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A COMPARATIVE VISUAL CONTENT ANALYSIS OF THE CDC AND WHO COVID-19 INFOGRAPHICS

by

MANUSHRI PANDYA

A THESIS

Presented to the Graduate Faculty of the

MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

In Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE IN TECHNICAL COMMUNICATION

2021

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ABSTRACT

In this study, I conducted a comparative visual content analysis of the CDC and WHO COVID-19 infographics. I considered infographics as an important genre of communication during such times because they not only provided sufficient information to the audience but did so in an engaging manner. The goal of my study was to think about the role of infographics in the context of health and risk communication during a pandemic, and to emphasize on the rhetorical elements that constitute the creation of infographics by major health organizations. I specifically focused on three elements: the kinds of information communicated through infographics, the text and graphic organization in the infographics, and the rhetorical strategies.

The results of my analysis indicated that (1) the CDC and WHO infographics included how-to information, dos and don'ts, step-by-step guidelines, checklists, and general informational topics on COVID-19 in their infographics; (2) the CDC infographics had structured text and graphic organization that established a reading pattern, whereas the WHO infographics followed an abstract design that gave the audience more freedom to explore the infographic; and (3) Both the CDC and WHO used visuals to make information more understandable, used imperatives whenever the aim was to initiate action, avoided frightening references in the infographics and focused on helpful information, and used document design according to the reading patterns of the audience. I concluded that audience was the key factor that stemmed the differences in the implementation of rhetorical strategies in the CDC and WHO infographics.

ACKNOWLEDGMENTS

This study is a result of all the great advice I have received from my advisor, Dr. Carleigh Davis, and my committee members, Dr. Sarah Hercula and Dr. David Wright. Dr. Davis has been immensely encouraging throughout the process and has invested her time, effort, and attention to every aspect of my thesis. Dr. Hercula and Dr. Wright have provided perspectives that have helped me focus on important details that form the crux of my analysis. I am extremely grateful to my committee members for providing their invaluable feedback on my thesis. Lastly, I would like to thank my family for perpetually believing in me and motivating me in my endeavors. This journey would not have been possible without the support of my advisor and my family.

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1. INTRODUCTION

COVID-19 is one of the most recent and one of the most devastating pandemics that the world has faced. As of January 14, 2021, the CDC website records a total of 22,965,957 confirmed COVID-19 cases in the United States with 383,351 deaths (CDC, 2021), and the WHO website states a total of 90,759,370 confirmed COVID-19 cases worldwide with 1,963,169 deaths (WHO, 2021). These numbers are indicative of the physical and emotional impact that COVID-19 diagnoses and deaths continue to have on people. Therefore, it is essential to know how the CDC and WHO—two of the most important health organizations in the US and the world, respectively—are communicating this extremely important health and risk information pertaining to COVID-19.

COVID-19 as a risk situation calls for effective technical communication that helps answer questions or solve problems relating to the disease. The Society for Technical Communication (STC) defines technical communication as a broad field that encompasses the communication of accurate information on specialized topics (including how-to information, technical specifications, medical information, etc.) by using technology and user-centered approaches that make information transfer usable and accessible (2020). In circumstances like a global pandemic, the role of technical communicators becomes even more significant because they have an ethical responsibility to society. Bowdon (2004) suggests that technical communicators are "public intellectuals" who act as rhetorical shapers of documents that impact public awareness. As technical communicators, "we must see the mediation of truth as one of

our required functions" in order to serve our communities as best as we can (Bowdon, 2004, p. 327). As such, in times like the COVID-19 pandemic, it is the responsibility of technical communicators to create and critique genuine documentation that not only conveys potential risks but also provides measures to fight against those risks. Essentially, I situate this research project among other technical communication projects that examine rhetorical approaches to public health communication.

The goal of this study is to analyze the differences in the format and rhetorical strategies implemented by the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) in their COVID-19 infographics. Since both organizations address slightly different audiences, such an analysis would provide insights into how cultural differences impact the way health and risk communication messages are constructed. In pursuit of these goals, this project will address the following research questions:

- **RQ1**. What specific kinds of information are conveyed through the COVID-19 infographics of the CDC and WHO?
- **RQ2**. How is the text and graphic organization in the CDC and WHO infographics similar to and different from each other?
- **RQ3**. What rhetorical strategies do the CDC and WHO infographics use to communicate health and risk information?

Infographics can be categorized as a form of technical communication because they contain information on specific topics and seek to translate this complex information to users in an easy-to-follow format. Scholars like Bursi-Amba et al. (2016), Toth (2013), and Zhang (2017) have identified infographics as a genre of technical communication,

therefore, my study of the COVID-19 infographics is well-situated in the field of technical communication. Infographics are also often used to convey health and risk information to the public in an effective, accessible manner. Because infographics are widely used to communicate health and risk information, it is important that technical communicators delve deeper into understanding and utilizing them in practice. This connection between infographics and technical communication further emphasizes the need to analyze COVID-19 infographics because such an analysis will help uncover communication strategies and audience-centered approaches that are used in a risk situation, thereby helping technical communicators make better informed responses in the future.

1.1. LITERATURE REVIEW

1.1.1. The Rhetoric of Health and Medicine. Technical communicators are called upon to create and evaluate accurate, usable, and accessible documents for the converging fields of health and risk communication. As Rude (2009) identifies, an important role that technical communicators perform is adding value to the product presented to users—this product could be any artifact that helps users overcome adverse situations and/or accomplish their goals. The academic study of health and risk communication explores the understanding and use of communication strategies that inform and educate the public about a specific risk situation, its impact, and the corresponding coping mechanisms. Health and risk communication includes sensitive and fundamental pieces of information that impact the public's interpretation, perception, and response towards the risk.

The role of technical communicators in times of public emergencies is also highlighted by various technical communication scholars (Bowdon, 2004; Cheek, 2019; Ding, 2014; Grabill & Simmons, 1998). Bowdon (2004) and Grabill & Simmons (1998) situate technical communicators as uniquely poised to construct and communicate messages to the public. These scholars agree that technical communicators possess the necessary language, research, and writing skills needed to create "accurate, effective, and ethically sound texts" (Bowdon, 2004, p. 325). Grabill & Simmons (1998) define risk as a socially constructed phenomenon and Bowdon (2004) asserts that technical communicators can serve as public intellectuals. In other words, these scholars are acknowledging technical communicators as well-suited individuals to carry out risk communication efforts effectively. Ding (2014) and Cheek (2019) situate technical communicators as mediators of information between organizations or experts and the public. These mediators "help organizations mediate disease discourse to prevent unduly increasing anxiety and inducing public panic during an outbreak" (Cheek, 2019, p. 5). Both scholars focus on panic reduction during an outbreak by reducing the communication gap between experts and non-experts. While Bowdon (2004) and Grabill & Simmons (1998) focus on skills that make technical communicators qualified to carry out effective communication, Ding (2014) and Cheek (2019) identify technical communicators as mediators that fill the communication gap. All of these authors establish the role of technical communicators as integral to effectively communicate information during emergency situations.

The rhetoric of health and medicine (RHM), as defined by Segal (2005), is a complex field which is a result of the following factors: (1) since the problems facing the

field of RHM are not all in relation to one particular discipline (e.g., language studies or philosophy or history), the field does not have a fixed identity; (2) there is a marked difference in what is considered to be the rhetorical study of health and medicine by various disciplines; and (3) there is an element of "bidirectionality of theory" which is the relation of rhetorical studies and studies in other disciplines" (p. 314). This definition, although nebulous, situates RHM as an interdisciplinary field that is highly dependent on the contributions made by scholars in the disciplines of history, sociology, anthropology, psychology, philosophy, and cultural criticism (Segal, 2005). Segal suggests that one of the responsibilities of rhetoricians of health and medicine is "to do the metarhetorical study: to consider what "rhetoric" means in the context of health and medicine when it is deployed by nonrhetoricians" (2005, p. 317). The field of RHM offers perspectives and strategies that can serve as good starting points for the creation of effective risk communication artifacts, like infographics, amid global crises situations such as the one created by COVID-19.

Significant research has been done by technical communication scholars (Angeli, 2012; Ding, 2009; Welhausen, 2015) regarding the role of the rhetoric of health and medicine in times of global crises, like pandemics. These scholars have talked about various pandemic flus and respiratory illnesses (like SARS, H1N1, and the Ebola virus) and presented their analyses of the risk communication situations—what communication strategies were used that did not turn out to be effective, and what should have been done differently. All of these scholars offer suggestions about how risk communication can be improved: by thinking about risk communication ethically (Ding, 2009); by using more logos-driven metaphors that add to the public's understanding of the situation (Angeli,

2012); and by using different visualization strategies that can communicate information to intercultural audiences (Welhausen, 2015).

Scholars like Teston (2012) and Angeli & Norwood (2017) have focused on the lack of research done by scholars in technical communication and other fields in the areas of knowledge construction and the design features of healthcare communication. Teston (2012) specifically investigates the intersection of technical communication, medical rhetoric, and visual communication. She argues that technical communication scholars "have not yet fully explored the ways that the visual as rhetoric affords the collaborative construction of knowledge and deliberative decision making" of medical information (Teston, p. 189). Angeli & Norwood (2017) focus more on the intersection of RHM and technical communication and argue that not much has been studied about the design aspects of healthcare communication. They propose a "collective mindfulness" approach in which all members work collaboratively to minimize potential failures, hence reducing risk of failure in healthcare communication.

Various scholars in the field of healthcare communication (Arcia et al., 2015; McCroire et al., 2016; Balkac & Ergun, 2018) advocate the use of infographics for communication. While Arcia et al. (2015) recommend moving away from the notion of "less is more" when communicating healthcare information because it lacks detail and leads to confusion, McCroire et al. (2016) and Balkac & Ergun (2018) suggest using infographics to educate patients and their families about certain diseases and to bridge the communication gap. These scholars reflect that infographics are a widely accepted genre of healthcare communication, and that the field of healthcare communication is working towards developing recommendations that can improve the effectiveness of infographics.

In this section, I outlined the definition of RHM and the role it plays in global crises. I also drew on the recommendations provided by scholars regarding improving health and risk communication strategies and creating effective infographics. Lastly, I highlighted the fact that there is a lack of research done on knowledge construction and design features in healthcare communication. The goal of my comparative study of the CDC and WHO COVID-19 infographics seeks to address, at least in part, this gap in the existing research on how health communication is designed. Through my study, I intend to understand how infographics, which are widely used in health and risk communication, are formulated—I specifically focus on the structure and rhetorical strategies implemented by the CDC and WHO to fulfill the communication demands of their audiences.

1.1.2. A Definition of Infographics. The field of the rhetoric of health and medicine points to the need for tools that communicate complex information in ways that are engaging and easy to understand, and infographics are perfect examples of such tools. The term "infographic" is derived from the combination of "information" and "graphics." Infographics are used to communicate complex quantitative or qualitative information in a visually engaging manner. This communication of complicated information is done by using different kinds of visual elements, like images, lists, graphs, charts, attractive color schemes, descriptive headings and subheadings, etc. An infographic, as defined by Krum (2014), is "a larger graphic design that combines data visualizations, illustrations, text, and images together into a format that tells a complete story" (p. 6). A wide range of information is communicated through infographics; this information includes financial and statistical data, topics related to journalism, heath and risk communication, marketing

information, "how-to" information, environmental and hazard communication, and educational information. An important characteristic of infographics, as noted by Toth (2013), is that they should serve as a standalone entity; i.e., they should be able to communicate the intended information without the audience having to look for additional sources for comprehension. Toth defines infographics as follows:

> Infographics, as the mashed up words imply, are information graphics. They attempt to educate an audience about a specific topic or issue in a visually interesting and easily navigable manner through a combination of words and visuals. Infographics often communicate complex quantitative and/or qualitative information quickly for their audience. They typically combine data displays, lists, graphics, and other visual elements to make a point; they intend to inform, and frequently persuade, their intended audience about a focused topic. (p. 448)

Toth considers infographics as highly visual documents that convey information on specific topics to an intended audience in a persuasive manner. Furthermore, scholars in various fields (Bursi-Amba, Aline EA, Gaullier, & Santidrian, 2016; Kimball & Hawkins, 2008; McCrorie, Donnelly, & McGlade, 2016; Toth, 2013; & Tufte, 2003) agree that visuals have an emotional impact that helps increase the comprehension and retention of information by the audience. These scholars also indicate that visual elements—by means of their emotional appeal—have the ability to gain the trust of their audience, therefore rendering the information as real and believable. Another desirable feature of infographics is the ability to share them on social platforms—their briefness and comprehensibility makes it possible for the readers to digest chunks of information

(Toth, 2013). In a world that is overloaded with digital documentation, infographics facilitate quick processing of information that is often welcomed by the audience.

Bursi-Amba, Aline EA, Gaullier, & Santidrian (2016) view infographics, specifically, as helpful tools for technical communicators. The authors note the advantages of using infographics, including increased willingness of the audience to read the information, increased comprehension rates, and the overcoming of language barriers. The authors also conclude that infographics satisfy the concept of accessibility, which is an important facet of technical communication. In 2017, Zhang studied the infographics created by Alibaba.com to educate its e-commerce merchants for their effectiveness. The results of this study suggest that infographics were useful tools, as they helped users make decisions and eased their everyday business operations. Zhang also considers the cultural and economic expectations of the target audience and claims that they must be taken into consideration while creating infographics. She offers three suggestions for infographic designers: (1) keep in mind that most infographics are viewed on mobile devices and optimize them accordingly; (2) create unique designs for each infographic based on the content and purpose, rather than using templates; and (3) choose the right kind of graph to present statistical data (p. 52, 53).

Both of these scholars identify infographics as useful tools of communication that increase audience perception and comprehension and that, in some cases, also help the audience make decisions. In addition, these scholars also brought up two important considerations: (1) the added component of accessibility through infographics, and (2) the cultural and economic expectations of the target audience. These considerations are essential when it comes to the analysis of COVID-19 infographics by the CDC and

WHO. Since both organizations have a wide range of audiences, it is essential to understand how their infographics are composed and whether they address their audiences inclusively.

1.1.3. A Short History of Infographics. Humans have been using visual representations to record data and information for tens of thousands of years. An early example of data visualization is the cave paintings that illustrated hunting strategies and maintained statistics of the number and kind of animals caught on dwellings (Aparicio & Costa, 2014). These ancient paintings were visual representations of complex data that were meant to be used strategically in the future. The fact that data visualization has been used historically reemphasizes that humans prefer and have relied on visuals as a need for communicating complex information. A more specific development of infographics as a type of data visualization can be traced back to the times of William Playfair, who published the book *The Commercial and Political Atlas* in the year 1786. This book contained a multitude of visual elements representing the economy of England that could be categorized as infographics. A more popular example of infographics in their modern usage is the "rose diagram" by Florence Nightingale (see Figure 1.1). In 1857, Nightingale created this coxcomb chart to represent the causes of death of the soldiers during the Crimean War, and this diagram was then presented to Queen Victoria in an attempt to persuade her to improve the health conditions of the soldiers.

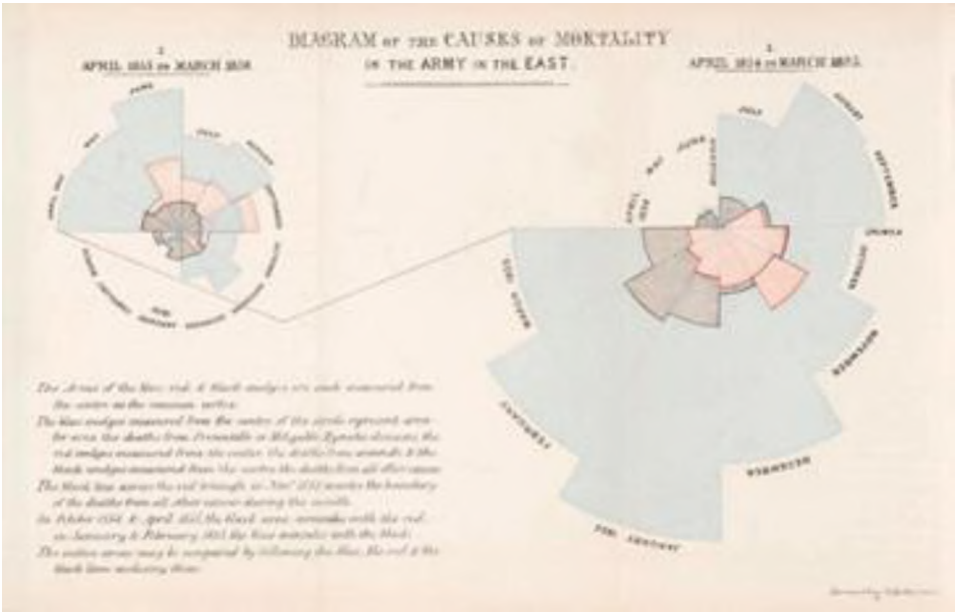

Figure 1.1. Diagram of the causes of mortality. The coxcomb chart created by Florence Nightingale can be considered an early example of infographics and data visualization. Retrieved from https://infowetrust.com/wp-content/uploads/2019/10/2.jpg.

Eventually, in the 1900s, the use of infographics experienced a rise until it became a legitimate genre of data visualization. In 1933, Harry Beck created the first London Tube map using only lines to depict the route and different stations—this map made visual representations a relevant aspect of public technical communication (visual.ly). Then, Otl Aicher created simplistic pictograms for the 1972 Summer Olympics that became very popular and are widely used today; an example is the human stick figures that are used in public signs (visual.ly).

The year 1975 marked the contributions of the father of data visualization, Edward Tufte, after which the field evolved rapidly. Tufte was a creative statistician who

wrote four books on data visualization[1] and eventually became an infographics expert. Around the same time, Peter Sullivan created infographics for the *Sunday Times* and advocated the use of infographics to communicate complex information (Krystian, 2016). The rising popularity of this genre led to the invention and use of online software and design tools to create infographics. Today, infographics are used in almost every field, including journalism, business, healthcare, academia, etc. The use of social media for sharing infographics has further expanded the scope and audience of the genre.

In times of public health emergencies, like the COVID-19 pandemic, the use of infographics has proven integral to the communication of health and risk information because infographics offer a crisp format which is easy for the audience to read and understand as compared to other longer documents. In this light, it becomes important that sufficient and specific attention is paid to the composition of the infographics published by organizations like the CDC and WHO because they fulfill the communication needs of a wide range of audiences worldwide. Through such an analysis, technical communicators can seek to understand the rhetorical strategies that are used by the CDC and WHO for public communication during a crisis situation. These strategies can then be referred to by technical communicators to make better positioned responses that meet the public's communication demands in the future.

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[1] Data visualization and infographics are sometimes considered synonymous, but they are actually quite different. While data visualizations refer to visual representations of numerical information, infographics are a combination of data visualizations, illustrations, text, and images formatted together to tell a complete story (Krum, 2013).

1.1.4. Infographics as Visual Rhetorical Tools. Kenneth Burke and Roland Barthes paid specific attention to the rhetoric of visual communication which led to the invention of *visual rhetoric*. This move led scholars (Hill & Grinnell, 2014; Lengler & Moere, 2009; Lindblom, Galante, Grabow, & Wilson, 2016; Toth, 2013; and Zhang, 2017) to analyze the composition and structure of images, typography, signs, symbols, and other visual elements as well as their consequent persuasive impact on the audience. Olson (2007) was the one to realize that visual rhetoric was fundamental to understanding sociocultural beliefs and it "provided a way to document histories of the poor and working classes" (p. 2). There is, then, an observed connection and interdependency between visual elements and sociocultural beliefs which impacts the way visuals are created and interpreted. With the rise of visual media technologies that aid in the production of visuals, the field of visual rhetoric deepened.

