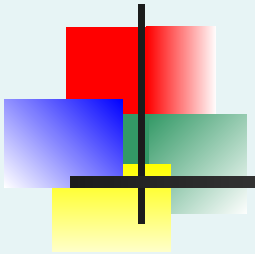
Business Statistics: A First Course
6th Edition



Chapter 2

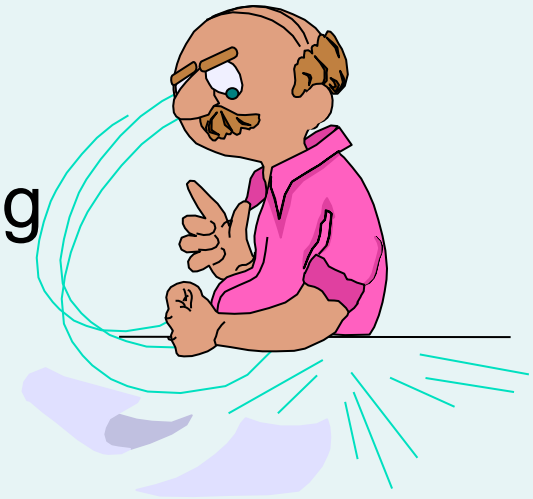
Organizing and Visualizing Data

Organizing and Visualizing Data

Learning Objectives

In this chapter you learn:

- The sources of data used in business
- To construct tables and charts for numerical data
- To construct tables and charts for categorical data
- The principles of properly presenting graphs



GOALS

- 1.Organize qualitative data into a frequency table.
- 2.Present a frequency table as a bar chart or a pie chart.
- 3.Organize quantitative data into a frequency distribution.
- 4.Present a frequency distribution for quantitative data using histograms, frequency polygons, and cumulative frequency polygons.

A Step by Step Process For Examining & Concluding From Data Is Helpful

In this book we will use DCOVA

- **D**efine the variables for which you want to reach conclusions
- **C**ollect the data from appropriate sources
- **O**rganize the data collected by developing tables
- **V**isualize the data by developing charts
- **A**nalyze the data by examining the appropriate tables and charts (and in later chapters by using other statistical methods) to reach conclusions

Why Collect Data?

DCOVA

- A marketing research analyst needs to assess the effectiveness of a new television advertisement.
- A pharmaceutical manufacturer needs to determine whether a new drug is more effective than those currently in use.
- An operations manager wants to monitor a manufacturing process to find out whether the quality of the product being manufactured is conforming to company standards.
- An auditor wants to review the financial transactions of a company in order to determine whether the company is in compliance with generally accepted accounting principles.

Sources of Data

DCOVA

- **Primary Sources**: The data collector is the one using the data for analysis
  - Data from a political survey
  - Data collected from an experiment
  - Observed data
- **Secondary Sources**: The person performing data analysis is not the data collector
  - Analyzing census data
  - Examining data from print journals or data published on the internet.

Sources of data fall into four categories

DCOVA

- Data distributed by an organization or an individual
- A designed experiment
- A survey
- An observational study

Examples Of Data Distributed By Organizations or Individuals

DCOVA

- Financial data on a company provided by investment services
- Industry or market data from market research firms and trade associations
- Stock prices, weather conditions, and sports statistics in daily newspapers

Examples of Data From A Designed Experiment

DCOVA

- Consumer testing of different versions of a product to help determine which product should be pursued further
- Material testing to determine which supplier's material should be used in a product
- Market testing on alternative product promotions to determine which promotion to use more broadly

Examples of Survey Data

DCOVA

- Political polls of registered voters during political campaigns
- People being surveyed to determine their satisfaction with a recent product or service experience

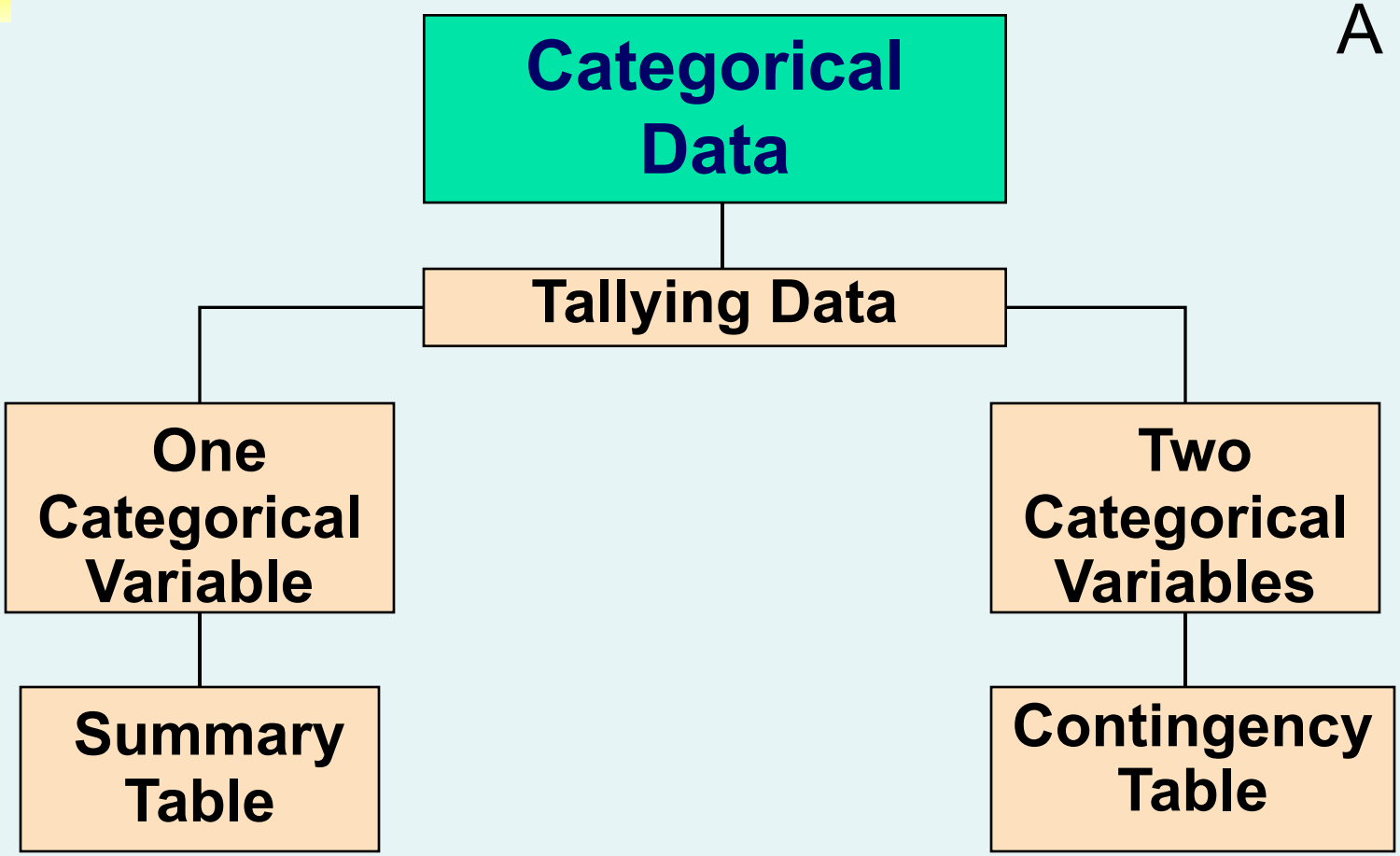
Examples of Data From Observational Studies

DCOVA

- Market researchers utilizing focus groups to elicit unstructured responses to open-ended questions
- Measuring the time it takes for customers to be served in a fast food establishment
- Measuring the volume of traffic through an intersection to determine if some form of advertising at the intersection is justified

Categorical Data Are Organized By Utilizing Tables

DCOVA



Organizing Categorical Data: Summary Table

DCOVA

- A **summary table** indicates the frequency, amount, or percentage of items in a set of categories so that you can see differences between categories.

Summary Table From A Survey of 1000 Banking Customers

Banking Preference?	Percent
ATM	16%
Automated or live telephone	2%
Drive-through service at branch	17%
In person at branch	41%
Internet	24%

Organizing Categorical Data: Summary Table

DCOVA

- A **summary table** tallies the frequencies or percentages of items in a set of categories so that you can see differences between categories.

Main Reason Young Adults Shop Online

Reason For Shopping Online?	Percent
Better Prices	37%
Avoiding holiday crowds or hassles	29%
Convenience	18%
Better selection	13%
Ships directly	3%

Source: Data extracted and adapted from "Main Reason Young Adults Shop Online?" *USA Today, December 5, 2012, p. 1A.*

A Contingency Table Helps Organize Two or More Categorical Variables

DCOVA

- Used to study patterns that may exist between the responses of two or more categorical variables
- Cross tabulates or tallies jointly the responses of the categorical variables
- For two variables the tallies for one variable are located in the rows and the tallies for the second variable are located in the columns

Contingency Table - Example

DCOVA

- A random sample of 400 invoices is drawn.
- Each invoice is categorized as a small, medium, or large amount.
- Each invoice is also examined to identify if there are any errors.
- These data are then organized in the contingency table to the right.

Contingency Table Showing Frequency of Invoices Categorized By Size and The Presence Of Errors

	No Errors	Errors	Total
Small Amount	170	20	190
Medium Amount	100	40	140
Large Amount	65	5	70
Total	335	65	400

Contingency Table Based On Percentage of Overall Total

DCOV

	No Errors	Errors	Total
Small Amount	170	20	190
Medium Amount	100	40	140
Large Amount	65	5	70
Total	335	65	400

42.50% = 170 / 400
25.00% = 100 / 400
16.25% = 65 / 400

	No Errors	Errors	Total
Small Amount	42.50%	5.00%	47.50%
Medium Amount	25.00%	10.00%	35.00%
Large Amount	16.25%	1.25%	17.50%
Total	83.75%	16.25%	100.0%

83.75% of sampled invoices have no errors and 47.50% of sampled invoices are for small amounts.

Contingency Table Based On Percentage of Row Totals

DCOV

	No Errors	Errors	Total
Small Amount	170	20	190
Medium Amount	100	40	140
Large Amount	65	5	70
Total	335	65	400

89.47% = 170 / 190
71.43% = 100 / 140
92.86% = 65 / 70

	No Errors	Errors	Total
Small Amount	89.47%	10.53%	100.0%
Medium Amount	71.43%	28.57%	100.0%
Large Amount	92.86%	7.14%	100.0%
Total	83.75%	16.25%	100.0%

Medium invoices have a larger chance (28.57%) of having errors than small (10.53%) or large (7.14%) invoices.

Contingency Table Based On Percentage Of Column Total

DCOV

	No Errors	Errors	Total
Small Amount	170	20	190
Medium Amount	100	40	140
Large Amount	65	5	70
Total	335	65	400

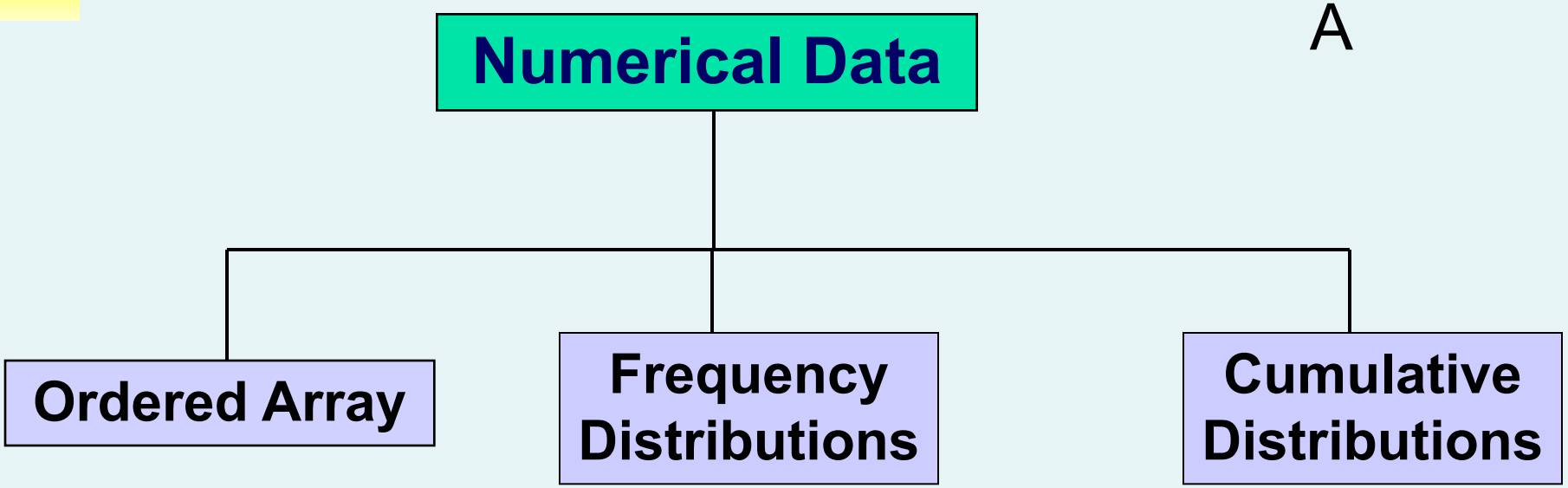
50.75% = 170 / 335
30.77% = 20 / 65

	No Errors	Errors	Total
Small Amount	50.75%	30.77%	47.50%
Medium Amount	29.85%	61.54%	35.00%
Large Amount	19.40%	7.69%	17.50%
Total	100.0%	100.0%	100.0%

There is a 61.54% chance that invoices with errors are of medium size.

