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Analysis of data visualizations in daily newspapers in terms of graphic design
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Abstract

Data visualization is the studies that visually present abstracted information in certain schematic forms, which also include their own attributes and variables. Basic aim of the data visualization is to convey the information with graphical methods in a more clear and effective way. As presenting the data graphically, data visualization also provides a new and different point of view about incidents and correlations of the incidents. Human mind can perceive visual information transfer in a short period, much more effective and permanent way in comparison to written or verbal information transfer. Data visualization, frequently used in daily newspapers, informs much better in long and complicated articles, which are accumulated with ratios, numbers and miscellaneous data. Recently adding with data visualization units in their structure, world leading newspapers are aiming to make complicated and boring data more understandable, memorable and remarkable with an effective visualization.

Keywords: Data visualization, newspaper design, information design, infographic.

1. Introduction

Data visualization is “the science of visual representation of ‘data’, which has been abstracted in some schematic form, including attributes or variables for the units of information” (Friendly, 2008, p. 2). The main aim of data visualization is to communicate information more clearly and effectively by using graphical means. “The human brain is more able to identify and comprehend relationships and patterns if data is encoded into visual forms. Graphs allow us to explore data and observe patterns that no other approach can achieve” (Cleveland, 1994, p.5). There are many graphic types for visualizing data, from bar graphics to pie charts, from tables to diagrams. As a matter of fact, most of the graphics used in the visualization applications are a part of our lives since many years.

2. History

When the history of data visualization is overviewed, it is seen that many graphic forms date back to the 18th century. William Playfair used data graphics in his works “The Commercial and Political Atlas” in 1786 and “Statistical Breviary” in 1801 for the first time. Playfair developed important graphics in the forms of bar chart, column chart (Figures 1), doughnut chart and pie chart (Figures 2), which are still in use today. In the 19th century
Florence Nightingale, who made significant studies on visual presentation of information, besides her contributions to medicine, discovered new statistical graphic types. Nightingale used data visualization applications in collecting, analyzing and reporting information about medical care and public health. She designed “polar diagram” by developing pie chart that William Playfair developed in 1801, to convey information that she collected on causes of mortality in the army in 1856, Crimean War. Nightingale indicates in the “Diagram of the Causes of Mortality” that she made in 1856 the number of soldiers died from epidemic diseases in the blue areas, from wounds in the red areas, and other causes of mortality in the black areas (Figure 3).

Again in the 19th century Charles Minard made many infographics which were innovative in terms of data visualization (Figure 4). Especially Minard’s infographic titled “1812 Napoleon’s Invasion of Russia” is one of the important works in data visualization history (Figure 5). In this graphic that Minard made in 1869, many varying information was analyzed with success on a two dimensional surface. The thick line on the map describing the losses in the Napoleon’s army in the 1812 Invasion of Russia shows the size of the army that marches to Moscow. On the other hand, the thin black line shows the return of the army from Moscow in freezing winter conditions that reached to -30°C. This thin black line is also linked to the heat and time scale. For Tufte, Minard’s work “1812 Napoleon’s Invasion of Russia” is the best statistical graphic ever made. Minard’s statement “the aim of my maps is to communicate the statistical results, the relationship that cannot be presented quickly by numerical statements that necessitate mental operations, in a way that can easily be associated at a glance” reflects the functional structure in the essence of data visualization (http://www.csiss.org/classics/content/58).

Russian chemist Dmitry Mendeleev’s “Periodic Table” that was designed in 1869, not only is a very important work for the world of science but also an example of data visualization in terms of the way it presents information.
Mendeleev developed the periodic law which is based on the principle that when elements are put in order according to their increasing atom weights, their characteristics as well change periodically. He created the “Periodic Table” to display these links that he observed (http://tr.wikipedia.org/wiki/Periyodik_tablo) The periodic table that Mendeleev designed enabled the chemical links that had been examined separately until that day to be observed as a whole. When the periodic table is examined from visual design perspective, it can be stated that it is effective in conveying information by successfully displaying intense pieces of information in a singular structure. Later on many designs were made having influences from the design and systematic of the periodic table.

The usage of data visualization in media is seen in the US since the 1930s. During these years in “Fortune” magazine successful data visualizations of famous graphic designers attracted attention. In the magazine the articles about many issues like industry, economy, politics, mechanics, science and military were presented with data visualizations according to their contents. Well-known graphic designer Herbert Bayer as well made data visualizations for Fortune (Figure 6). The significance that media attributed to data visualizations which simplified complex information and enhanced its comprehensibility, led them enter our lives more.

3. Data visualization in newspapers

Data visualizations can make unnoticed numbers and significant numerical data in an article, recognizable very easily. In this sense it is crucial for journalism. The influence of SND (Society for News Design) established in 1979, on progressing consciousness about the direct impact of effective newspaper designs on communication is substantial. The institution gets together the visual designers and the teams of infographic and data visualization of the newspapers from all around the world with an annual newspaper design competition and a conference that it organizes. The SND which made significant contributions to the development of data visualization gave the Lifetime Achievement Award to one of the pioneers of news graphics George Rorick in 2005. Rorick have realized that graphic is an element that makes an important contribution to the process of communication through the news. “The coloured weather forecast graphic” (Figure 7), is accepted as the beginning of a new period for infographics on the newspapers (http://office.snd.org/about/history_awards.html). In the “weather forecast graphic” that he designed, Rorick presented a dull and incomprehensible topic with a more understandable and attractive way by combining map, graphic, table, symbol and text.