Infographics are highly visual in essence and always have a purpose and audience associated with them. Scholars including Lengler & Moere (2009), Hill & Grinnell (2014), and Zhang (2017) emphasize on the rhetorical goals of visuals in relation to their audiences. Lengler & Moere (2009) focus on meaning making on the recipient's end; Hill & Grinnell (2014) prioritize the aspect of internationality of communication, which is only possible if relevant digital tools are used to visually convey complex information; and Zhang (2017) considers infographics as visuals that should be created in keeping with the cultural and economic expectations of the audience. While Lindblom et. al (2016) lean towards the use of infographics for a visual synthesis of complex texts, Toth (2013) offers approaches on how students can be made aware of infographics as "visual masterpieces". All of these scholars consider visuals as factors contributing to the

audience's comprehension of information and touch upon the visual rhetoricity of infographics from various perspectives. For technical communicators preparing health and risk information, a knowledge of the perspectives on visual rhetoric of infographics reminds them of the principles that guide the creation process of effective infographics.

Storytelling is another concept that is included in the visual rhetorical study of infographics. Storytelling has historically been used as a tool to convey information that is otherwise difficult to digest. Many scholars (Arslan & Toy, 2015; Bursi-Amba, Aline EA, Gaullier, & Santidrian, 2016; Hill & Grinnell, 2014; Huang et al., 2019; Jones, Sage, & Hitchcock, 2019; Lengler & Moere, 2009; Lindblom et al., 2016; and Toth, 2013) have considered infographics as "storytelling tools" in various degrees and from various perspectives. For instance, Arslan & Toy and Lengler & Moere view infographics in the sense of telling a "data-driven story." Whereas Toth; Hill & Grinnell; Jones et al.; and Lindblom et al. imply that infographics are "digital storytelling tools" that could be incorporated in classrooms and student assignments. Yet another perspective—that of memory or retention by means of storytelling—is drawn by Huang et al. and Bursi-Amba et al. All of these scholars share a common ground that the various elements of infographics (including text, visuals, and colors) function together to tell a complete story to the audience. This story motivates the audience to read further in the infographic, provides them with new information, and persuades them to take an action. Infographics, then, are a visual storytelling device of communication that we use every day to share complex information, form relationships, and initiate actions.

When taking into account the COVID-19 infographics generated by the CDC and WHO, it is essential that we try to associate them with the concepts of visual rhetoricity

and storytelling. The element of visual rhetoricity reminds information designers of the audience—their sociocultural beliefs and comprehension levels—as well as the purpose of communication as they generate information for the public. Similarly, the element of storytelling reminds information designers to draw a clear and complete picture for the audience. A close analysis of the infographics based on the elements of visual rhetoric and storytelling will give us insights into what rhetorical strategies these organizations use to convey health and risk information pertaining to COVID-19.

1.1.5. Infographics and "chartjunk." Not all scholars are completely convinced of the usefulness of infographics; some are critical of their quality, design components, and/or comprehensibility, including those who recommend the use of infographics. Edward Tufte (1983) introduced the term "chartjunk" to refer to information that only looked pretty but had no effect on knowledge transfer. Many other scholars subsequently used this term to deplore what they believed was ineffective visual design—the most prominent of them within the field of technical communication is Michael J. Albers. In 2014, Albers questions whether infographics were actually useful or if they were just chartjunk. He asserts that many visual designers misuse infographics to convey information because they believe that if something looks pretty, it will serve their purpose. Albers believes that without a clear and specific goal and audience in mind, it is not possible to create a comprehensible infographic. In his article, Albers also suggests moving away from the traditional methods of testing infographics that focus on fact finding, and instead focus on testing these infographics in terms of comprehension. He concludes that infographics should be used for comprehension and not to beautify information. Albers published a follow-up article in 2015 in which he added the

dimension of creating infographics that retain the complexity of information but lower the barrier to comprehension. He urges that more research is needed into how people comprehend the infographic and connect that understanding to the bigger picture.

In 2011, Stephen Few claimed that the criteria defined by Tufte were not enough to determine what qualifies as chartjunk. He conducted a study in which 20 participants were given two types of charts— "embellished" versus "plain (minimalist)"—to measure their effects on comprehension and recall. Their study found that a chart that included embellishments relevant to the message being conveyed, with some additional quantitative data that were "related to but incidental to the message," was still as comprehensible as a minimalist chart (2011, p.3). In fact, the embellished chart had a better recall for the participants 2–3 weeks after the study. Therefore, he concluded that anything, including an embellishment, relevant to the subject matter of the chart is not "junk" at all. As long as embellishments do not undermine the message, distract the reader's attention, or misrepresent the data, they are not chartjunk.

In 2015, Arslan and Toy wrote an article wherein they focused completely on the design components like colors, layout, typography, and illustrations used in infographics. Drawing from Tufte, they added the criteria of improper use of colors, typography, and pictograms to the conception of chartjunk. Few and Arslan & Toy have worked on similar grounds—they redefined what chartjunk meant within the context of their studies. The articles by Albers focused on the comprehensibility aspect of infographics and provided approaches on how to make infographics more useful and effective for the audience. All four articles opposed the use of chartjunk and supported the notion of including visual cues that make infographics more meaningful.

The debate of the kinds of infographics that are considered chartjunk is still ongoing and may continue; the point of importance, here, is to understand *what* makes an infographic effective. One way to delve deeper in this area is by assessing the composition of infographics—the concoction of different, meaningful elements that serve as a medium to convey information in an easygoing and transparent manner. In the next section, I will provide detailed information on the methods utilized in my study that evaluate the composition of the CDC and WHO COVID-19 infographics. I will also explain the role of the CDC and WHO in the context of health and risk communication and why it is important to study their communication efforts.

2. METHODS

In the previous section, I situated my research within the context of the rhetoric of health and medicine in technical communication and provided a definition of infographics, outlined their history, characterized them as visual rhetorical and educational tools, and explained the circumstances under which they are considered chartjunk. In this section, I will categorize this study as mixed methods, provide information on the method of data collection used in the study, explain the process of inductive coding used in analysis of this data, provide the codes and their definitions, present my data results graphically, and outline the comprehensive results and inter-rater reliability.

The primary aim of this study is to conduct an analysis of COVID-19 infographics that the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) developed for their websites and social media pages as well as for individual third-party use. The CDC is an agency of the government of the United States of America; it falls under the Department of Health and Human Services and its mission is "to protect America from health, safety and security threats, both foreign and in the U.S. Whether diseases start at home or abroad, are chronic or acute, curable or preventable, human error or deliberate attack, CDC fights disease and supports communities and citizens to do the same" (CDC, 2021). The CDC serves as the nation's health protection agency, which means that its essential target audience is people residing in America. The CDC's main function is to ensure the health and safety of its audience by providing accurate, timely information on emerging health-related concerns and

encouraging healthy behaviors among the public. The CDC also has its own set of guidelines on Crisis and Emergency Risk Communication (CERC) in a manual that serves as a resource for public health communication (Reynolds & Seeger, 2014).

The WHO falls under the purview of the United Nations. It is "the directing and coordinating authority on international health," and its objective "is the attainment by all peoples of the highest possible level of health. Health, as defined in the WHO Constitution, is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (United Nations, n.d.). The WHO collaborates with 194 member states spread across six regions and 150 country offices (WHO, n.d.), which is indicative of the fact that its target audience is people all over the world. The WHO's main function is to help people combat communicable and noncommunicable diseases. Like the CDC, the WHO also has a set of guidelines on emergency risk communication that offers recommendations on how to effectively handle communication in emergency situations.

I selected the CDC and WHO to analyze in this study for two reasons. First, the CDC is a U.S. organization that operates at a national level, and the WHO is a worldwide organization that operates at an international level. This was an important consideration because in my study, I was interested in detecting the similarities and differences in terms of the format of the infographics and the information they communicate. Second, as these organizations operate at different levels, they also have different audiences. In my study, I was also interested in discovering whether this difference in audiences led to different rhetorical constructions of the infographics between the two organizations. Both of these

considerations gave me insights regarding the rhetorical strategies, specifically the style and format, that these organizations use for health and risk communication.

There is a wealth of infographics created by these organizations, including the infographics specific to the COVID-19 outbreak that are the subject of this study. My source of data collection from the CDC was a page on their website titled "Communication Resources" under the page group "Coronavirus Disease 2019 (COVID-19)." Located within a collection of pages that offer information about the COVID-19 pandemic, this particular page acts as a toolkit for public communication about COVID-19 and contains various communication resources including infographics, videos, and public service announcements. For this study, I included only the infographics on this page. Similarly, my source of data collection from the WHO website was a page titled "Advice for the Public" under the page group "Coronavirus disease 2019," where all the COVID-19 information is stored. This page contains videos, infographics, and technical documents that communicate COVID-19 information on various topics—my focus, again, was solely on the infographics stored on this page.

For my study, I collected 55 infographics from each organization's web page (110 total). These pages have been consistently updated since the start of the COVID-19 pandemic; however, for this study, I only collected infographics available on the aforementioned pages prior to November 10, 2020. As my intention was to study the infographics on the CDC and WHO webpages, I limited my collection to include only content that met Toth's (2013) definition of infographics described in Section 1.

Two main focus areas from Toth's definition drove my selection process: (1) an attempt to educate the audience about something specific and (2) a combination of words

and visuals that communicate complex information easily. I skipped those infographics that (1) had the same topic covered multiple times and/or (2) were comprised of only textual information. Adherence to these criteria left me with a selection of infographics from both pages. From this selection, I chose 55 infographics from each page at random to serve as my data set for this study. This number served as a good data set for my study as it gave me a manageable number of infographics to work with while also achieving data saturation. Data saturation is defined by Charmaz (2006) as the stage when gathering more data does not lead to newer insights, nor reveals any new properties or theories.

My research on the COVID-19 infographics created by the CDC and WHO can be classified as mixed methods. A mixed methods study includes a combination of methods—usually both quantitative and qualitative (Hughes & Hayhoe, 2008). I identify my study as mixed methods because it is characterized by an understanding of a symbiotic relationship between the quantitative and qualitative aspects. A simple quantitative study that involves counting the number of images or sentences or the frequency with which an item appears in the infographic would not be sufficient to inform my analysis of which rhetorical strategies are used by both organizations in conveying risk information. Similarly, a purely qualitative rhetorical analysis could not portray the extent to which both organizations use certain strategies in conveying information to their audiences—which would not allow me to further compare the results from data analysis. Therefore, only a mutual connection between quantitative and qualitative methods would allow me to seek answers to my research questions. Such a comparative rhetorical analysis would also provide me with better discernments on how

the differences between audiences might affect the way in which infographics are designed by the CDC and WHO.

Quantitative methods were used in certain situations like keeping a numerical count of the number of men, women, and people of color in the infographics; the frequency of beneficial or detrimental interaction; the occurrence of numerical information (like temperature, distance, and time) in the infographics; and the number of times the CDC and WHO utilized certain rhetorical tactics in their communication. The qualitative aspect of my study involved coding and categorizing, and it started by compiling a physical data set of the documents or artifacts being analyzed, that is., the infographics (Hughes & Hayhoe, 2008, p. 86). I highly depended on textual and visual cues in my analysis like titles, text descriptions, text and graphic arrangement, and representations shown in the graphic. My qualitative analysis explores *what* is happening in the infographic and *how*. In most instances, the code name identifies the *what*, and the code description identifies the *how*. For instance, the code "beneficial interaction" explains what is happening in the graphics, and the code description defines the actions that are beneficial; that is, how the beneficial interaction is taking place.

To sort the data, I used the general inductive approach to coding that enabled "research findings to emerge from the frequent, dominant or significant themes inherent in raw data" (Thomas, 2003, p. 2). This type of coding begins by a close reading of the document or artifact and is followed by discerning the segments that contain units of meaning. As these units of meaning are identified, they can be further paired together to form major themes. Once these major themes are determined, the next step is to create codes and categories and continue to refine them until the researcher is left with a set of

categories that captures the inherent themes that complement the research objectives (Thomas, 2003). The general inductive approach I used has several similarities to the research approach known as grounded theory (Charmaz, 2006). These approaches are similar in the sense that they guide researchers toward coding for qualitative analysis of the data, and both approaches first require a round of close reading of the data, followed by a conceptual or thematic organization of the data.

Despite the resemblances between both approaches, their main difference is that while the general inductive approach "is a systematic procedure for analyzing qualitative data where the analysis is guided by specific objectives" (Thomas, 2003, p.2), grounded theory is open to "all possible theoretical directions indicated by your readings on the data" and uses "focused coding to pinpoint and develop the most salient categories in large batches of data" (Charmaz, 2006, p.46). Since the purpose of my study was to establish connections between the research objectives and the infographics which served as raw data, I categorized my study as following Thomas's general inductive approach.

Based on the process described by Thomas (2003), I collected raw data (infographics in their electronic format) and conducted a general inductive analysis of the previously defined 110 infographics from the CDC and WHO websites. During the process, I analyzed the various elements that composed these infographics—including the title, written text and graphics, the kind of interaction in the graphics, different tools used for emphasis, the kind of information and how it was delivered, and the organization and structure of the content. In this initial coding process, I focused on the emergent themes and characteristics that aligned with my research objectives. This afforded me with an analytical perspective that "interprets what is happening and makes relationships between

implicit processes and structures visible" (Charmaz, 2006, p.54). Once all 110 infographics were coded, I moved on to theoretical coding, which is the level of coding that specifies "possible relationships between categories you have developed" (Charmaz, 2006, p. 63). During this phase, I made comparisons between categories and observed coincidences between some of them, as described in the sections below. These codes helped me frame an analytic story and make coherent sense of the data. I concluded my analysis on experiencing data saturation.

2.1. CODES & DEFINITIONS

Following the general inductive coding process, the following codes and their corresponding definitions emerged from the data (see Table 2.1). Two separate sheets for the CDC and WHO infographics were prepared in MS Excel to log information and supply evidence/examples for each code.

Table 2.1. Codes and code descriptions used in the study.

Initiating action	Titles and text descriptions initiate actions on part of the readers by using imperative and directive sentence structure—asking the readers to take certain actions to prevent themselves from falling sick or to prevent the spread of the virus.
Direct references to COVID-19	Text descriptions and graphics explicitly deliver relevant and important information pertaining to COVID-19 by including terms like "coronavirus," "COVID-19," or other similar terms. The use of declarative sentence structure and informative statements is evident.
Beneficial interaction (graphics)	Graphics reflect some kind of interaction either among humans or between humans and objects. This interaction is beneficial—like wearing a mask, washing your hands, using sanitizers, etc.

Table 2.1. Codes and code descriptions used in the study (cont.).

Detrimental interaction (graphics)	Graphics reflect some kind of interaction either among humans or between humans and objects. This interaction is detrimental—like touching random surfaces, coming in contact with infected people or objects, etc.
Including numerical data	Text descriptions and/or graphics contain numerical data in the form of temperatures, percentages, distance, or time.
Communicating risk by referring to the virus	Certain text refers to the coronavirus by including words like germs, spread of the virus, infection, protecting self and others from the virus, etc. Certain graphics represent the virus in the form of shapes or icons. In both cases, a sense of urgency to stay away from the virus or stop the spread of the virus is indicated.
Participatory figures	Graphic representations include people that are participating in interactions with other people and objects.
Structure of the infographic	Refers to the spatial text-graphic arrangement in the infographics. Some are structured or sequenced in the sense that there is alignment and consistency in the structure of the infographic. The proximity between text and graphics makes their association to each other obvious.
Including an introductory paragraph	Text that gives an overview of the topic being addressed and is at least one complete sentence long.
Delivering general information	Text descriptions and graphics deliver information that can be used outside the immediate context of COVID, such as how to wash one's hands, what kinds of masks should or should not be chosen, etc.
Graphic representations of symptoms	Specific representation of various COVID-19 symptoms, including coughing, sneezing, fever, chills, etc.

2.2. COMPREHENSIVE RESULTS

The chart below outlines the results obtained from the comparative analysis of the CDC and WHO infographics (see Figure 2.1). This comparison shows the frequency at which the aforementioned codes are implemented (or not) by each organization in their COVID-19 infographics. Both the CDC and WHO show detrimental interaction in 12 out

of 55 infographics and have graphical representations of symptoms in 9 out of 55 infographics. The CDC uses the strategies of initiating action, showing beneficial interaction, including numerical information, designing structured infographics, and including introductory paragraphs more than the WHO. In contrast, the WHO uses the strategies of delivering specific COVID-19 information, communicating risk by indicating the virus, and delivering general information more than the CDC. These results give us brief insights into how these organizations use different rhetorical strategies to cater to the needs of their respective audiences. More detailed analyses of these findings are included in the following section.

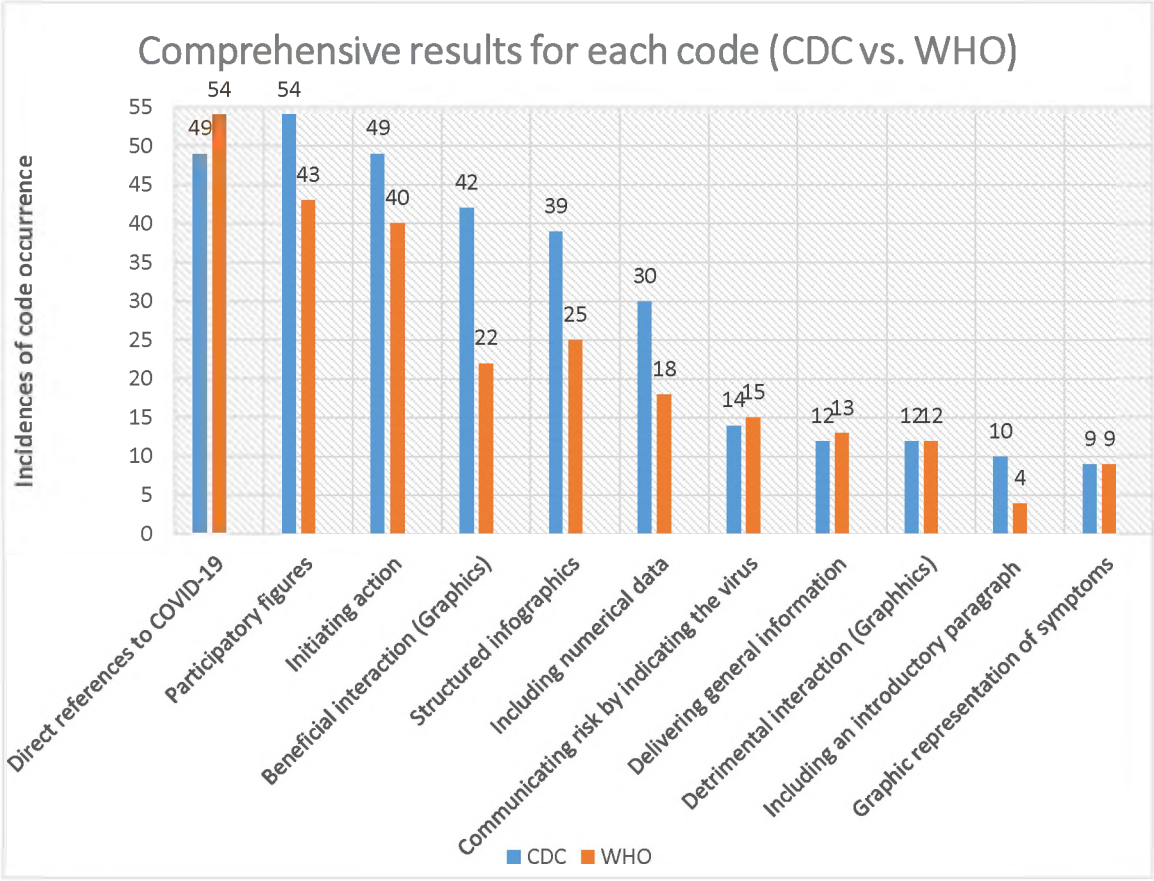

Figure 2.1. Comprehensive results for each code.