Tables Used For Organizing Numerical Data

DCOVA



Organizing Numerical Data: Ordered Array

DCOVA

- An **ordered array** is a sequence of data, in rank order, from the smallest value to the largest value.
- Shows range (minimum value to maximum value)
- May help identify outliers (unusual observations)

Age of Surveyed College Students	**Day Students**					
	16	17	17	18	18	18
	19	19	20	20	21	22
	22	25	27	32	38	42
	Night Students					
	18	18	19	19	20	21
	23	28	32	33	41	45

Organizing Numerical Data: Frequency Distribution

DCOVA

- The **frequency distribution** is a summary table in which the data are arranged into numerically ordered classes.

- You must give attention to selecting the appropriate *number* of **class groupings** for the table, determining a suitable *width* of a class grouping, and establishing the *boundaries* of each class grouping to avoid overlapping.

- The number of classes depends on the number of values in the data. With a larger number of values, typically there are more classes. In general, a frequency distribution should have at least 5 but no more than 15 classes.

- To determine the **width of a class interval,** you divide the **range** (Highest value–Lowest value) of the data by the number of class groupings desired.

Organizing Numerical Data: Frequency Distribution Example

DCOVA

Example: A manufacturer of insulation randomly selects 20 winter days and records the daily high temperature in degrees F.

24, 35, 17, 21, 24, 37, 26, 46, 58, 30, 32, 13, 12, 38, 41, 43, 44, 27, 53, 27

Organizing Numerical Data: Frequency Distribution Example

DCOVA

- Sort raw data in ascending order:
  12, 13, 17, 21, 24, 24, 26, 27, 27, 30, 32, 35, 37, 38, 41, 43, 44, 46, 53, 58
- Find range: **58 - 12 = 46**
- Select number of classes: **5 (usually between 5 and 15)**
- Compute class interval (width): **10 (46/5 then round up)**
- Determine class boundaries (limits):
  - **Class 1: 10 to less than 20**
  - **Class 2: 20 to less than 30**
  - **Class 3: 30 to less than 40**
  - **Class 4: 40 to less than 50**
  - **Class 5: 50 to less than 60**
- Compute class midpoints: **15, 25, 35, 45, 55**
- Count observations & assign to classes

Organizing Numerical Data: Frequency Distribution Example

DCOVA

Data in ordered array:

12, 13, 17, 21, 24, 24, 26, 27, 27, 30, 32, 35, 37, 38, 41, 43, 44, 46, 53, 58

Class	Midpoints	Frequency
10 but less than 20	15	3
20 but less than 30	25	6
30 but less than 40	35	5
40 but less than 50	45	4
50 but less than 60	55	2
Total		20

Organizing Numerical Data: Relative & Percent Frequency Distribution Example

DCOVA

Data in ordered array:

12, 13, 17, 21, 24, 24, 26, 27, 27, 30, 32, 35, 37, 38, 41, 43, 44, 46, 53, 58

Class	Frequency	Relative Frequency	Percentage
10 but less than 20	3	.15	15
20 but less than 30	6	.30	30
30 but less than 40	5	.25	25
40 but less than 50	4	.20	20
50 but less than 60	2	.10	10
Total	20	1.00	100

Organizing Numerical Data: Cumulative Frequency Distribution Example

DCOVA

Data in ordered array:

12, 13, 17, 21, 24, 24, 26, 27, 27, 30, 32, 35, 37, 38, 41, 43, 44, 46, 53, 58

Class	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
10 but less than 20	3	15%	3	15%
20 but less than 30	6	30%	9	45%
30 but less than 40	5	25%	14	70%
40 but less than 50	4	20%	18	90%
50 but less than 60	2	10%	20	100%
Total	20	100	20	100%

Why Use a Frequency Distribution?

DCOVA

- It condenses the raw data into a more useful form
- It allows for a quick visual interpretation of the data
- It enables the determination of the major characteristics of the data set including where the data are concentrated / clustered

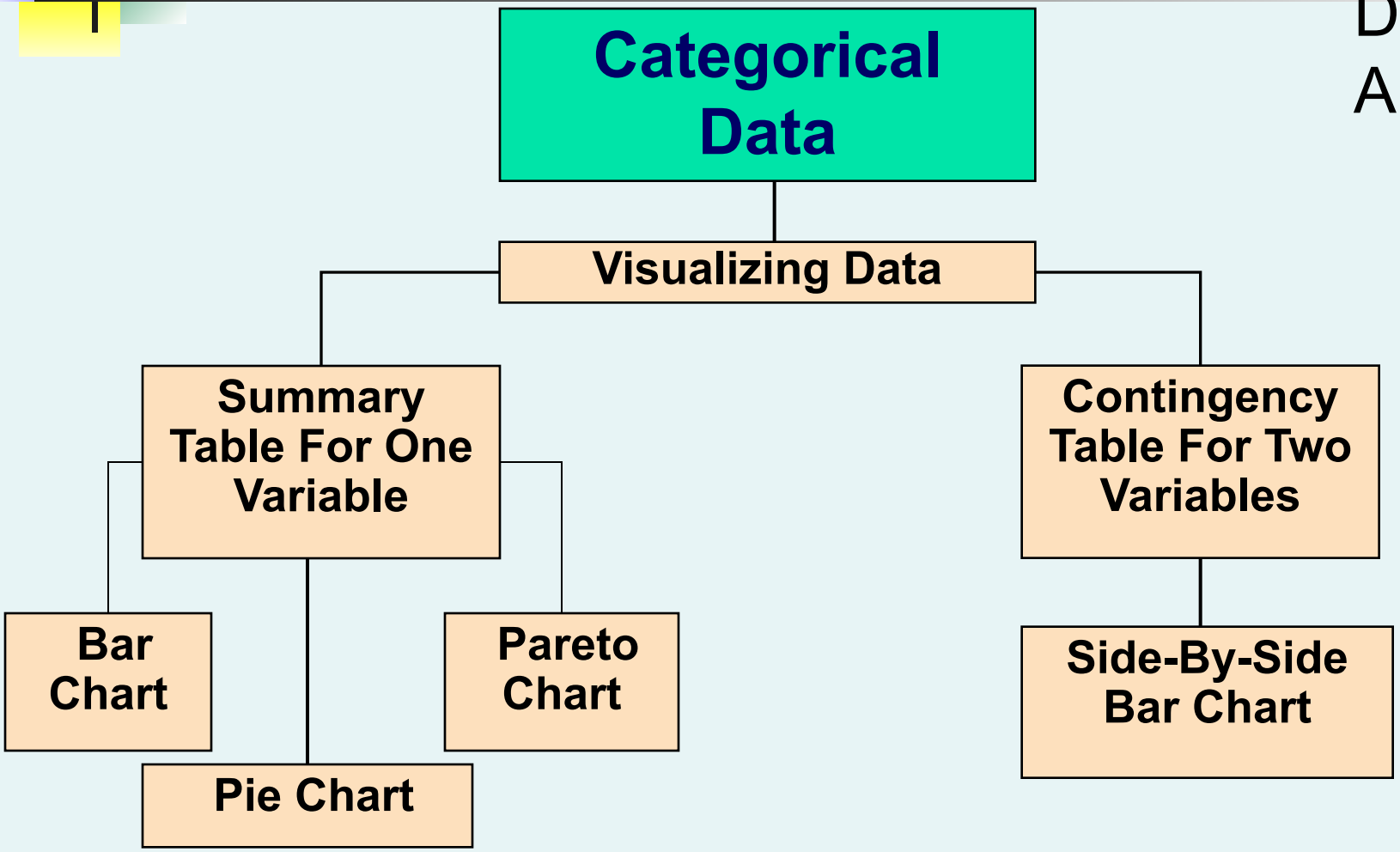
Frequency Distributions: Some Tips

DCOVA

- Different class boundaries may provide different pictures for the same data (especially for smaller data sets)
- Shifts in data concentration may show up when different class boundaries are chosen
- As the size of the data set increases, the impact of alterations in the selection of class boundaries is greatly reduced
- When comparing two or more groups with different sample sizes, you must use either a relative frequency or a percentage distribution

Visualizing Categorical Data Through Graphical Displays

DCOVA

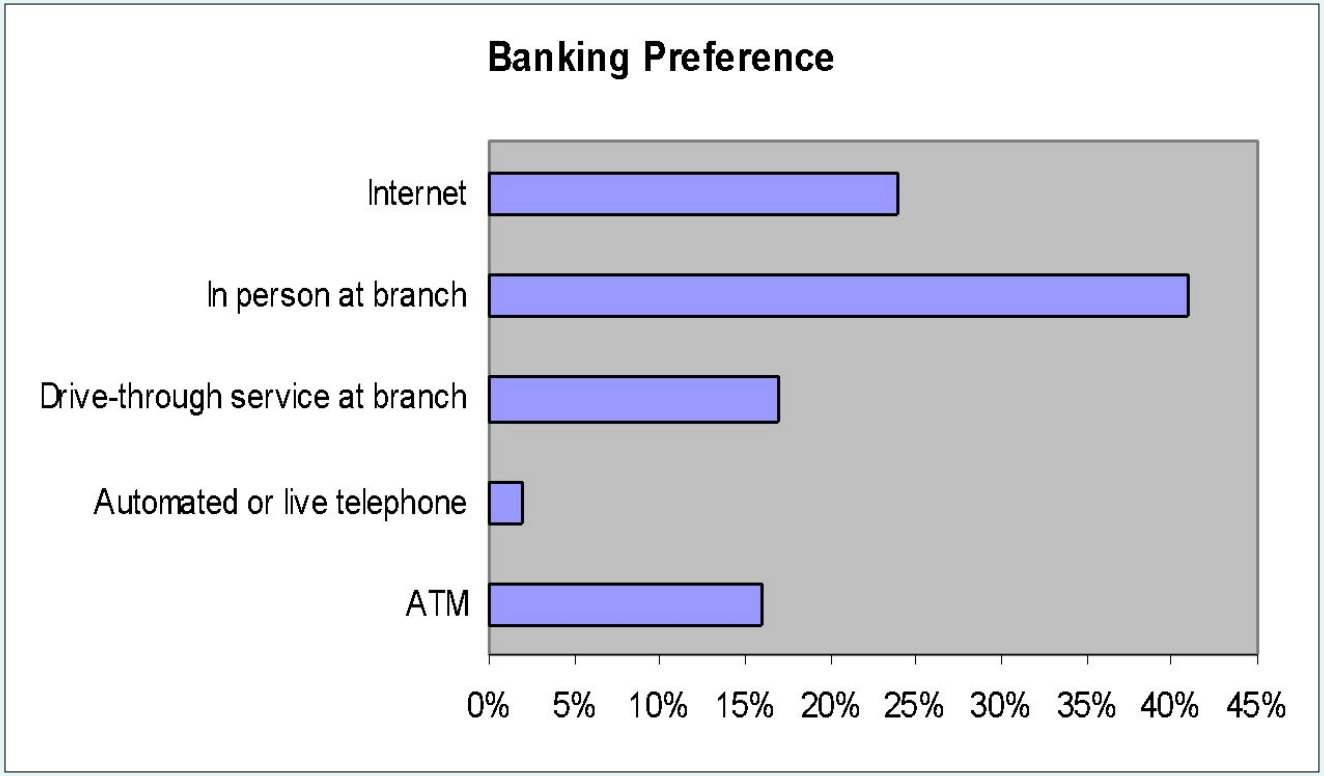


Visualizing Categorical Data: The Bar Chart

DCOVA

- In a **bar chart,** a bar shows each category, the length of which represents the amount, frequency or percentage of values falling into a category which come from the summary table of the variable.

