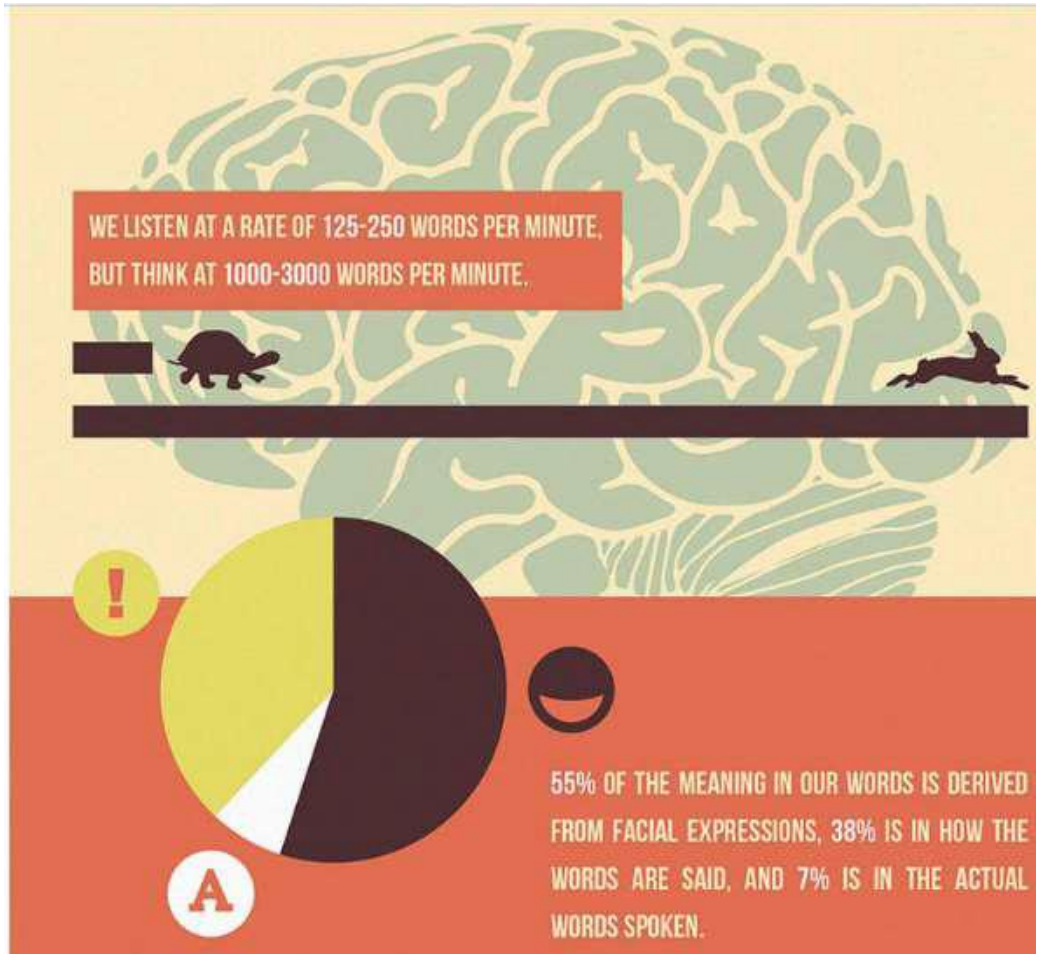
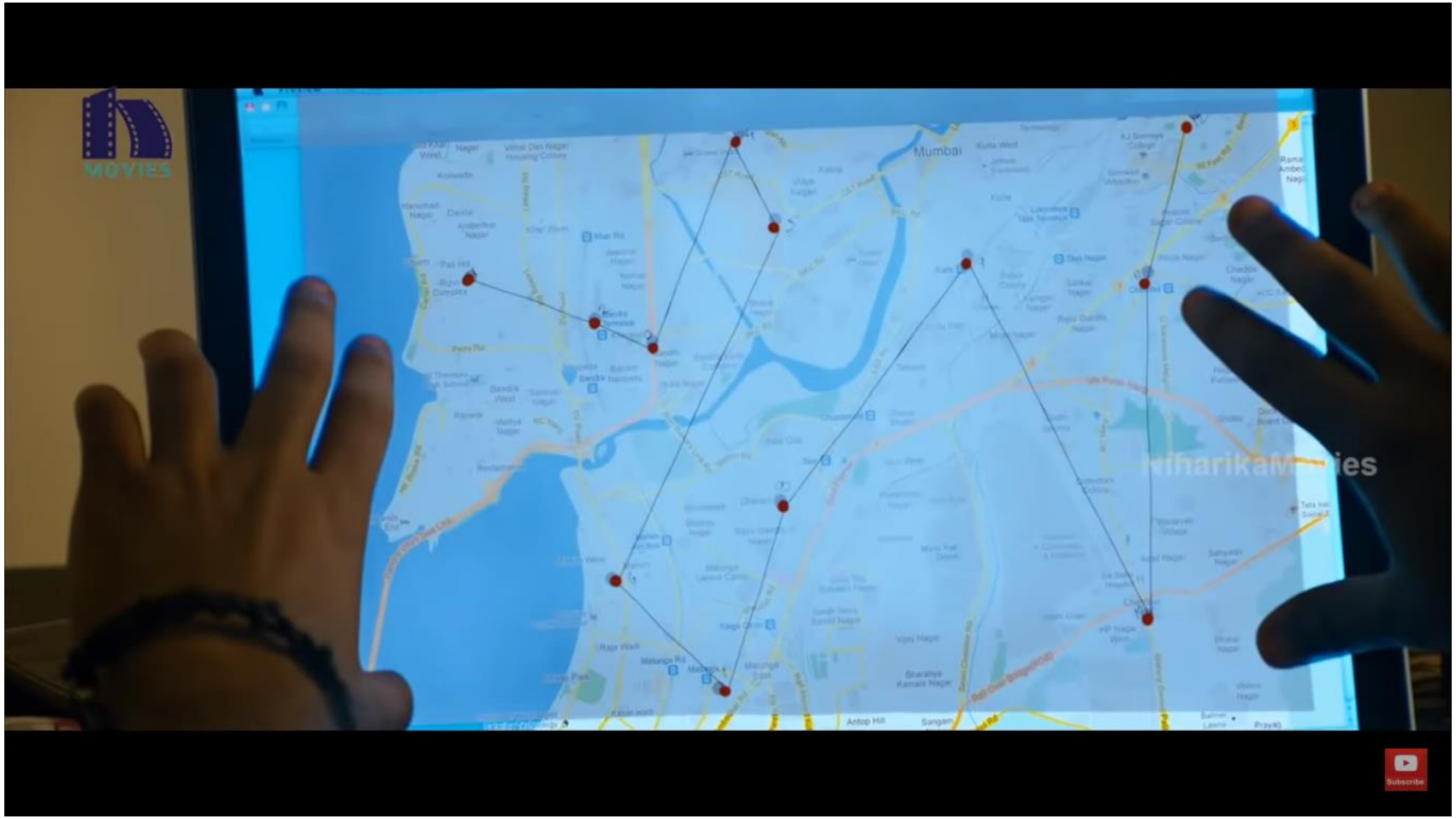
DATA VISUALIZATION

Introduction

INTRODUCTION



TYPES OF VISUALIZATION - EXPLORATORY – LOOK AT THE DATA FROM VARIOUS PERCEPTIONS



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EXPLANATORY – FIRST FIND OUT WHO IS THE AUDIENCE AND CREATE VISUALS ACCORDINGLY.