2.3. INTERRATER RELIABILITY

Qualitative studies can achieve the same degree of rigor as quantitative studies; credibility, transferability, and dependability are considered the three standards of rigor in qualitative studies (Hughes & Hayhoe, 2008). Triangulation is a technique for achieving dependability and maximizing validity (Flick, 2004). In order to achieve dependability and validity, a research study should be replicable and must reach the same conclusions when performed by different researchers (Hughes & Hayhoe, 2008, p. 80). For my research, I achieved dependability in the following ways as described by Hughes and Hayhoe (2008):

- Depth of engagement: This criterion refers to the duration of a researchers' engagement with the data; the longer researchers are engaged with their data, the more dependable and elaborate their findings will be. In my case, I worked on my research from August 2020 through May 2021. Over these months, I collected, analyzed, coded, and categorized my data; and achieved data saturation in order to frame reliable and dependable conclusions.
- Diversity of perspectives: This criterion refers to perceiving the data from different perspectives. During my research, I worked with my advisor who is a professor of technical communication, and another graduate student who has received training in human-computer interaction. They reviewed my codes and analyses and provided their perspectives and interpretations, thereby ensuring the dependability of my research.

Interrater reliability is the rate of agreement between different coders; all coders must reach a sufficient level of agreement, ideally 70%, in order for the data to be

considered valid (Thayer et al., 2007). For my research study, I generated the codes and created a master code sheet that was used by my advisor, Dr. Carleigh Davis, and a graduate student, Kosha Soni, who graduated with her degree in M.S. Information Science & Technology from Missouri S&T, to record their observations and analyses. Dr. Davis and Ms. Soni coded 10% of the data, as that amount is considered to be ideal (Thayer et al., 2007); and this selection resulted in a total of 11 infographics—6 from the CDC and 5 from the WHO to be coded by the other coders. To begin the inter-rater reliability process, I first carried out meetings separately with my coders to explain the codes and provide examples, and then I answered their questions. This ensured that all three of us interpreted the codes and definitions in a similar way. Based on their data recordings, I calculated the inter-coder reliability using the simple agreement method, which is defined as the percentage of decisions that are in agreement between all coders (Geisler, 2004).

My coders sent their coding sheets to me as soon as their analysis was complete. Once I received the results, I created two separate MS Excel sheets to tabulate the number of agreements with each coder. After this was done, I divided the number of agreements by the total number of possibilities. Since there were 11 infographics and 12 codes, the total number of possibilities was 132 (11x12). The following formula is used for calculating simple agreement:

# of agreements / # of coding possibilities

My individual agreements with Dr. Davis and Ms. Soni were 0.83 (or 83%) and 0.90 (or 90%), respectively. Table 2.2 below provides a brief description of the number of agreements, disagreements, decisions, and simple agreement values. My average

agreement with both coders was 86.5%, which meets the minimum requirement of 70%, as described by Thayer et. al (2007). This number, therefore, demonstrates my study as dependable, valid, and replicable.

Table 2.2. Simple agreement value with each coder.

Coder	**Number of Agreements**	**Number of Disagreements**	**Total Number of Decisions**	**Simple Agreement**
Dr. Davis	110	22	132	0.83
Ms. Soni	119	13	132	0.90

In this section, I explained my methods of data collection and data interpretation, described my codes and definitions, and illustrated how the study achieved inter-rater reliability. This, in turn, ensured the replicability and validity of my study. In the following section, I will present the raw data derived from the study that calculates the number of incidences for each code and the differences between them. The section also provides an overall analysis of the results and outlines the major differences and similarities in the strategies used by the CDC and WHO in their risk communication of the COVID-19 pandemic.

3. RESULTS

This section contains graphical representations of the inductively coded data from the CDC and WHO COVID-19 infographics. The data is displayed separately for each code and then represented as percentages of coincidences of codes. For my study, coincidence is the overlap or cooccurrence of two or more codes—meaning, one infographic exhibits the characteristics of two different and/or opposite codes. Such coincidences represent how multiple, contrasting codes are used in tandem with each other to create a rhetorical effect that impacts the creation and delivery of messages. An example of coincidence is the overlap of beneficial and detrimental interaction in the same infographic—beneficial interaction shows actions like wearing a mask and maintaining social distance, whereas detrimental interaction shows actions like sneezing in public and not wearing a mask. The section also includes a comprehensive overview of results and describes the significant elements that appear in the CDC and WHO COVID-19 infographics, including the similarities and differences between them.

In the introduction of this thesis, I presented three research questions that are the main goals of my study; these are as follows:

- **RQ1.** What specific kind of information is conveyed through the COVID-19 infographics of the CDC and WHO?
- **RQ2.** How is the text and graphic organization in the CDC and WHO infographics similar to and different from each other?
- **RQ3.** What rhetorical strategies do CDC and WHO infographics use to communicate health and risk information to the people?

As stated in the previous section, I used the general inductive coding approach (Thomas, 2003) for my study. These codes emerged directly from a close reading of the infographics, and therefore revealed the tactics used by the CDC and WHO in their COVID-19 infographics. I also calculated the frequency of these codes by considering the number of times they were present or absent from an infographic. In my analysis, the codes fulfill three functions: they help me to understand the creation and distribution of risk messages for the public; they help me identify specific characteristics of these messages; and they form the scaffolding of my rhetorical analysis. Following Aristotle's concept of *topoi*, I considered these codes to be rhetorical strategies that the CDC and WHO implemented in their infographics. *Topoi,* as defined by Aristotle, "are a means of locating and building argument" (Zompetti, 2006, p. 15). Zompetti (2006) builds on this concept of *topoi and* asserts that they "aid in the construction and delivery of arguments," "help us understand and recognize arguments," and "help us uncover deeper meanings in arguments" (p. 15, p. 26). Wilder (2012) further strengthens *topoi* as tools that can be used for rhetorical analysis (p. 19).

3.1. INITIATING ACTION

Titles and text descriptions in the CDC and WHO COVID-19 infographics aim to initiate actions on the part of the readers by using imperative and directive sentence structure—asking the readers to take certain actions to prevent themselves from falling sick or to prevent the spread of the virus. Imperative tone and directive sentences are used when making commands or requests that direct the reader to do or not to do something. 40 out of 55 WHO infographics had the element of initiating action, which is about 73%

of the total WHO COVID-19 infographics observed (see Figure 3.1.). As for the CDC, 49 out of 55 infographics had the element of initiating action, which is about 89% of the total CDC COVID-19 infographics observed (see Figure 3.2.).

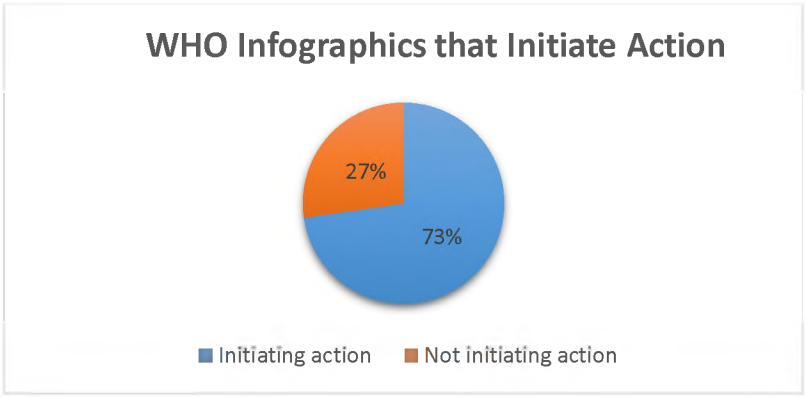

Figure 3.1. WHO infographics that initiate action.

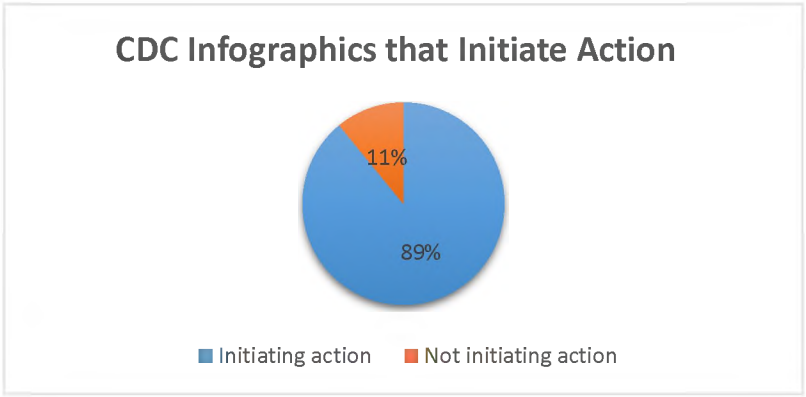

Figure 3.2. CDC infographics that initiate action.

3.2. DIRECT REFERENCES TO COVID-19

Text descriptions and graphics aim to deliver specific, relevant, and important information pertaining to COVID-19, such as prevention measures, how-to information, transmission of the virus, etc. These infographics either name the virus directly, show an

image of it, or include a description of phenomena that are very closely related to COVID-19 (for example, social distancing). 54 out of 55 WHO COVID-19 infographics delivered information pertaining to the virus, which equals to about 98% of the total infographics observed (see Figure 3.3). Whereas 49 out of 55 CDC COVID-19 infographics made direct references to the virus, which is about 89% of the total infographics observed (see Figure 3.4.).

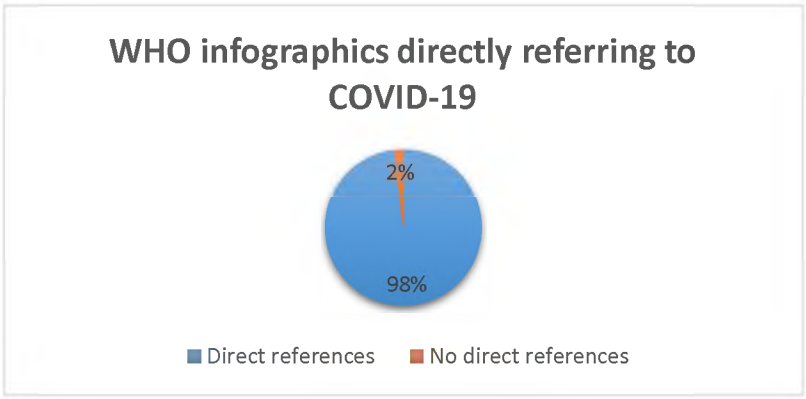

Figure 3.3. WHO infographics directly referring to COVID-19.

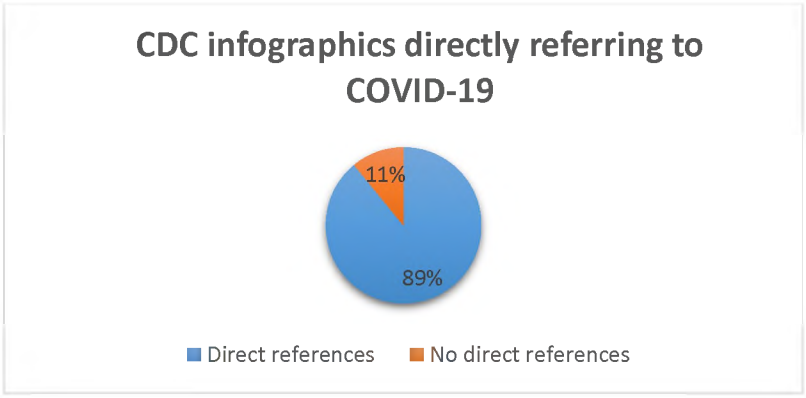

Figure 3.4. CDC infographics directly referring to COVID-19.

3.3. BENEFICIAL INTERACTION (GRAPHICS)

Graphics or visuals that accompany the text in the infographics show that there is some kind of interaction going on either among humans or between humans and objects. Some of these interactions can be categorized as beneficial—like wearing a mask, washing your hands, using sanitizers, and maintaining social distance. 22 out of 55 WHO COVID-19 infographics presented beneficial interaction, which is about 40% of the total infographics observed (see Figure 3.5.). On the other hand, 42 out of 55 CDC COVID-19 infographics presented beneficial interaction, which is about 76% of the total infographics observed (see Figure 3.6.).

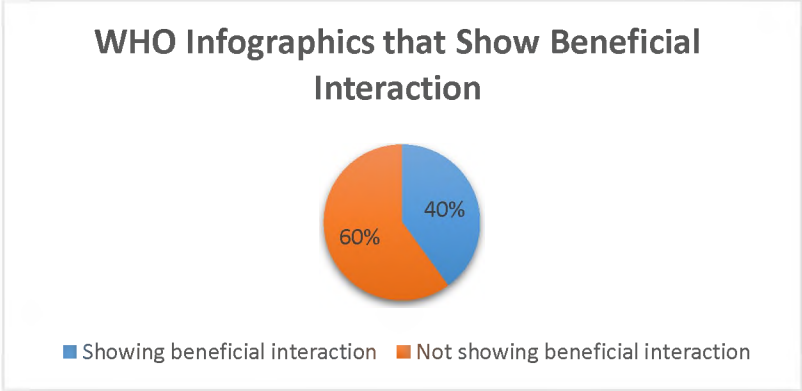

Figure 3.5. WHO infographics showing beneficial interaction.

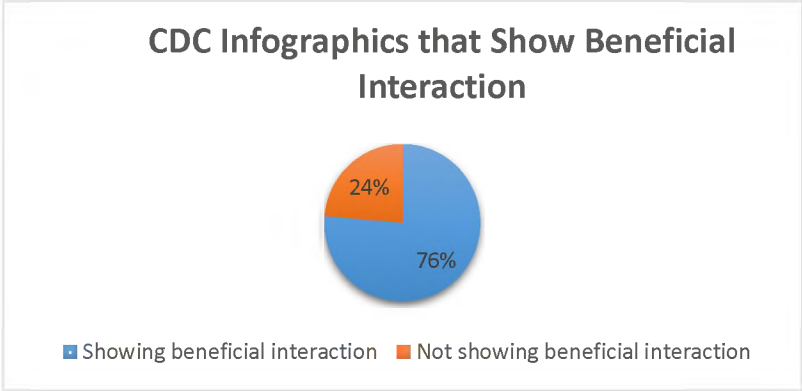

Figure 3.6. CDC infographics showing beneficial interaction.

3.4. DETRIMENTAL INTERACTION (GRAPHICS)

As observed in beneficial interaction above, graphics or visuals that accompany the text in infographics show that there is some kind of interaction going on either among humans or between humans and objects. Some of these interactions can be categorized as detrimental, like depictions of humans touching random surfaces or coming in contact with infected people or objects. For both the CDC and WHO, 12 out of 55 COVID-19 infographics presented detrimental interaction, which equals to about 22% of the total infographics observed from each organization (see Figures 3.7. & 3.8.).

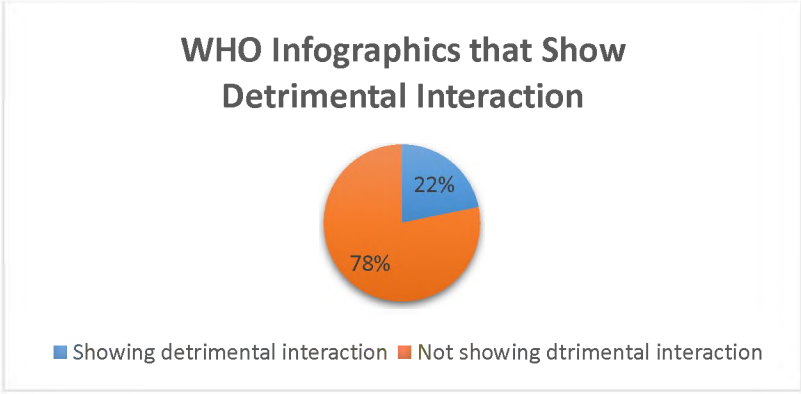

Figure 3.7. WHO infographics showing detrimental interaction.

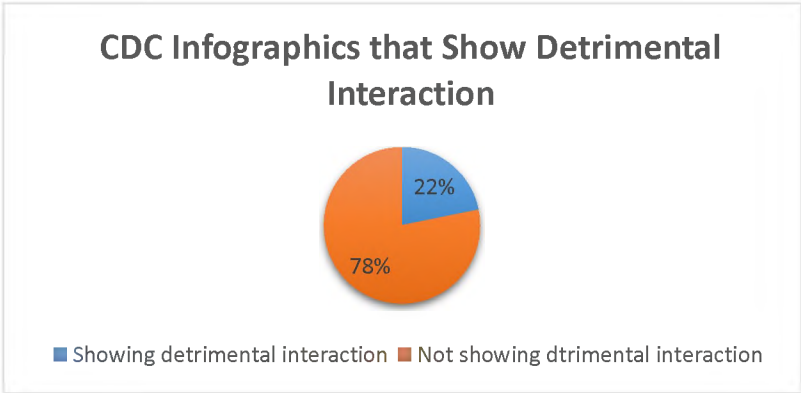

Figure 3.8. CDC infographics showing detrimental interaction.

3.5. INCLUDING NUMERICAL DATA

Text descriptions and graphics sometimes contain numerical data in the form of temperatures, percentages, distances, or time. 18 out of 55 WHO COVID-19 infographics presented numerical data, which equals to about 33% of the total infographics observed (see Figure 3.9). Alternatively, 30 out of 55 CDC COVID-19 infographics included numerical data, which equals to about 55% of the total infographics observed (see Figure 3.10.).

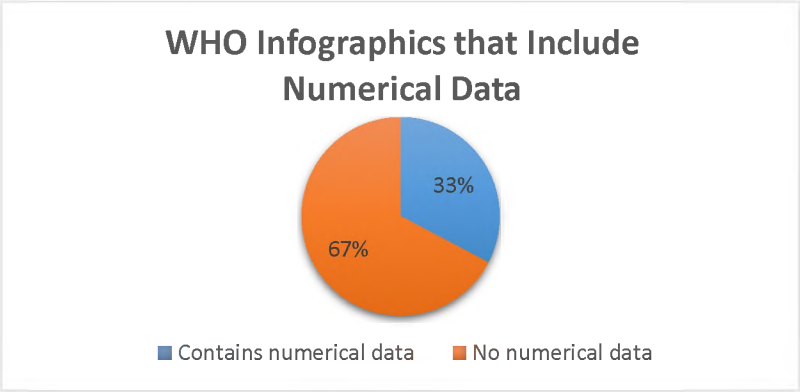

Figure 3.9. WHO infographics including numerical data.

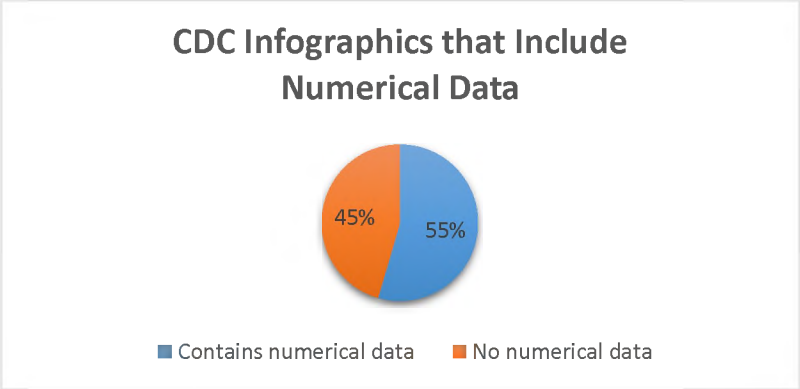

Figure 3.10. CDC infographics including numerical data.