Banking Preference?	%
ATM	16%
Automated or live telephone	2%
Drive-through service at branch	17%
In person at branch	41%
Internet	24%



Visualizing Categorical Data: The Bar Chart

DCOVA

- The **bar chart** visualizes a categorical variable as a series of bars. The length of each bar represents either the frequency or percentage of values for each category. Each bar is separated by a space called a gap.

Reason For Shopping Online?	Percent
Better Prices	37%
Avoiding holiday crowds or hassles	29%
Convenience	18%
Better selection	13%
Ships directly	3%

Visualizing Categorical Data: The Pie Chart

DCOVA

- The **pie chart** is a circle broken up into slices that represent categories. The size of each slice of the pie varies according to the percentage in each category.

Banking Preference?	%
ATM	16%
Automated or live telephone	2%
Drive-through service at branch	17%
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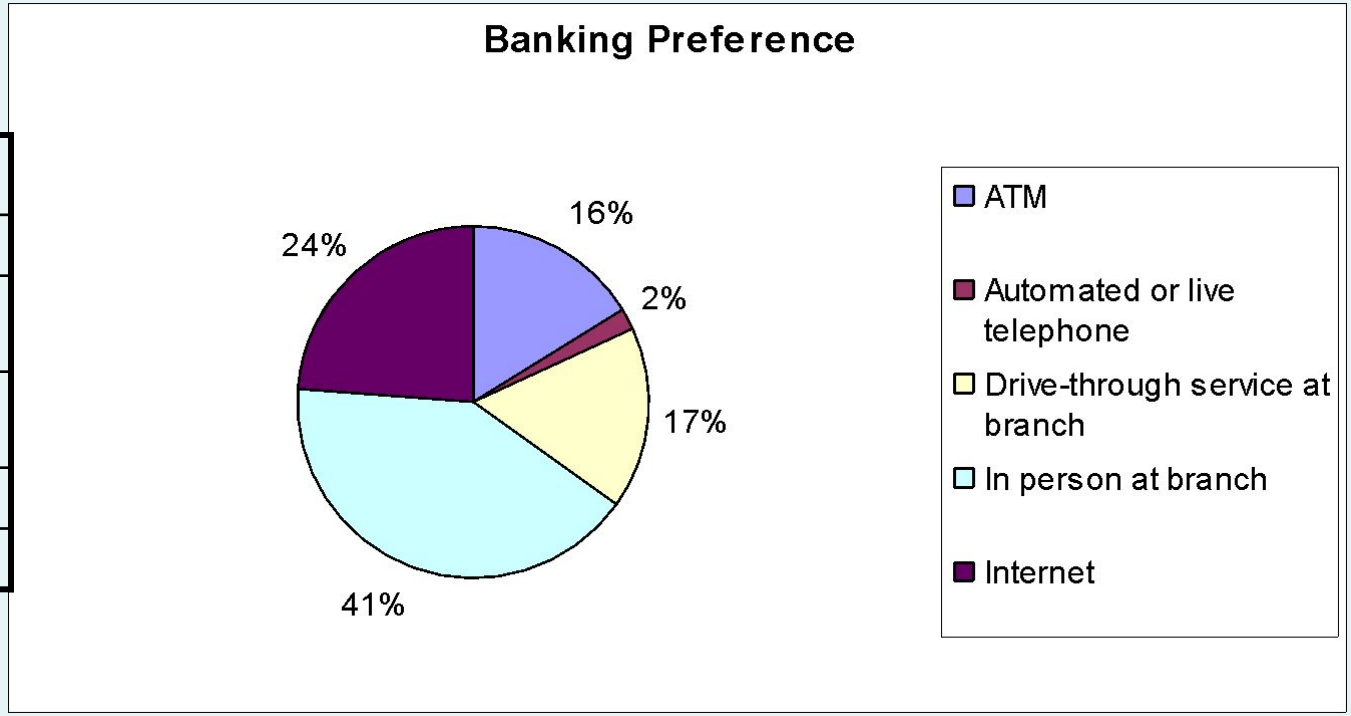

Visualizing Categorical Data: The Pie Chart

DCOVA

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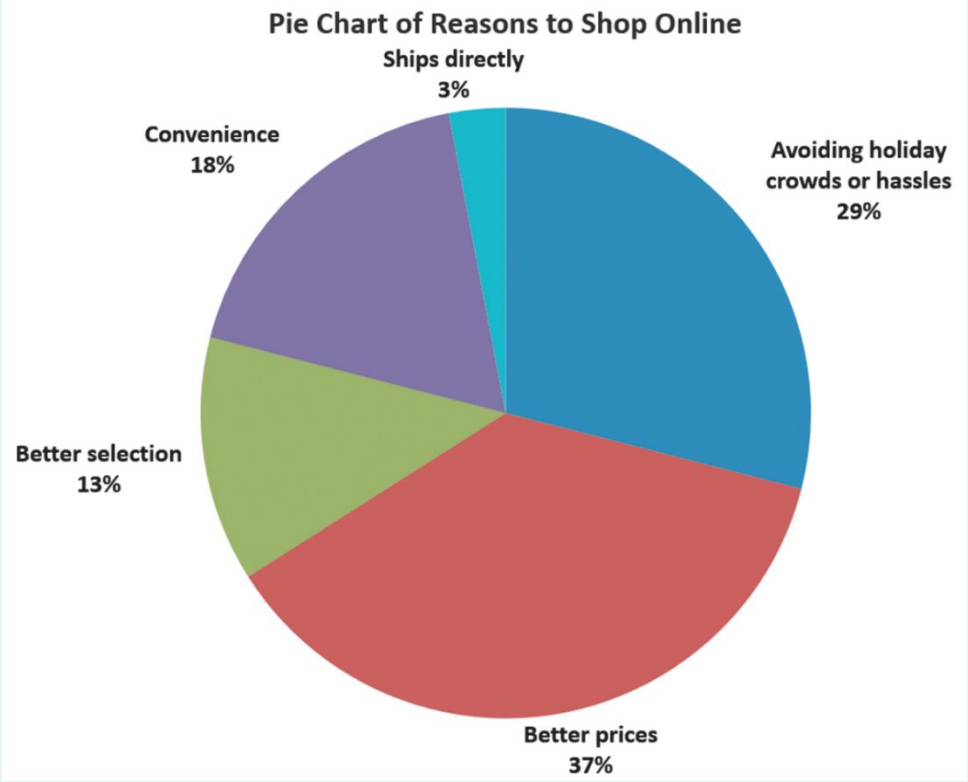


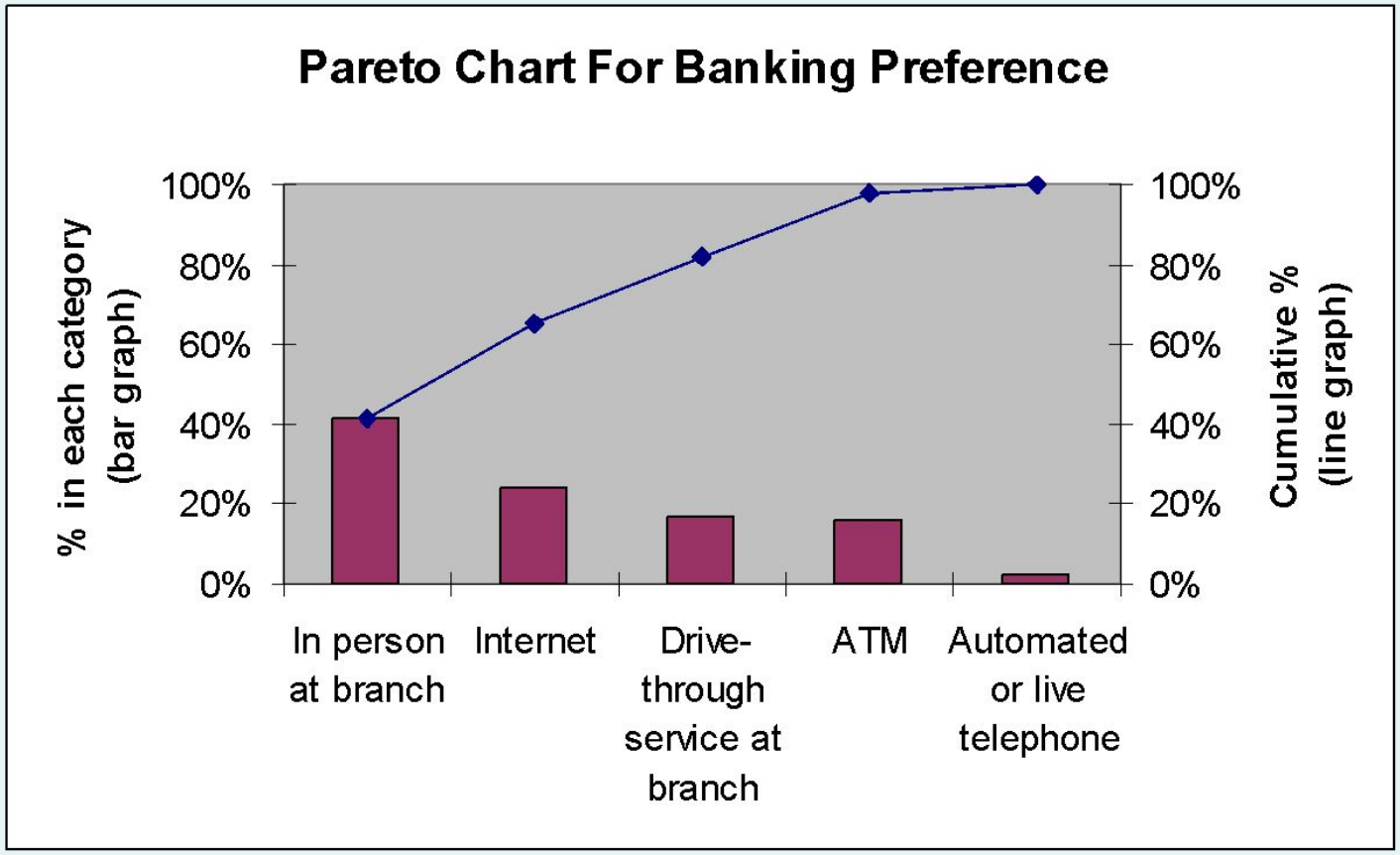
Visualizing Categorical Data: The Pareto Chart

DCOVA

- Used to portray categorical data
- A vertical bar chart, where categories are shown in descending order of frequency
- A cumulative polygon is shown in the same graph
- Used to separate the “vital few” from the “trivial many”

