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The Effectiveness of Infographics and How it is Applied to Communicate the Effects of Factory Farming

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Use of Infographics

An infographic is an "image representing an integration of design and visually pictured data to help organizations convey their messages in a concise fashion" (Milovanovic, D., & Ivanisevic, L., 2014). Infographics have the ability to increase initial attention and retention of presented information and increase the effectiveness of information absorption if they are designed correctly. Many studies have been centered around the overall effectiveness of infographics compared to other data communication media as well as things to avoid when designing infographics. Information architects have varying opinions on what is the most adequate way to visualize data. While some prefer concise, traditional methods, others are pushing the boundaries by applying a touch of human connection to basic data analysis techniques. I will analyze the ideas of prominent members of the industry in order to build a set of guidelines that can be followed to create an effective infographic. I will critique a preexisting infographic that addresses the harmful effects of factory farming and redesign it, taking influence from industry leaders.

First, I will discuss various studies that have analyzed the way that people respond to infographics. In 2016, a study was done to see how students reacted when infographics were added into their lesson. 86.4% of students said that infographics helped them understand the material better (Ozdamli, F., Kocakoyun, S., Sahin, T., & Akdag, S., 2016). Infographics have also been known to attract more readers than text and enhance the quality of learning (Vanichvasin, P., 2013).

There are also a lot of studies that focus on why infographics are psychologically more effective than other types of learning. First is visual pictorial primacy, processing a picture rather than text uses less time and energy. Welson, Metzler, and Reed conducted a study and concluded that regardless of the amount of detail, the retention of pictorial material is still helpful. Next, infographics improve the retention of the reader's attention. From his research, Nielson determined that the average person only reads 20% of words on a page. Infographics, as long as they are used sparingly, stand out within a sea of words. Another reason why infographics are more effective is shareability. Many people do not like to share articles that they have not read completely. Infographics simplify this process and put all of the information in one place. Lastly, infographics are more effective due to aesthetics. Attractive colors, shapes, and modern designs are more eye-catching than a typical written report (Milovanovic, D., & Ivanisevic, L. 2014).

Pioneers of data visualization have developed innovative ways to display and organize data. Three of the most prominent people in this industry are Lisa Strausfield, Edward Tufte, and Giorgia Lupi. In regards to data visualization, the designers have drastically different techniques that provide multiple opportunities to influence my design process. Not only can it change the way I approach data, but it can also provide a set of basic limitations so that my infographic maintains effectiveness. Based on their work, I will analyze each designers' style and extract elements that could aid in my process.

Lisa Strausfeld is a data visualization entrepreneur that is currently a creative director at Bloomberg. She has revolutionized data visualization by incorporating

interactive components into all of her projects. She is currently working on a "network graph." This is a model of 3-D human connections throughout history. It can be used to document various historical timelines such as women's history, African American history, etc. This is being built in a Google spreadsheet which will not only make it available to the public to view but it will also allow people to add events as they see fit (Strausfeld, n.d.). Introducing interactive components into data visualization techniques allows people to engage with the data in unprecedented ways. Providing ways to interact with data in a way that emphasizes the user experience makes data more approachable than ever before. This form of data interaction allows users to simplify their experience by only seeing the data they want to as opposed to overwhelming them with all of the data at once. This approach to data highlights the importance of understanding the needs and past experiences of your consumer base. Although I would be interested in making an interactive infographic, time limitations prevent this from occurring.

Edward Tufte is a trained statistician that has made notable achievements in the field of information design. He believes that a good example of data visualization delivers a visual representation of data to the user in a way that is "most fit for purpose". He has created numerous guidelines for visual information to ensure that these displays are as effective as possible. First, is graphical excellence: providing a number of ideas in the shortest amount of time. Then, there is visual integrity: the newly visualized form of data should not misrepresent or distort the data. Next, the data must be maximized by remaining conscious of the ink ratio. This aims to minimize the amount of decoration

or unnecessary information that could detract from the main point of the argument. He has stated that, "... it is wrong to distort the data measures—the ink locating values of numbers—in order to make an editorial comment or fit a decorative scheme." (Tufte, 1984) The Nielsen Norman Group support this point by advising that designers should use a limited color palette or avoid using decorative fonts (Martin, 2018). Tufte encourages data architects to include a reference point for data that includes variables that are not easily understood by the general public. This allows the viewer to grasp the significance of these unfamiliar measurements. His last guideline is aesthetic elegance. Tufte preferred designs to be as simple as possible rather than over the top. Tufte's technique capitalizes on the idea that data information should be simplified as much as possible to make it less complicated for the end consumer (Tufte, 1984). Rather than prioritizing artistic design or encouraging users to engage with data, he is accepting that people will only remain attentive for a short amount of time. His guidelines emphasize being as concise and simple as possible in order to expedite the data consumption process for the average user. Based on Tufte's guidelines, I will display the most important information while limiting the amount of text and unnecessary graphics. I also think that incorporating a reference point will be important when discussing scientific information that the average consumer would not be familiar with.