3.6. COMMUNICATING RISK BY REFERRING TO THE VIRUS

Certain infographics consist of text descriptions that indicate the risk pertaining to COVID-19 by including words like *germs, spread of the virus, infection, preventing self and others from the virus*, etc. In the infographics that communicate risk by showing the virus, the graphics represent the virus in the form of shapes or icons. In both cases, a sense of urgency to stay away from the virus or stop the spread of the virus is indicated. 15 out of 55 WHO COVID-19 infographics had virus representations, which equals to about 27% of the total infographics observed (see Figure 3.11.). Likewise, 14 out of 55 CDC COVID-19 infographics had virus representations, which equals to about 25% of the total infographics observed (see Figure 3.12.).

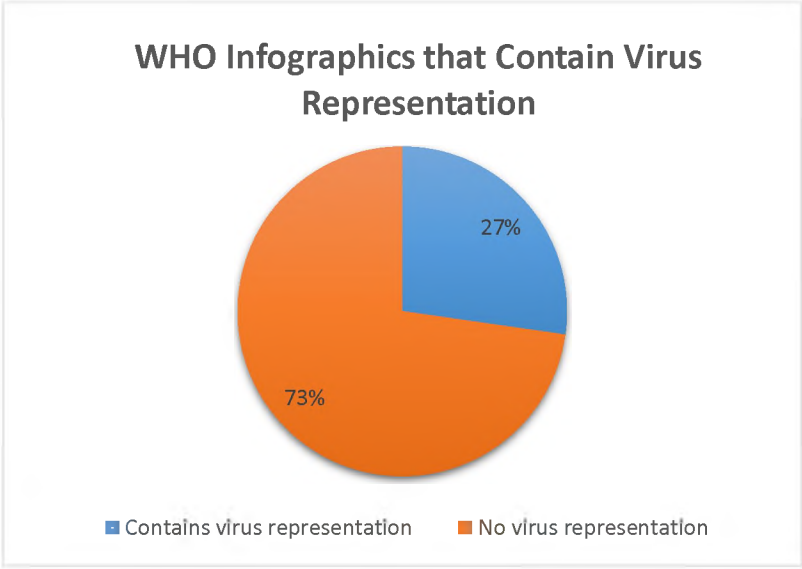

Figure 3.11. WHO infographics containing virus representation.

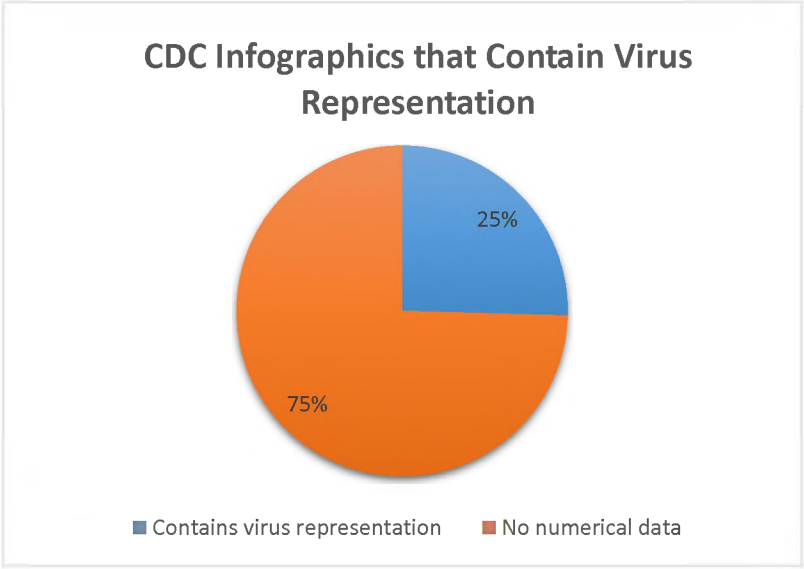

Figure 3.12. CDC infographics containing virus representation.

3.7. STRUCTURE OF THE INFOGRAPHICS

Some infographics are structured or sequenced in the sense that their text-graphic arrangement is consistently repeated and there is direct text-to-graphic association. Other infographics are more abstract, as in their text-to-graphic associations are inconsistent, and there are no direct associations between the text and graphics. 30 out of 55 WHO COVID-19 infographics followed an abstract structure, which equals to about 55% of the total infographics observed (see Figure 3.13.). On the other hand, 16 out of 55 CDC COVID-19 infographics followed an abstract organization, which equals to about 29% of the total infographics observed (see Figure 3.14.).

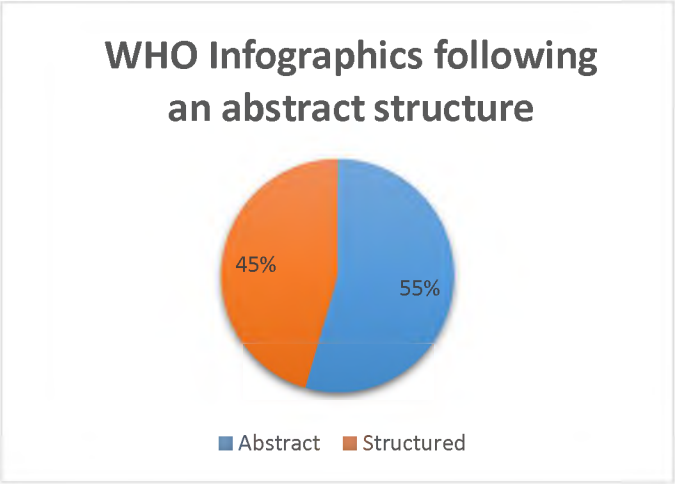

Figure 3.13. WHO infographics following an abstract structure.

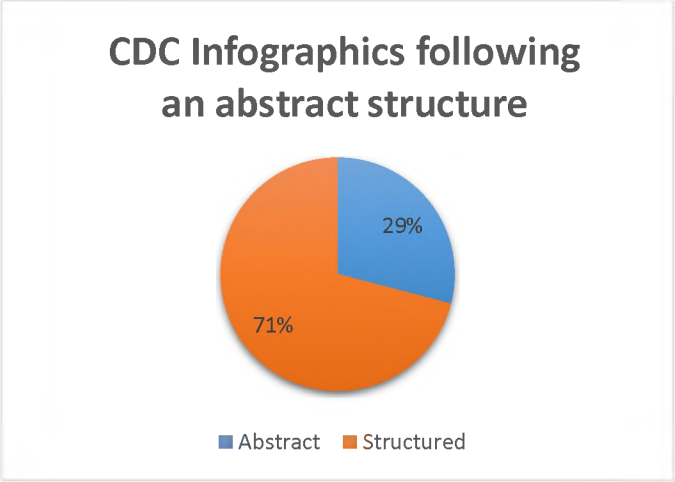

Figure 3.14. CDC infographics following an abstract structure.

3.8. PARTICIPATORY FIGURES

In the data set of my study, 78% (43 out of 55) of the total WHO infographics depicted human figures, whereas 98% (54 out of 55) of the total CDC infographics depicted human figures. Graphic representations of people vary from lighter skin tones to comparatively darker skin tones (indicated by the skin color used in the graphics),

and/or unusually colored skin colors, like purple and green, which are not included in these former categories because they do not portray naturally occurring skin colors.

3.8.1. People with Darker Skin Color. 31 out of 55 WHO COVID-19 infographics had people with darker skin tones as participatory figures, which is about 56% of the total infographics observed (see Figure 3.15.). Contrastingly, 53 out of 55 CDC COVID-19 infographics had people with darker skin tones as participatory figures, which is about 96% of the total infographics observed (see Figure 3.16.).

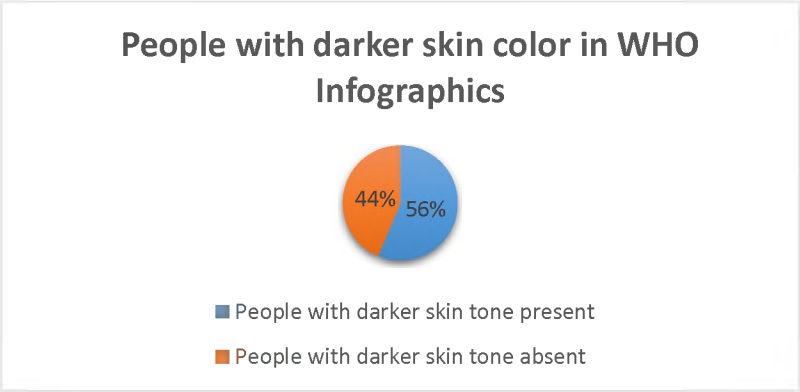

Figure 3.15. WHO infographics including people with color.

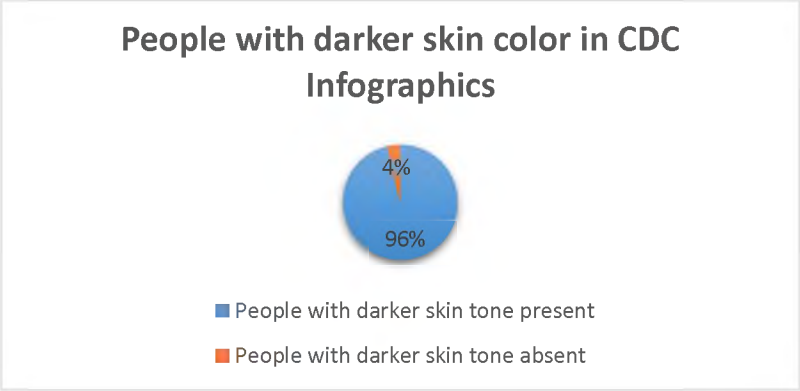

Figure 3.16. CDC infographics including people with color.

3.8.2. People with Unusual Skin Color. 26 out of 55 WHO COVID-19 infographics had people with unusual color as participatory figures, which is about 47% of the total infographics observed (see Figure 3.17.). On the other hand, 9 out of 55 CDC COVID-19 infographics had people with unusual color as participatory figures, which is about 16% of the total infographics observed (see Figure 3.18.).

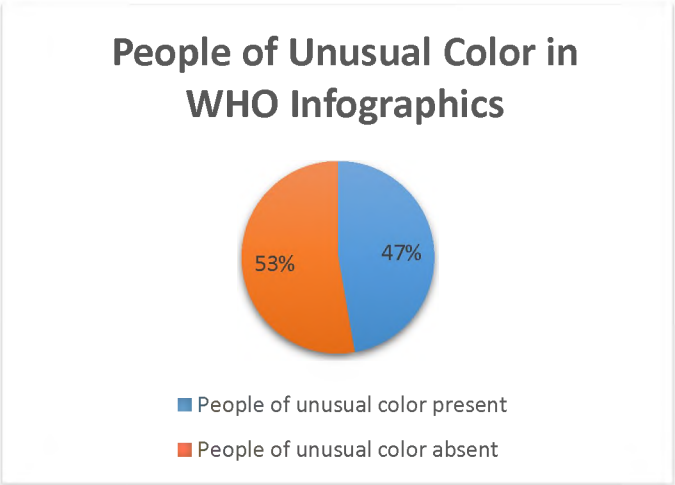

Figure 3.17. WHO infographics including people of unusual color.

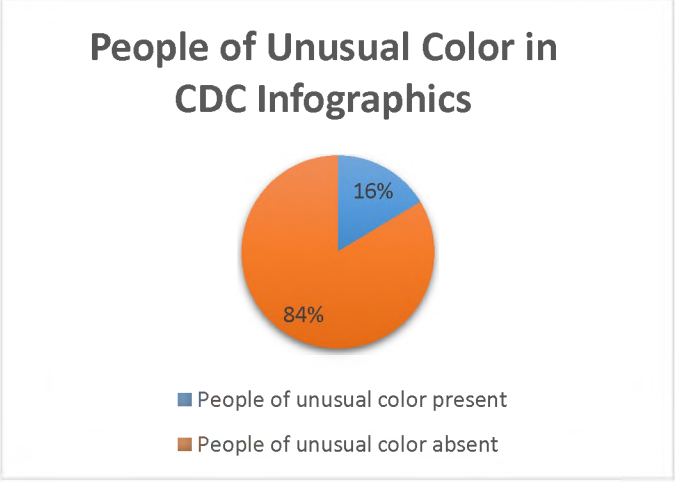

Figure 3.18. CDC infographics including people of unusual color.

3.8.3. People with Lighter Skin Color. 16 out of 55 WHO COVID-19 infographics had people with lighter skin color as participatory figures, which is about 29% of the total infographics observed (see Figure 3.19.). Whereas 27 out of 55 CDC COVID-19 infographics had people with lighter skin color as participatory figures, which is about 49% of the total infographics observed (see Figure 3.20.).

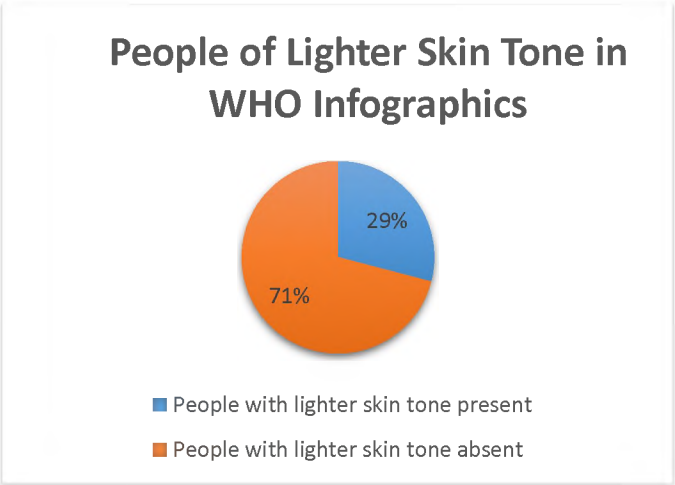

Figure 3.19. WHO infographics including people with lighter skin color.

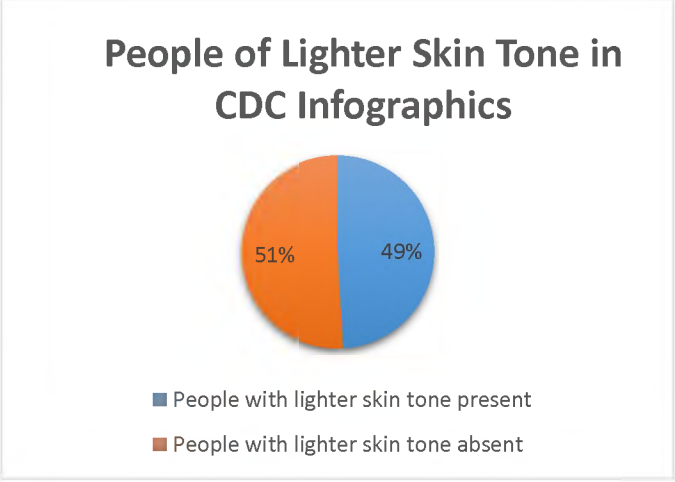

Figure 3.20. CDC infographics including people with lighter skin color.

3.9. INCLUDING AN INTRODUCTORY PARAGRAPH

Some infographics include an introductory chunk of text occurring at the top of the infographics (shorter or longer) that gives an overview of the topic being addressed. 4 out of 55 WHO COVID-19 infographics included introductory text, which equals to about 7% of the total infographics observed (see Figure 3.21.). Furthermore, 10 out of 55 CDC COVID-19 infographics included introductory text, which equals to about 18% of the total infographics observed (see Figure 3.22).

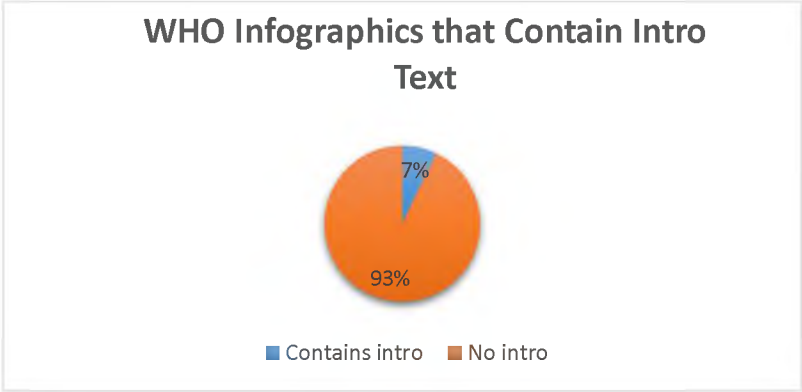

Figure 3.21. WHO infographics containing introductory text.

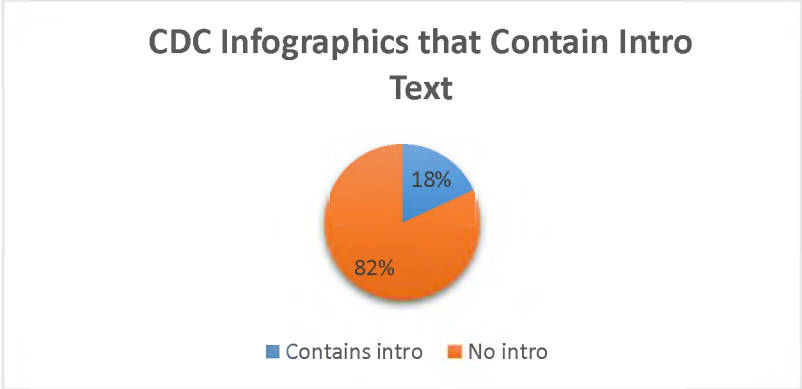

Figure 3.22. CDC infographics containing introductory text.

3.10. DELIVERING GENERAL INFORMATION

In this data set, text descriptions and graphics deliver information on general topics like how to wash your hands, what kinds of masks should or should not be chosen, etc. This is information that can be used with or without the COVID-19 context. 12 out of 55 CDC COVID-19 infographics delivered general information, which equals to about 22% of the total infographics observed (see Figure 3.23.). Following a similar pattern, 13 out of 55 WHO COVID-19 infographics delivered general information, which equals to about 24% of the total infographics observed (Figure 3.24.).

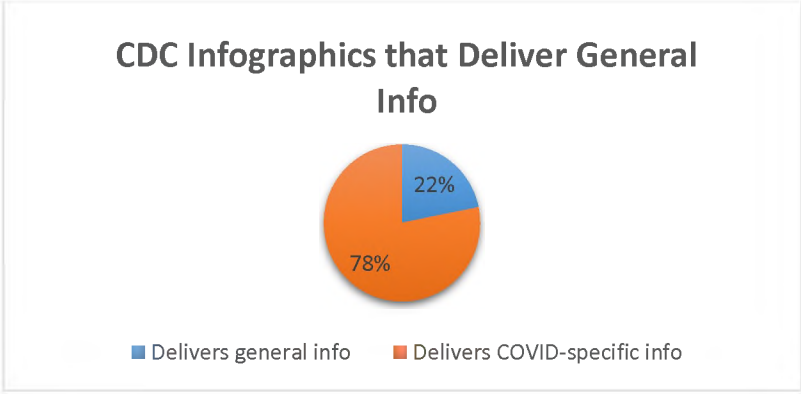

Figure 3.23. CDC infographics delivering general information.