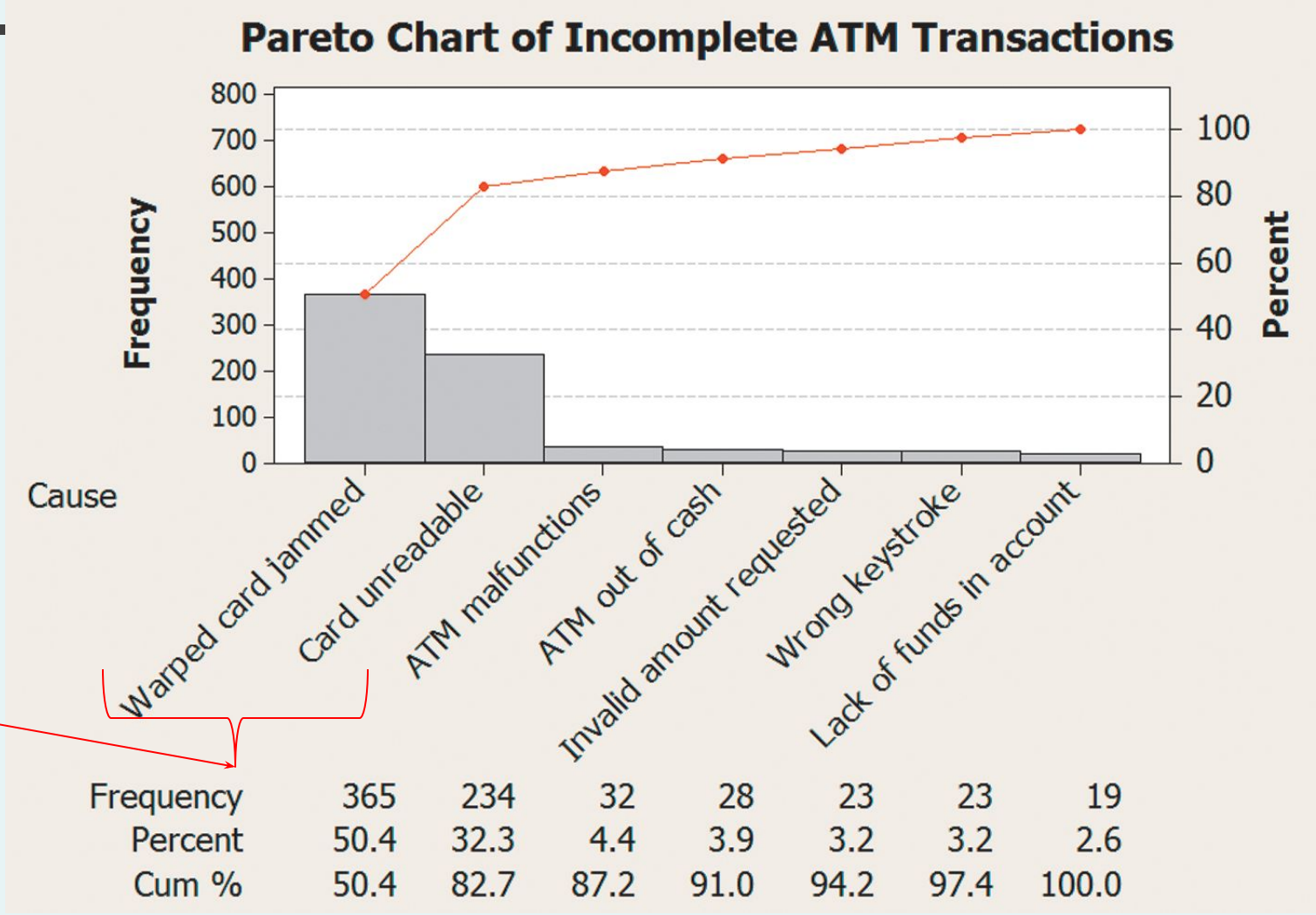
Visualizing Categorical Data: The Pareto Chart (con't)

DCOVA



Visualizing Categorical Data: The Pareto Chart (con't)

DCOV



Frequency	365	234	32	28	23	23	19
Percent	50.4	32.3	4.4	3.9	3.2	3.2	2.6
Cum %	50.4	82.7	87.2	91.0	94.2	97.4	100.0

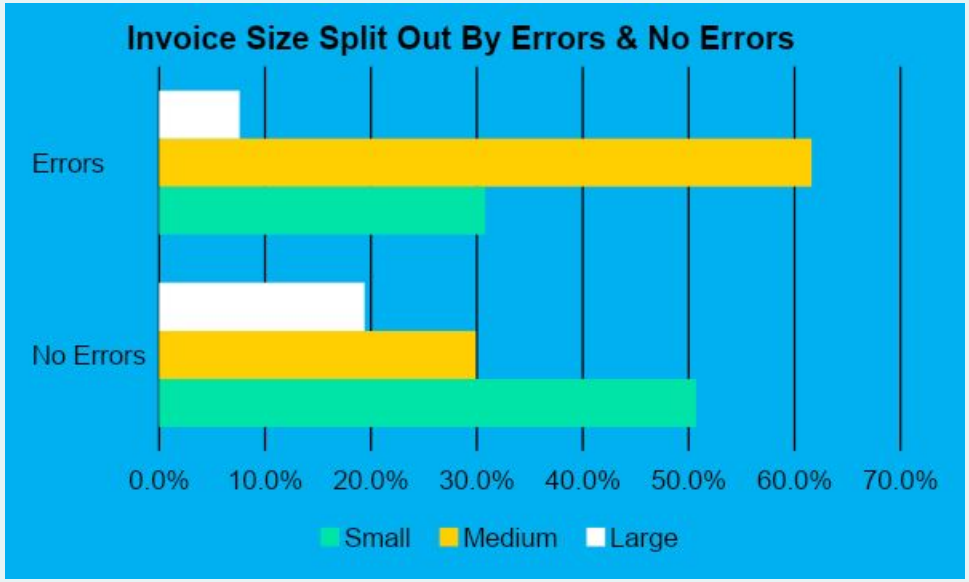
The "Vital Few"

Visualizing Categorical Data: Side-By-Side Bar Charts

DCOVA

- The **side-by side-bar chart** represents the data from a contingency table.

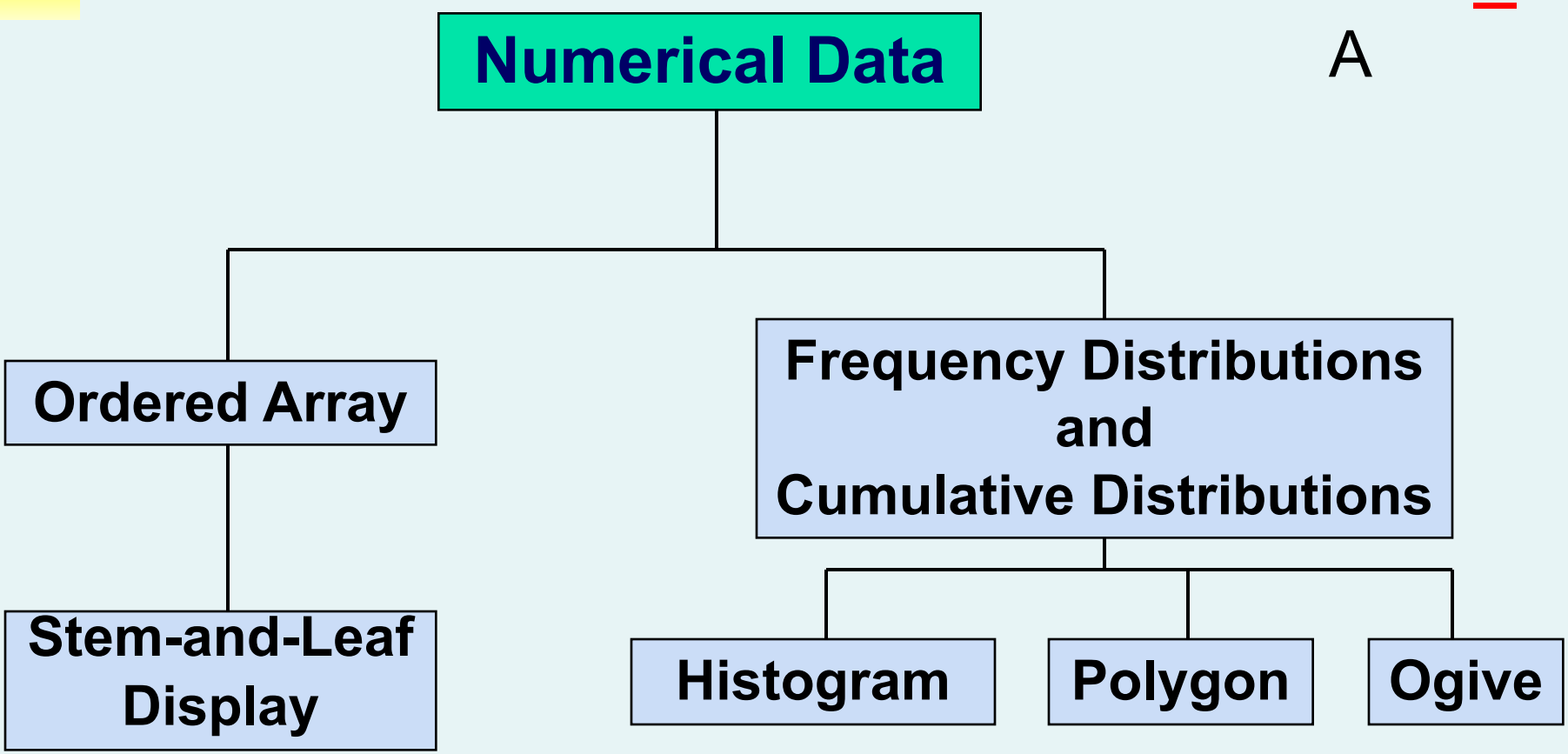
	No Errors	Errors	Total
Small Amount	50.75%	30.77%	47.50%
Medium Amount	29.85%	61.54%	35.00%
Large Amount	19.40%	7.69%	17.50%
Total	100.0%	100.0%	100.0%



Invoices with errors are much more likely to be of medium size (61.54% vs 30.77% and 7.69%)

Visualizing Numerical Data By Using Graphical Displays

DCOVA



Stem-and-Leaf Display

DCOVA

- A simple way to see how the data are distributed and where concentrations of data exist

METHOD: Separate the sorted data series into leading digits (the **stems**) and the trailing digits (the **leaves**)

Organizing Numerical Data: Stem and Leaf Display

DCOVA

- A **stem-and-leaf display** organizes data into groups (called stems) so that the values within each group (the leaves) branch out to the right on each row.

Age of Surveyed College Students						
	Day Students					
	16	17	17	18	18	18
	19	19	20	20	21	22
	22	25	27	32	38	42
	Night Students					
	18	18	19	19	20	21
	23	28	32	33	41	45

Age of College Students

Day Students

Stem	Leaf
1	67788899
2	0012257
3	28
4	2

Night Students

Stem	Leaf
1	8899
2	0138
3	23
4	15

Visualizing Numerical Data: The Histogram

DCOVA

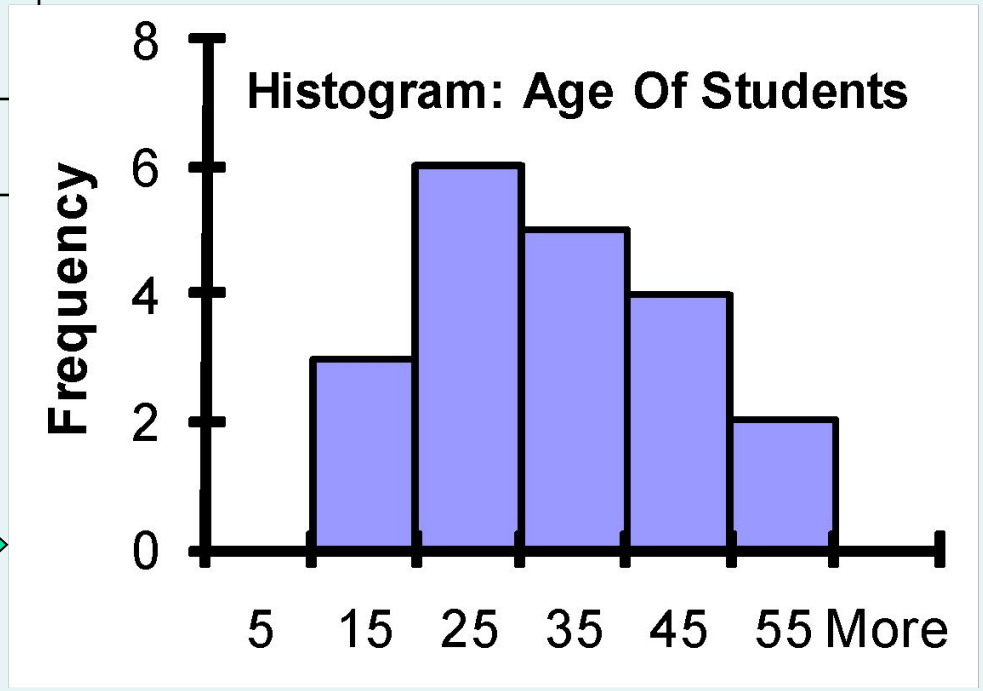
- A vertical bar chart of the data in a frequency distribution is called a **histogram.**
- In a histogram there are no gaps between adjacent bars.
- The **class boundaries** (or **class midpoints**) are shown on the horizontal axis.
- The vertical axis is either **frequency, relative frequency,** or **percentage**.
- The height of the bars represent the frequency, relative frequency, or percentage.