In contrast, Giorgia Lupi is a cutting edge designer in this field that prioritizes the addition of meaning and context into data visualization. As opposed to Tufte, Lupi does not limit her creative work by incorporating common techniques such as succinctness or simplicity, but rather tries to engage the consumer by making artistic representations of

the data. The artistic elements of her designs entice people to interact with data and encourages them to recognize the data that is present in their everyday lives. Lupi stated, "The more that you collect data and the data is a part of your life, the more you start seeing data everywhere. It really changes your perception" (Lupi, 2017). One of her most well-known works is her book, "Dear Data". This book documents how she and fellow information designer, Stefanie Posavec, became friends over the course of a year by exchanging data that they collected about their own lives. This was done by sending each other weekly postcards that contained recorded data about their everyday lives such as how many times they looked at the time, said thank you, or had a negative thought (Lupi et al, 2018). During an interview on Design Matters, Lupi said that when they were documenting their every behavior, they found themselves using the data to become better humans. They would smile at strangers on the street or say thank you more often than usual (Debbie Millman, 2016). I hope to incorporate this finding into the infographics about factory farming. Because factory farming has so many negative implications, I hope that highlighting how the daily actions of society affect the environment, animal welfare, and human health will cause people to be more conscious of their behavior.

I will take inspiration from these pioneers to critique and redesign the infographic below. The biggest issue with the infographic is the overwhelming amount of information in one place. I will downsize this infographic by splitting it into multiple pieces that each highlight the environmental effects of factory farming, animal welfare, what is in our food, and the solutions to these problems. Next, there is way too much text and ink on

the page. Edward Tufte's guidelines say to minimize the amount of ink used for graphics, text, and background colors. In order for people to focus on the data, the data must be where the eye is attracted to. I will simplify the amount of graphics, the paragraphs of text, and remove the arrows that connect each piece of data to the next. For the complex scientific data about topics like methane emissions, I will include a reference point to put it in terms that people can understand. Finally, I will take most of my influence from the research of Giorgia Lupi. Because factory farming has many elements that are capable of appealing to various emotions, I intend on designing my infographics with her ideas of incorporating context and meaning in mind. This will be done by displaying the effects of factory farming in terms of daily activities like eating a hamburger or driving a car so that people can immediately see their impact on that scale.

Effects of Factory Farming

Why is it important to understand the effects of factory farming? Can you imagine living in areas that have no access to fresh drinking water or basic sanitation? Although this is already a critical problem throughout the world today, if we continue on with our current environmental practices without intervention, this will be a reality for even more people than before. The OECD projects that by 2050 over 40% of the global population will not have access to fresh water while 1.4 billion will still not have access to basic sanitation. As the population rises from 7 billion to over 9 billion in the next 40 years, many people alive today will live to see the environmental consequences of our own inaction (OECD, 2012). The veganism and vegetarian trend has been rising and this may have a number of positive outcomes, including a slowdown in environmental degradation. This is because cattle production is the one of the main producers of methane, one of the major greenhouse gases (EIA, 2011). That statistic does not even include the other effects of factory farming such as deforestation and water consumption that is caused by the actions required to feed all of us.

The first, arguably most impactful, effect of factory farming is gas emissions. Factory farming releases methane, a greenhouse gas. Greenhouse gases are gases that "trap heat in the atmosphere." The main greenhouse gases are carbon dioxide, methane, nitrous oxide, and fluorinated gases (EPA, October 31, 2018). Their emissions cause the greenhouse effect, a process in which these gases trap some of the sun's radiation which maintains the Earth's temperature at around 33 degrees Celsius. Although this allows for life to exist on Earth, in excess the planet can become

too warm causing a plethora of negative implications (Australian Government). The most well-known contributor to the greenhouse effect is carbon dioxide. This is warranted because it is responsible for 76% of emissions. However, I will be focusing on the second highest contributor of emissions at 16%: methane (EPA, April 2017).