Today, we can see that data visualizations are frequently used in long and complicated texts in newspapers that ratios, numbers and various data accumulate since they communicate information much better. In recent years, leading newspapers in the world opened up data visualization units aiming to make complex and uninteresting data more comprehensible, easy to remember and attractive with an effective visualization. Among the fields of usage of data visualizations in newspapers, weather forecast data like Rorick’s, statistical data like election or survey results, data about scientific or financial topics can be listed.
Data visualization enables realizing an analysis by taking people’s perception abilities and the differences of interpretation between them into account. With data visualization techniques, data can easily be portrayed, and a general idea about the data can be reached.” (Bilgin, Çamurcu, 2008, 107). The data visualization prepared for the article titled “Death Penalty Statistics, Country by Country” in Guardian newspaper in 2011, enables the reader to have a general idea about the mentioned data (Figure 8). Additionally, this approach serves the newspaper’s aim to draw reader’s attention to the issue and generate an impact. Orange areas indicate death sentences handed down; red areas indicate the executions in scales that vary according to the numbers. The biggest red area in the graph that catches the eye at first sight, gives the information that the number of executions in China which remains unexplained reaches to thousands.

According to Simon Rogers who is a news editor on the Guardian, working with the graphics team to visualise and interpret huge datasets “… the bigger task is to think about the data like a journalist, rather than an analyst. What's interesting about these numbers? What's new? What would happen if I mashed it up with something else? Answering those questions is more important than anything else” (Rogers, 2011). The aim of the data visualization titled “NATO operations in Libya” in 2011, was not only to present data in an understandable way but also to show the huge scale military power that NATO used for Libya Operations. (Figure 9). Thus, the data visualization was designed with a reporting style that aims to generate impact. Moreover, data visualization, while presenting the data graphically, makes the events and the connections between the events to be perceived in a new and different way. When the military power sent by NATO to Libya is shown in graphics in Figure 9, connections can be established between the data such as a comparison between the countries, the places hit and the numbers.

4. Data visualizations in newspapers from graphic design perspective

All tables should be numbered with Arabic numerals. Headings should be placed above tables, underlined and centred. Leave Human mind can perceive visual information transfer in a short period, with a much more effective and permanent way in comparison to written or verbal information transfer. Therefore, the design of the data visualizations should be qualified to support the visual transmission of information. In data visualizations preferring graphical analyses appropriate for the existing data is essential for a design approach appropriate for the content. Even though they seem pleasant, complicated designs make the subject even more incomprehensible. For this reason, design details that reflect the data correctly and an attractive and understandable general design will fulfill the main function of data visualization in newspapers.

In data visualizations for an accurate organization of the content, it is necessary for the designer to analyze the data well, classify it according to an order of importance and associate it according to its meaning. An accurate and
effective encoding within this organization guides the reader about where to focus and in which order to read the flow of information. The correct and balanced usage of graphical elements like colours, typography and visuals are the points that need to be paid attention to in visual encoding. While using these elements, the same design principles are guiding in data visualizations just like the other graphic design products. However, in addition to a good stylistic design the functionality of the data visualizations is very important as well since by nature they visualize statistical data.

According to Friedman (2008) the "main goal of data visualization is to communicate information clearly and effectively through graphical means. It doesn’t mean that data visualization needs to look boring to be functional or extremely sophisticated to look beautiful. To convey ideas effectively, both aesthetic form and functionality need to go hand in hand, providing insights into a rather sparse and complex data set by communicating its key-aspects in a more intuitive way. Yet designers often fail to achieve a balance between form and function, creating gorgeous data visualizations which fail to serve their main purpose - to communicate information"

5. Conclusion

In data visualizations of the newspapers the data should be analyzed correctly and a relevant and comprehensible design solution should be searched. Otherwise it will be meaningless to present to the reader a bulk of data consisting of complicated numbers in graphics. For Cleveland (1994, p.1) as well “When a graph is made, quantitative and categorical information is encoded by a display method. Then the information is visually decoded. This visual perception is a vital link. No matter how clever the choice of the information, and no matter how technologically impressive the encoding, a visualization fails if the decoding fails. Some display methods lead to efficient, accurate decoding, and others lead to inefficient, inaccurate decoding. It is only through scientific study of visual perception that informed judgments can be made about display methods”. All the colours, typography, graphics (charts, tables, etc.) which are selected according to the subject and all the visual expression makes the visual codes to be perceived correctly. The examples of data visualization in the newspapers lead the designers to a research for more effective and accurate designs in terms of functionality and esthetics while encouraging the reader to open up her/his perception for visual analysis. The significance of data visualization for journalism is increasing in the context of data-based reporting, which is an important influential, convincing and trusted means. Especially, as the big newspapers give place to data visualization units in their organizations, it is seen that this task gradually evolves into a field of specialty on its own.

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