Visualizing Numerical Data: The Histogram

DCOVA

Class	Frequency	Relative Frequency	Percentage
10 but less than 20	3	.15	15
20 but less than 30	6	.30	30
30 but less than 40	5	.25	25
40 but less than 50	4	.20	20
50 but less than 60	2	.10	10
Total	20	1.00	100

(In a percentage histogram the vertical axis would be defined to show the percentage of observations per class)



Visualizing Numerical Data: The Polygon

DCOVA

- A **percentage polygon** is formed by having the midpoint of each class represent the data in that class and then connecting the sequence of midpoints at their respective class percentages.

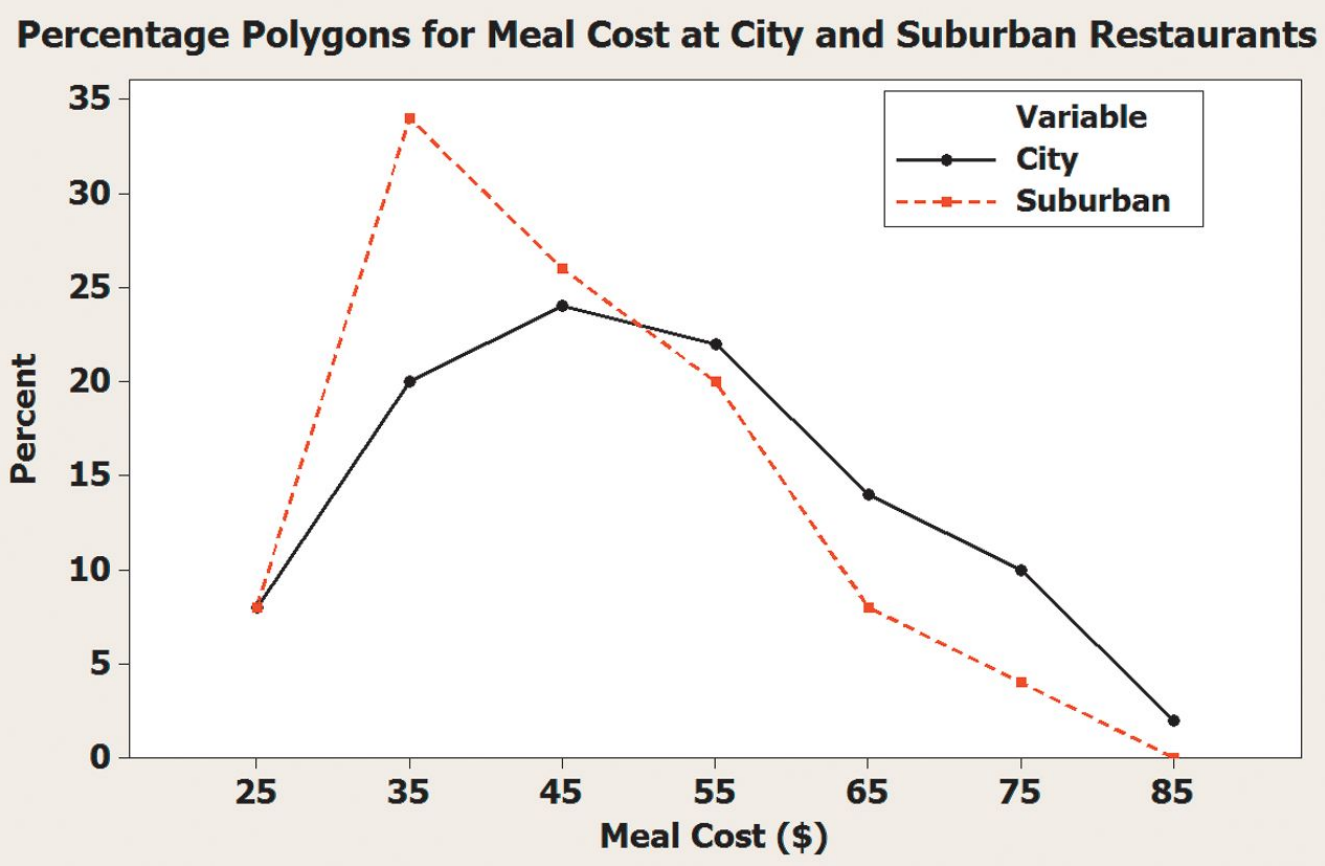
- The **cumulative percentage polygon,** or **ogive,** displays the variable of interest along the *X* axis, and the cumulative percentages along the *Y* axis.

- Useful when there are two or more groups to compare.

Visualizing Numerical Data: The Percentage Polygon

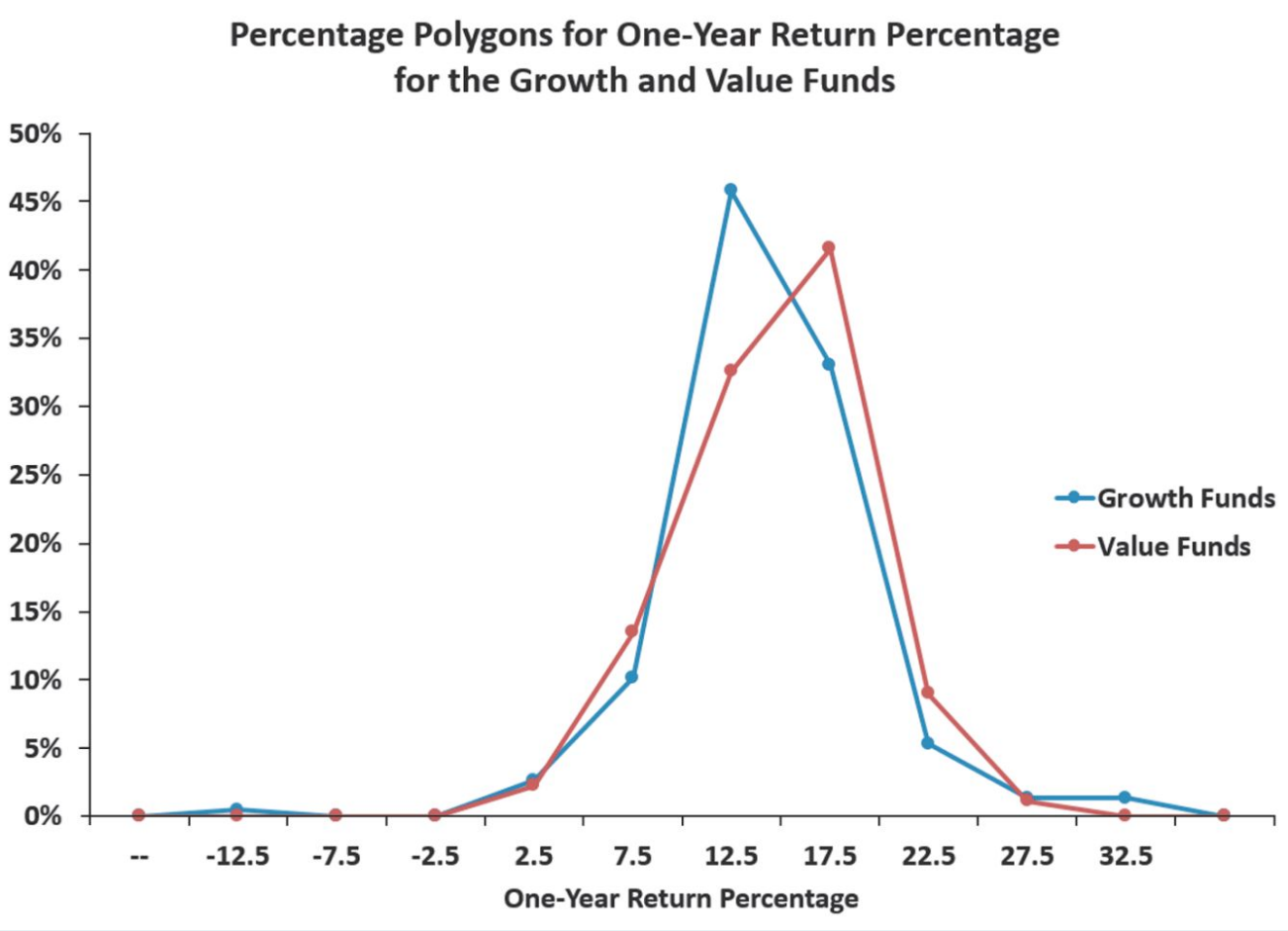
DCOVA

Useful When Comparing Two or More Groups



Visualizing Numerical Data: The Percentage Polygon

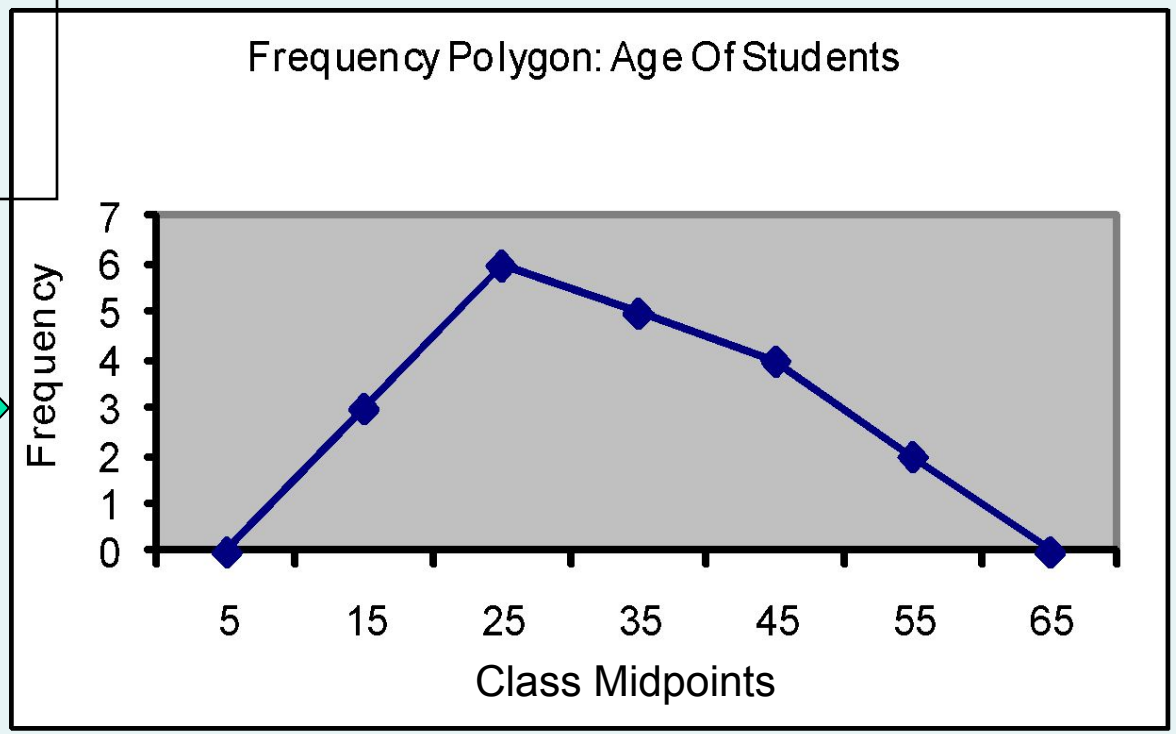
DCOVA



Visualizing Numerical Data: The Frequency Polygon

DCOVA

Class	Class Midpoint	Frequency
10 but less than 20	15	3
20 but less than 30	25	6
30 but less than 40	35	5
40 but less than 50	45	4
50 but less than 60	55	2