VISUAL ANALYTICS (1/2)

- Understand Cognitive perception
  - ➢ Leverage strengths of our brain
- Eliminate visual clutter
  - ➢ Focus on the business insight
- Choose appropriate display mechanism
  - ➢ Graph types to match the message
- Design dashboards
  - ➢ Solve business question easily

VISUAL ANALYTICS (2/2)

- Explore visually
  - ➢ Systematic process to generate insights
- Analyze visually
  - ➢ Techniques to extract meaning from large data sets
- Create storyboards
  - ➢ Transform complex data into information

DOMAINS AND THEIR DESCRIPTIONS

FUNCTION	DESCRIPTION	EXEMPLARS
Supply chain	Simulate and optimize supply chain flows; reduce inventory and stock-outs.	Dell, Wal-Mart, Amazon
Customer selection, loyalty, and service	Identify customers with the greatest profit potential; increase likelihood that they will want the product or service offering; retain their loyalty.	Harrah's, Capital One, Barclays
Pricing	Identify the price that will maximize yield, or profit.	Progressive, Marriott
Human capital	Select the best employees for particular tasks or jobs, at particular compensation levels.	New England Patriots, Oakland A's, Boston Red Sox
Product and service quality	Detect quality problems early and minimize them.	Honda, Intel
Financial performance	Better understand the drivers of financial performance and the effects of nonfinancial factors.	MCI, Verizon
Research and development	Improve quality, efficacy, and, where applicable, safety of products and services.	Novartis, Amazon, Yahoo

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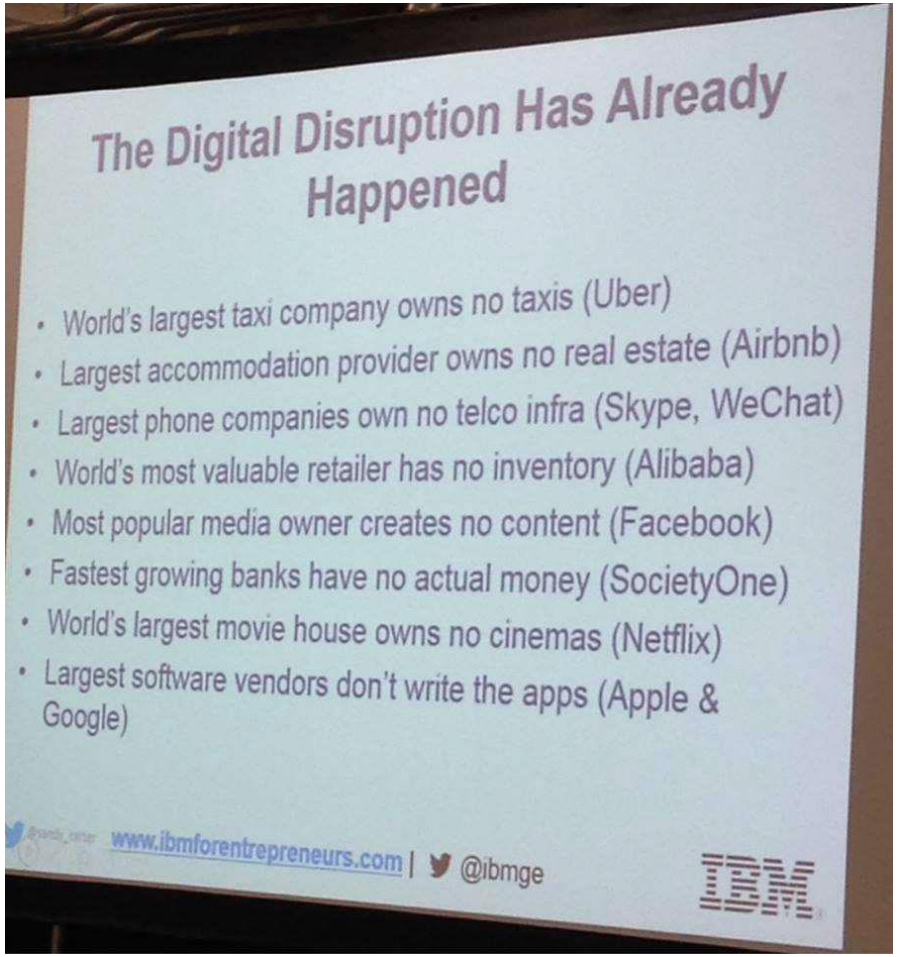
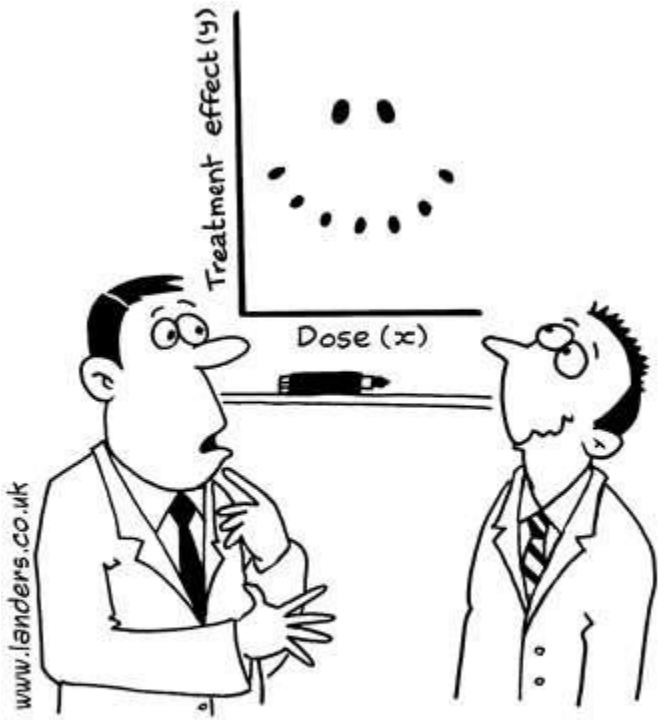
DIGITAL DISRUPTION



UNDERSTANDING THE PATTERNS IN THE DATA



"It's a non-linear pattern with outliers.....but for some reason I'm very happy with the data."

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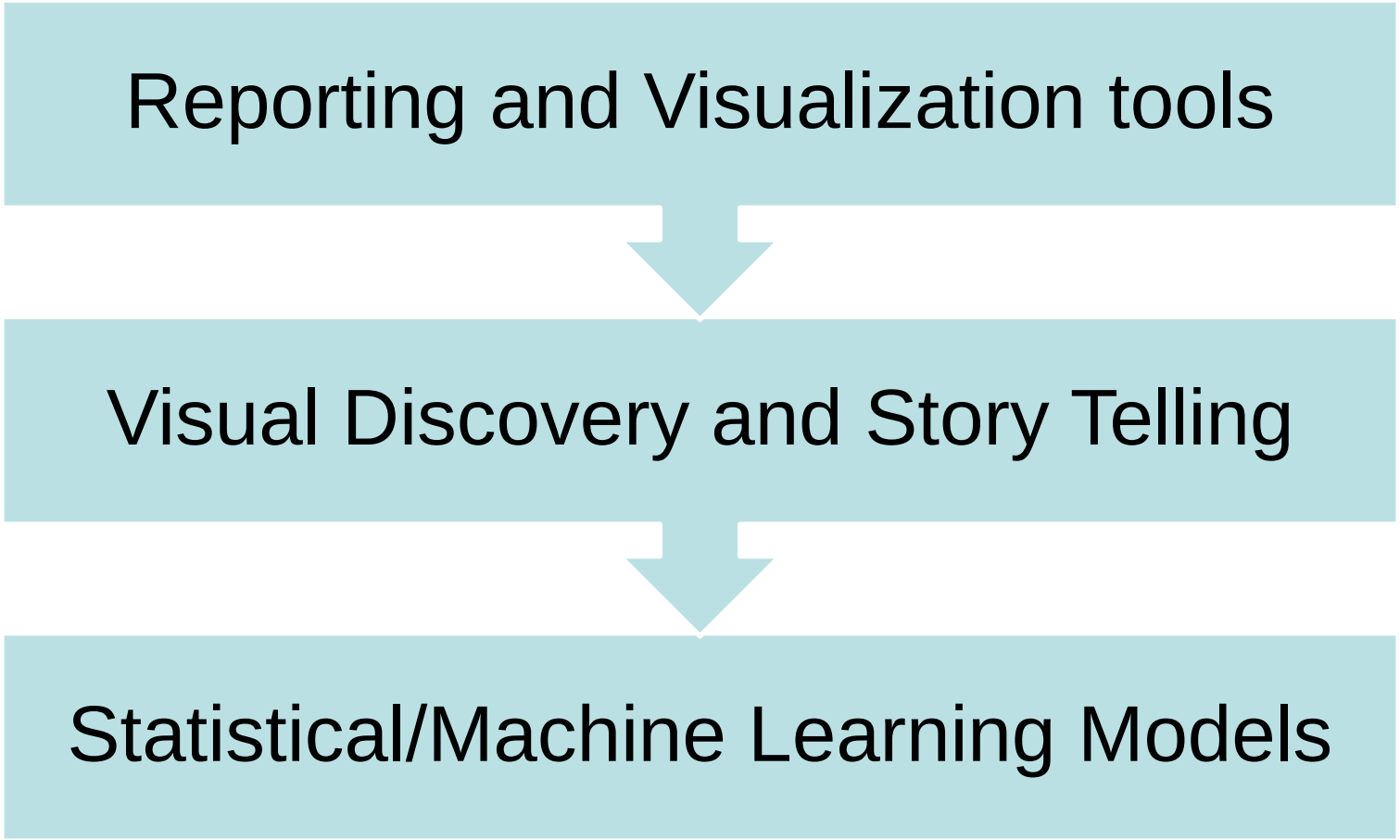
DATA VISUALIZATION AND INSIGHTS