In order to compare the harmful effects of greenhouse gases to each other, a system called Global Warming Potential was created. According to the EPA, "it is a measure of how much energy the emissions of one ton of a gas will absorb over a given time, relative to the emissions of one ton of carbon dioxide (EPA, February 2017). This comparison takes into account how long the gas remains in the atmosphere and how efficient it is at absorbing energy. Carbon dioxide is used as a reference, so it's global warming potential is one. Methane's global warming potential is 34, meaning that it is 34 times more efficient at retaining heat than carbon dioxide (EPA, February 2017). Although it leaves the atmosphere faster than carbon dioxide, it is worse for the planet in the short term, especially since global methane emissions are on the rise.

Methane emissions are caused by landfill management, biomass burning, rice cultivation, coal production, wetlands, oil and gas extraction, and, most importantly, enteric fermentation and manure management (EPA, April 2017). Cattle production is responsible for methane emissions in two ways: enteric fermentation and manure management. Enteric fermentation is a part of the digestive system in certain animals, including cattle, where microbes in the digestive tract break down food and methane is emitted as a byproduct (Morris J, n.d.). Cows can emit anywhere from 23 to 132 gallons of methane a day, an amount comparable to a car (Silverman, 2007). Manure

management is responsible for ensuring that manure, wastewater from sanitizing operations, and residue from food processing are all disposed of in a clean way (USDA, n.d.). This process involves capturing, storing, treatment, and reuse of animal manure. Methane is produced from the breakdown of organic matter during the storage period. The level of emissions is affected by "temperature, oxygen level, moisture, and source of nutrients" (R.S., 2018). As a cow's ability to digest the feed they are given increases, there are lower rates of methane emissions. However, most cattle are fed corn as a cheap alternative to their normal diet and they are biologically unable to digest it. Also, manure can be stored in two ways: liquid or solid. Liquid storage in "ponds, lagoons, or holding tanks" can emit up to 80% of emissions while solid storage methods emit barely any. This implies that emission levels can be easily manipulated by changing the diet of the cattle or altering the type of storage (R.S., 2018).

Another impact of factory farming is deforestation. Forests are cleared in order to house livestock and create room to produce the food necessary to keep the animal alive. Wageningen University and Research Centre said that "agriculture is estimated to be the direct driver for around 80% of deforestation worldwide" (Wageningen University and Research Centre, 2012). In 2014, 43% of deforestation was done in order to make space for pastures or crops (Garlow, 2018). "Livestock is the world's largest user of land resources, with grazing land and cropland dedicated to the production of feed representing almost 80% of all agricultural land. Feed crops are grown in one-third of total cropland, while the total land area occupied by pasture is equivalent to 26% of the ice-free terrestrial surface." (FAO, n.d.) The Food and Agricultural Administration stated

that 70% of land formerly supporting the rainforest has been turned over to grazing (FAO, 2006). This is problematic because it creates a carbon deficit, "the loss of the production of oxygen and removal of carbon dioxide because of the removal of trees." The creation of oxygen and removal of carbon dioxide is obviously essential for life (Djekic., n.d.).

As I mentioned earlier, water supply will be a major problem in the years to come. While 70% of the planet is water, only 2.5% is freshwater. Of that 2.5%, only .0007% is available for human consumption (National Geographic, 2017). About one-third of water consumption is used for the production of animals and animal products. In the United States, 56% of water is used for animal agriculture. 1 egg requires 53 gallons of water, 1 pound of chicken requires 468, 1 gallon of cow's milk uses 880, and one pound of beef uses 1800 gallons. To put that in perspective, the average hamburger requires 660 gallons of water to produce, this is equivalent to two month's worth of showers. Only 5% of water consumption worldwide is consumed by private homes. In addition to water consumption, animal agriculture is also depleting the water supply through contamination. About one-third of rivers in the US were polluted by animals and agriculture runoffs. Tyson dumps more toxic pollutants into the water than ExxonMobil (J.L., 2018).

So why is all of this important? Global warming has negative implications on the environment. This can lead to rising sea levels, coral bleaching, reduction of wildlife habitats, a lack of drinking water, a rise of invasive species, and changes in precipitation patterns. Changes in precipitation patterns can result in extreme weather conditions like

floods, forest fires, and hurricanes. The rise of invasive species is easier in higher

temperatures and makes it easier to spread disease. Animals are at risk to lose more

than half of their habitats: 18% for insects, 16% for plants, and 8% for vertebrates

(World Wildlife).

