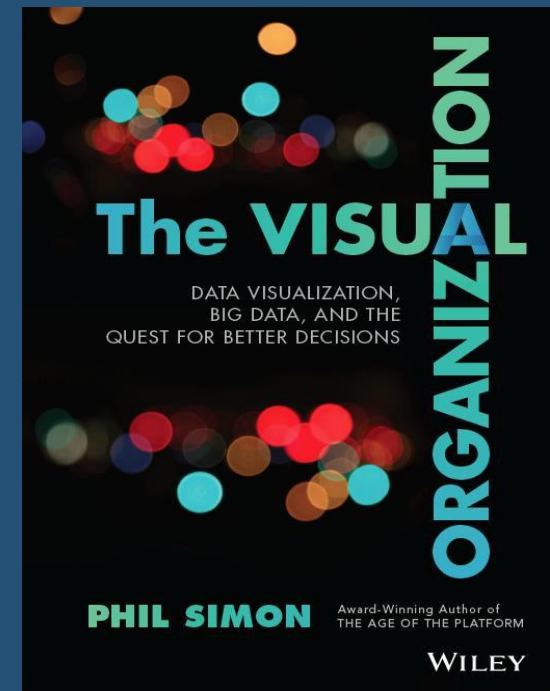
Emerging JCU Analytic Culture

- **Data**
  - Building Authoritative Sources
- **Design**
  - Look/feel consistency
  - Interactivity
- **Deployment**
  - Sharing visuals and dashboards

Empowering the Campus

Spring 2016

- Request Data and Analysis Support
  - data@jcu.edu
- HR Training Part II:
  - *Data-informed Decision Making*
- Tableau Boot Camp and Training Classes
- Tableau for Teaching
  - www.tableau.com/academic/teaching

I hear and I forget
–
I see and I remember
–
I do and I understand

– Confucius –