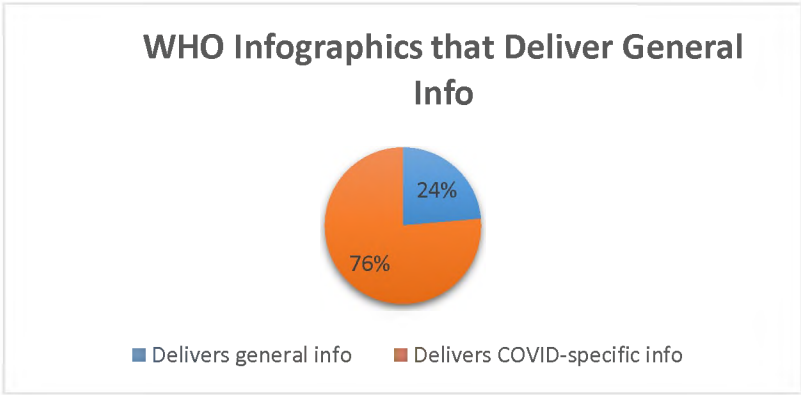

Figure 3.24. WHO infographics delivering general information.

3.11. GRAPHIC REPRESENTATIONS OF SYMPTOMS

Some graphics stand out as specific representations of various COVID-19 symptoms including coughing, sneezing, fever, chills, etc. Both the WHO and CDC COVID-19 infographics had 9 out of 55 graphic representations of symptoms which equals to about 16% of the total infographics observed (see Figures 3.25. & 3.26.).

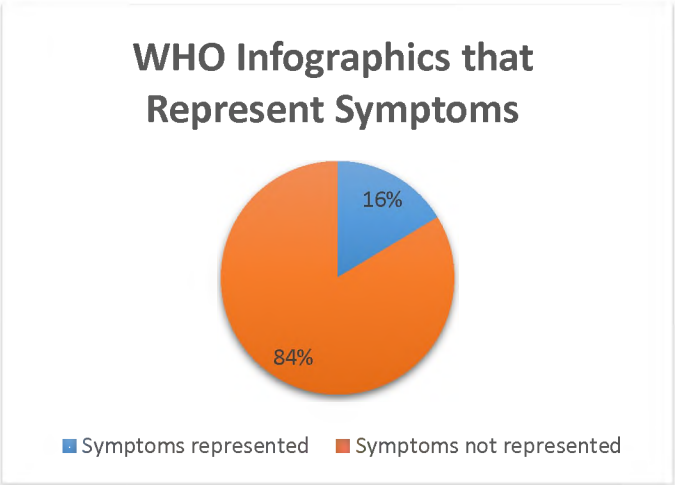

Figure 3.25. WHO infographics representing symptoms.

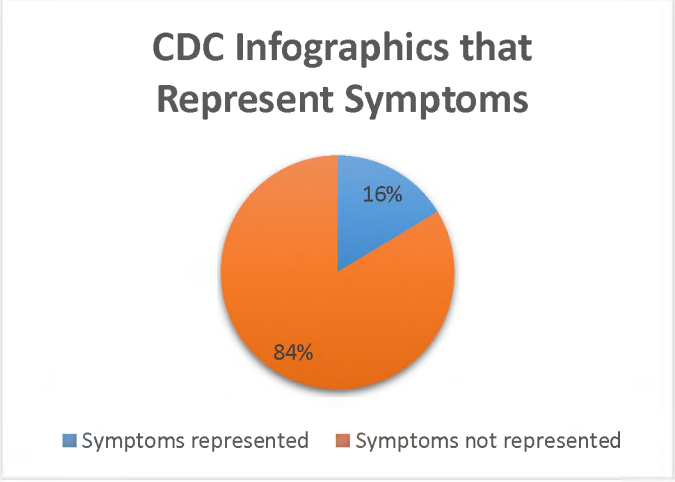

Figure 3.26. CDC infographics representing symptoms.

3.12. COINCIDENCES BETWEEN CODES

In the following sections, I present the coincidences between various codes used in my study. Coincidences are an overlap or co-occurrence of two or more different or contrasting codes that impact the rhetorical construction and delivery of messages. In my study, I have identified two major overlaps that are discussed below.

3.12.1. Beneficial and Detrimental Interaction. In the coding process, two types of interactions were identified: beneficial and detrimental. Coincidence in these codes occurs when both beneficial and detrimental interactions are taking place in the same infographic. In the WHO COVID-19 infographics, we see 7 such occurrences in which both beneficial and detrimental interactions are taking place (see Figure 3.27.). In the CDC COVID-19 infographics, we see 10 such occurrences in which both beneficial and detrimental interactions are taking place (see Figure 3.28.).

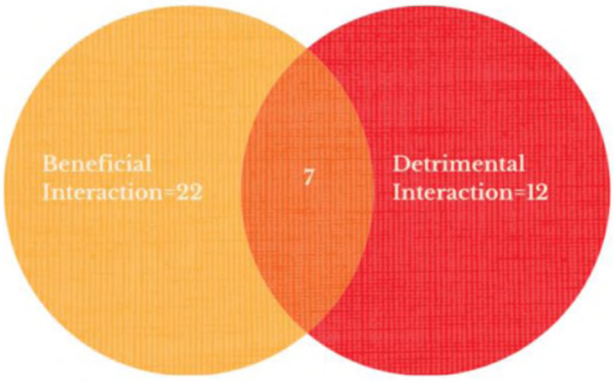

Figure 3.27. Coincidence between beneficial and detrimental interaction in WHO infographics.

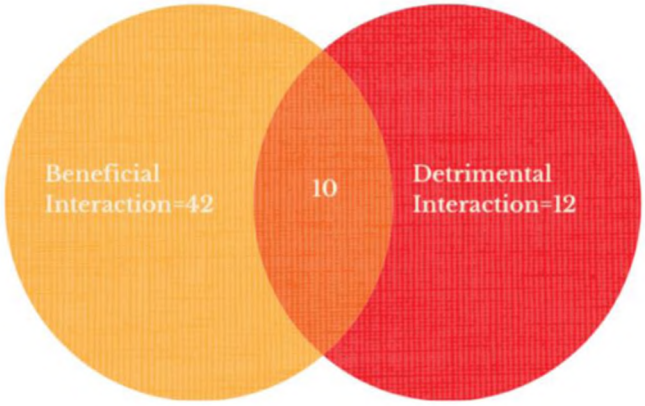

Figure 3.28. Coincidence between beneficial and detrimental interaction in CDC infographics.

3.12.2. Coincidences between Participatory Figures. As mentioned earlier, the graphic representations of people include people with darker skin tones, people with unusual or non-recognizable color, and people with lighter skin tones. There are instances when all three of them appear together, or any two of them appear together. These coincidences are shown in the tables below. For the CDC, the coincidence between (1) people with darker skin color, unusual color, and lighter skin color is observed in 3 out of 55 infographics, (2) people with darker skin color and lighter skin color is seen in 22 out of 55 infographics, and (3) people with darker skin color and unusual color is evident in one infographic (see Table 3.1). As for the WHO, the coincidence between (1) people with darker skin color, unusual color, and lighter skin color is observed in 10 out of 55 infographics, (2) people with darker skin color and lighter skin color is seen in 6 out of 55 infographics, (3) people with darker skin color and unusual color is evident in three infographics, and (4) people with unusual color and lighter skin color is reflected in one infographic (see Table 3.2).

Table 3.1. Coincidences between participatory figures in CDC infographics.

People with darker skin color, unusual color, and lighter skin color	3
People with darker skin color and lighter skin color	22
People with darker skin color and unusual color	1
People with unusual color and lighter skin color	0

Table 3.2. Coincidences between participatory figures in WHO infographics.

People with darker skin color, unusual color, and lighter skin color	10
People with darker skin color and lighter skin color	6
People with darker skin color and unusual color	3
People with unusual color and lighter skin color	1

3.13. ELEMENTS OF SIGNIFICANCE

An overview of the results obtained from counting the incidences and coincidences of codes revealed that a few elements of significance consistently emerged in the CDC and WHO COVID-19 infographics. This prevalence of codes and resultant observations are separately presented for both organizations below, followed by the differences and similarities in the focal elements. A detailed analysis of results is presented in the next section in which I elaborate on themes and rhetorical strategies that these organizations implement in their infographics.

CDC COVID-19 infographics:

3.13.1. Structured Document Design. A large portion of the CDC infographics employ a structured document design in which information is aligned consistently throughout the infographic. These infographics contain lists, points, or other structured layouts that follow a pattern of organization (for instance two-column layouts, numbered lists, or checklists) and contain blocks of text that cover similar types of information.

3.13.2. Detailed Visual Representations. The CDC infographics provide more context in their visual representation of information. Context, here, refers to the depiction of surroundings or environments in which certain actions and interactions between humans or humans and objects are taking place. CDC visuals have very detailed visual elements that clearly inform the reader of the context or settings in which certain phenomena occur.

3.13.3. Beneficial Interaction in Visuals. The CDC infographics not only do a great job at providing detailed context in their visuals but also ensure that positive or beneficial interactions are consistently reinforced in the minds of the audience. Overall, beneficial interactions occur more frequently in the CDC COVID-19 infographics than detrimental interaction does.

3.13.4. Comprehensive Topics. The CDC infographics cover a plethora of topics, most of which are comprehensive in nature. Comprehensive, here, refers to those topics that account for more information and details. Most COVID-19 infographics have longer textual explanations which are paired with relevant visuals—and this kind of an arrangement leads to more informative and longer infographics.

3.13.5. Audience-centric Approach. The CDC infographics that are meant for use in environments where children are the primary audience are designed differently than infographics intended for other environments. These infographics do not contain any numerical annotations, are set on a notebook page, and use more colorful designs and font styles. This is also true of the infographics that are meant to be used by athletes, coaches, campers, or people residing in shelters. Overall, the CDC COVID-19 infographics take a very specific approach when creating infographics for a particular group of people, and this strategy is visible throughout their infographics' documentation.

WHO COVID-19 infographics:

3.13.6. Abstract Document Design. While the CDC has a structured approach to document design, the WHO has a more abstract, relaxed approach to organizing the different elements in an infographic. The WHO infographics use different background colors, font colors, and font sizes, along with following a mostly random arrangement of information in the infographics—the use of different colors and random arrangement provides an informal ambience to their infographics. Such an arrangement also makes more sense for WHO because it is delivering information to people all over the world. Since different cultures have different reading patterns, designing abstract infographics makes it possible for the WHO to meet the needs of a wider range of audience.

3.13.7. Context-centric Approach. The WHO infographics hardly move away from the context of COVID-19 in their infographics. This means that they employ some type of indication that explicates a particular infographic in light of COVID-19. The WHO has done a better job at contextualizing their infographics to COVID-19 by reinforcing certain terms and images that pertain to the coronavirus disease.

3.13.8. Specialized Set of Topics. The WHO has not only done a great job at contextualizing topics to COVID-19 but has also covered a range of special topics that normally are not considered in light of a pandemic. This is evident in their infographics on topics that are relevant to our everyday lives—like doing laundry, buying groceries, and feeling stressed in times of a global pandemic. There are multiple infographics that cover the importance of staying active at home, helping children cope with stress, and being kind to each other in times of a global pandemic. All of these examples manifest that the WHO is aware of its audience's concerns in times of COVID-19.

3.13.9. Using Social Media Trends. Another significant element that emerges in WHO COVID-19 infographics is the use of social media hashtags, like #COVID-19, #StaySafe, etc. This is an important consideration because people rely heavily on social media for information and incorporating such digital elements can draw the reader's attention to the infographic and the information present in it.

3.13.10. Brief Topics. Most of the WHO infographics observed addresses topics that contained shorter textual explanations and brief descriptions. This is not to say that all infographics were brief in nature—some were comprehensive and contained more text than usual—but for the most part, these infographics were quick readings that addressed a single, specific topic. This is in contrast to the comprehensive nature of the CDC COVID-19 infographics.

3.14. DIFFERENT FOCAL ELEMENTS IN THE CDC AND WHO INFOGRAPHICS

The CDC and WHO have different approaches to communicating COVID-19 risk information via infographics to their audiences. The most prominent difference is

document design. As reflected in the results, the CDC takes a formal, structured approach to document design while the WHO takes an informal, abstract approach. Another difference is the contextualization of the visuals—while the CDC has very refined visual setting in the infographics, the WHO visuals focus directly on human figures and their interactions. Another major difference is in the use of social media elements—the WHO includes social media elements that familiarize information for a specific set of audience that relies on platforms like Twitter, Facebook, or Instagram. CDC infographics never make use of such social media elements like hashtags and trends.

3.15. SIMILAR FOCAL ELEMENTS IN THE CDC AND WHO INFOGRAPHICS

Despite of the differences between the rhetorical strategies that the CDC and WHO use in their COVID-19 risk communication, there are some focal elements that are similar to each other. Both organizations use the imperative and directive sentence structure in their communication pertaining to COVID-19, specifically the how-to information, dos and don'ts, and overall approach to coping with the coronavirus. In addition, both the CDC and WHO consistently use a good combination of text and visuals in their COVID-19 infographics. This shows that both organizations are well aware of the strategies they need to employ in risk communication that is intended to be used by a wide range of audiences.

These organizations also use similar elements of emphasis in their infographics; these emphasis elements include moves like bolding, bigger text/graphic size, different font colors, various background colors, capitalization, and other similar elements. Neither the CDC nor WHO extensively include fear-inducing references to the virus, which

means that both organizations believe in delivering factual information that helps the audience overcome the risk of the virus. Their approaches to showing detrimental interactions in infographics also follow a similar pattern—neither the CDC nor the WHO include harmful interactions to a great extent. This indicates that both organizations are trying to inform us that (1) the risk of the virus can be reduced by following certain guidelines, and (2) the risk can be reduced by engaging in more beneficial over detrimental interactions.

In this section, I presented the results of my study in the form of raw data and provided a brief analysis of the elements that were prominent in the CDC and WHO infographics. In the next section, I will offer a thorough analysis of the rhetorical strategies used by these organizations in their COVID-19 communication, why these strategies are important, and how they affect the quality of risk communication in times of a global pandemic.

4. ANALYSIS

In the previous section, I described the results of my study, presented the incidences of code repetition, and highlighted the most prominent elements that occurred in the CDC and WHO COVID-19 infographics. I also established my codes as rhetorical strategies that are implemented by both organizations in their health and risk communication in times of a global pandemic. Primarily, my results show that some of these rhetorical strategies are common to both organizations, while others are used significantly more often by one organization or the other. In this section, I analyze the results derived from my study and report major themes that surfaced from my analysis of the infographics. These themes focus on the use of risk communication strategies to manage panic among the public, the common aspects of risk communication between the CDC and WHO, and the differences in the approach to risk communication of the two organizations. I conclude with the claim that the differences in rhetorical strategies used by the CDC and WHO in their COVID-19 infographics are a result of these organizations' national vs. international audiences.

4.1. RISK COMMUNICATION AND MANAGING PUBLIC ACTIONS

Risk situations pose a demand for official communication channels that not only explain the risk scenario but also provide information that manages public action. The lack of official sources of information during a pandemic leads the public to resort to alternative sources that circulate misinformation ultimately leading to phenomena like panic buying of certain goods and commodities (Ding, 2009). Ding (2009, 2014) has

persistently identified that rumors and poor risk communication lead to panic and panic-induced behaviors. Even during the COVID-19 pandemic, a spike in the buying of storable consumer products—specifically paper-based products (including toilet paper)—was observed in the UK, US, Germany, Italy, France, and Spain (Keane & Neal, 2020). Several news resources (BBC, The Guardian, CBS News) have echoed that the behavior of panic buying was observed among people, especially when COVID-19 was declared a pandemic in March 2020. In order to avoid such fear-induced reactions on part of the people affected by a risk situation, technical communicators must ensure that the public is given the right information at the right time. As technical communicators, our responsibility is to guide the audiences to take steps that lead them to desirable outcomes, as opposed to the adverse outcomes highlighted by Ding (2009) resulting from the lack of an official channel of communication. Therefore, in risk communication, it is essential that accurate information is presented in a way that allows the audience to perceive the risk, comprehend the severity levels, and respond to the risk efficiently without inducing panic. I argue that using infographics for such a delivery of information not only amounts for sufficient information but also does so in an engaging manner—providing the audience with both textual and visual contexts that clarify complex scenarios and preventative measures for them.

The CDC and WHO are cognizant of these expectations, and this awareness is evident in their risk communication efforts for COVID-19. These organizations are the primary sources of official communication for their respective audiences, and hence, their responsibility is to create understandable health and risk messages that are relevant and useful to the public. Both the CDC and WHO have their own guidelines for crisis and

risk communication in which they identify effective strategies for delivering information to the public. This includes acknowledging that the public must trust the source of information and have persistent knowledge of the crisis situation (Reynolds & Seeger, 2014 and WHO, 2018). These guidelines show us that these organizations have reflected in the past on how health and risk communication should be rendered to the public during a pandemic. The following analysis describes the rhetorical strategies that are present in the CDC and WHO COVID-19 infographics, which offers an opportunity for future reflection.

4.2. COMMON STRATEGIES: MANAGING PUBLIC ACTIONS DURING A PANDEMIC

The codes discerned in my study act as rhetorical strategies that help me identify the characteristics of risk messages that are created and distributed by the CDC and WHO through their COVID-19 infographics. An analysis of these codes reveals that there are some common approaches to how these organizations communicate risk and manage public actions. In the following sections, I will describe how the CDC and WHO communicate the risk situation without inducing panic and offer specific guidelines that can help manage public actions. These common codes and their analyses are described below.

4.2.1. Communicating Risk by Directly Referring to the Virus.

Communicating risk by indicating the virus signifies the characterization of the coronavirus in textual and/or visual terms. These references are made either by using the term "COVID-19" or emphasizing the key phrases and pieces of information that are closely related to COVID-19 (like social distancing, wearing masks, or staying home).

The WHO is observed to implement the tactic of making direct references to COVID-19 more often than the CDC. 25% of the total WHO infographics observed communicated risk by directly referring to the virus and 27% of the CDC COVID-19 infographics did so. Both the CDC and WHO communicate risk by indicating the virus to a similar extent which means that these organizations are aware of how to include scary risk information without overwhelming the public.

As noted by Witte (1995), effective risk messages not only describe the threat and associated hazards but also provide solutions that the public can easily implement to overcome the risk. Drawing on textual terms, risk is indicated by the use of words and phrases that directly refer to the coronavirus outbreak; like "fighting against the virus" or "controlling the spread of the virus" or "preventing self and others from being infected." Such phrases cause readers to have negative responses to the information (Angeli, 2012). Similarly, in visual terms, an indication of risk happens by representing COVID-19 as an image or icon—such depictions bring COVID-19 to life (Baecker, Small, & Mander, 1995) by clarifying its look and appearance and reminding us of the risks associated with it. As such, indicating the virus textually or visually emphasizes the urgency of the situation. Using phrases like "protect yourself and others from COVID-19" and "protect yourself and others from getting sick" instills a sense of responsibility among the audience—that they have to perform and avoid certain actions to protect themselves and their loved ones from the virus. Including words like "germs" and "infection" further presses a sense of fear among people, ultimately leading them to take preventative measures. It is important to study these kinds of rhetorical practices used in risk communication because they inform us of the ways in which these large organizations

tackle public communication in times of a crisis. Both the CDC and WHO include fewer virus representations in their COVID-19 infographics. In some instances, the virus representation takes up a large portion of the infographic area to draw attention, and this is especially true of WHO COVID-19 infographics.

Witte also asserts that "[w]hen threatening information about a risk is released all at once, people are overwhelmed emotionally because they feel a lack of control" (p. 251, 1995). Therefore, a balance between releasing fearsome information, preventative measures, and solutions for the public is considered to be an effective strategy to formulate risk messages by Witte. If the audience is constantly attacked by words that mostly have negative connotations (like "battle," "fight," or "threat"), it can worsen the risk situation by increasing panic and making risk communication more difficult. The code of communicating risk by referring to the virus appears comparatively less often than other codes in my study for both the CDC and the WHO, which is noteworthy because these organizations are limiting themselves to only certain kinds of virus indications to suggest the risk severity of COVID-19.