The Effects of Factory Farming

References

Debbie Millman (2016, October 10). *Design Matters: Giorgia Lupi* [Audio blog interview]. Retrieved from https://designobserver.com/feature/giorgia-lupi/39392

EIA. (2011, March 31). Emissions of Greenhouse Gases in the US. Retrieved from https://www.eia.gov/environment/emissions/ghg_report/ghg_methane.php

EPA. (2017, April 13). Global Greenhouse Gas Emissions Data. Retrieved from https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

EPA. (2017, February 14). Understanding Global Warming Potentials. Retrieved from https://www.epa.gov/ghgemissions/understanding-global-warming-potentials

EPA. (2018, October 31). Overview of Greenhouse Gases. Retrieved from https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane

EPA. (2018, November 14). Frequent Questions About Coal Mine Methane. Retrieved from https://www.epa.gov/cmop/frequent-questions

FAO. (n.d.). Animal production. Retrieved from http://www.fao.org/animal-production/en/

FAO (2006, November 6) Livestock a major threat to environment. Retrieved from http://www.fao.org/newsroom/en/news/2006/1000448/index.html

Garlow, A. (2018, October 29). This is How Animal Agriculture Causes Deforestation. Retrieved from http://www.onegreenplanet.org/animalsandnature/this-is-how-animal-agriculture-causes-deforestation/

Lupi, G., Posavec, S., Díez, M. B., & Popova, M. (2018). *Dear data*. Barcelona: Flow Press Media.

Martin, L. (2018, August 12). Designing Effective Infographics. Retrieved from https://www.nngroup.com/articles/designing-effective-infographics/

Milovanovic, D., & Ivanisevic, L. (2014). Infographic as a Marketing Communication Tool. *Symorg,*266-273. Retrieved from http://symorg.fon.bg.ac.rs/proceedings/papers/04 - COMMUNICATION MANAGEMENT AND SOCIAL NETWORKING .pdf#page=23

Morris, J. (n.d.). Enteric fermentation. Retrieved from
    http://www.ccacoalition.org/en/activity/enteric-fermentation

National Geographic (2017, January 27). Competing for Clean Water Has Led to a
    Crisis. Retrieved from
    https://www.nationalgeographic.com/environment/freshwater/freshwater-crisis/

OECD. (2012). Environmental indicators, modelling and outlooks. Retrieved from
    http://www.oecd.org/env/indicators-modelling-outlooks/oecdenvironmentaloutlookt
    o2050theconsequencesofinaction-keyfactsandfigures.htm

Ozdamli, F., Kocakoyun, S., Sahin, T., & Akdag, S. (2016). Statistical Reasoning of
    Impact of Infographics on Education [Abstract]. Retrieved from
    https://www.sciencedirect.com/science/article/pii/S1877050916325947.

R. S. (2018, November 8). Carbon farming: Reducing methane emissions from cattle
    using feed additives. Retrieved from
    https://www.agric.wa.gov.au/climate-change/carbon-farming-reducing-methane-e
    missions-cattle-using-feed-additives

Silverman, J. (2007, July 16). Do cows pollute as much as cars? Retrieved from
    https://animals.howstuffworks.com/mammals/methane-cow.htm

Strausfeld, L. (n.d.). VR Prototype for The New Historia. Retrieved from
    https://informationart.com/

Lupi, Giorgia (2017, March). *How Can We Find Ourselves in Data* [Video file].
    Retrieved from
    https://www.ted.com/talks/giorgia_lupi_how_we_can_find_ourselves_in_data?lang
    uage=en

Tufte, E. R. (1984). *The visual display of qualitative information*. Cheshire, CT:
    Graphics Press.

USDA (n.d.). Natural Resources Conservation Service. Retrieved from
    https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/mnm/

Vanichvasin, P. (2013). Enhancing the Quality of Learning Through the Use of
    Infographics as Visual Communication Tool and Learning Tool. *Amazon AWS,*
    135-142. Retrieved from
    https://s3.amazonaws.com/academia.edu.documents/40779898/ICQA__proceedi
    ng_2013.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1550175

047&Signature=6eU0ES9pjyEtno0Trw6mcnKfUp0=&response-content-disposition =inline; filename=Accreditation_Quality_Assessment_and_the.pdf#page=136

Wageningen University and Research Centre. "Agriculture is the direct driver for worldwide deforestation." ScienceDaily. ScienceDaily, 25 September 2012. <www.sciencedaily.com/releases/2012/09/120925091608.htm>.

World Wild Life. (n.d.). Our planet is warming. Here's what's at stake if we don't act now. Retrieved from https://www.worldwildlife.org/stories/our-planet-is-warming-here-s-what-s-at-stake-if-we-don-t-act-now