Reading Graphs and Charts

As our technology has become more advanced, we have witnessed an increase in society's use of charts and graphs to explain, classify, and evaluate data. Recognizing this, it becomes clear that our understanding of much of today's information depends on how well we can read and evaluate such graphs. Since graphs are so important, this handout endeavors to make them more understandable by focusing on three steps to studying graphs and charts: Study, Analyze, and Evaluate. Following, you will find a graph involving mortality rates for cardiac arrest patients. As I explain each step in reading a graph, I will refer back to this graph as an example.

![Graph showing survival rates for cardiac arrest patients](image)

**Step #1: STUDY**

In order to understand all of the information which the author presents, you need to study the graph thoroughly. Take full advantage of the clues in the graph by:

- identifying the genre
- recognizing the purpose
- reading the title
- reading the caption
- interpreting the axes
- distributing the legend
- studying the data

Just as it would be silly to sign a contract after reading only one paragraph, or to go on a trip after mapping just the first hour's drive, it makes no sense to read only part of the information given in a graph. Completing each of the above seven steps will give you the understanding you need to analyze and evaluate the graph.
Identify the Genre

Because different genres of graphs and charts lend themselves to different types of information, understanding how the different genres operate can help you anticipate the strengths and weaknesses of a chart, as well as the type of information which might be provided. Using the reference chart (see last three pages of this handout) of 15 common genres, I can tell that the example graph is a column graph. Thus, I can expect that the graph will show specific pieces of data in relation to one another.

Recognize the Purpose

In this category, purpose does not refer to the reasons the author chose the graph, but rather to the type of information the author is trying to convey. Ask yourself: Am I supposed to notice specific data or general ideas? What does the author want me to learn from the graph? There are two general possibilities:

1. The graph is Qualitative: Qualitative graphs seek to reveal changes over time, compare overall rates or quantities, express trends, or reveal other, more general concepts. Step, curve, and surface charts (among others) are commonly used to convey qualitative information.

2. The graph is Quantitative: Quantitative graphs are designed to set forth facts, exact quantities, or specific trends. Pie charts, when they clearly show parts of a whole, or bar/column charts, when used to present exact numbers, are common types of quantitative graphs.

When I identified the genre, I decided that my example graph was a column graph. Because such graphs usually present specific data, I will expect that my graph is quantitative. However, the fact that my chart has several columns next to one another might indicate that an overall trend is important, so I probably shouldn’t rule out a qualitative purpose yet.

Read the Title

A well-made graph should have a clear title. This may not be the case, however, so watch out for overcreative or underdescriptive titles which might misrepresent the information in the graph. In fact, my example graph has no title at all, so in this way the author has given me no clues at all about what is important. (In the article where I found the graph, it was placed near a chart labelled “Out-of-Hospital Cardiopulmonary Arrest,” so perhaps this title was meant to apply to both. Certainly, this method of labelling is less than clear, but it does prove an important point about examining other information in the printed text.)

Read the Caption

Like reading a title, when evaluating a chart or graph you need to read the caption beneath the graph. In the caption, the author may provide a short summary of the graph’s contents, a description of its purpose, or even a brief commentary or analysis of the chart’s contents. The caption in my example graph contains a great deal of information which will help me understand the graph itself. The first sentence is a concise summary of the type of information presented. The following sentences give specific definitions. Thus, in the caption alone I learn that the graph will
present the survival rates of cardiac arrest patients based on specific definitions of "cardiac arrest case" and "survival," and I learn what those specific definitions are.