4.2.2. Initiating Action. Initiating action essentially signifies the act of persuasion that motivates the audience to undertake specific tasks or steps in order to prevent themselves and others from a risk situation. In communication pertaining to COVID-19, it is important that the communicators of information incorporate strategies that not only deliver their message but also stimulate the audience to follow the advice. The CDC and WHO have consistently used a style of communication that is informative, authoritative, and directive. This can be observed in the infographics released by both organizations that cover various topics including how-to information, step-by-step

instructions, and day-to-day measures to reduce the spread of COVID-19. The element of initiating action was present in 89% (49 out of 55) of the total CDC COVID-19 infographics observed and 73% (40 out of 55) of the total WHO COVID-19 infographics observed. The use of imperatives is evident throughout their documentation. The imperative sentence structure, for instance, is present in CDC1 where sentences like "Stay home from work and school," "Cover your cough and sneezes," and "Wash your hands often" are consistently included. Initiating action includes information that can be used to mitigate panic among people by providing specific details that help overcome risks.

The number of WHO infographics that initiate action is lower than the CDC. This difference in number exists because the former covers a higher number of informative topics that do not emphasize taking steps; rather, they aim to educate the audience on topics like how the virus spreads, who should seek care, who are the high- and low-risk groups, etc. For both organizations, the ultimate goal is to drive actions that prevent the spread of the virus. The CDC is managing public actions greater than the WHO by implementing the strategy of initiating action more often. An aspect of managing public action is providing the audience with sufficient guidelines and measures that will mitigate the risk situation. By using a sentence structure that aims to motivate the audience to act a certain way, the CDC is more likely to reduce risk behaviors, ultimately managing public action.

4.2.3. Showing More Beneficial than Detrimental Interaction in Graphics. Visuals are an integral part of technical communication because they help depict actions and behaviors that have an emotional impact on the audience. In the context of the CDC

and WHO COVID-19 infographics, these visuals depict protocols like maintaining social distance, wearing masks, covering coughs and sneezes, using sanitizers, disinfecting homes and other spaces, as well as represent symptoms like chills, fever, cold, headache, etc. Scholars from various fields agree that visuals have an emotional impact (Kimball & Hawkins, 2008; Toth, 2013; & Tufte, 2003) that helps increase the comprehension and retention of information (Bursi-Amba, Aline EA, Gaullier, & Santidrian, 2016; & McCrorie, Donnelly, & McGlade, 2016). These scholars also indicate that visual elements—by means of their emotional appeal—have the ability to gain the trust of their audience, therefore rendering the information as real and believable (Toth, 2013). Overall, visuals help enhance the presentation and comprehension of information; sometimes, visuals "can express some ideas *more* clearly than text can" (Cohn, 2020, p.21).

As a technical communication strategy, beneficial interaction signifies the inclusion of such visuals that foster effective behaviors which will help deal with relatively new and distressing circumstances, like a global pandemic. As highlighted by Lipkus (2007), "Graphics and other visual displays (e. g., film, cartoons) are being recommended and used more frequently as adjuncts to numeric and verbal communications of risk" (p. 702) and have the ability to attract and hold the reader's attention. The ability of graphics to grasp the reader's attention points to the fact that COVID-19 infographics, by consistently presenting beneficial interaction through visuals, draw the audience's attention and remind them about actions that will prevent them and others from getting and spreading the virus. Such a depiction of positive actions (or beneficial interaction) can help convey risk-reducing information—primarily those

strategies that the audience can implement in their day-to-day interactions to diminish the threats posed by the virus. This kind of communication not only enables people to accomplish their goals but also ensures their safety in doing so.

The CDC is observed to implement the tactic of showing beneficial interaction more than the WHO in its COVID-19 infographics. The difference in number tells us the way that these organizations are reinforcing positive images keeping in mind the picture superiority effect. Picture superiority effect means that visuals have the ability to be remembered more than words (Coleman, 2010, p. 242). If readers perceive COVID-19 messages with a sense of the importance of beneficial interactions, they are more likely to participate in such interactions and motivate others to do so as well. The fact that CDC depicts beneficial interaction in visuals indicates that it is constantly emphasizing constructive behaviors that will slow down the spread of the virus. Since visuals are more memorable than text and have an emotional impact on the reader, including more beneficial depictions than harmful ones create a stronger connection with positive actions that the audience is more likely to remember and follow.

Considering that visuals leave an emotional effect on the audience, the nature of these visuals—beneficial versus detrimental—is an important consideration when analyzing the rhetorical strategies that the CDC and WHO incorporate in their health and risk communication. As opposed to showing beneficial interaction in infographics pertaining to the COVID-19 outbreak, showing detrimental interaction informs the readers about actions that should *not* be taken in order to prevent the spread of the disease. This includes common visual representations of actions that contribute to the spread of the virus, like sharing the same items with others who are feeling sick, not

keeping safe distance from someone who is experiencing symptoms, not handling a mask appropriately, touching random surfaces, and not covering your coughs and sneezes. Showing detrimental interaction informs the audience about the kinds of actions in which they may be inadvertently participating and must avoid in the future.

As Michie et al. (2020) have indicated in their research, it is important to create mental models in the minds of the audience about how virus contamination functions because that helps understand the "route of transmission" of the virus and how it can be blocked (Finset et al., 2020). Showing detrimental interaction creates such a mental image in the minds of the audience about certain kinds of actions, although extremely common, that act as factors that can adversely affect the public. Detrimental representations, by showing everyday actions that are unfavorable in times of a pandemic, can hopefully change the way the audience participates in risk prevention.

It is interesting to note that both the CDC and WHO have the same number of infographics that show detrimental behavior. What is also important to note is that the number is on the lower side (12 out of 55) for both organizations when compared to other codes identified in my study. This approach again goes in line with the picture superiority effect—the phenomenon in which images are better retained than words. Showing more beneficial interaction than detrimental interaction in visuals constantly prompts the audience to take positive actions. But at the same time, presenting detrimental interaction periodically reminds the audience about tasks they should not participate in so as to prevent themselves and others from the virus. The fact that both the CDC and WHO include limited detrimental interactions in their visuals reflects that these organizations are creating mental models that show how the virus spreads, but they are supporting these

mental models by displaying more beneficial interaction so that the audience feels in control to reduce that spread.

4.2.4. Graphic Representation of Symptoms. Since visual information has such a deep impact on the audiences' perception and interpretation rates, it is important that this information is created and rendered effectively—this means that the visual information should complement the written text as well as explicate it. The advantage of including graphics in communication is that they make information more accessible for people who cannot read or understand a specific language—they can still interpret the message by referring to the visuals—as well as people with different learning habits and aptitudes (Markel & Selber, 2018).

In the context of the CDC and WHO COVID-19 infographics, a depiction of symptoms further simplifies information perception and retention for the audiences. There are certain reflex responses that occur or are performed in a similar manner globally. This includes certain symptoms that are related to COVID-19 like sneezing, coughing, fever, shortness of breath, and fatigue. For a non-English reader, such a representation of symptoms conveys the same information that the text in the infographic does—that if you are experiencing any of these symptoms, you should be careful and visit a healthcare provider soon (see Figure 4.1). Visually representing the symptoms, therefore, renders the content of the infographic accessible to most people. This is an important technical communication strategy because it is our ethical responsibility to ensure that the information is conveyed accurately to as much of our audience as possible.

Figure 4.1. CDC infographic that showcases the symptoms and prompts the reader to visit a healthcare provider.

Both the CDC and WHO implement the tactic of visual representation of symptoms to the same extent. This strategy ensures that information is delivered in a way that is easy for the audience to understand. Generally, a discussion of symptoms occurs alongside other focus areas like wearing masks and social distancing; hence, a visual representation of symptoms was superseded by other visual demonstrations. Although only 16% of the total infographics observed employed the strategy of visually representing the symptoms, the CDC and WHO COVID-19 infographics did not fail to provide understandable descriptions to their audiences. The lower percentage of infographics that contain visual representations of symptoms is because there were very

few infographic topics that talked only about the symptoms that occurred during COVID-19—those that did were supported visually by showing symptoms such as coughing, sneezing, feeling feverish or fatigued—which made it easier to comprehend which physical indicators were signs of COVID-19. Such a representation of symptoms ties back to the notion that visuals have an emotional impact on the audience and hence are more likely to be remembered. By showing symptoms visually, the CDC and WHO are ensuring that symptom-related information is retained longer in the memory and that people have knowledge of the symptoms to be wary of. When people are aware of the physical signs that are common symptoms of COVID-19, they are more likely to see a healthcare provider and get tested, ultimately reducing the spread of infection.

4.2.5. Summary. In the sections above, I highlighted the rhetorical strategies that were common to both the CDC and WHO COVID-19 infographics. The CDC and WHO infographics indicate the urgency of the situation by showing virus representations and detrimental interactions but do so in a way that does not overwhelm or induce panic among the public. They propose problem-solving guidelines and persuade people to follow those guidelines by using directive and imperative sentences. Lastly, these organizations make their infographics accessible by including visuals wherever possible and depicting more beneficial interactions. Overall, their approaches seem appropriate with regards to risk communication because both the CDC and WHO provide sufficient amounts of information in an accessible format that educates the public without inducing fear. In the next section, I will highlight the differences observed in the tactics used by both organizations.

4.3. DIFFERENT STRATEGIES: RISK COMMUNICATION AND TARGETING AUDIENCES

In the previous section, I discussed the common aspects of risk communication that the CDC and WHO implement in their infographics pertaining to COVID-19. Despite the commonalities in rhetorical strategies, there are differences in the incidences of these strategies and how they are incorporated in the infographics. The variation in approach is evident in the way that the CDC and WHO target their audiences. I argue that both organizations are audience-focused, but both of them have unique approaches to their audiences. An audience-centered approach recognizes audience diversity as integral to the creation of successful of health messages and maintains that an understanding of the audience informs and directs the process of health message design (Cho, 2012). Although both organizations take their audiences into consideration when formulating risk information, their approaches to doing so are quite different. A major finding in the previous section was that the CDC designs its infographics for specific groups of people based on their age, occupation, and the environments they inhabit. For instance, this organization has special infographics for people that attend school or college, players and coaches who spend most of their time in the field, people who reside in shelters, campers that spend their time outdoors; and people who participate in recreational activities. There is a clear categorization observed in the CDC COVID-19 infographics that is based on factors like who is using this information and in what context.

On the other hand, the WHO COVID-19 infographics incline more towards answering questions that help the audience perform day-to-day tasks efficiently while dealing with the virus safely. This includes information on how to perform activities like grocery shopping, laundry, currency exchange, and others. carefully in times of COVID-

19. Information pertaining to mental and physical health during a pandemic is also included in their infographics—topics like how to cope with stress, how to help children cope with stress, how to stay active at home, how to be respectful to each other during COVID-19, and how to work from home. The WHO is more interested in ensuring that the audience's questions and concerns are addressed appropriately and accurately. The major difference between the approaches of the CDC and WHO is that the former categorizes information in the infographics based on the audience's context of use, while the latter does so by conforming to the audience's queries and apprehensions about the situation. In the following sections, I will describe how the CDC and WHO, though they have the same communicative goals of managing public action, use different approaches to address their national vs. international audiences.

4.3.1. Structured Versus Abstract Infographics. Structural quality and document design have been studied by various technical communication scholars including Schriver (1989), Moore & Fitz (1993), and Lentz & Maat (2004). Schriver (1989) defines document design as a constructive activity that demands close analysis of the rhetorical situation to produce accurate representations of the communication problem; it is an interdisciplinary inquiry that studies how creators and readers of text read, write, understand, and are motivated by the text (p. 316). Moore and Fitz (1993) focus on the Gestalt theory of design and indicate its usefulness in creating effective textual and graphic designs. Document design first begins with the analysis of the "communicative purposes" (Lentz & Maat, 2004). These communicative purposes can be studied by considering the following four factors: the intended effect of communication, the topic of communication, the target audience, and the organizational goal of

communication (p. 388). In addition, the communicative purpose can also effect a change in the audience's mindset and resultant behavior. These scholars draw on document design as a rhetorical move that affects the way readers interact with the document. Based on this understanding, it is important to consider how information is structured in the COVID-19 infographics created by the CDC and WHO.

Document design is important because it guides the way users read a document. A structured document has a hierarchical flow of information that guides the readers in navigating the document. This flow or directionality of text can be horizontal—left-to-right or vice versa—or vertical, that is, top-to-bottom (Markel & Selber, 2018, p. 249, 253). Readers try comprehending such documents by following the flow or direction that the document presents.

As outlined above, the way that information is presented to an audience can affect their risk perception. Structured versus non-structured designs can also affect the way public perceives the information. Structured document designs follow the design principles like contrast, repetition, alignment, proximity, consistency, and balance. Such designs group information logically into chunks that enhance content retention (Spyridakis & Wenger, 1992) and influence the long-term memorability of a document (Sentell, 2016). Therefore, structured document designs that follow an organizational pattern in text arrangement are considered to be more memorable. They also have a formal aura to them which makes the risk communication appear more official and validated.

A non-structured, or what I consider an abstract document design, does not have a flow or directionality. These documents do not intend for the readers to follow a certain

reading pattern; rather, they just provide all the information needed for the audience (see Figure 4.2). A non-structured or abstract document design gives more control to the reader and conveys an informal and relaxed approach to risk communication. Such an approach can make information transfer more plausible and easier to understand. The WHO implements the tactic of incorporating abstract designs more than the CDC, and such a consideration informs us about these organizations' approaches to organizing information in infographics.

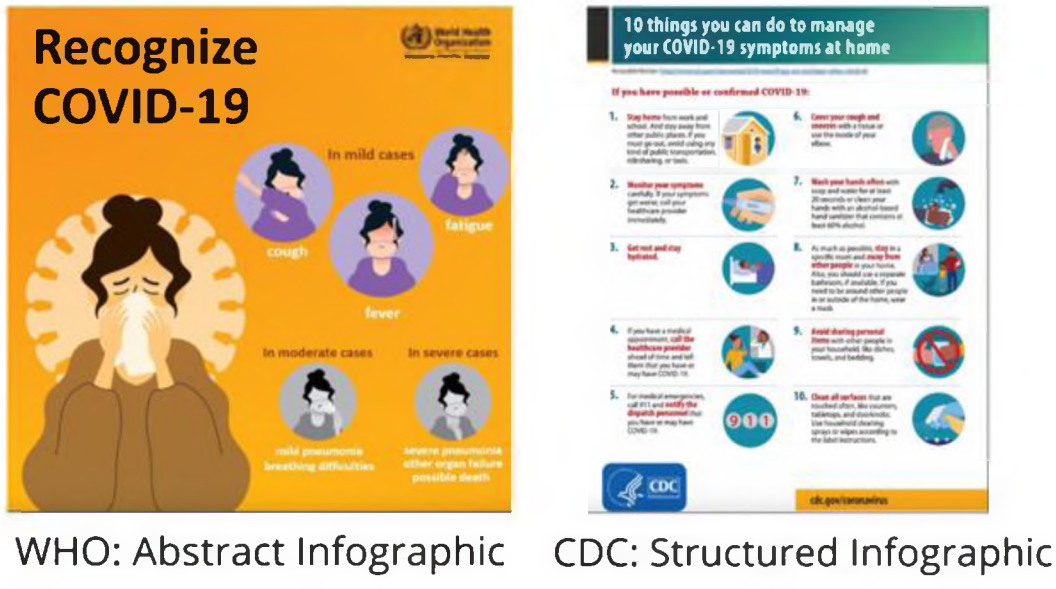

Figure 4.2. Examples demonstrating WHO's abstract design vs. CDC's structured design.

Analyzing the document design of the COVID-19 infographics reflects the communicative goal of the CDC and WHO to provide accurate and sufficient COVID-19 information in a visually engaging manner to their audiences. The WHO, as compared to the CDC, has a wider range of audiences to deliver communication to, as it is operating at

an international level; therefore, we might assume that the WHO is taking an informal approach because (1) they want to cater to the communicative preferences of a wider range of audiences and (2) they want to do so in an informative and informal manner. Such an informal approach can appeal to a wider range of audiences because it does the job of delivering risk information, does so in a way that alleviates the stress caused by information overload, and gives more control over information to the reader—hence reducing panic among people. The CDC, on the other hand, implements a more structured document design in its infographics. As discussed above, structured designs have a better impact on long-term memory and also appear to be more official. The CDC is mainly targeting people residing in the United States, so a vast majority of them have a reading pattern from left-to-right and top-to-bottom. Although English has never been declared the official language of the United States, it is still dominantly spoken in the country (Kaur, 2018). Therefore, a structured document design does not conflict with the way people read and engage with the information.

In addition to the structured versus abstract document design, there is another element in the CDC and WHO infographics that affects the formality or informality of these documents—inclusion of introductory text. Introductions help orient readers to a specific topic or act as an "advance notice" as to what is included further in the document for the readers (Najjar & Swales, 1987). As a technical communication strategy, introductions serve as important tools for situating information in an audience-centric method. They act as primers that inform the audience about what to expect further in the document, and they also help the audience make a choice of whether the presented information is relevant or not.

In the context of the CDC COVID-19 infographics, the introductions primarily explain the importance of beneficial interactions, like cleaning and disinfecting, and provide quick information about how to do it. In one instance, the introduction served as a definition of the terms "quarantine" and "isolation" (COVID-19: Quarantine vs. Isolation, July 2020). In the collected data sample, the CDC incorporates introductory text in 18% of its infographics as compared to the 7% of WHO infographics. This inclusion of introductory text informs us about the method by which these organizations arrange content within their infographics, specifically, their approach to arranging longer topics that need more clarity and readability. The CDC has more comprehensive information in some of its infographics than the WHO; therefore, there is a greater need for an introduction that quickly explains the topic.

As for the WHO COVID-19 infographics, similar characteristics are present in the introductory text, including explaining the importance of participating in beneficial interactions and how to do so. The introductions for WHO infographics are comparatively shorter in length than CDC, but their length varies with the topic being addressed. Most WHO infographics present brief information, and hence do not require an introduction. This again reiterates the fact that WHO takes a more informal approach to their infographics' documentation. In the context of my study, an informal approach is one where information is presented abstractly; meaning, it does not follow the design principles consistently and gives the readers more freedom to grasp information the way they prefer. Most of the WHO infographics in my sample were concise—and in some instances only contained short phrases and words—and therefore did not require an introduction that would overview the forthcoming information. Introductory text at the

beginning of an infographic acts as a marker of the flow of information contained within the infographic and affects the order in which this information will be read by the audience. By including introductory text more often, the CDC is establishing a reading pattern for its audience—that the reader must ideally begin at the introduction and then move forward. Such an assignment of the reading flow is another characteristic that makes the CDC infographics more structured than the WHO.

4.3.2. Including Numerical Information in the Infographics. In the CDC and WHO COVID-19 infographics, there are numerical annotations to percentages, distance, time, and temperatures—these are included both textually and visually. Numerical annotations were present in 55% of the total CDC infographics and 18% of the total WHO infographics observed—a marked difference.

As risk communication involves the delivery of accurate and genuine information, it also demands the need to include quantifiable items that render the information as believable and backed in logic. Numerical data may better convey detailed information about the precise aspects of a risk situation; such numerical presentations also improve risk perception, hence leading to better decision-making (Trevena et al., 2013). As Lipkus (2007) outlines, numerical values have certain appealing qualities that lead to better risk perception—numbers are precise and accurate; "convey an aura of scientific credibility"; "can be converted from one metric to another"; and "can be verified for accuracy" (p. 699). Some people also just prefer seeing numerical annotations because they have either received mathematical training or use numbers frequently in their professional lives (Lipkus, 2007, p. 699).