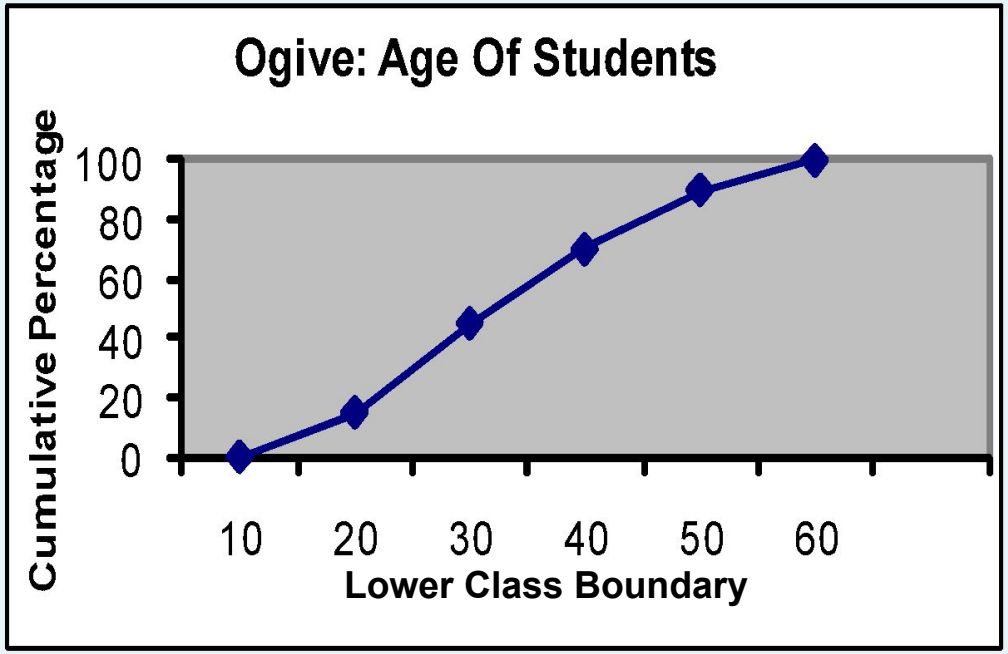
(In a percentage polygon the vertical axis would be defined to show the percentage of observations per class)

Visualizing Numerical Data: The Ogive (Cumulative % Polygon)

DCOVA

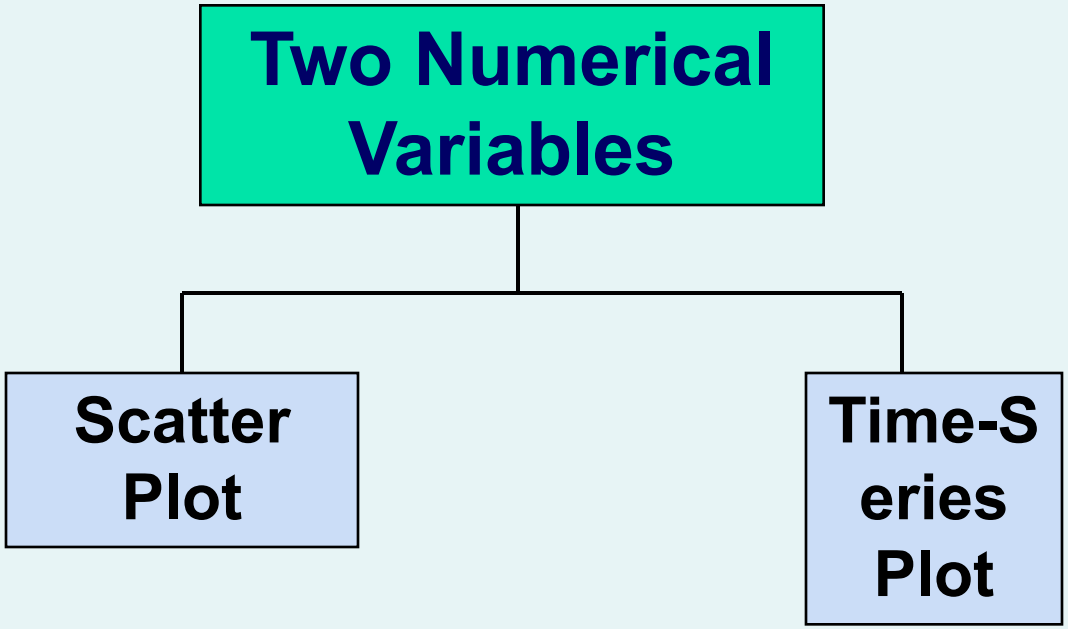
Class	Lower class boundary	% less than lower boundary
10 but less than 20	10	0
20 but less than 30	20	15
30 but less than 40	30	45
40 but less than 50	40	70
50 but less than 60	50	90
60 but less than 70	60 100	

(In an ogive the percentage of the observations less than each lower class boundary are plotted versus the lower class boundaries.



Visualizing Two Numerical Variables By Using Graphical Displays

DCOVA



Visualizing Two Numerical Variables: The Scatter Plot

DCOVA

- **Scatter plots** are used for numerical data consisting of paired observations taken from two numerical variables

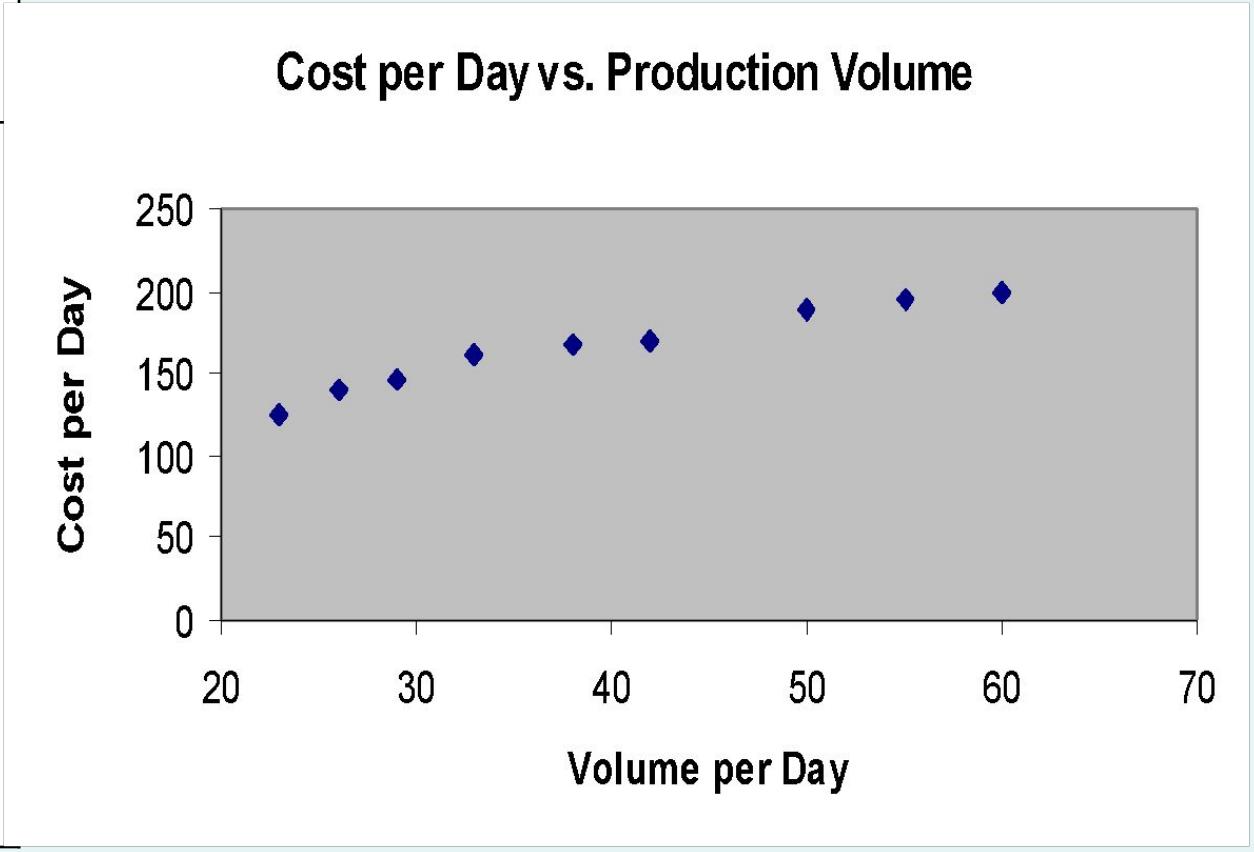
- One variable is measured on the vertical axis and the other variable is measured on the horizontal axis

- Scatter plots are used to examine possible relationships between two numerical variables

Scatter Plot Example

DCOVA

Volume per day	Cost per day
23	125
26	140
29	146
33	160
38	167
42	170
50	188
55	195
60	200



Visualizing Two Numerical Variables: The Time-Series Plot

DCOVA

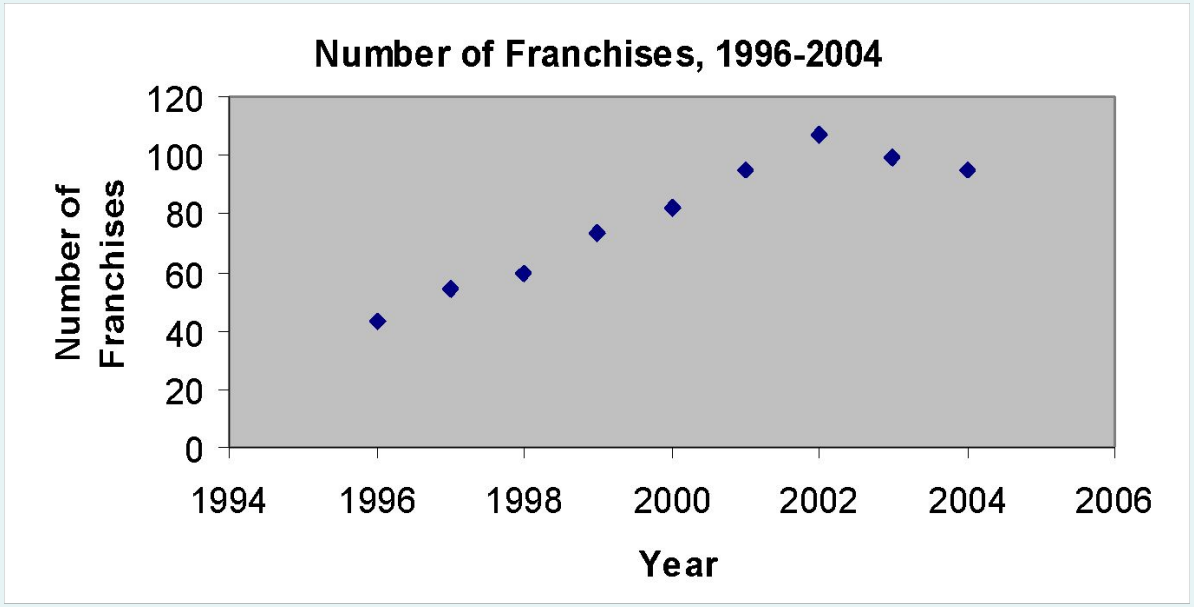
- **Time-series plots** are used to study patterns in the values of a numeric variable over time.

- The numeric variable is measured on the vertical axis and the time period is measured on the horizontal axis.

Time-Series Plot Example

DCOVA

Year	Number of Franchises
1996	43
1997	54
1998	60
1999	73
2000	82
2001	95
2002	107
2003	99
2004	95



Exploring Multidimensional Data

DCOVA

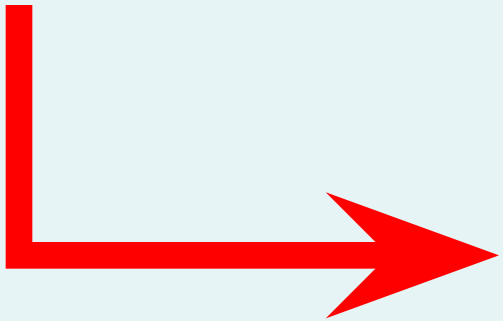
- Can be used to discover possible patterns and relationships.
- Simple applications used to create summary or contingency tables
- Can also be used to change and / or add variables to a table
- All of the examples that follow can be created using Sections EG2.3 and EG2.7 or MG2.3 and MG2.7

Pivot Table Version of Contingency Table For Bond Data

DCOV

First Six Data Points In The Bond Data Set A

Fund Number	Type	Assets	Fees	Expense Ratio	Return 2009	3-Year Return	5-Year Return	Risk
FN-1	Intermediate Government	7268.1	No	0.45	6.9	6.9	5.5	Below average
FN-2	Intermediate Government	475.1	No	0.50	9.8	7.5	6.1	Below average
FN-3	Intermediate Government	193.0	No	0.71	6.3	7.0	5.6	Average
FN-4	Intermediate Government	18603.5	No	0.13	5.4	6.6	5.5	Average
FN-5	Intermediate Government	142.6	No	0.60	5.9	6.7	5.4	Average
FN-6	Intermediate Government	1401.6	No	0.54	5.7	6.4	6.2	Average



	A	B	C	D
1	PivotTable of Type and Fees			
2				
3	Count of Fees	Fees		
4	Type	Yes	No	Grand Total
5	Intermediate Government	34	53	87
6	Short Term Corporate	20	77	97
7	Grand Total	54	130	184

Can Easily Convert To An Overall Percentages Table

DCOV
A

	A	B	C	D
1	Contingency Table of Type and Percentages of Fees			
2				
3	Count of Fees	Fees		
4	Type	Yes	No	Grand Total
5	Intermediate Government	18.48%	28.80%	47.28%
6	Short Term Corporate	10.87%	41.85%	52.72%
7	Grand Total	29.35%	70.65%	100.00%

Intermediate government funds are much more likely to charge a fee.

