This handout will:

- Address the purpose of integrating visuals into academic papers.
- List the advantages and disadvantages of different types of visuals.
- Help determine when visuals are necessary.
- Demonstrate how to integrate visuals.
- Help avoid common pitfalls.

The Purpose of Integrating Visuals into Academic Papers

Visuals are graphs, charts, tables, and other similar graphics that are incorporated into academic papers/reports to serve the following purposes:
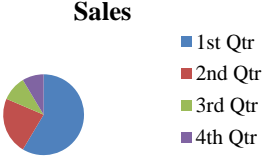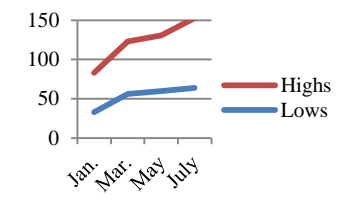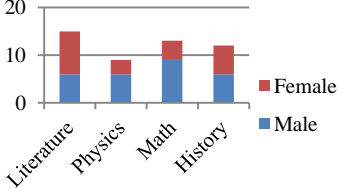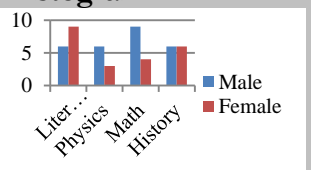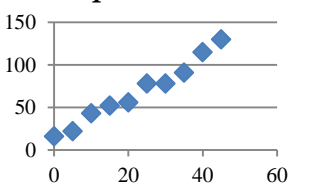
- *They attract and hold the reader's interest and attention.* Readers, especially those who are visually oriented, will immediately gravitate towards visuals. However, it is crucial that the visuals you use do not merely serve to catch the reader's attention, but that they are also <u>relevant</u> to your paper
- *They provide a quick method of communicating concepts.* Visuals serve to <u>complement</u> a paper, and thus, they can quickly illustrate a point that could possibly take a paragraph or more to express. For example, a graph displaying the relationship between household incomes and voting patterns expresses the concept much faster than words can.
- *They simplify, better illustrate, and reinforce a concept/point*. Visuals condense a large amount of information into a small graphic, which can also then serve to reinforce your arguments.
- *Visuals persuade readers in a way that words may not.* Because readers are naturally drawn towards visuals, a visual can be more memorable than merely reading about it, and thus, it can strengthen your ideas and arguments.
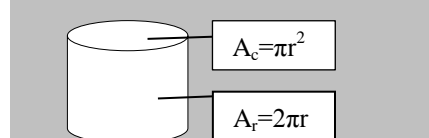
The Advantages and Disadvantages of Different Types of Visuals

Choosing the most effective visual to display your content is an integral part of the writing process. The table below lists the advantages and disadvantages of different visuals that can be incorporated into a paper.

Type of Visual	Advantages	Disadvantages
Table Pop. Ratio Living Below Poverty Year Percentage 2013 14% 2012 12% 2011 11% 2010 13%	• Organizes statistics well. • Presents data in categories. • Compares and contrasts ideas.	• Trends and patterns might not be as obvious as with other types of visuals such as graphs. • Overwhelms readers with too much data.
Pie Chart	• Displays the percentage of the category out of the whole.	• The "Other" category that is sometimes used can be vague and thus problematic. • Having more than six categories becomes confusing.
Line Graph	• Large amount of data can be plotted. • Easy to analyze trends/patterns over a period of time. • Emphasizes physical quantity.	• Hard to decipher precise values. • Data often has to be continuous.
Bar Graph	• Compares data, and therefore displays relationships over a period of time. • Emphasizes physical quantity.	• Data does not have to be exact. • Difficult to have long category labels (for vertical bar graphs).
Histogram	• Presents a range of values/data. • Displays trends and relationships.	• Data has to be continuous since it presents a range of values.
Scatterplot	• Displays trends and their relationships. • Presents precise data, including maximum and minimum values, and outliers.	• More useful in smaller data sets. • A flat trend line is not very useful (inconclusive data).