- **Visualization**
  - ➢ is the representation and presentation of data that exploits our visual perception abilities in order to amplify cognition.
- **Insights**
  - ➢ is the discovery of non-trivial, complex, deep, unexpected or relevant truths about information.

ANALYST… WHO?

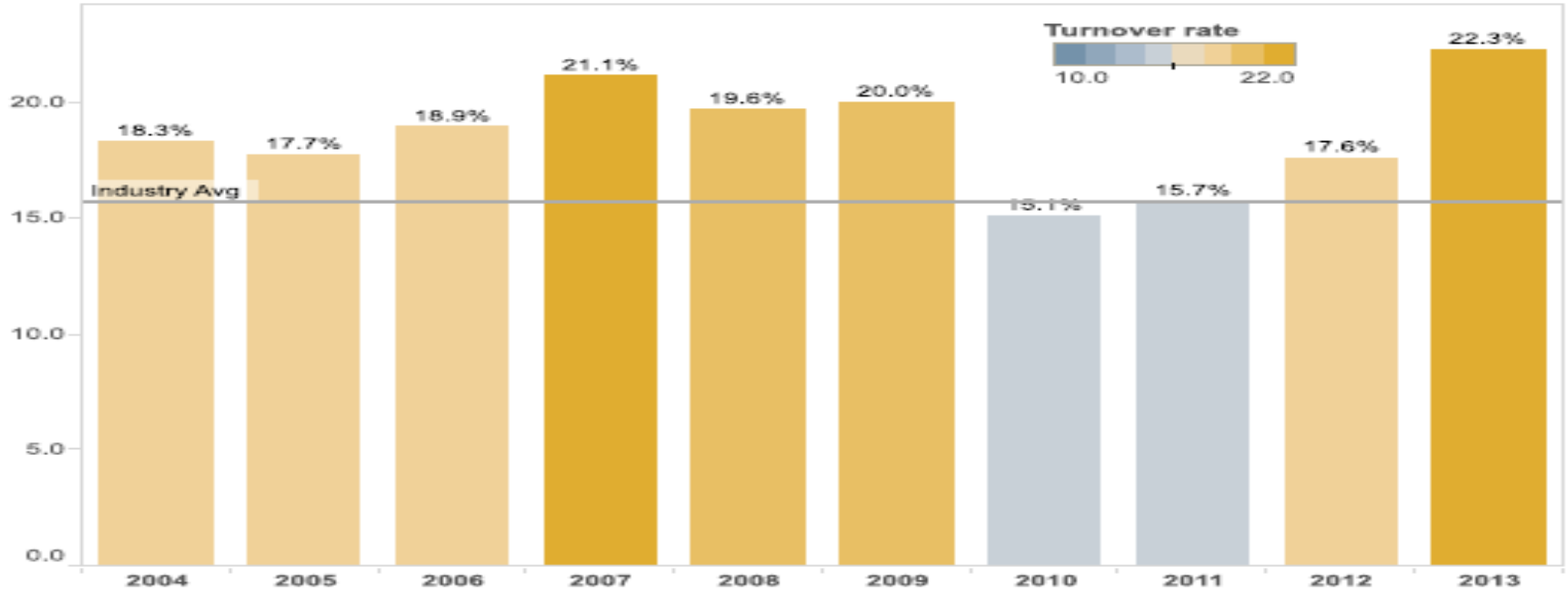

Reporting and Visualization tools
Visual Discovery and Story Telling
Statistical/Machine Learning Models

STORY EXAMPLE

Employee Retention Problem

Many Departments are struggling to hold onto employees, despite a huge initiative to improve employee engagement.

Our performance is worse than the industry average.	Employee turnover is a company-wide problem.	The problem is particularly acute at some locations.	And city-wide, the problem isn't getting better.



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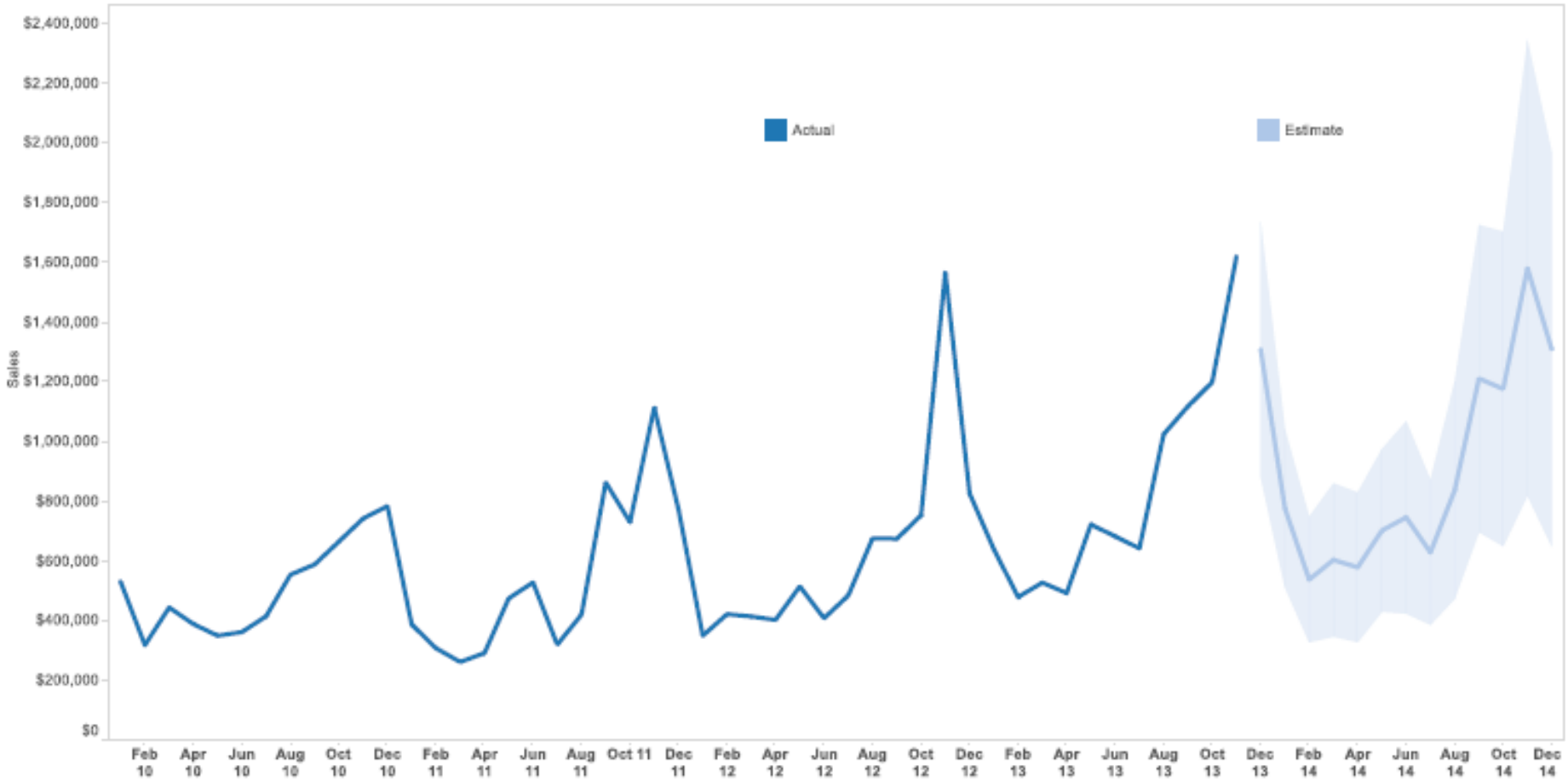
STATISTICAL/ML TECHNIQUES