Can Easily Add Variables To An Existing Table

DCOV

	A	B	C	D	E
1	Multidimensional Contingency Table of Type, Risk, and Fees				
2					
3	Count of Fees		Fees		
4	Type	Risk	Yes	No	Grand Total
5	Intermediate Government	Above average	15	14	29
6		Average	13	19	32
7		Below average	6	20	26
8	Intermediate Government Total		34	53	87
9	Short Term Corporate	Above average	7	23	30
10		Average	7	30	37
11		Below average	6	24	30
12	Short Term Corporate Total		20	77	97
13	Grand Total		54	130	184

Is the pattern of risk the same for all combinations of fund type and fee charge?

Can Easily Change The Statistic Displayed

DCOV
A

	A	B	C	D
1	Contingency Table of Type, and Fees, and Sums of Assets			
2				
3	Sum of Assets	Fees		
4	Type	Yes	No	Grand Total
5	Intermediate Government	26252.7	56692.2	82944.9
6	Short Term Corporate	16842.1	67772.3	84614.4
7	Grand Total	43094.8	124464.5	167559.3

This table computes the sum of a numerical variable (Assets) for each of the four groupings and shows a total for each row and column.

Tables Can Compute & Display Other Descriptive Statistics

DCOV

	A	B	C	D	E
1	Contingency Table of Type, Risk, Fees and Means of 2009 Return				
2					
3	Average of Return 2009		Fees		
4	Type	Risk	Yes	No	Grand Total
5	Intermediate Government	Above average	4.89	1.41	3.21
6		Average	3.39	3.74	3.60
7		Below average	5.98	7.17	6.90
8	Intermediate Government Total		4.51	4.42	4.45
9	Short Term Corporate	Above average	15.99	12.42	13.25
10		Average	9.87	9.66	9.70
11		Below average	6.53	5.63	5.81
12	Short Term Corporate Total		11.01	9.23	9.60
13	Grand Total		6.92	7.27	7.16

This table computes and displays averages of 3-year return for each of the twelve groupings.

Principles of Excellent Graphs

DCOVA

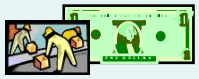
- The graph should not distort the data.
- **The graph should not contain unnecessary adornments (sometimes referred to as chart junk).**
- The scale on the vertical axis should begin at zero.
- All axes should be properly labeled.
- The graph should contain a title.
- The simplest possible graph should be used for a given set of data.

Graphical Errors: Chart Junk

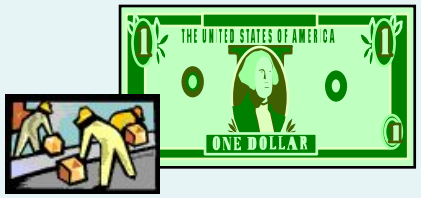
DCOVA

Bad Presentation

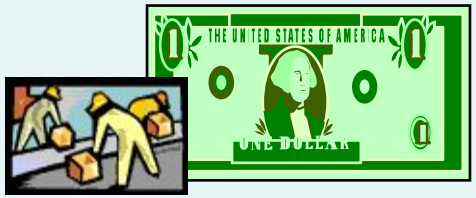
Minimum Wage


1960: $1.00


1970: $1.60

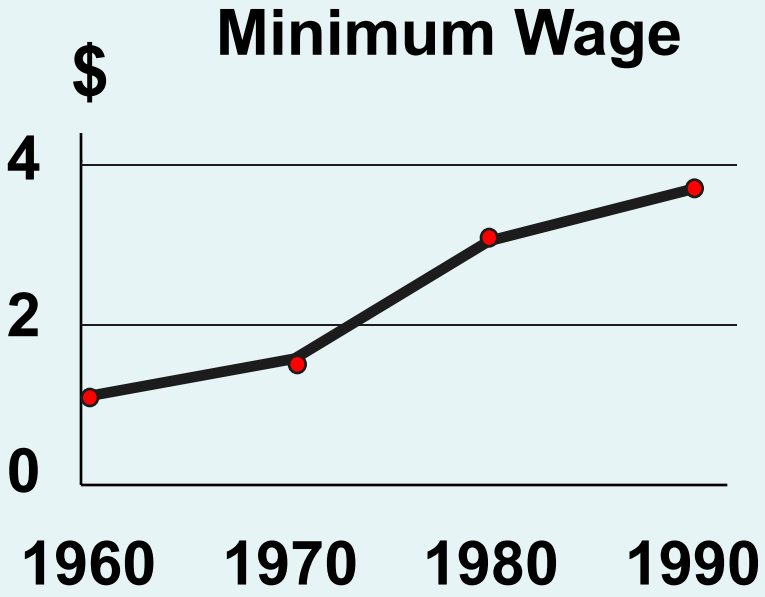


1980: $3.10



1990: $3.80

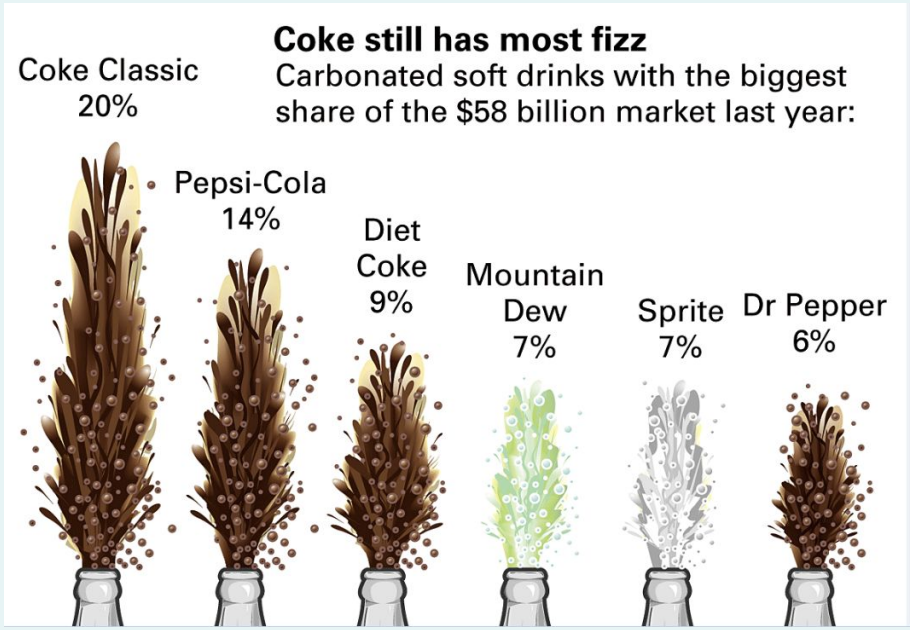
Good Presentation



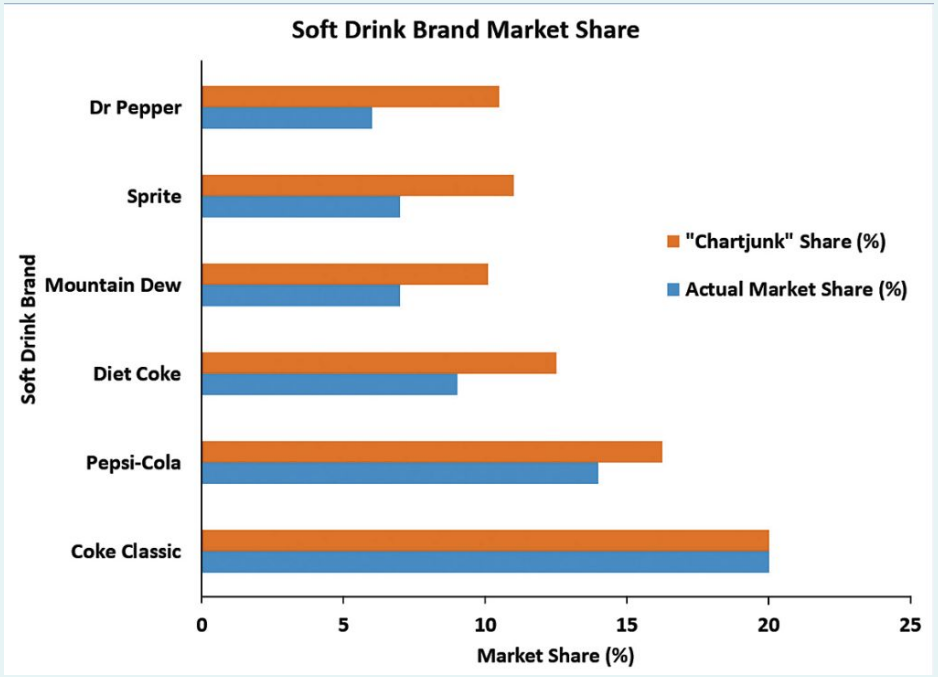
Graphical Errors: Chart Junk, Can You Identify The Junk?

DCOVA

Bad Presentation



Good Presentation



Graphical Errors: Chart Junk, Can You Identify The Junk?

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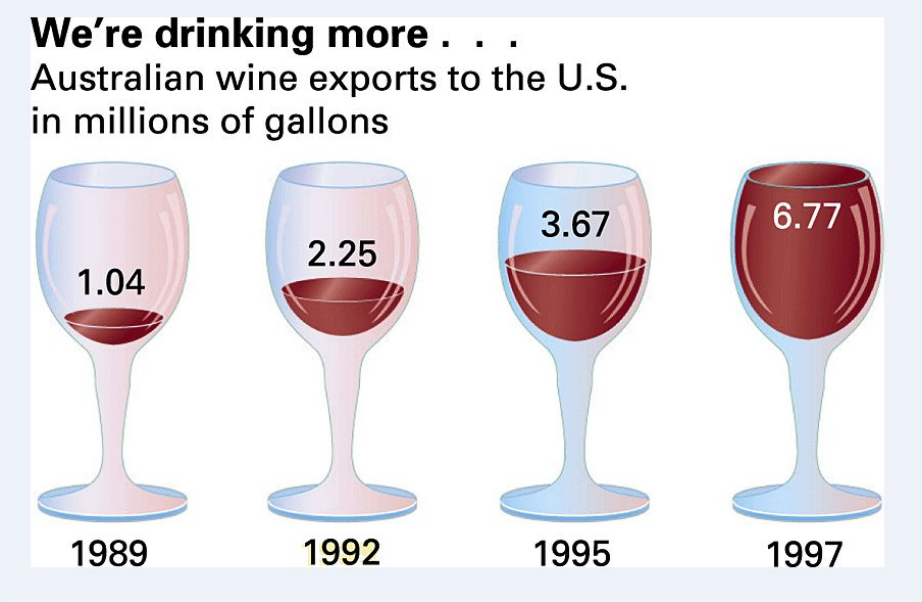
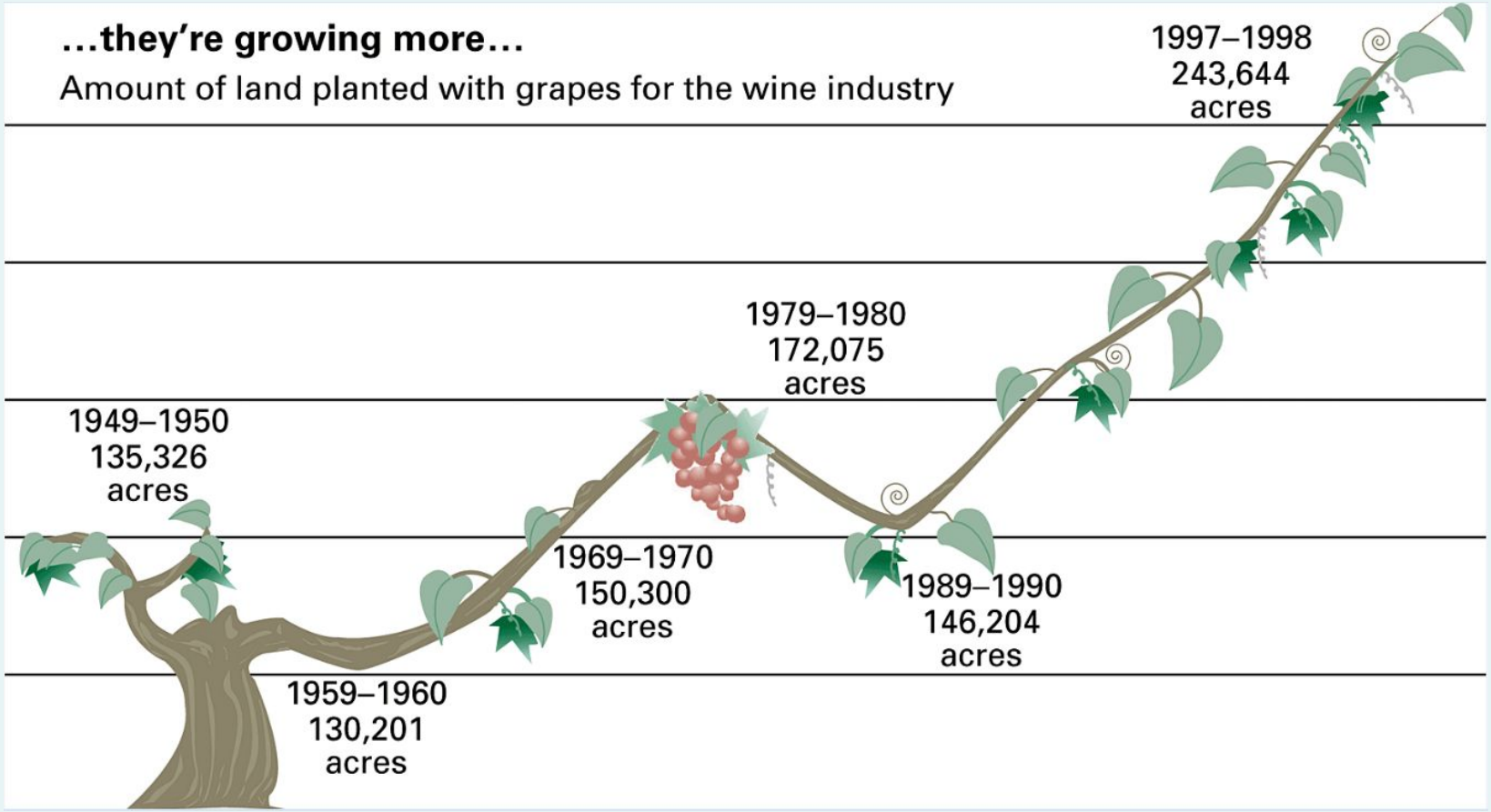
Good Presentation