Organizational Chart Legislative Branch House Senate	• Best for showing relationships between people, organizations, and institutions.	• These charts can occupy a large amount of space, and therefore it is important that they are relevant to the paper.
Flowchart Evaporation ↓ Condensation ↓ Precipitation	• Displays step-by-step processes. • Displays relationships.	• These charts can occupy a large amount of space, and therefore it is important that they are relevant to the paper.
Gantt Chart 3.12 3.14 3.16 3.18 3.20 Task 1 Task 2	• Condenses multiple items into a single timeline.	• Can easily become too complex to follow.
Pictograph Public Transportation Usage Bus Car Train = 100 people surveyed	• Condenses a large amount of data into icons.	• Difficult to quantify partial icons.
Map*	• Displays relationships between objects and locations.	• Limited categories. • Not exact numbers. • Color key can have an unintended message for the reader.
Photograph	• Visualizes information.	• Readers can interpret them differently from the writer.
Illustration/Diagram $A_c = \pi r^2$ $A_r = 2\pi r$	• Visualizes difficult information/complicated objects.	• When not done correctly, it can complicate concepts and confuse readers.

*Source Information for Map Image:
"Election Results." *HuffPost Politics.* TheHuffingtonPost.com, Inc., 2012. Web. 18 Jul. 2014.

<u>Determining the Need for Visuals</u>

Although visuals are a great way to engage readers and reinforce concepts, not all papers will require them. Before incorporating them into a paper, be sure to ask yourself the following two questions to determine whether a visual is relevant to your paper or not:

- *How does the visual further the arguments of the paper?*
  A visual is meant to work *in conjunction* with your ideas. It should not merely serve as decoration or a repetition of your arguments. Rather, visuals should contribute to the message you wish to convey in your paper.
  - *<u>Example of an Effective Use of Visuals</u>:* A paper on how the increase of pollution affects the population of marine life might include a graph showing this relationship, especially if you have a large amount of data to convey.
  - *<u>Example of an Ineffective Use of Visuals</u>:* A paper comparing the depiction of Paris through Honoré de Balzac and Charles Baudelaire's literary works would not require illustrations of Paris. Rather, you would only need quotations from their poetry and stories to explain how the two versions of Paris are similar or different.
- *How will the visual help readers better understand your paper?*
  The purpose of integrating visuals into a paper is to help your audience have an easier reading experience. Think about how readers might react to the visuals you have chosen to include and what messages those visuals are sending. Are they simplifying complex ideas or are they further complicating your arguments?
  - *<u>Example of an Effective Use of Visuals</u>:* A research paper on Darwin's contribution to the theory of evolution might include illustrations of the different shapes of tortoise shells to help readers better visualize the topic and evidence.
  - *<u>Example of an Ineffective Use of Visuals</u>:* If you were to write an engineering report on the benefits of an apparatus and you include an illustration of it, labeling every detail of this apparatus—even when not necessary to the matter discussed in your report— would likely overcomplicate the visual and confuse the reader.

When considering the two questions above, it is often helpful to think back to the purpose of integrating visuals:

- *Will it attract and hold the reader's attention/interest?*
- *Will it simplify a concept and communicate it much faster?*
- *Will it better illustrate and reinforce your ideas?*
- *Will it ultimately strengthen your paper/report or will it be redundant?*

Integrating Visuals into Academic Papers

Not only do the visuals themselves matter in a paper. The manner in which you integrate them will affect how your readers will perceive your arguments and ideas. When done correctly, a visual will boost the strength and credibility of your paper. When done incorrectly, visuals can make your paper appear disordered and unprofessional.

General Guidelines for Integrating Visuals:

- **Placement:** *Never* place visuals before they are mentioned in the text as this will only confuse readers. Place them on the same page where they are mentioned or immediately afterwards on the next page if you do not have enough room. Be sure to *refer* to the visuals in the text.
  - **MLA:**
    - *Tables* are left justified while *figures* can either be centered or left justified.
    - When making a reference in-text, conclude the sentence with the following: (see fig. #), (see table #).
    Example: Public opinion on global warming has been increasingly negative in the last ten years (see table 3).
  - **APA:**
    - Both *tables* and *figures* are centered.
    - When making a reference in-text, use a signal phrase to introduce the visual.
    Example: According to Table 3, public opinion on global warming has been increasingly negative in the last ten years.
  - **Chicago Manual of Style:**
    - *Tables* are left justified while *figures* are centered.
    - When making a reference in-text, use either a signal phrase or a parenthetical reference.
    Example of a Signal Phrase: The data in figure 3 shows that there is a disproportioned allocation of funds for the research experiment.
    Example of a Parenthetical Reference: There is a disproportioned allocation of funds for the research experiment (fig. 3).