Interpret the Axes

When applicable, take the time to determine what each of the axes in a graph or chart stands for. Interpreting axes is necessary in curve, surface, bar/column, step, and dot charts. Since my example graph is a column graph, it clearly has axes. Because the graph is 3-Dimensional, reading those axes might be a bit challenging. I decided to interpret the vertical axis first, because it is the most obvious. This axis is composed of vertical lines labelled 0-50 in increments of 10. Near the numbers are two labels—one reading "By Case Definition, %," and the other reading "By Survival Definition, %." I can guess that the percentages refer to the numbers 0-50 because of the way they are placed near the vertical axis, but it seems hard to imagine that one axis would have two conflicting labels. As I look closer, though, I notice that the labels do seem to correspond with all of the phrases labelling the columns (which I recognize from the caption as being definitions of cases and survival rates). Perhaps I will understand more about the axes’ labels after I have more fully distributed the legend.

Distribute the Legend

The legend, or key, to a graph is just that—a key to understanding the information presented. By providing labels and defining specific facts within the graph, it reveals exactly what the different parts of the graph are about. Legends are generally presented as separate portions of the graph itself, but may be as simple as labels on the existing columns, bars, or wedges of a pie. To distribute the legend on my example graph, I would want to read the descriptions which are placed near the columns. The descriptions below the front columns seem to match the definitions of cases given in the caption, while the descriptions to the side of the columns seem to match the definitions of survival given in the caption. Based on this similarity I can guess that the labels near the vertical axis apply to the rows of columns in the chart.

Study the Data

Now that I understand what sort of data the graph contains, as well as how that data is organized, I have all of the tools I need to examine the data itself. Because I understand how the axes work in my example graph, I know that by finding the intersection of the case definition and survival definition in which I am interested, I can determine the percentage of overall cases which match that description. For example, if I wanted to know how many "witnessed cardiac arrest" patients were "alive at admission," I would find the column where those rows intersect (the back center column) and I could read that column to learn that around 26% of the patients studied fit that description. I could go on to use this same method to read each column in the graph.

Step #2: ANALYZE

In the analysis phase of reading the graph, you should begin to consider the way the graph interacts with the text in which it is included. Two keys to determining the quality of this interaction include relating the graph to other graphics in the text and reading the textual information surrounding the graph.
Relate to Other Graphics

Often, other graphics in a text can help you understand the graph you are studying by providing similar data, expanding on a specific point, providing contrasting information, and so on. Thus, examining other graphics (which should be easy, now that you know how to follow the steps) is extremely important. When studying other graphics, be sure to consider charts, graphs, lists, illustrations, photographs, titles, explanatory boxes, and other like items. Keep in mind that additional graphics can be helpful or misleading, depending on the purposes of the author.

My example graph came from an article entitled "Case and Survival Definitions in Out-of-Hospital Cardiac Arrest". This article contains only one other graphic—a chart which appears directly above my graph. This chart provides specific numbers, as well as percentages, regarding patient description (age, gender, previous medical conditions, etc.) according to the case descriptions used in my example graph. Because this chart is organized by case description, I understand that it was meant to provide me with additional information about the specific patients represented by the figures in my graph.

Read the Textual Information

Because the general function of a graph is to further illustrate the textual information in which it is provided, graphs are useless unless studied as a part of that larger text. So, once you have thoroughly studied the graph itself, refer back to the text and try to determine how the two relate. To do so, first determine which section (or sections) of the text the graph illustrates. Then compare the information presented. Does the graph support, expand, contrast, or disprove the text? Determining the relationship between the information in the graph and in the text can help you evaluate the validity of the graph.

After reading my example article, I can clearly see how my graph fits into the text. The article begins by describing the gathering methods and patient samples used in the study. However, it then explains in writing the case and survival definitions, as well as the overall results of the survey. This information is the same information which I found in the caption and columns of my graph! In fact, the "Results" section of the article even points to the graphs as a representation of "survival rates as a function of both case and survival definitions" (Valenzuela et al. 273). To me, this graph looks like a physical representation of the written results of the study. This section also explains that "survival rates ranged form a low of 6% (all arrests; alive at discharge) to a high of 38% (witnessed ventricular fibrillation; alive at admission)" (273). In other words, the importance of the graph is the relation between the highest and lowest possible survival rates, depending on the definitions used. (The graph turns out to be qualitative after all.)