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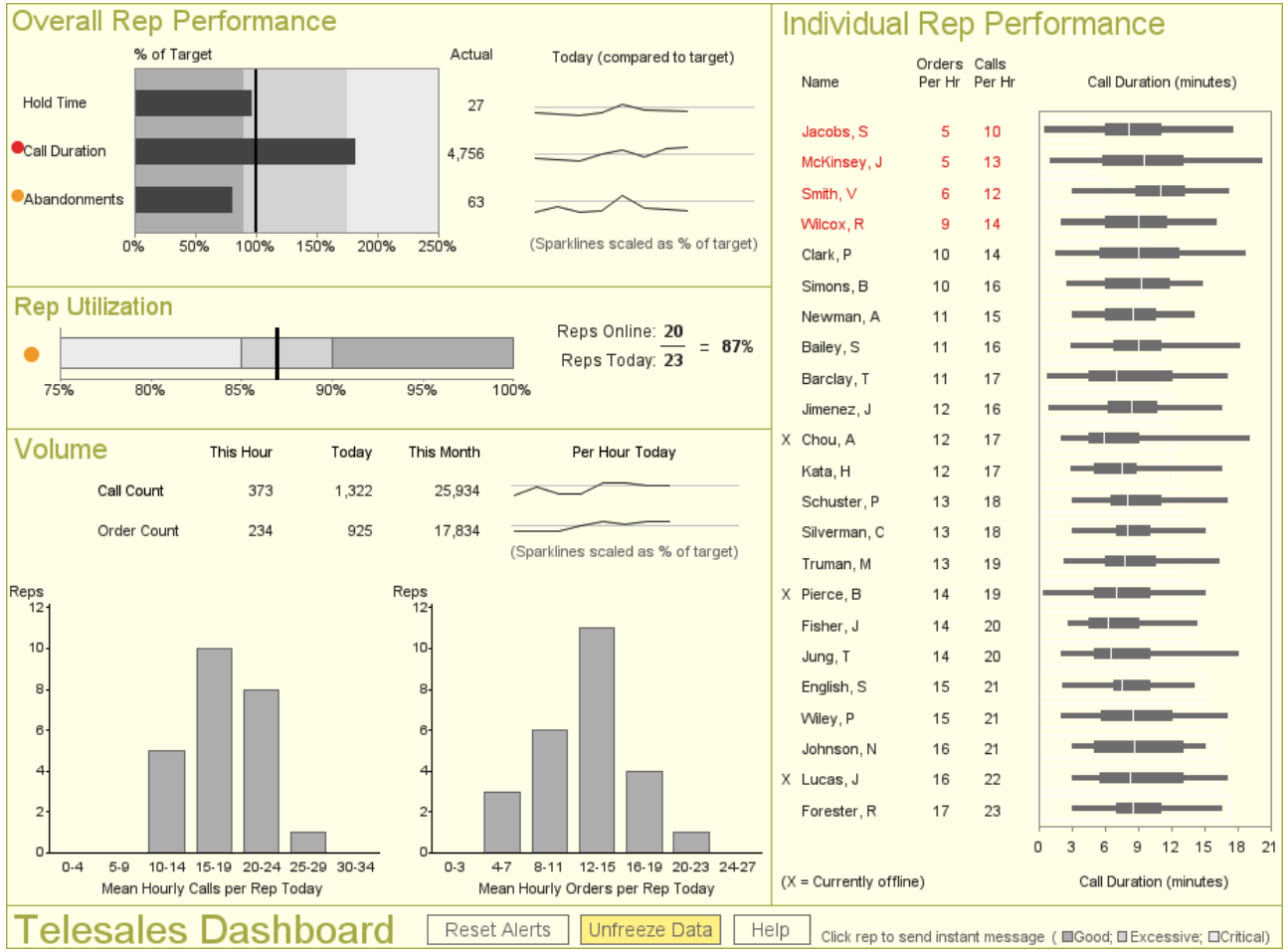
MOST PEOPLE AGREE TO THIS AS DATA VISUALIZATION



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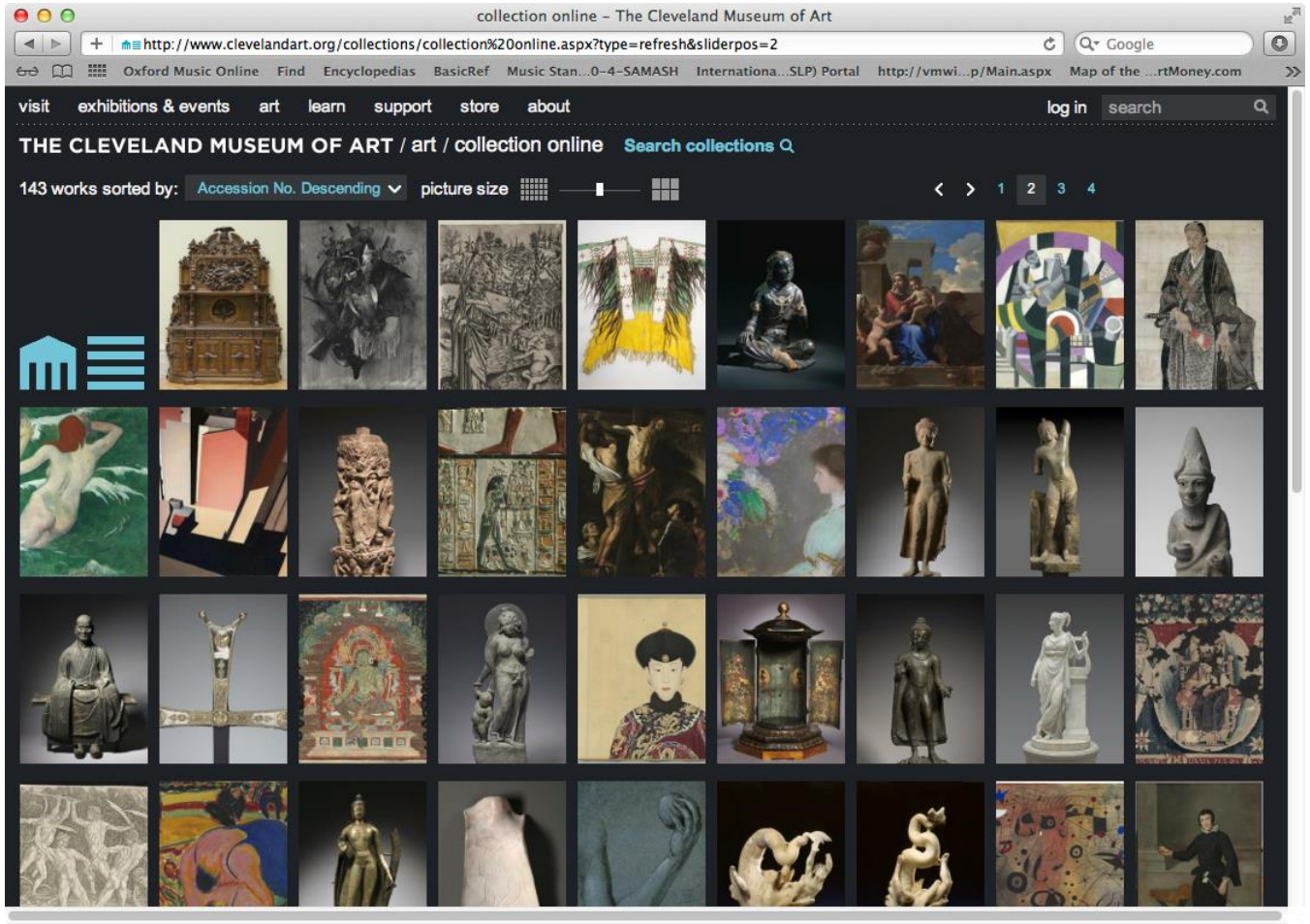
THIS?