- **Size:** In general, visuals occupy one-fourth to one-half of a page. Try to avoid having visuals that occupy an entire page as readers will be forced to flip back and forth between pages as they read. However, the clarity of the visual should hold priority over its size. *Never* break apart a visual and have it occupy two pages.

- **Labels:** All visuals should include a label indicating the type of visual you are using. These should be left justified.
  - **Tables** should be labeled Table 1, Table 2, Table 3, etc.

- o **Figures** are all other visuals with the exception of musical illustrations and should be labeled Figure 1, Figure 2, Figure 3, etc.
  - o **Examples** are musical illustrations, which should be labeled Ex. 1, Ex. 2, Ex. 3, etc.

- **Titles for Tables:** All tables require a title that is short but clear enough to express the topic of the visual. Like labels, titles should also be left justified and are found above the table. There should not be any use of periods at the end of titles.
  - o **MLA:**
    - The title should be under the label "Table #".
    - Capitalize all major and proper nouns. Major words include nouns, adjectives, verbs, adverbs, and pronouns.
    - Double-space.

    Example:

Table 1
Average Annual Income (2014)

  - o **APA:**
    - Titles should be in *italics* in the line beneath the label "Table #".
    - Capitalize all major and proper nouns. Major words include nouns, adjectives, verbs, adverbs, and pronouns.
    - Double-space.

    Example:

Table 1
Average Annual Income (2014)

  - o **Chicago Manual of Style:**
    - Titles should follow the label "Table #." on the same line.
    - Capitalizing only the first letter of the title and proper nouns is recommended but not necessarily required.
    - Single-space.

    Example:

Table 1. Average annual income (2014)

- **Notes in Tables:** In addition to the source information, tables and certain parts of the visual may sometimes require further explanation. These notes/footnotes should go under the table, and they are left justified.
    - **MLA:**
        - Use superscript lowercase letters within the visual and only lowercase letters for each commentary. Indent the first line, and place them under the source citation of the table. Superscript letters are smaller than the normal font used and are found slightly above the line of type. *Example*: Title [superscript]
        - Double-space.

    Example:

Source: [MLA Citation]
a. Inflation is not accounted for in these measurements.

    - **APA:**
        - General notes about the entire visual should come immediately under the table. Begin with "*Note.*" before writing your commentary.
        - Use superscript lowercase letters both within and under the visual for specific notes about an element of the visual. Additional notes continue on the same line.
        - Use superscript asterisks for probability notes (p value). This should be at the very end of the caption.
        - Double-space.

    Example:

Note. Inflation is not accounted for in these measurements. Adapted from
[APA Citation].
[a][Additional Notes]. [b][Additional Notes]. [c][Additional Notes].
[*][Probability Notes]

    - **Chicago Manual of Style:**
        - General notes for the entire table will go immediately under the source following the label, "*Note:*".
        - Notes for a specific aspect of the table will go underneath the general notes section. Use superscript lowercase letters to distinguish each footnote within the visual and in the caption.

- Single-space notes and bibliographic information, but add a space to separate each one.

Example:

> *Source*: [Citation]
>
> *Note:* [General Notes]
>
> [a]Inflation is not accounted for in these measurements.
>
> [b][Additional Notes]

- **Captions for Figures and Musical Examples:** Figures and musical examples will often have a caption/descriptive phrases instead of a title. Along with their labels, captions for figures and musical examples are placed at the bottom of the visual and are left justified. *Exception:* Musical examples in Chicago Manual of Style format are found above the visual.
  - **MLA:**
    - Provide the caption after "Fig. #." or "Ex. #." on the same line.
    - Capitalize only the first letter of the phrase and any proper nouns.
    - Double-space.

Example for a Figure:

> [Pie Chart]
>
> Fig. 1. Congress expenditures in 2009.

Example for a Musical Example:

> [Musical Example]
>
> Ex. 1. Vivaldi, 'Spring," opening.

  - **APA:**
    - The caption should follow the label "*Figure #.*"
    - Only the first letter of the caption and any proper nouns should be capitalized.
    - Double-space.
    - **Note:** APA does not specify guidelines for musical illustrations.