The CDC is observed to implement the tactic of including numerical data in 55% of its infographics as compared to the 33% of the WHO infographics, and this is important to note because it shows that the CDC takes a more data-driven approach to delivering information by consistently including numbers and values that facilitate the understanding of the risk. The CDC includes numbers more often than the WHO, hence rendering the information to be more exact and transparent to its audience. Such a precision in numerical information helps the public with risk perception and decision making which ultimately leads to more informed behaviors and less panic.

On the other hand, the WHO is evidently including more texts and visuals to impart risk information to a wider range of audiences because using numbers to communicate risk information might pose a difficulty for some readers and "may convey an unwarranted sense of precision" (Gurmankin, Baron, & Armstrong, 2004). The lack of sensitivity of numbers to express "gut-level reactions and intuitions" and people's levels of numeracy are potential weaknesses of using numbers (Lipkus, 2007, p. 699). An important thing to consider, though, in CDC infographics is that they do not include any numerical data in infographics that are designed to be used in schools or targeting other spaces that mostly involve kids. An implication to keep in mind with regard to childhood numeracy is the aspect of "variability"; that is, "Individual children vary in their performance across different numerical tasks" (Sophian, 2009, p. 3). Including numerical information without knowing the level of comfort that children have with numbers can add to the cognitive load of information; therefore, CDC's visual approach to communicating with children is appropriate.

These numerical presentations are in no way complex and difficult to comprehend, but they provide the audience with specific numerical figures that highlight precise features of the risk situation (Trevena et. al, 2013) and lead to better risk perceptions and resulting actions (Lipkus, 2007). For instance, specifically mentioning that 6 feet of social distance must be maintained gives the audience an idea that they should remain at least two arms apart (see Figure 4.3) when in queues or in large public areas. These quantities further clarify the information for the audience, ultimately helping them to effectively overcome the risk situation.

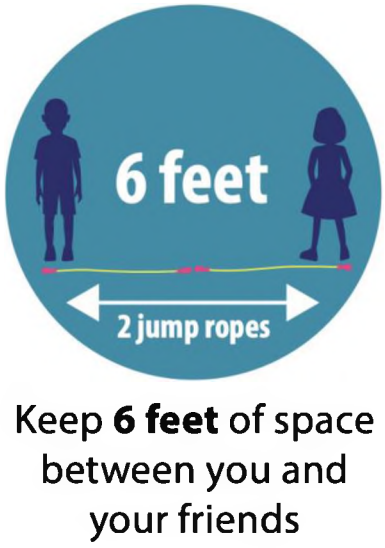

Figure 4.3. Numerical annotations shown in CDC and WHO infographics.

4.3.3. Differences in Visual Representations. A significant visual rhetoric strategy, observed especially in the CDC infographics, is providing detailed visual representations that contextualize the interaction between human figures as well as other objects. This is done such that the visuals clearly depict where these interactions are

occurring (at home, in public, at a health center, in a shelter, etc.) and who or what is involved in these interactions (humans, objects, or both). These visual representations help the reader imagine the entire context of the presented information and, thus, increase the likelihood that people will remember it.

The visual representations in the infographics are descriptive enough for the audience to understand where, when, and how certain measures should be taken in order to reduce the spread of COVID-19. For instance, certain infographics depict the steps that should be taken to stop the spread of the virus, and this textual data is supported by visuals that display public environments in which masks are appropriately worn and six feet distance is maintained. These visuals are set in certain spaces like public transport, shelters, or home, and this delineation of the surroundings is explicitly done by the CDC. As for the WHO, the main visual focus is the human figures or objects present in the infographic with less focus on the context in which these humans or objects are present. This difference is a result of the CDC and WHO operating at different levels and addressing different audiences. For the CDC, these surroundings are easier to identify and portray because its infographics are primarily for people residing in the US; for them, most public areas and other environments look similar and relatable. The WHO is preparing its infographics for the worldwide audience; therefore, a delineation of surroundings is very difficult because each country looks and operates differently—hence, the focus shifts to human figures and objects instead. From this analysis, it can be said that the CDC has contextualized its visuals more clearly and explicitly than the WHO, and that these visual representations clarify the type of care that should be taken in personal and public environments (see Figures 4.4 & 4.5).

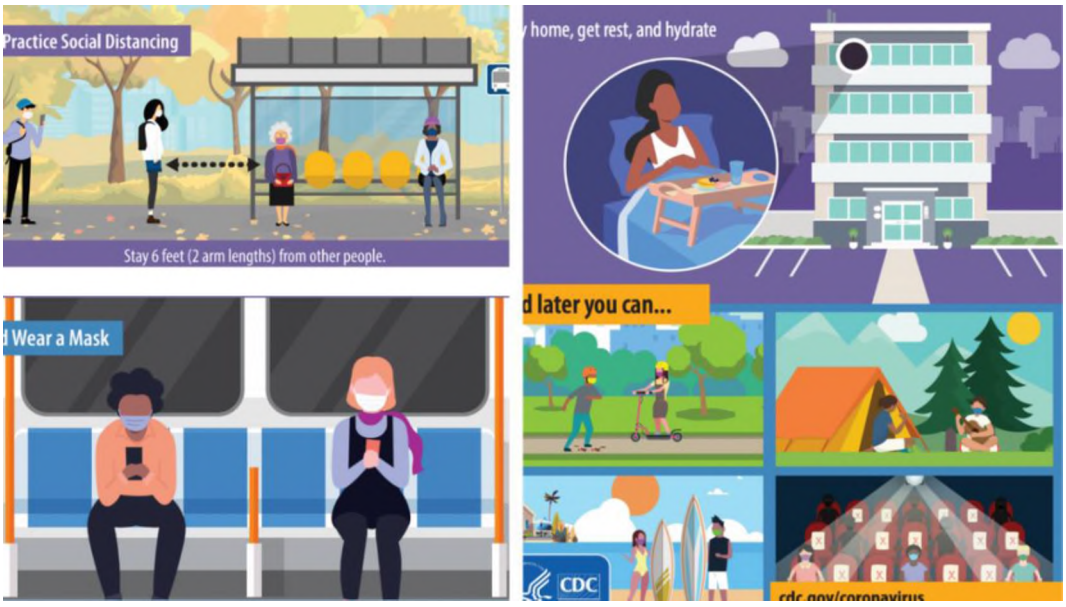

Figure 4.4. CDC infographics that depict the details in the surroundings.

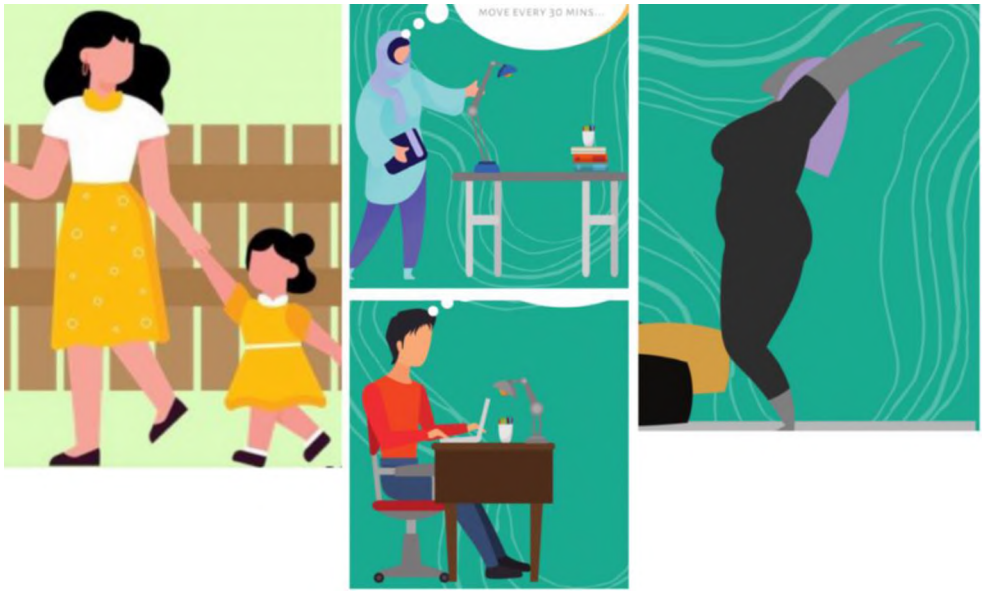

Figure 4.5. WHO infographics that focus on humans and objects.

4.3.4. Summary. In the sections above, I discuss the differences between the strategies implemented by the CDC and WHO in their COVD-19 infographics. Both

organizations approach elements of document design, inclusion of numerical information, and addressing the audience's communication needs differently. In addition, the CDC and WHO have distinct tactics to contextualize their infographics to COVID-19, both textually and visually. In the next section, I highlight a major factor that leads to these differences in rhetorical strategies—national vs. international audiences.

4.4. THE MAJOR FACTOR: NATIONAL VS. INTERNATIONAL AUDIENCE

Both the CDC and WHO are taking an audience-focused path to communication, but it is executed uniquely. While the CDC segregates information based on factors like age, occupation, and environment, the WHO delves into providing information needed by its audience in their everyday lives. A segregation of audiences based on their biography would be a huge endeavor for the WHO to achieve because it is focused on a worldwide audience. Therefore, the fact that the WHO and CDC operate on national vs. international levels has an impact on the magnitude at which these rhetorical strategies are implemented.

The factor that really differentiates the rhetorical strategies seen in the COVID-19 infographics by the CDC and WHO is their audiences. Both organizations serve to fulfill the communication needs of slightly different audiences: the CDC focuses on the American population whereas the WHO on worldwide population. With this distinction comes a unique approach to elements including the following: (1) topics covered in the infographics; (2) composition of the infographics (structured vs. abstract); (3) focal points in the contextualization of visuals; and (4) overall approach to audience-centered communication.

The difference in the kind of topics included directly affects the strategy of initiating action implemented by both organizations. This difference in the initiating action strategy is because certain topics do not call for the use of imperative and directive sentence structure as they are more focused on educating the reader. In the WHO infographics, more informational topics were observed that answered the questions for the public, making its risk communication approach less directive and more educative. This difference in the types of topics covered also affects the length of the infographics—most WHO infographics in my data set are brief in nature as compared to the more comprehensive CDC infographics.

Similarly, a difference in audience also affects the way that the CDC and WHO organize the texts and visuals on their infographics. The CDC follows design principles consistently and hence has a more structured approach to organizing information within the infographic. On the other hand, the WHO creates its infographics for a worldwide audience and has a more abstract text to visual arrangement. This is because people accessing WHO infographics in English do not necessarily follow the same reading pattern (left-to-right); they might be from geographical areas that have a different directionality when it comes to reading. Therefore, an abstract design just makes more sense because it gives readers the authority to follow their own reading patterns.

This audience-based difference is also observed in codes that emphasize the visuals within the infographics. These codes include beneficial interaction, detrimental interaction, symptom representation, and virus indication. Based on these codes, one of my major analyses is the contrast between the contextualization of visuals present in the CDC and WHO COVID-19 infographics. The CDC has very elaborately and clearly

represented the environments in which certain actions and interactions are taking place because it is delivering information to a U.S. audience that is familiar to these environments or contexts. The WHO does not have the ability to contextualize these surroundings because they are not the same everywhere; hence, the focus is diverted towards human figures, objects, and their interactions.

In this section, I provide an analysis of the similarities and differences in the rhetorical strategies implemented by the CDC and WHO in their COVID-19 communication efforts through infographics. By drawing on Ding's (2009) research, I also assert that these organizations are aware of the adverse outcomes that a lack of communication channel during emergency situations can lead to. My overall analysis informs that both organizations are shaping their communication strategies keeping in mind the communication needs of their audiences. The CDC and WHO use similar tactics in their COVID-19 risk communication but to different degrees. In the next section, I will discuss the importance and applications of my study and suggest some areas for further investigation.

5. CONCLUSION

The COVID-19 outbreak has impacted lives globally, and with every massive outbreak comes the need to educate the public about virus transmission and preventative measures that reduce risk (Cheek, 2019). It is the ethical duty of technical communicators to ensure that risk information, especially during a global crisis, is made accessible to a wide range of audiences. Cheek argues that "[technical] communicators are uniquely suited to help organizations mediate disease discourse to prevent unduly increasing anxiety and inducing public panic during an outbreak" (2019, p. 5). Utilizing an inappropriate tone in risk communication can induce fear among people, which can mislead them to panic-induced behaviors like panic buying and even racism. Acts of racism towards Asians were specifically observed during the COVID-19 pandemic when expressions like "Chinese virus" and "kung flu" were used to refer to the virus (Kambhampaty & Sakaguchi, 2020). Four-in-ten U.S. adults have reported facing racist or racially insensitive views about Asians after the COVID-19 outbreak (Ruiz et al., 2020). Therefore, health and risk communication should be articulated in ways that serve to mitigate fear, panic, and racist ideas in the public.

Infographics are digital tools that have the ability to convey information in a crisp format that combines texts and visuals to impart a well-rounded understanding of a specialized topic. The goal of my study was to move beyond this definition, to think about the role of infographics in the context of health and risk communication during a pandemic, and to focus on the rhetorical elements that constitute the creation of

infographics by major health organizations. Through my study, I answered the following research questions:

RQ1. What specific kind of information is conveyed through the COVID-19 infographics of the CDC and WHO?

- The CDC and WHO infographics include how-to information, dos and don'ts, step-by-step guidelines, checklists, and general informational topics on COVID-19 that aim to educate people.

RQ2. How is the text and graphic organization in the CDC and WHO infographics similar to and different from each other?

- The CDC infographics have a structured text and graphic organization that establishes a reading pattern for readers, whereas the WHO follows an abstract design structure that gives the audience more freedom to explore the infographic.

RQ3. What rhetorical strategies do CDC and WHO infographics use to communicate health and risk information to the people?

- Both the CDC and WHO implement the following rhetorical strategies:
    - Using visuals to make information understandable
    - Using imperatives whenever the aim is to initiate action
    - Avoiding frightening references and focusing on helpful information
    - Using document design according to the reading patterns of the audience

An understanding of the rhetorical strategies used by the CDC and WHO in their COVID-19 infographics could familiarize information designers with the approaches that these health organizations take in creating and disseminating health and risk information. Such an understanding also provides scholars and practitioners with the opportunity to

reflect on which rhetorical strategies have been effective versus which need further examination.

5.1. THE IMPORTANCE OF RISK INFORMATION

Information, as defined by Potts (2013), "is validated data" (p. 24). According to her definition, content goes through three phases to become "data," "information," and finally "knowledge." In the information phase, data becomes validated in that it starts making associations with other pieces of data to become "richer, useful, and contextualized content" (p. 24). In the context of my study, information corresponds with the concept of *information-as-knowledge* (Buckland, 1991), which is defined as the knowledge concerning a specific fact or subject as well as the "the notion of information as that which reduces uncertainty" (p. 351).

As a technical communication strategy, delivering information signifies the need to transfer information from experts to non-experts in usable and accessible formats. Delivering accurate, real, verifiable, and useful information is the most important goal of technical communication. Risks that are relatively new to the public "include low familiarity, are seen as unnatural and exotic, and create high levels of uncertainty" (Reynolds & Seeger, 2005, p. 44). Hence, risk communication during such times must be "accurate, credible, timely, and reassuring" (p. 45). Risk information should not only reduce uncertainly but also help the public get accustomed to a relatively new situation. In addition, it should also educate and inform the public, encourage risk reduction behavior, and provide necessary warnings and emergency information (Ng & Hamby,

1997). Information in this context, then, should be clear and concise and must cater to the purpose of communication.

In times of a global pandemic, information designers need to address the communication needs of a wide range of local and international audiences. As St.Amant (2015) has identified, global communication of health and risk information "requires creating visuals that effectively convey health and medical information to diverse audiences" (p. 38). Studying the rhetorical tactics used in COVID-19 infographics revealed that the CDC and WHO include visuals that depict information with clarity, make information accessible to the audience, and complement the textual information.

In the risk communication pertaining to COVID-19, the main purpose is to deliver specific and correct information to the public—this information must come from a credible source, be updated regularly, and serve to reduce panic among the audience. Although I emphasized the features that scholars (Ng & Hamby, 1997; Reynolds & Seeger, 2005; St.Amant, 2015) have highlighted for effective risk communication, I have intentionally overlooked the idea of best practices in infographics and, therefore, have no universal recommendations to improve the way infographics are created. These scholars have taken a more prescriptive approach, in that they have provided communicators with an approach to creating information in times of a heath and/or risk emergency. In my study, I have taken a more descriptive approach in which I seek to understand the constituent elements of the COVID-19 infographics, analyze the similarities and differences, and offer a description that can be used as a resource for risk communication. The purpose of content analysis is to analytically examine the content and characteristics of a document, here, the CDC and WHO COVID-19 infographics (Vaismoradi et al.,

2013). The descriptive approach allowed me to focus on the content of these infographics—the text and visuals—without setting any predefined expectations from them.

The concept of best practices is both subjective and situational; hence, it is not always possible to deem an item (here, infographics) to be following best practices. Rather, my research questions focused on the kind of information included in the CDC and WHO COVID-19 infographics, the differences in their formats, and the rhetorical strategies that drove the creation process of these infographics. COVID-19 is a relatively new scenario which is widespread and calls for local and international communication strategies. My study is an exploratory work in an area where not much is known yet, and hence the descriptive content analysis method is well-suited (Vaismoradi et. al, 2013, p. 400). The uniqueness and newness of COVID-19 requires an investigation into the current communication strategies before deciding if these strategies are best or otherwise. Hence, my analysis of the CDC and WHO COVID-19 infographics acts as a contribution to a repository that studies knowledge construction in infographics during a pervasive crisis situation. My study demonstrates that the COVID-19 infographics include a variety of subjects that are presented as how-to information, step-by-step guidelines, checklists, dos and don'ts, and general informational topics. My study also establishes that these infographics have different formats—the CDC infographics are structured, and the WHO infographics are abstract. Lastly, my study reveals the rhetorical strategies in use and how they were implemented by both organizations in their COVID-19 infographics.

Having knowledge of how the CDC and WHO construct their infographics can help point and fill the gaps in communication. Insights on the kind of information

included in the CDC and WHO COVID-19 infographics, their structured vs. abstract format, and most importantly, their rhetorical strategies can inform technical communicators about how national vs. international audiences impact the way communication efforts are structured. The more we know about these audience-centered approaches and the differences that affect the formulation of risk communication, the better positioned our future responses to such situations can be.

This study provides a holistic view of what steps are taken by health organizations towards risk communication for an intercultural audience in times of a global crisis, and this view is especially relevant for the field of technical communication. Technical communicators are tasked with effectively solving modern communication problems by: (1) presenting accurate, easy-to-follow information to the audience; (2) conveying the risk situation and its severity levels appropriately; and (3) ensuring that the communication occurs ethically and responsibly. A study of how these big organizations meet the communication requirements of a wide range of audiences helps us understand and improve the way in which communication messages are formulated and distributed. My study lays groundwork for future researchers who are interested in exploring the effectiveness of the strategies implemented in infographics. Although this study specifically focuses on a disease outbreak, its results are not limited and can be applied to any crisis situation that poses the need for urgent and efficient public communication.