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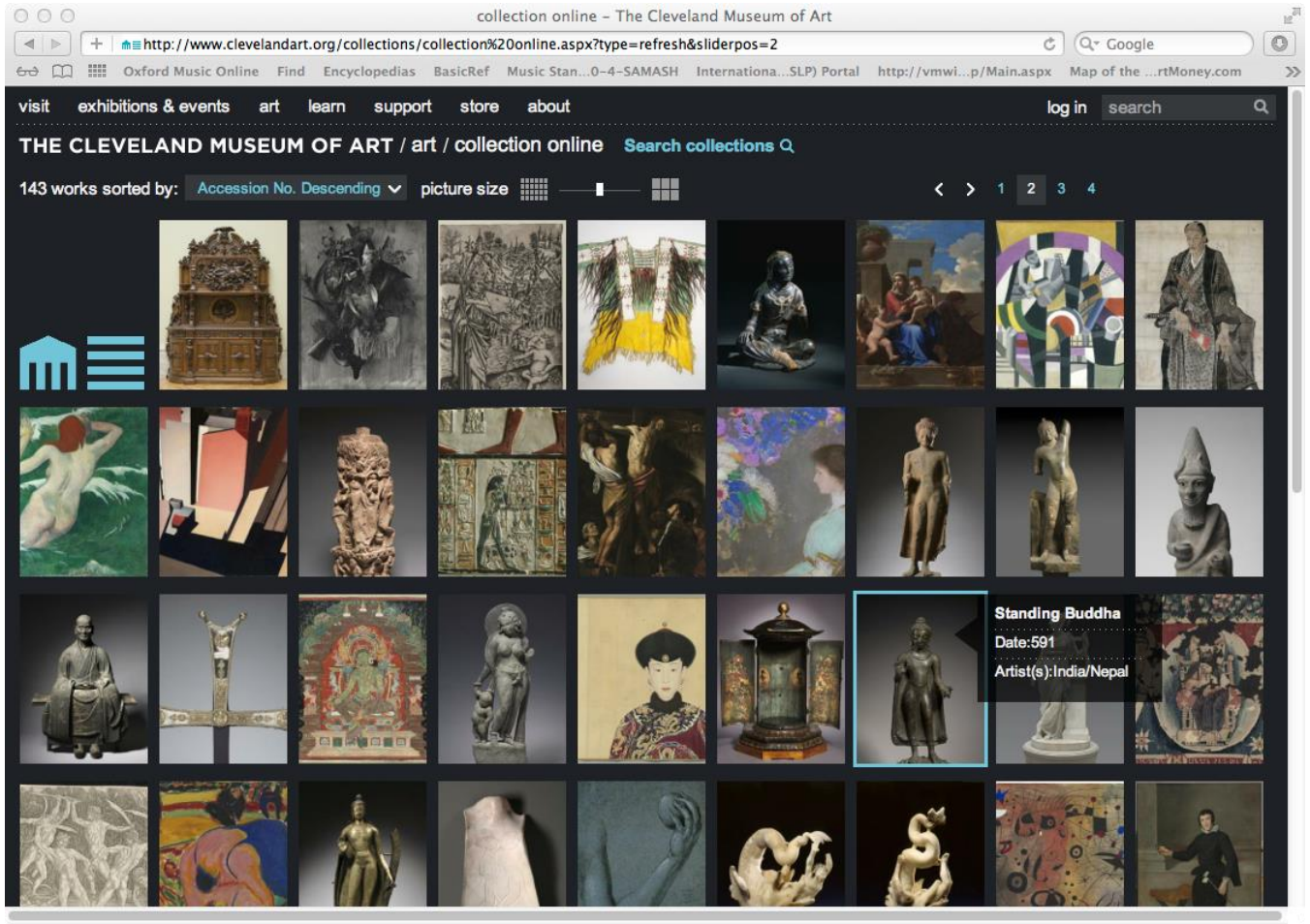
THIS?



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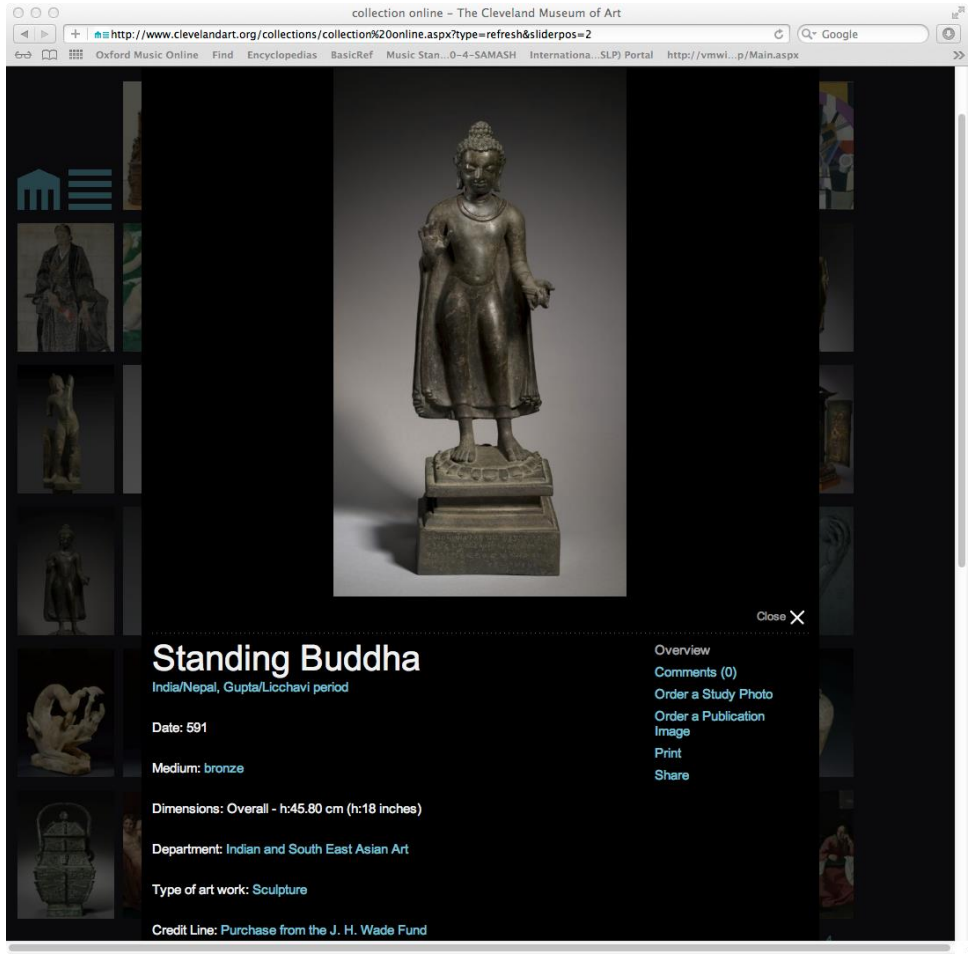
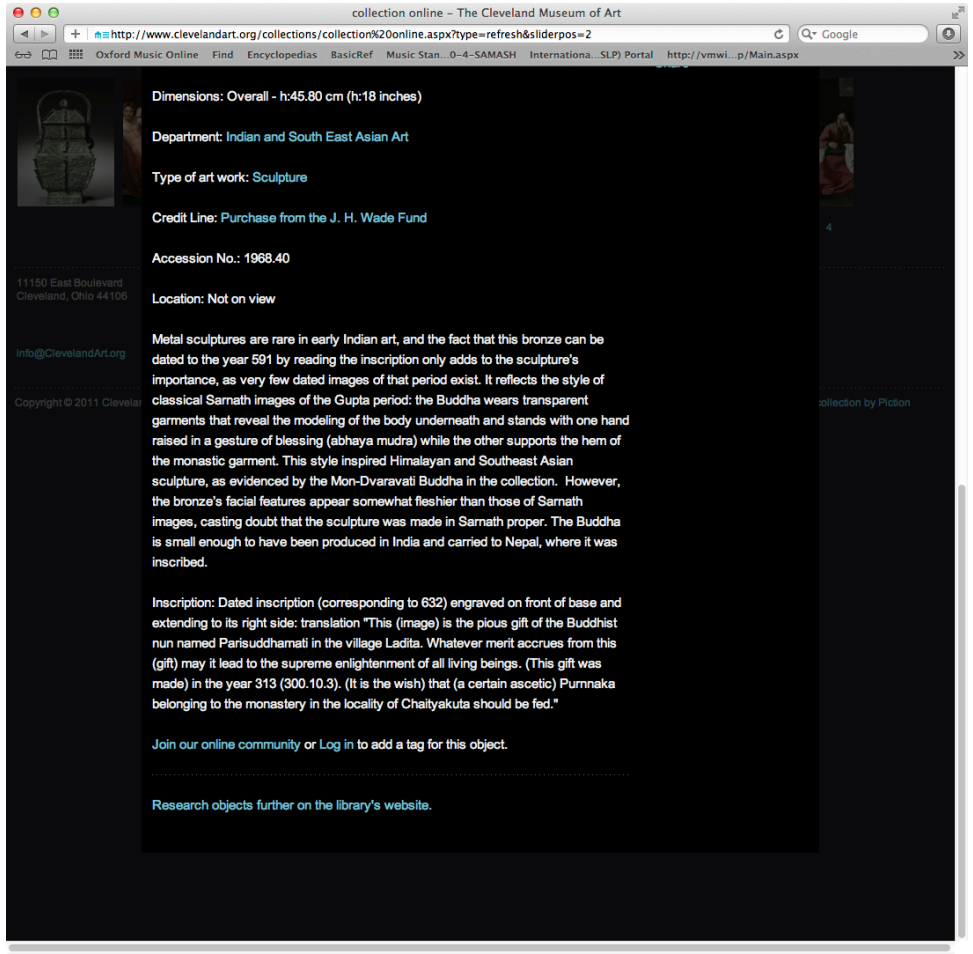
DRILL DOWN