Example:

> [Pie Chart]
>
> *Figure 1.* Congress expenditures in 2009.

  - **Chicago Manual of Style:**
    - The caption follows the label "Fig. #." or "Ex. #."
    - Capitalizing only the first letter of the caption and any proper nouns is recommended but not necessarily required.

- Single-space.

Example for a Figure:

[Pie Chart]
Fig. 1. Congress expenditures in 2009

Example for a Musical Example:

Ex. 1. Vivaldi, 'Spring,'' opening.
[Musical Example]

Note: There should not be a period after 2009 if nothing else follows. However, if you need to add more information, such as the source, use periods to separate them.

Avoiding Common Pitfalls

Once you have determined the need to include visuals in your work, creating and integrating them can seem an arduous process. The questions below address the most common issues that develop during the process of integrating visuals.

- **Does the visual serve a purpose in the paper?**
  - o Is your visual merely a repeat of your text?
  - o How does it advance your argument?
  - o **Note:** Do not omit information from the visuals that might not necessarily support your arguments, as this will only damage your credibility and that of the paper.
- **Is the visual clear and concise?**
  - o Did you avoid the use of unnecessary details? (eg. vertical lines in tables when writing in APA style)
  - o Are your visuals of high quality?
  - o Are your visuals self-explanatory? (ie. Are your titles/captions descriptive enough?)
  - o If you are using two visuals side-by-side, is it possible to combine them? (This is not required, but it is helpful for the flow and clarity of the paper.)
- **Are your visuals well-formatted?**
  - o Do your visuals have a title/descriptive phrase?
  - o Are your visuals and other relevant details clearly labeled?
  - o Are your captions/notes properly formatted?
  - o Is the placement of your visuals accurate?
  - o Did you refer to your visuals in the text before integrating them?
- **Can your readers interpret visuals differently from you? Will it hinder your paper?**
  - o Consider your use of colors. Is there an unintended message from your specific choice of colors?
  - o If you are placing two visuals side-by-side for comparison, are there other messages readers might glean from the visuals that might affect the reception of your arguments?

Exercise: Choosing the Best Visual to Use

Choose the best visual for each of the following situations.

1. You are writing a research paper on the increasing college student debt. In addition to higher tuition, you wish to explore other possible causes. You have conducted research and compiled data on student budgets and spending habits in the last ten years. From the list of visuals below, choose the most effective one to present this data in the following situations and explain why.
   Options: Table   Bar Graph   Pie Chart   Line Graph   Histogram
   a. Due to budget cuts, financial aid for students has decreased, causing them to take out more loans.
   _____
   _____
   _____

   b. Student loans have increased significantly in relation to all other forms of funding post-recession.
   _____
   _____
   _____

   c. There is a lack of support for students specifically on managing a budget.
   _____
   _____
   _____

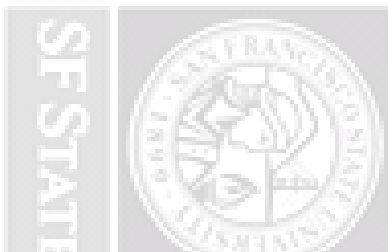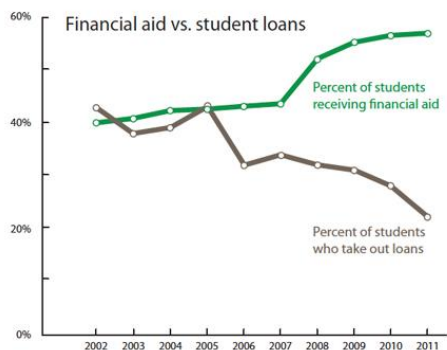2. Which examples below are effective ways to use visuals and why?
   a. You are writing an engineering report where you are proposing alterations to make the hybrid cars more efficient. You incorporate a diagram of your new design.
   b. You are writing an environmental report expressing that CO_2 emissions are projected to stay relatively stable for most countries for the next decade. You use a line graph to show this projection.
   _____
   _____
   _____
   _____
   _____