Step #3: EVALUATE

By this point, you understand both the information in your graph and the way your graph relates to the other materials in your text. Your final task lies in answering one last question:

Is this graph an effective part of the overall argument?

In order to determine your answer, consider the following: What is the main point of the graph? How well does the graph agree with the surrounding data? If it does not agree, why not? Is the
Pie Charts (circle chart, sectogram, or secto-graph)- circular charts which use information to show how parts relate to a whole. Because they demonstrate parts of a whole, pie charts are most useful for showing percentages. Keep in mind that pie charts will not always be accurate (especially if used to show any relationship other than part/whole).

Bar Charts and Column Charts- illustrate the given information in relation to each other. The overall totals are not as significant as are the comparisons between the proportions. They differ in that bar charts are represented horizontally and column charts are shown vertically.

Step Charts (histogram)- like bar charts and column charts these charts evaluate information in relation to each other; however, unlike bar and column charts, step charts assess the information in relation to time. Note: Step chart columns will always touch, whereas bar and column charts columns will not.

Curve Charts (line chart or line graph)- illustrate the fluctuations in the information over a period of time. These charts differ from curve charts in that while they look similar they usually tend to emphasize the specific changes in trends rather than the quantities represented by those changes. These charts are usually very accurate, even when compressed into a small area. They also can be extended to illustrate predicted future trends.

Surface Charts- illustrate proportional changes in information over time. Unlike curve charts, they emphasize the quantities as a result of the changes over a period of time. These charts are usually very accurate, but the reader must be careful not to misinterpret the information when the chart presents two or more layers or information on top of each other.

Dot Charts (scatter diagrams)- plot out patterns of information by using statistics and/or facts to illustrate patterns of information. These patterns may reveal trends from which the author will formulate his/her conclusions and assumptions.

Maps- present information in spatial relationships to show various facts. Maps can either be photographs or drawings. (When evaluating a map, always remember to distribute the legend or the key before making assumptions about the information.)

Flow Charts- arrange information in a sequential or logical manner. There are several ways to organize information in this logical manner. The following five genres are different forms of flow charts.

Time Lines- flow charts that use a left to right sequencing. They illustrate significant points in time in chronological order according to the information given.

Time-&-Activity Charts- flow charts that work like time lines in that they illustrate specific
points or instances in time. In addition, Time-&-Activity charts also correlate those specific instances with the processes that took place at that time.

Schematics- a flow chart that plots out information according to an organization’s needs and abilities. They are organizing tools that can assist a company in planning through illustrating concept relationships.

Organizational Charts- a flow chart that, like schematics, plots out information to illustrate relationships. However, unlike schematics, organizational charts illustrate the hierarchical and authoritative responsibilities of individuals and/or groups. Thus, where schematics clearly illustrate concepts, organizational charts are better representative of human relations.

Step-by-Step Diagrams- a flow chart that uses logical sequencing to show how an idea or project has come (or will come) about.

Tables- present information in organized groups. They generally consist of lists that are arranged according to logical relationships. These relationships will be explained in writing, rather than illustrated in graph form.
graph relevant to the text it is supposed to support? Does the graph illustrate a major point in the
text? By answering questions like these, you can determine the value of the graph within the text
which it explains.

I have already decided that my graph represents the overall conclusions of the study in
which it appears, so I know that it clearly relates to an important part of the text which it supports.
I also know that its main idea is the difference of 32% between the highest and lowest survival
rates according to definition. Because of the problems interpreting the labels, identifying that
purpose from the graph itself was a little difficult. Though not as effective as it could have been
were it more clear, the graph seems an appropriate illustration of the text's overall argument.

Hopefully, using these three steps—Preview, Analyze, and Evaluate—has helped you to
understand your graph, and to see it as a coherent (or perhaps, not so coherent) part of the overall
text. Graphs are an invaluable resource for authors. And if this handout has done its job, you as a
reader now find them equally informative.

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