collection online – The Cleveland Museum of Art
http://www.clevelandart.org/collections/collection%20online.aspx?type=refresh&sliderpos=2
Close
Standing Buddha
India/Nepal, Gupta/Licchavi period
Date: 591
Medium: bronze
Dimensions: Overall - h:45.80 cm (h:18 inches)
Department: Indian and South East Asian Art
Type of art work: Sculpture
Credit Line: Purchase from the J. H. Wade Fund
Overview
Comments (0)
Order a Study Photo
Order a Publication Image
Print
Share

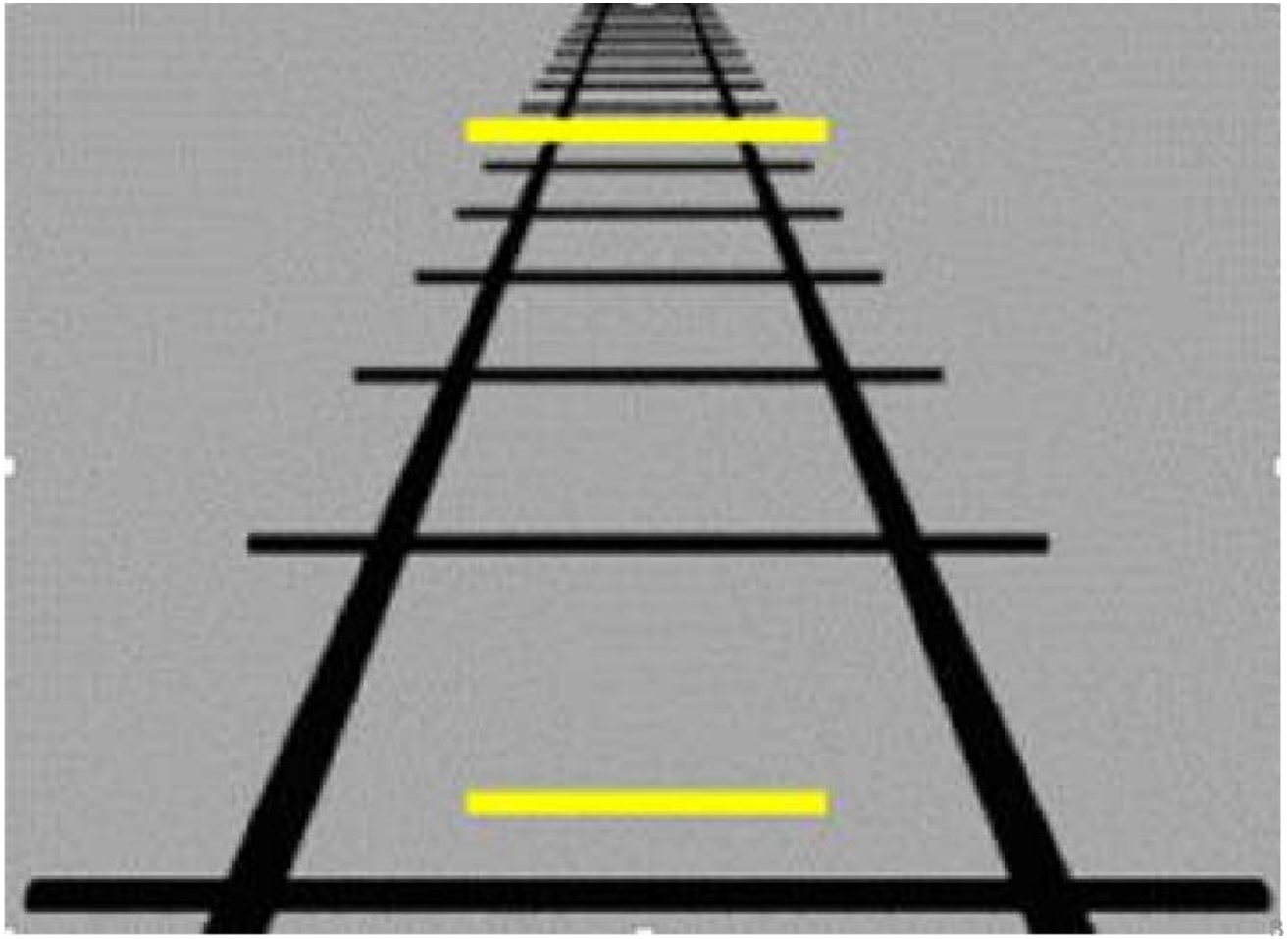
FURTHER DRILL DOWN



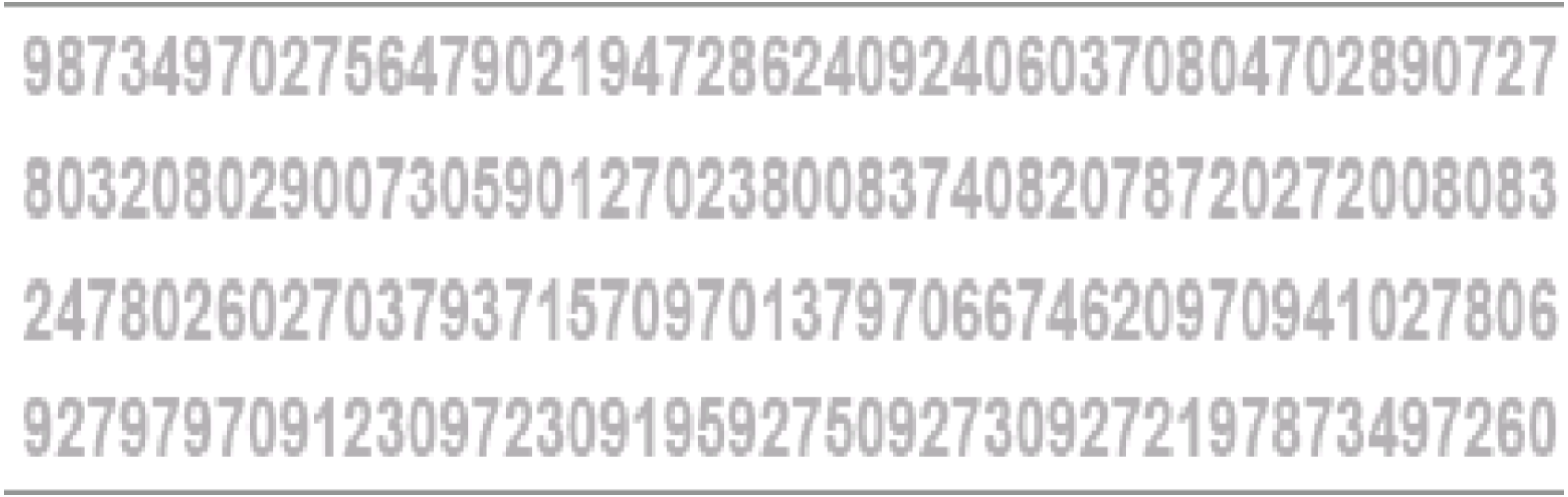
WHAT CAN YOU SEE?

