

# Categorical Variables: Pie Charts and Bar Graphs

## Lecture 2

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# Outline

- 1 Distributions
- 2 Pie Charts
- 3 Bar Graphs
- 4 Assignment

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# Distributions

## Definition (Distribution)

A **distribution** of the values of a *categorical* variable is a list of the categories (labels) paired with either the counts or the percents of individuals that fall into those categories.

# Example

## Example (HSC Graduates)

- The following table summarizes the majors of the 2015 HSC graduating class, arranged alphabetically by major.

| Major                | Number | Major            | Number |
|----------------------|--------|------------------|--------|
| Biology              | 23     | History          | 25     |
| Chemistry            | 5      | Mathematics      | 4      |
| Classical Studies    | 2      | Modern Languages | 2      |
| Computer Science     | 2      | Philosophy       | 3      |
| Economics            | 75     | Physics          | 8      |
| English              | 7      | Psychology       | 15     |
| Fine Arts            | 2      | Religion         | 2      |
| Gov't & For. Affairs | 29     |                  |        |

# Example

## Example (HSC Graduates)

- The following table summarizes the majors of the 2015 HSC graduating class, arranged by count.

| Major                | Number | Major             | Number |
|----------------------|--------|-------------------|--------|
| Economics            | 75     | Mathematics       | 4      |
| Gov't & For. Affairs | 29     | Philosophy        | 3      |
| History              | 25     | Classical Studies | 2      |
| Biology              | 23     | Computer Science  | 2      |
| Psychology           | 15     | Fine Arts         | 2      |
| Physics              | 8      | Modern Languages  | 2      |
| English              | 7      | Religion          | 2      |
| Chemistry            | 5      |                   |        |

# Example

## Example (HSC Graduates)

- The following table summarizes the majors of the 2015 HSC graduating class, arranged by percent.

| Major                | Percent | Major             | Percent |
|----------------------|---------|-------------------|---------|
| Economics            | 37%     | Mathematics       | 2%      |
| Gov't & For. Affairs | 14%     | Philosophy        | 1%      |
| History              | 12%     | Classical Studies | 1%      |
| Biology              | 11%     | Computer Science  | 1%      |
| Psychology           | 7%      | Fine Arts         | 1%      |
| Physics              | 4%      | Modern Languages  | 1%      |
| English              | 3%      | Religion          | 1%      |
| Chemistry            | 2%      |                   |         |

# Outline

1 Distributions

**2 Pie Charts**

3 Bar Graphs

4 Assignment

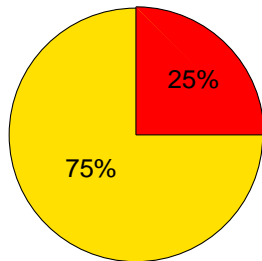


## Definition (Pie chart)

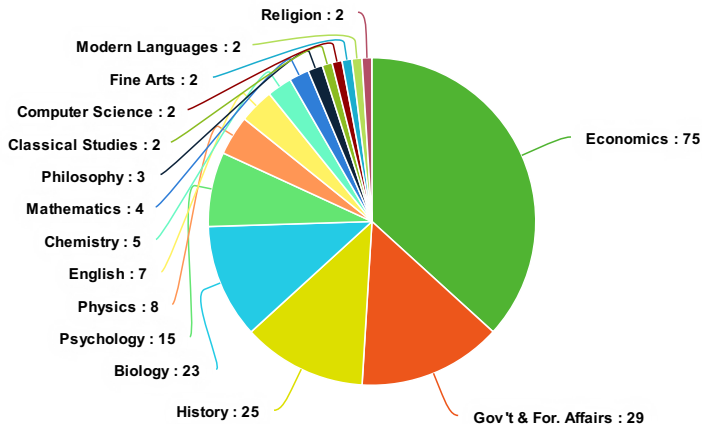
A **pie chart** is a display of categorical data in which each category is represented by a slice of a pie. The size of each pie slice is proportional to the number of observations in that category.

- Use the percentage associated with the category to compute the central angle of the pie slice.
- For example,  $25\%$  of  $360^\circ = 90^\circ$ .
- A pie chart facilitates the comparison of one category to the whole.

# Pie Charts



# Pie Charts



# Example

- How was the weather in Farmville in December 2015?
- According to the National Weather Service:

| Weather Conditions | No. of Days |
|--------------------|-------------|
| Clear              | 7           |
| Scattered Clouds   | 3           |
| Partly Cloudy      | 3           |
| Fog                | 5           |
| Rain               | 10          |
| Thunderstorms      | 3           |
| Snow               | 0           |

- Use [www.meta-chart.com](http://www.meta-chart.com) to draw a pie chart of the data.

# Example

- How was the weather in Farmville in December 2014?
- According to the National Weather Service:

| Weather Conditions | No. of Days |
|--------------------|-------------|
| Clear              | 6           |
| Scattered Clouds   | 5           |
| Partly Cloudy      | 3           |
| Fog                | 1           |
| Rain               | 15          |
| Thunderstorms      | 0           |
| Snow               | 1           |

- Use [www.meta-chart.com](http://www.meta-chart.com) to draw a pie chart of the data.

# Example

- How did the Farmville weather in December 2014 compare to the Farmville weather in December 2015?
- It is not a good idea to try to compare the two pie charts.
- Instead, a **bar graph** should be used.

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# Bar Graphs

## Definition (Bar graph)

A **bar graph** is a display of categorical data in which each category is represented by a bar (rectangle). The height of the bar is proportional to the number of observations in that category.

- The horizontal scale shows the categories.
- The vertical scale shows the counts or percentages.
- The horizontal/vertical orientation may be reversed.
- A bar graph facilitates the comparison of one category to another.



# Example

- How was the weather in Farmville in December 2015?

| Weather Conditions | No. of Days |
|--------------------|-------------|
| Clear              | 7           |
| Scattered Clouds   | 3           |
| Partly Cloudy      | 3           |
| Fog                | 5           |
| Rain               | 10          |
| Thunderstorms      | 3           |
| Snow               | 0           |

- Use [www.meta-chart.com](http://www.meta-chart.com) to draw a bar graph of the data.

# Example

- How was the weather in Farmville in December 2014?

| Weather Conditions | No. of Days |
|--------------------|-------------|
| Clear              | 6           |
| Scattered Clouds   | 5           |
| Partly Cloudy      | 3           |
| Fog                | 1           |
| Rain               | 15          |
| Thunderstorms      | 0           |
| Snow               | 1           |

- Use [www.meta-chart.com](http://www.meta-chart.com) to draw a bar graph of the data.

# Example

- Draw a bar graph that compares the December 2015 weather to the December 2014 weather.

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# Assignment

## Homework

- Read Chapter 1: Pie Charts and Bar Graphs.
- Apply Your Knowledge: 3, 4, 5.
- Check Your Skills: 14, 15 (choose the correct statement), 16.
- Exercises: 25, 26, 29.