<Assignment 3 - Part 1>

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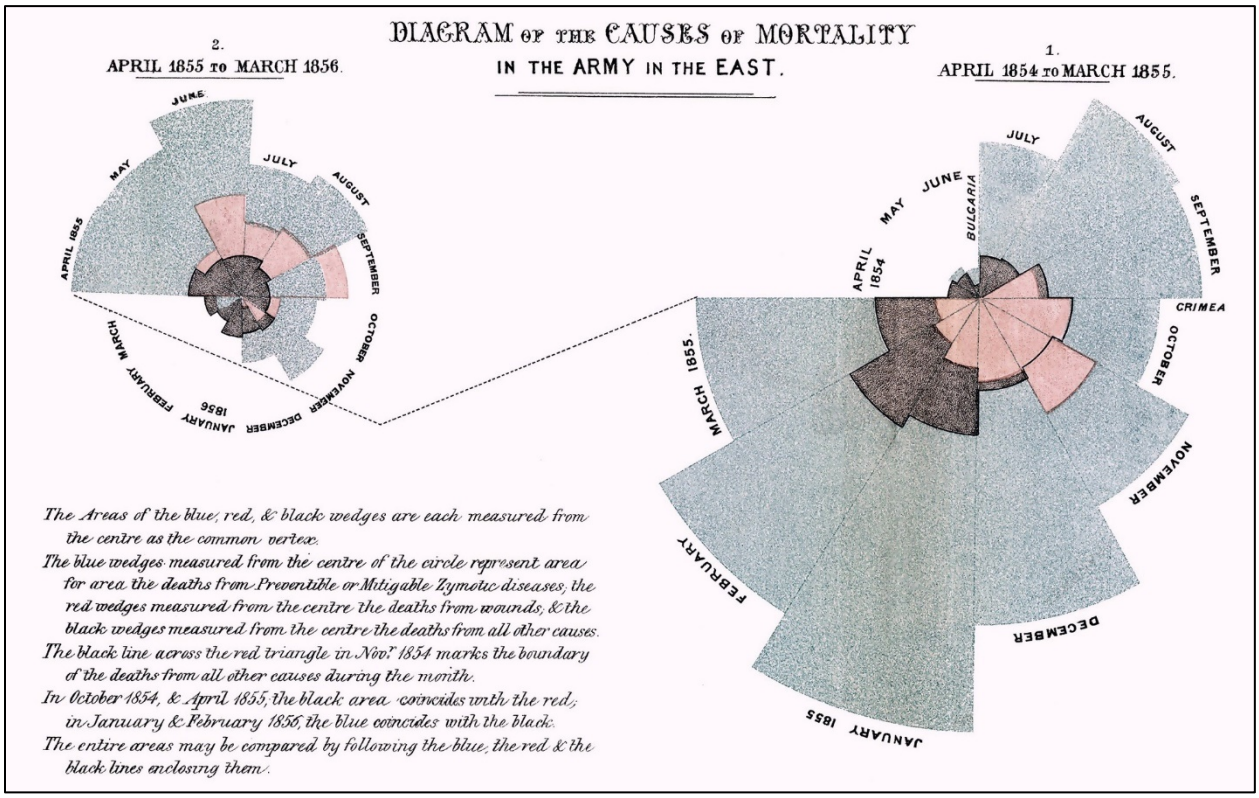

Source: https://commons.wikimedia.org/wiki/File:Nightingale-mortality.jpg

For this visualization critique assignment, I chose the above figure authored by Florence Nightingale (1820 - 1910). She won a reputation as the mother of the modern nursing system focusing sanitation during the Crimean War (Oct 1853 - Feb 1856), but the graph which is also known as "Nightingale Rose Chart" has been also often referred as an important contribution made by her. She became the first women member of the Royal Statistical Society in the British Army and an honorary member of the American Statistical Association for her contribution.