CAN YOU SEE NOW?

VISUAL PERCEPTION



COUNT THE NUMBER OF 5S



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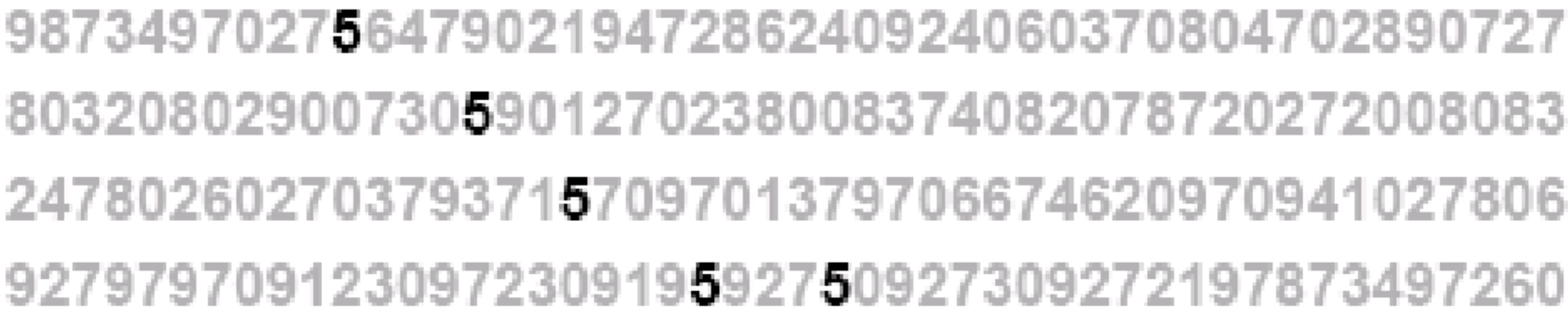
SERIAL AND PARALLEL PROCESSING



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HMUAN MNID

- The phaonmneal pweor of the hmuan mnid, aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it dseno't mtaetr in waht oerdr the ltteres in a wrod are, the olny iproamtnt tihng is taht the frsit and lsat ltteer be in the rghit pclae. The rset can be a taotl mses and you can sitll raed it whotuit a pboerlm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe. Azanmig huh? yaeh and I awlyas tghuhot slpeling was ipmorantt!

FedEx
Express

FedEx
Express

WEST
12
60
FAMILY DOLLAR
GARAGE SALE
Perennial Sale
GARAGE SALE
GARAGE SALE
GARAGE SALE
SALE!
CLOTHES, TOOLS, TOYS & ELECTRONICS
& MORE!!!
FRI-TUE
683 9TH Street
GARAGE SALE
175
157 · 5TH
SALE TODAY
MOVING SALE
GARAGE SALE

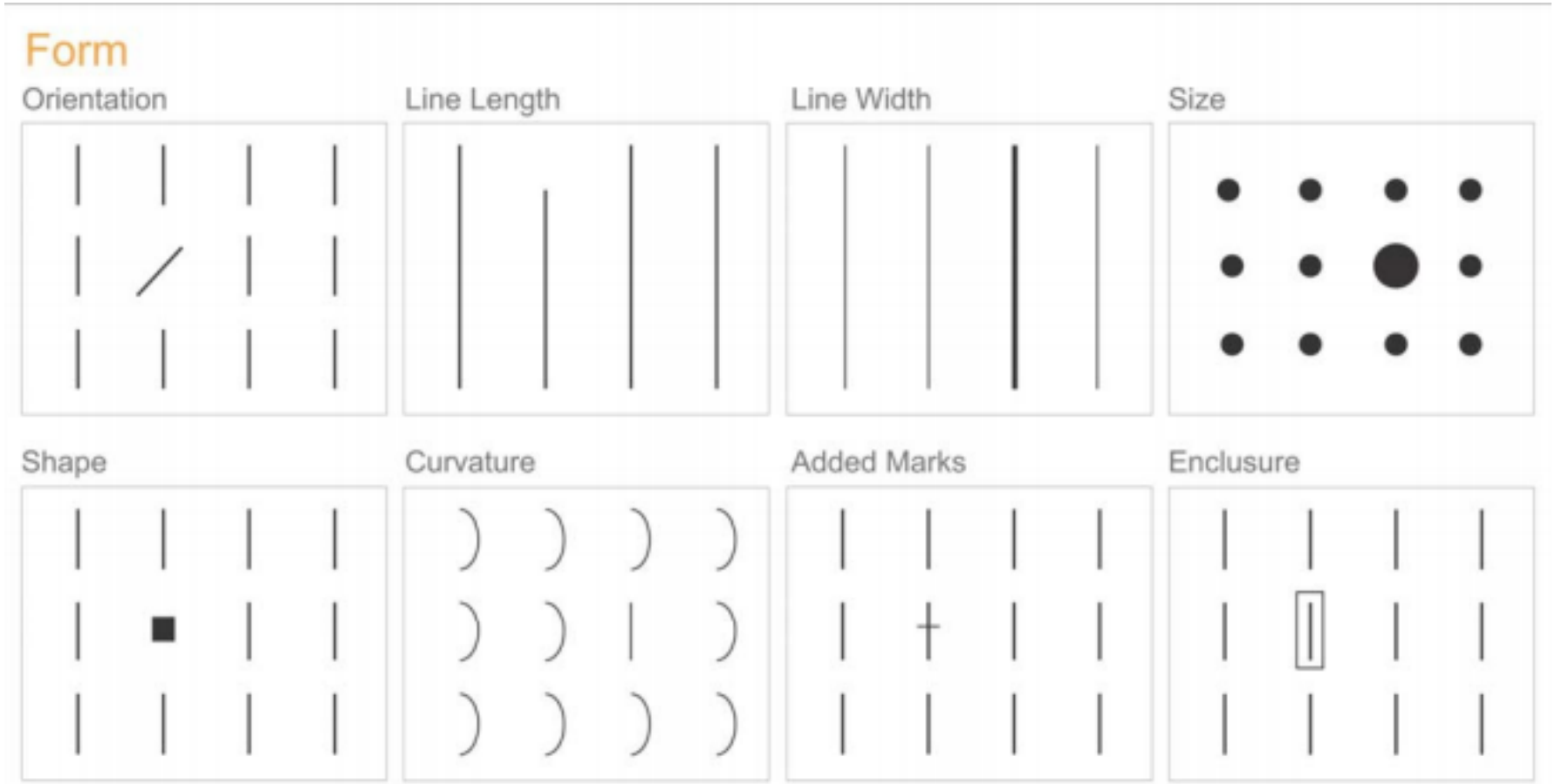
5 QUESTIONS TO ASK YOURSELF BEFORE STARTING TO VISUALIZE

- Who is my audience?
- What is the main idea I need to convey to my audience
- What is the story of my report
- Am I using my audience's language
- What output is right for my audience