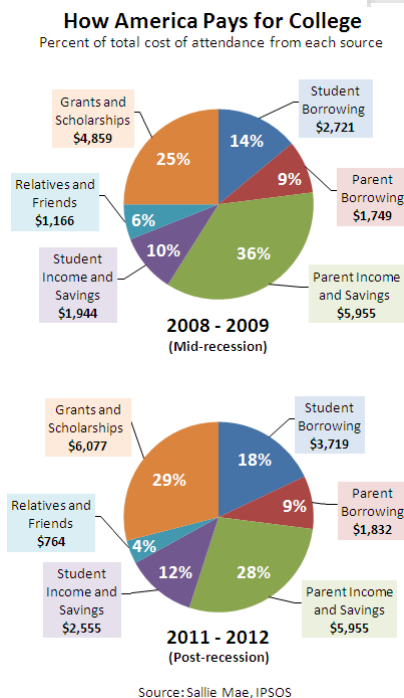## Answer Key: Choosing the Best Visual to Use

1a. Line Graph

Source:

"Financial Aid Budget Increasing to $120 Million,
    Supporting Commitment to Keep Yale College
    Affordable for All." *Yale News*. Yale University, 13
    Mar. 2012. Web. 6 Aug. 2014.

In this situation, a line graph showing the relationship between decreasing financial aid and increasing student loans would be an effective way to express your point. Line graphs are helpful in showcasing trends and relationships between objects.

1b. Pie Chart(s)

Source:

Landy, Benjamin. "Graph: How America Pays for College."
    Blog of the Century. The Century Foundation, 17 Jul.
    2012. Web. 7 Aug. 2014.

Because you want to first show how students are funding their education, using a pie chart will display each form of funding as part of the whole. Having two pie charts—one for mid-recession and one for post-recession—allows the reader to see how much student borrowing has increased in relation to other forms of funding.
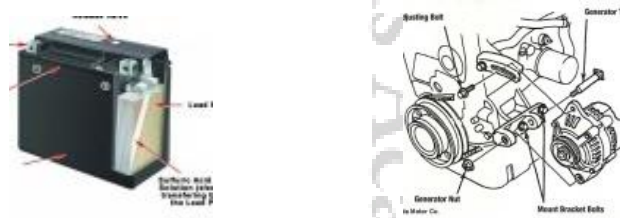
1c. No visual is necessary.

Visuals are often most useful in cases where you have a large quantity of data to convey. In this situation, you would not necessarily rely fully on numbers to argue your point. Instead, you might use a combination of quotations, studies, and statistics. Because of this, a visual would not be necessary in this situation.
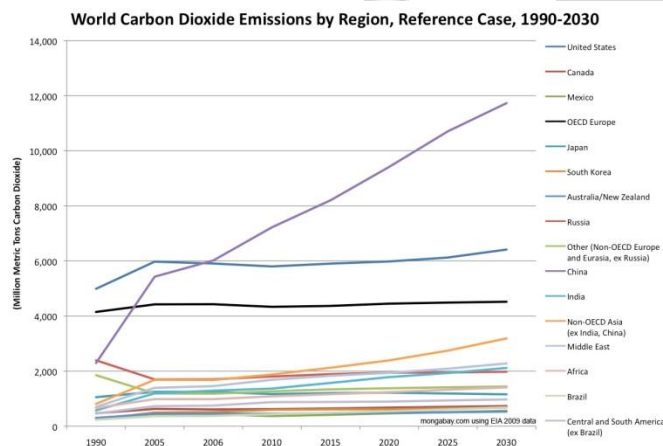
2a. Ineffective

Sources:

"Chevrolet To Offer Volt Modifications Against Battery Fire Risk, Gallery 1." *Green Car Reports.*
    High Gear Media, n.d. Web. 7 Aug. 2014.
"The Service Consultant's Basics of Starting & Charging Systems." *MDH Motors: Asian & European Import Auto Centre.* MDH Motors, n.d. Web. 7 Aug. 2014.

Because you are proposing changes to be made to an apparatus that already exists, including a diagram of the old design in addition to the new design will aid the reader in understanding specifically which changes need to be made.

2b. Effective

Source:

"Graph: Carbon Dioxide Emissions for
    Countries of the World." *Monga Bay.*
    Mongabay.com, 2009. Web. 6 Aug.
    2014.

Line graphs are useful visuals to show trends and changes over time. When there are multiple sets of data, such as in this case, it is useful to use color to distinguish them.

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