The two pie charts display the proportion of the reasons for death in the British Army from April 1854 to March 1956. The total areas under each wedge are first proportional to the number of dead people in each month and each color represents different reasons for death. The texts on the left-bottom side state that the blue-green, gray, and pink wedges correspond to death caused by diseases, wounds, and other reasons, respectively. With this chart, Nightingale basically attempted to show the effectiveness of her nursing regime which was implemented in April 1855 in terms of preventing the death from diseases (or saving lives) in the war hospitals. Let's now evaluate the chart with the five criteria suggested by Alberto Cairo.

First, is this chart *truthful*? I think the chart conveys the truth. First, the total mortality in a war hospital must have been relatively easy to count; identifying a dead soldier from a live one in wartime hospital should not be a difficult task for the medical staffs. And since the symptoms from zymotic diseases (e.g., smallpox) are clearly different, which must have made the death caused by wounds from battles distinguishable from the death caused by those kinds of diseases. Moreover, the officials must have needed to conduct the headcount during the war. This implies that people involved in producing the raw data did not have any incentive to distort the raw data. Of course, the reliability of the raw data does not always guarantee the truthfulness of a visualization based on the data. Skeptics might argue that we cannot be sure whether the area of each wedge correctly reflect the absolute numbers or the proportions of the causes of death in each month; however, I think we can at least argue that the accuracy of the original source for the chart constitutes an important necessary condition for truthfulness of the chart. For example, even the popular labor statistics such as the unemployment rate can be misleading in a sense it only takes accounts for the economically active population, rather than the whole population as its denominator.

Is this chart *beautiful*? I would say, "Yes" to this question. I think the font styles used in the graph are quaint in a good way. I feel that the style of the title makes it look important and the cursive scripts on the left-bottom meet the decorative purpose. The most impressive point from the chart to me is the color scheme: it immediately reminded me of the base color scheme of ggplot2 in R. I did not do further research, but I think it might be the case that Hadley Wickham, the creator of ggplot2 package, might have been influenced by the above chart considering the fame of the chart. (The light blue and red looked just so familiar.)

Then, is the graph *functional*? My answer to this would be half-and-half. On the one hand, the graph does justice in terms of showing the effectiveness of the sanitation with the decreasing size of the blue wedges (for both absolute and relative term) starting from April 1855 when the sanitation measure was implemented. In addition to this, the black line between the wedges was drawn to denote the boundary between the death from wounds and other causes from diseases. These help readers to grasp the trend. I found some attempts on the Internet to redesign the graph into a bar chart[1], but I found that juxtaposing two pie charts works well because a pie chart can show the changes in absolute and relative size simultaneously. However, I think the graph could be improved in some senses. For example, a legend could more effectively represent the meaning of each color (blue-green, grey, and pink) in the diagrams than the texts. And I wonder why the two pie graphs were arranged reversely; at first glance, I thought the pie graph on the left represented the early half period, but I found that it corresponded to the later-half period. I believe that there were some reasons why the chart was made this way at that time, but I would put the first half period on the left side for today.

Here, I would discuss the last two elements. Is this chart *insightful* and *enlightening*? Absolutely. No one seems to be able to deny the importance of the topic, the cause of mortality

[1] For example, please refer to https://www.dataplusscience.com/NightingaleRedesign.html

during the war. And I certainly believe that Nightingale did her best with data, given that her nursing regime saved hundreds of thousand people even after the Crimean War. In terms of insightfulness, I think the graph functioned as a crucial building block to understand the importance of sanitation both in practical and theoretical senses. The reversed chronological order of the two pie-charts and the lack of a legend in a contemporary sense might reduce the spontaneity of the graph to some degree. But once it is noticed, I believe it does not take much time to get the main message for people outside of academia.

In sum, I believe the "Nightingale Rose Chart" generally does justice with the data and it deserves its current popularity. But at the same time, I think we also can improve it. Perhaps applying some principles to maximize the "data-ink ratio" proposed by Tufte could be a constructive pathway to take. For example, replacing the texts on the left-bottom with a simple legend and switching the location of the two pie charts can make it the graph more intuitive.