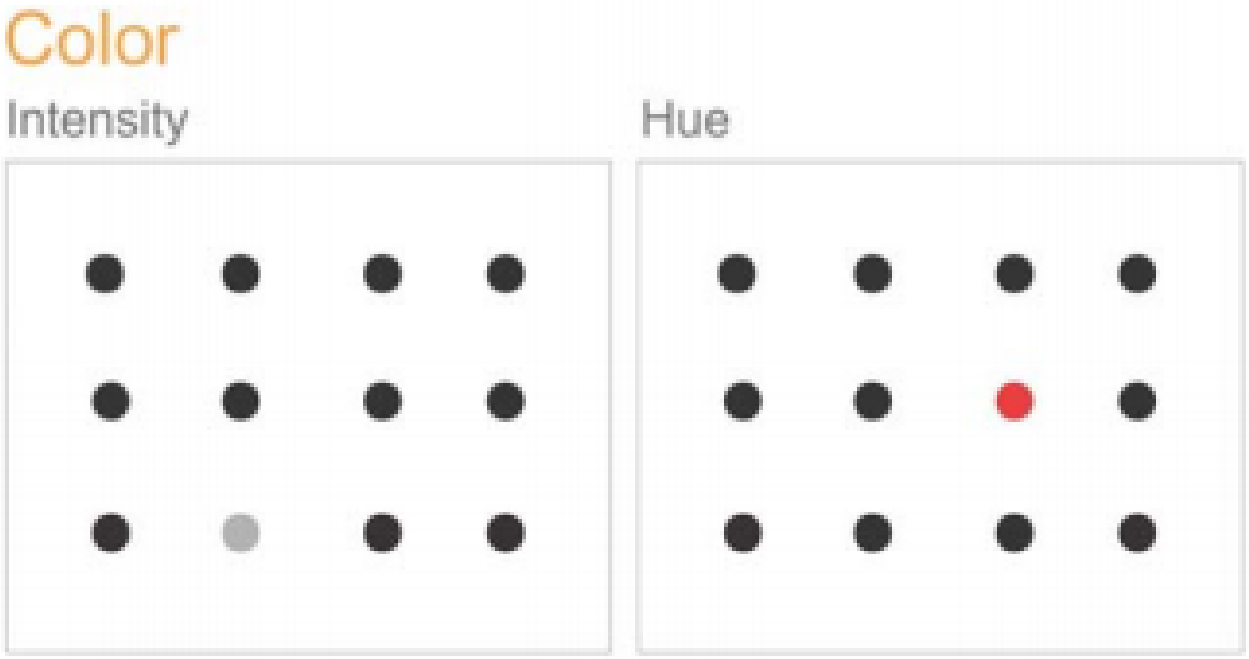
PRE-ATTENTIVE ATTRIBUTES

- Pre-attentive attributes are those which determine what information captures users' attention.
- Pre-attentive processing occurs without our consciousness at an extremely high speed. It is tuned to detect a specific set of visual attributes.
- There are 4 categories of pre-attentive visual attributes:
  - Form
  - Colour
  - Spatial Position
  - Movement

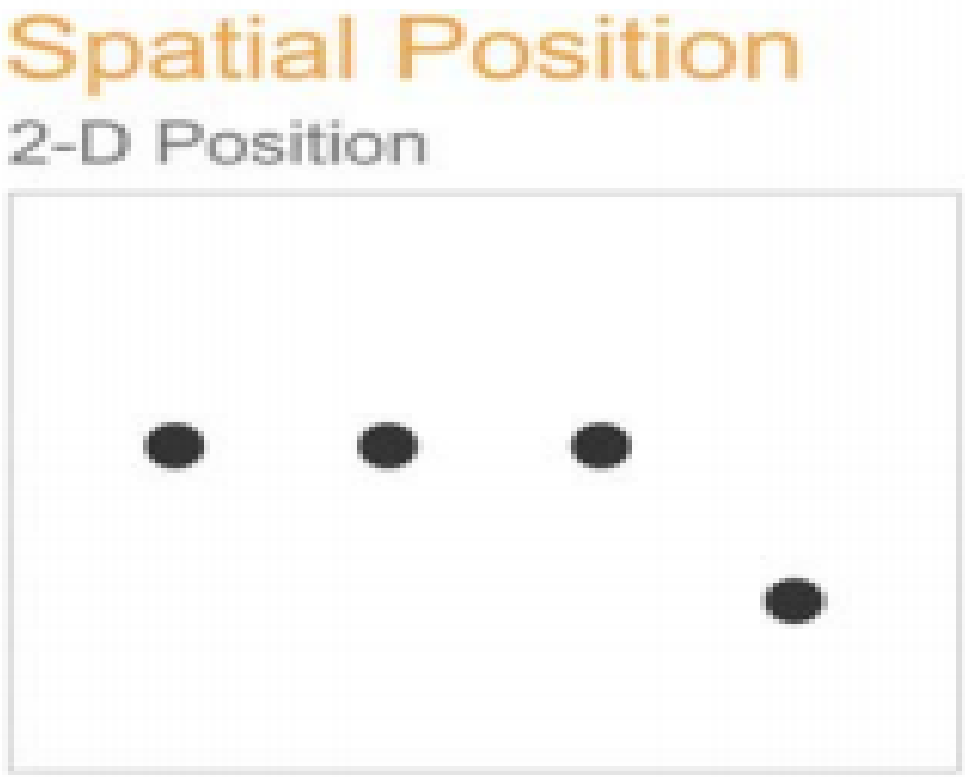
FORM


Form
Orientation
Line Length
Line Width
Size
Shape
Curvature
Added Marks
Enclosure

COLOR



SPATIAL POSITION



DESCRIPTIVE DATA

Which product / region shows higher sales but low profitability

		Region							
		Central		East		South		West	
Category	Sub-Category	Profit	Sales	Profit	Sales	Profit	Sales	Profit	Sales
Furniture	Bookcases	($22,399)	$258,919	($14,607)	$145,816	$3,599	$171,504	($175)	$246,411
	Chairs & Chairmats	$51,534	$651,654	$54,181	$469,652	$14,988	$292,478	$28,947	$348,052
	Office Furnishings	$30,852	$259,389	$20,645	$149,828	$21,865	$129,434	$27,068	$159,443
	Tables	($27,545)	$471,751	($65,504)	$652,965	$887	$316,405	($6,902)	$454,887
Office Supplies	Appliances	$49,445	$317,079	$17,556	$136,944	$17,732	$149,023	$12,425	$133,946
	Binders and Binder Accessories	$90,004	$309,262	$94,617	$294,907	$61,612	$214,942	$61,180	$203,847
	Envelopes	$12,794	$47,531	$11,162	$43,691	$9,715	$33,256	$14,512	$49,608
	Labels	$4,733	$14,062	$2,253	$6,298	$4,067	$10,930	$2,624	$7,692
	Paper	$19,509	$150,710	$10,723	$96,958	$8,307	$100,210	$6,725	$98,576
	Pens & Art Supplies	$1,927	$45,807	$2,578	$42,908	$1,620	$35,768	$1,448	$42,625
	Rubber Bands	$173	$5,815	($167)	$3,089	$57	$2,687	($165)	$3,416
	Scissors, Rulers and Trimmers	($4,406)	$36,376	($1,229)	$4,729	($1,865)	$9,315	($299)	$30,577
	Storage & Organization	($11,358)	$299,116	$630	$280,367	$12,072	$263,166	$5,320	$227,534
Technology	Computer Peripherals	$27,675	$250,718	$23,452	$198,649	$25,461	$195,535	$17,700	$150,974
	Copiers and Fax	$44,542	$404,175	$41,350	$173,833	$22,403	$209,237	$59,066	$343,117
	Office Machines	$108,471	$563,395	$55,305	$321,105	$155,488	$610,807	($11,551)	$673,390
	Telephones and Communication	$105,941	$613,410	$64,906	$394,726	$64,500	$405,524	$61,604	$475,653

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USING THE PRE-ATTENTIVE ATTRIBUTES

Now answer the same question using this visual

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CHOOSING CHART BASED ON DATA TYPES

- Bar Chart :
  - Compare
  - Category
  - Rank
  - High/Low
  - Correlation

CHOOSING CHART BASED ON DATA TYPES

- Scatter Plot:
  - Trend
  - Concentrations
  - Gaps
  - Outliers (Box plot)
  - Groups/Clusters
  - Relationship

CHOOSING CHART BASED ON DATA TYPES

- Pie Chart
  - Part-to-whole
  - Angles not difficult to interpret
  - Constrained for space (Geo Spatial)
  - Large volume of data (bubble chart)

CHOOSING CHART BASED ON DATA TYPES

- Line Charts
  - Trend
  - Straightforward
  - Pattern
  - Sequence
  - Seasonality
  - Time