Graphical Errors: Chart Junk, Can You Identify The Junk?

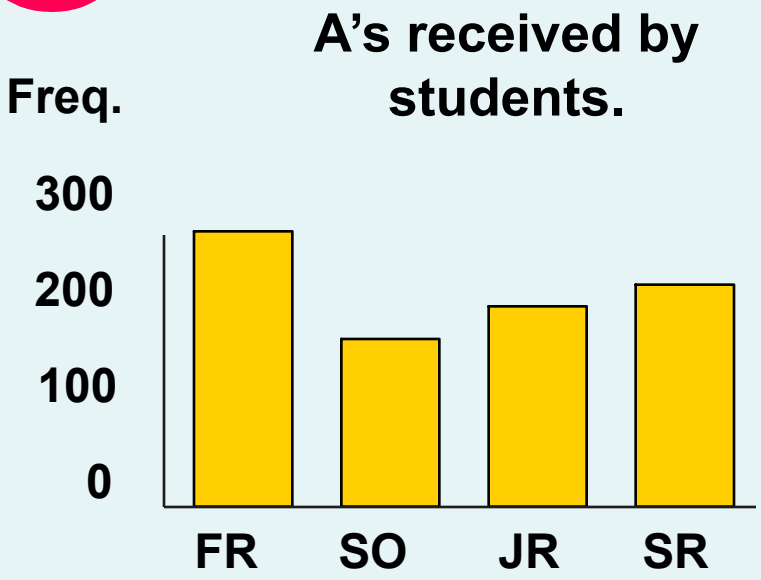
DCOVA



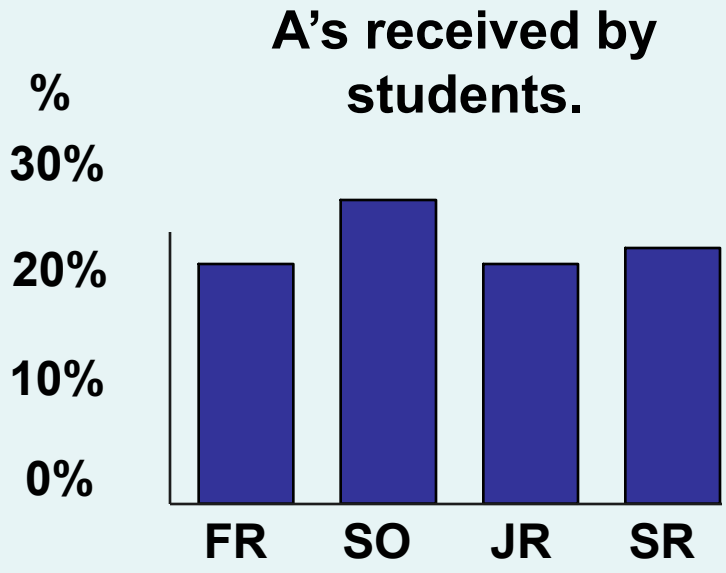
Graphical Errors: No Relative Basis

DCOVA

Bad Presentation



Good Presentation

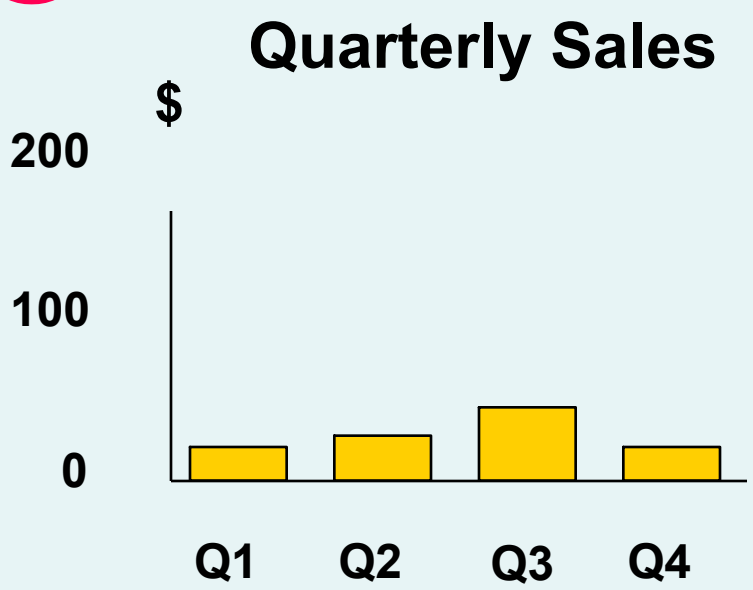


FR = Freshmen, SO = Sophomore, JR = Junior, SR = Senior

Graphical Errors: Compressing the Vertical Axis

DCOVA

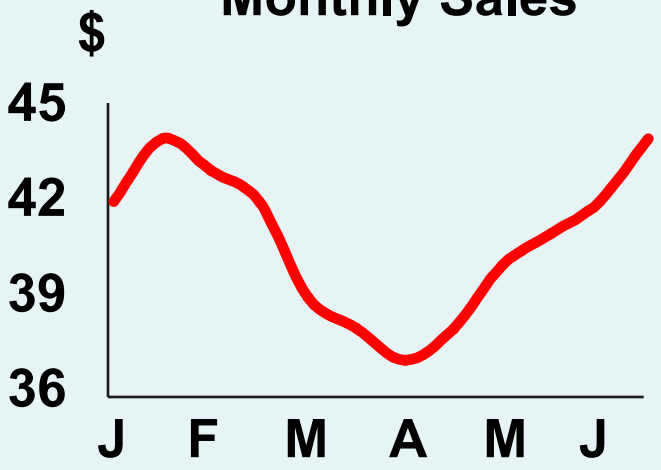
Bad Presentation



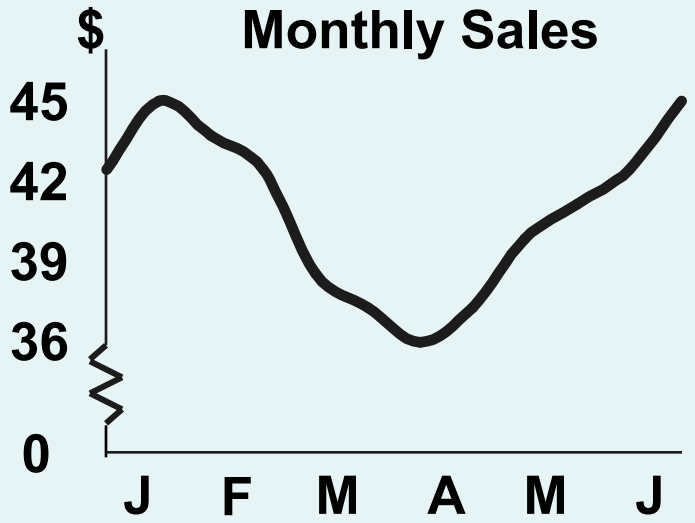
Good Presentation

Graphical Errors: No Zero Point on the Vertical Axis

Bad Presentation



Good Presentations



Graphing the first six months of sales

In Excel It Is Easy To Inadvertently Create Distortions

- Excel often will create a graph where the vertical axis does not start at 0
- Excel offers the opportunity to turn simple charts into 3-D charts and in the process can create distorted images
- Unusual charts offered as choices by Excel will most often create distorted images

Chapter Summary

In this chapter, we have

- Discussed sources of data used in business
- Organized categorical data using a summary table or a contingency table.
- Organized numerical data using an ordered array, a frequency distribution, a relative frequency distribution, a percentage distribution, and a cumulative percentage distribution.
- Visualized categorical data using the bar chart, pie chart, and Pareto chart.
- Visualized numerical data using the stem-and-leaf display, histogram, percentage polygon, and ogive.
- Developed scatter plots and time-series graphs.
- Looked at examples of the use of Pivot Tables in Excel for multidimensional data.
- Examined the do's and don'ts of graphically displaying data.

1. An insurance company evaluates many numerical variables about a person before deciding on an appropriate rate for automobile insurance. A representative from a local insurance agency selected a random sample of insured drivers and recorded, *X,* the number of claims each made in the last 3 years, with the following results.

X	*f*
1	14
2	18
3	12
4	5
5	1

1. Referring to Table 2-1, how many drivers are represented in the sample? ( )

2. Referring to Table 2-1, how many total claims are represented in the sample? ( )

3. A type of vertical bar chart in which the categories are plotted in the descending rank order of the magnitude of their frequencies is called a ( )

4. The width of each bar in a histogram corresponds to the( )

a) differences between the boundaries of the class.

b) number of observations in each class.

c) midpoint of each class.

d) percentage of observations in each class.

5. When constructing charts, the following is plotted at the class midpoints:

A. frequency histograms.

B. percentage polygons.

C. cumulative relative frequency ogives.

D. All of the above.

COUNTIF (range, criteria)

Active Learning Lecture Slides

For use with Classroom Response Systems

Business Statistics: A First Course

Which of the following always displays percentages rather than counts?

A. Frequency table

B. Bar chart

C. Relative frequency table

D. Contingency table

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Which of the following gives the best visual of how a whole group is partitioned into several categories?

A. Bar chart

B. Frequency distribution

C. Pie chart

D. Contingency table

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D. Contingency table

The following is a breakdown of TV viewers during the Super Bowl in 2007.

	Male	Female	Total
Game	279	200	479
Commercials	81	156	237
Won't Watch	132	160	292
Total	492	516	1008

What percentage of viewers was male:

A. 19.8%

B. 47.5%

C. 48.8%

D. 27.7%

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Of the viewers who did not watch the Super Bowl, what percentage was male?

A. 45.2%

B. 48.8%

C. 26.8%

D. 27.7%

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In a contingency table, when the distribution of one variable is the same for all categories of another, we say the variables are

A. separate.

B. independent.

C. distinct.

D. dependent.

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A. separate.

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D. dependent.

You should use a histogram to display categorical data.

A. True

B. False

You should use a histogram to display categorical data.

A. True

B. False

Thank you