A comparative analysis of the CDC and WHO COVID-19 infographics uncover the rhetorical strategies that both organizations implemented in their health and risk communication. The analysis also informed that certain differences in strategies existed because both organizations—despite having the same communicative goal of educating

the public about COVID-19—addressed a different set of audiences. The sections below present the limitations and future scope of my study.

5.2. LIMITATIONS OF THE STUDY

Although this study discusses how certain rhetorical strategies are used that can help reduce panic, it does not directly test these COVID-19 infographics for panic reduction or overall effectiveness. My study outlines the role of certain rhetorical strategies that can be tested further by including user participation methods like surveys, questionnaires, and interviews. Results from using user participation methods will give insights on the comprehension and retention of the information conveyed through infographics. It would also be interesting to see what effects these approaches to risk communication have on panic reduction. In addition, it is important to note that there are likely other rhetorical (and non-rhetorical) strategies used in these infographics that were outside the scope of my current analysis. This study is also limited to a set of 55 infographics from each organization; therefore, it does not intend to comprehend the overall approach that the CDC and WHO take in their risk communication.

5.3. FUTURE AREAS FOR RESEARCH

My comparative analysis reveals that the CDC and WHO addressed their intercultural audiences by including participatory figures that resembled people with both lighter and darker skin tones. One concern observed during the analysis of the participatory figures in the COVID-19 infographics was the over-inclusion of people with darker skin tones as compared to those with lighter skin tones. As stated by Abraham and

Appiah (2006) in their article, "images can be used implicitly and subtly to proposition meanings that go beyond simply the information contained in the text in multi-modal modes of presentation" (p. 185). Abraham and Appiah also position that presenting visual and verbal/textual information together can lead to a potential merger or interplay of both channels, resulting in the creation of meanings that go beyond the intention of the message. Therefore, despite the text in these COVID-19 infographics being completely neutral and not directed to any specific group of people, the fact that people with darker skin tone are included more extensively than people with lighter skin tone might imply that COVID-19 infects darker skin colored people more or that people with darker skin tones need this information more than people with lighter skin tones. People with darker skin tones have been disproportionately affected by the virus because of societal, economical, and cultural factors that expose them to higher risk (Ali et al., 2020). Such an incorporation of skin color can lead to miscommunication of information and a consequent construction of racial prejudice. This identification of color was solely based on the skin and/or body colors presented in these infographics. An example of a person of lighter skin color vs. darker skin color is presented below (see Figure 5.1). I understand and believe that this approach to identifying and categorizing participatory figures is not appropriate and needs a more streamlined process that identifies and segregates skin colors into specific social groups. In addition, my perception of skin colors can be influenced by how I, as a person of West Indian origin, identify myself as compared to people of different skin colors. But overall, I sustain that skin color is an important factor to consider in these infographics because visual imagery presented in mass-circulated artifacts (online or offline) can lead to the formation of racial stereotypes.

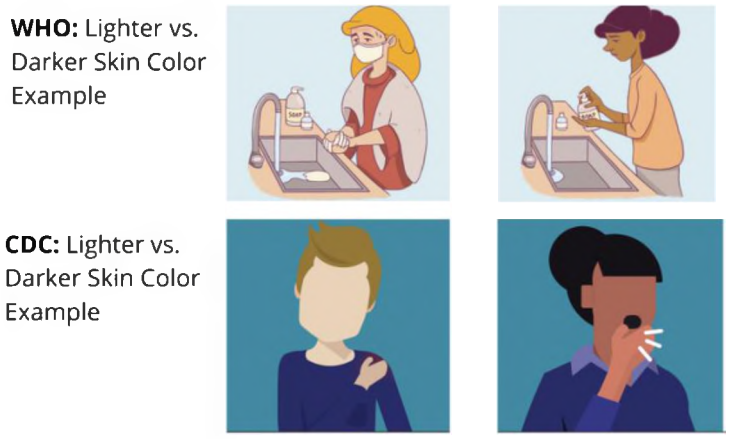

Figure 5.1. Lighter vs. darker skin tones observed in the COVID-19 infographics.

Research in comic studies (Abraham & Appiah, 2006; Facciani, Vendemia, & Warren, 2016; Glascock & Preston-Schreck, 2004) has reiterated that media representations of people of darker skin tone have had inherent social implications on how people with lighter skin tone perceive them. The contrary is observed the COVID-19 infographics because it includes people with darker skin tones in prominence. This over-inclusion may stem from two reasons: (a) a lack of understanding of how much is too much, and (b) an attempt on part of the CDC and WHO to foster inclusion rather than the exclusion observed in comic studies. But the fact that creators of information are over-including people of darker skin tone calls for research that delineates the point where inclusion becomes racism. Further study is needed to determine the effects that skin colors have on risk perception and possible racism.

Another interesting facet that emerged from the analysis of these infographics is the promotion of information reuse. As a technical communication strategy, delivering general information signifies the approach to content creation that makes the reuse of the

same information in different contexts possible. Both the CDC and WHO create what is called "intelligent content" (Rockley, Cooper, & Abel, 2015), which is defined as content that is structured and categorized in a way that makes it automatically discoverable, reusable, and adaptable. Both organizations create content that can be reused and adapted outside the context of COVID-19—this tactic is described in the code "delivering general information." It would be interesting to know which information from these COVID-infographics can be reused for other flus or influenzas.

The use of social media elements like hashtags is also indicative of information reuse. The WHO uses hashtags in its COVID-19 infographics. Hashtags are used to establish trends that other people can follow, which means that the WHO is encouraging the reuse of these infographics by establishing trends through hashtags. More research is required to understand the impact that these social media elements have on the risk perception of public. It would be interesting to know what kind of information (positive or negative) from these infographics is generally reused in other contexts.

5.4. MAIN TAKEAWAYS

- The CDC takes a more prescriptive approach to risk communication whereas the WHO gives more agency to the reader. The CDC's structured document design, use of imperatives, and detailed contextualization in visuals is indicative of its overall prescriptive approach that establishes a reading pattern for the audience and directs them to take certain measures in certain environments. The WHO's abstract document design, visual focus on humans and objects, and inclusion of trivial but integral topics that affect the everyday activities of people suggests a

more relaxed approach to risk communication that gives more agency to the audience in terms of the reading pattern and where and how this information can be used.

- Audience is the key factor that stems the differences in the implementation of rhetorical strategies in the CDC and WHO infographics. As mentioned in the previous section, both organizations are audience-centered but have different strategies to approaching their respective audiences.

APPENDIX

	Initiating action	Delivering COVID-19 info	Beneficial interaction (graphics)	Detrimental interaction (graphics)	Including numerical data
CDC1	Yes	Yes	Present 4 times.	Present (?)	3 times (temp, time, %)
CDC2	Yes	Yes	Present 3 times.		2 times (distance and %)
CDC3	Yes	Yes	Present 5 times.	?	2 times (distance and time)
CDC4	Yes		Present 5 times.		Once (time)
CDC5	Yes	Yes	Yes, always		Once (distance)
CDC6	Yes	Yes	Yes, 3 times		Once (time)
CDC7				Present (?)	
CDC8	Yes		Yes, 3 times		
CDC9			Yes, 3 times		
CDC10	Yes	Yes			
CDC11	Yes	Yes	Yes, always		Once (distance)
CDC12	Yes	Yes	Yes, always		Once (distance)
CDC13	Yes	yes	Yes, always		
CDC14	Yes	Yes	Yes, always		2 times (distance)
CDC15	Yes				
CDC16	Yes	Yes			
CDC17	Yes	yes	yes, always		2 times (distance)
CDC18	Yes	Yes	Yes, 3 times	Present (?)	Once (distance)
CDC19	Yes	Yes	Yes, once	Yes, once	4 times (days and hours)
CDC20	Yes	Yes	Yes, 2 times		
CDC21	yes	yes	Yes, always		
CDC22	Yes		Yes, 4 times	Yes, 7 times	
CDC23	Yes				
CDC24	Yes	Yes			
CDC25		Yes			
CDC26		Yes			
CDC27	Yes	Yes	Yes, always		2 times (distance)
CDC28	Yes	Yes	Yes, once	Yes, once	Once (%)
CDC29	Yes	Yes	Yes, once	Yes, once	2 times (distance)
CDC30	Yes	Yes	Yes, once		
CDC31	Yes	Yes	Yes, always		3 times (distance)
CDC32	Yes	Yes	Yes, 5 times		Once (distance)
CDC33	Yes	Yes	Yes, 4 times	Yes, once	2 times (time and %)
CDC34	Yes	Yes	Yes, 4 times		4 times (%, days, temp, time)
CDC35	Yes	Yes			
CDC36	Yes	yes	yes, once		
CDC37	Yes	Yes	Yes, 4 times		
CDC38	Yes	Yes	Yes, 2 times		Once (time)
CDC39	Yes	Yes	Yes, always		Once (distance)
CDC40		Yes	Yes, once		
CDC41	Yes	Yes	Yes, once		
CDC42	Yes	Yes	Yes, once		
CDC43	Yes	Yes	Yes, 2 times		2 times (distance)
CDC44	Yes	Yes	Yes, 4 times		Once (distance)
CDC45	Yes	Yes			
CDC46	Yes	Yes	Yes, always		Once (distance)
CDC47	Yes	Yes	yes, always		3 times (distance)
CDC48	Yes	Yes	Yes, always		2 times (distance)
CDC49	Yes	Yes			
CDC50	Yes	Yes	Yes, once		
CDC51	Yes	Yes	Yes, 6 times	Yes ?	29 times (various)
CDC52	Yes	Yes	Yes, always		Once (distance)
CDC53	Yes	Yes	Yes, 6 times	Yes, 5 times (?)	
CDC54	Yes	Yes	yes		3 times (time, days, %)
CDC55		Yes		Yes, once	3 times (time and distance)

Creating emphasis	Communicating risk by indicating the virus
bolding, font color and size	
bolding, font color and size	"...the higher the risk of **COVID-19 spread**."
bolding, font size, captioning, and bigger graphics	"Stop the spread of **germs**"; "spread of repiratory **diseases**"
bolding, font size, font color, concise sentences	
bigger graphics, + sign (indicates that all measures should be taken)	
font color, bolding, check marks	"reduce the **spread of disease**."
font size and bolding, bigger graphics, crossmarks	
font size and bolding, bigger graphics	
font size, bolding, check marks	
Bigger graphics and fonts, bolding	
bigger graphics, bolding.	"you could be **infected** but not have symptoms."
Large graphic with some text listed as bullets	
Large and overlapping graphics. Bolding and font size	
Bigger graphics, check marks	**Yes**, virus shows as an icon in the graphic.
Bolding, capitalizing, check marks, bigger graphic	
Set on a notebook page, colored boxes, non-std fonts, bold, caps	
Set on a notebook page, caps, bolding, non-std fonts, colored shapes	
Creating 2 columns	
two columns, font color, bolding, font size	
bolding, capitalizing.	
Bigger font size, bolding	"Stop the **spread of germs**."
check marks, cross marks, bigger graphics, font color, bolding	
caps, bolding	
stop sign, bolding, caps, underlining	
2 columns, bolding, labeling graphics	
use of arrows, bolding, font color	"**infection** control"
large graphics	**Yes**, virus shows as an icon in the graphic.
checklist, low to high risk scale, bolding	
low to high risk scale, bolding	
decorated heading, large and colorful graphics, caps, kid wearing a cape	**Yes**, virus shows as an icon in the graphic; "**fight off germs**"
bigger font size, bigger graphics, bolding	
0	
overlapping graphics; non-std text, caps, bigger fonts	
caps, font color, numbering, using *, non-std font	
font color, bolding, caps	**"infected" "infection"**
cross & check mark, non-std fonts, caps, bolding, set on a notebook pg, colored boxes	0
set on a notebook pg, non-std fonts; caps	
font color, caps	**Yes**, virus shown as icon.
bigger graphic	
underlines (links), font color, 2 columns	
graphics (stop, think, wash hands), caps, non-std fonts, colored boxes	
caps, non-std fonts, bigger graphics, colored text boxes	**Yes,** virus shown as icon.
bigger graphics, caps, non-std fonts	
graphics as badges, caps, bolding	
colored text boxes, graphics as badges, caps, bolding	
bigger graphics	
bolding, font color, use of *	
bigger graphics, arrows indicating distance, bolding, font color	
bigger graphcs, labels, bolding, font color, use of *	
colored text boxes, graphics (stop, think, wash hands), non-std fonts, caps	
Bolding, numbering	
colored text boxes	
graphics, font color, cross marks	
caps, font color, checklist, bolding, non-std font	
font color, 2 column	**Yes**, image of the virus.

Organizing the elements of the infographic	People of color	Unusual color/unidentified
Structured and sequenced; clear text-graphic associations	Yes, 12.	
Structured (L) and sequenced (R); clear text-graphic associations	Yes, 7	
Structured with text acting as captions to graphics.	Yes, 9	
Abstract; clear text-graphic associations	Yes	
Structured with text acting as titles to graphics.	Yes, 11	
Sequenced, but not vertically. Steps are organized horizontally.	Yes, 2.	
Structured; clear text-graphc associations	Yes, 3	
Structured and sequenced; clear text-graphic associations. Steps organized horizontally	Yes, 3	
Structured; clear text-graphc associations	Yes, 3	
Structured; text acting as titles.	Yes, 7	Yes, 5
Structured; text acting as captions and titles.	Yes, 2.	
Sequenced as bullet points. Structured.	Yes, 3	
Structured; clear text-graphc associations, sequenced as bullet points, text as title	Yes, 4	
Structured, text as title and explanatory text.	Yes, 4	
Structured; text as caption and explanatory text		
Abstract; clear text-graphic associations	Yes, 5	
Structured; clear text-graphic associations	yes, 1	Yes, 7
2-column structure; clear text-graphic associations; sequenced as bullet points	Yes, 10	
2-column structure; clear text-graphic associations; sequenced as bullet points	Yes, 12.	
Structured; clear text-graphic associations	Yes, 2.	
Structured; clear text-graphic associations, text as explanation of graphics	Yes, 1	
Structured; clear text-graphics associations; text as captions and titles	Yes, same person repeated throughout	
Structured; clear text-graphic associations; text as captions to images	Yes, 11	
Structured; clear text-graphic associations	Yes, 11	
2-column structure; clear labels	Yes, same person repeated throughout	
Abstract; clear text-graphic associations, sequenced bullet points	Yes, 6	
Abstract	Yes, 3	
Structured checklist, abstract graphics, text as captions to graphics	Yes, 3	
sequenced bullet lists, abstract graphics, text as captions	Yes, 4	
Abstract wirh graphics all over; very little text	Yes, 1	
Structured, text as captions to graphics	Yes, 3	yes, 2
Structured, text as titles and captions to graphics	Yes, same person repeated throughout	
Abstract; text as explanation to graphics	Yes, 12.	
structured, clear text-graphic associations, numbered 1 to 5	Yes, 5	
structured, clear text-graphic associations, sequenced as bullet points	yes, 8	
Abstract	Yes, same person repeated throughout	
Abstract; clear text-graphc associations	Yes, 3	once
Abstract, sequenced bullet lists, clear text-graphic associations	Yes, 4	Yes, 2
Structured; text as bullet points	Yes, 3	
2-column, clea text-graphic associations		
Abstract	Yes, 1	
Abstract	Yes, same person repeated throughout	
Structured, text as title	Yes, 2.	
Structured, text as title and caption	Yes, 4	
Structured; clear text-graphic associations	Yes, 5	
Structured, text as captions to graphics	Yes, 20	
Abstract, clear text-graphic associations	Yes, 7	Yes, 9
Abstract	Yes, 5	Yes, 1
Abstract	not possible to count	not possible to count
Abstract, text as titles, text as list of questions	yes, 1	
Structured, step-by-step graphics and instructions, labeled graphics	Yes, once	
Abstract	Yes, 10	Yes, 1
Structured; text as title and explanation to graphics.	Yes, same person repeated throughout	
Structured checklist, abstract graphics	Yes, once	
2-column, clea text-graphic associations, bullet lists	Yes, 7	

Caucasian people	Introductory text	Delivering general information	Graphic representations of symptoms
Yes, one.			yes
Yes, one.			yes
		Yes. "Wash your hands"	
Yes, 2. (2 blondes?)			
	Present		
		Yes. "DO NOT choose masks that"	
		Yes. "How to take off a mask"	
		Yes. "DO choose masks that"	
Yes, 3			
Yes, 4			
one			
	Present		
Yes, one.	Present		yes
Yes, one.			
Yes, 2.	Present	Yes. "Are you at a higher risk of severe illness?"	
Yes, 2	Present as definitions		yes
Yes, 2			yes
Yes, 2			yes
		Yes. "Facemask do's and don'ts"	
Yes, 2			Yes
Yes, 1	Yes		Yes
		Yes. "COVID-19 PPE for Healthcare Personnel"	
Yes, 4		Yes. "CDC protects and prepares communities"	
Yes, 2			
Yes, 1			
		Yes, "handwashing is your superpower"	
Yes, 1			
one			
Yes, 2		Yes, "how to safely wear and take off a mask"	
yes, once	Yes		
Yes, 2			
Yes, one.			
Yes, 1	Yes		Yes
Yes, 3			
Yes, 1			
Yes, 3			
not possible to count	yes		
	Yes	Yes."How to make a chlorine solution..."	
Yes, 2	yes		
		yes. "respirator on/off"	
Yes, 1			

	Initiating action	Delivering COVID-19 info	Beneficial interaction (graphics)	Detrimental interaction (graphics)	Including numerical data
WHO1		Yes		Yes, always	Once (distance)
WHO2		Yes		Yes, always	2 times (Distance)
WHO3	Yes	Yes	Yes, always		Once (distance)
WHO4	Yes	Yes	Yes, 7 times	Yes, once	Once (distance)
WHO5	Yes	Yes	Yes, 7 times	Yes, 3 times	Once (distance)
WHO6	Yes	Yes	Yes, 6 times	Yes, 5 times	Once (distance)
WHO7	Yes	Yes	Yes, 7 times		Once (distance)
WHO8	Yes	Yes	Yes, 2 times		None
WHO9	Yes	Yes	Yes, once		None
WHO10	Yes	Yes	Yes, 2 times	None	None
WHO11		Yes		None	None
WHO12		Yes		None	None
WHO13	Yes	Yes	Yes, 4 times	None	None
WHO14	Yes	Yes	Yes, 3 times	None	None
WHO15	Yes	Yes	Yes, 3 times	None	Once (distance)
WHO16	Yes	Yes		None	None
WHO17	Yes	Yes		None	None
WHO18	Yes			None	None
WHO19	Yes	Yes	Yes, 1	None	None
WHO20	Yes	Yes		None	Once (time)
WHO21		Yes		None	2 times (time)
WHO22	Yes	Yes		None	None
WHO23	Yes	Yes		None	None
WHO24	Yes	Yes		None	Once (distance)
WHO25		Yes		None	None
WHO26		Yes		None	None
WHO27	Yes	Yes		Yes, 2 times	None
WHO28		Yes		None	None
WHO29	Yes	Yes	Yes, 1	None	None
WHO30	Yes	Yes		None	None
WHO31	Yes	Yes		None	None
WHO32	Yes	Yes		None	Once (age)
WHO33	Yes	Yes		None	None
WHO34	Yes	Yes		None	None
WHO35	Yes	Yes		None	None
WHO36	Yes	Yes		None	None
WHO37	Yes	Yes		None	None
WHO38		Yes		Yes, always	None
WHO39		Yes		Yes, 2 times	None
WHO40	Yes	Yes	Yes, 3 times	Yes, 1	Once (distance)
WHO41	Yes	Yes	Yes, 3 times	Yes, 1	Once (distance)
WHO42	Yes	Yes	Yes, 3 times	Yes, 4 times	Once (distance)
WHO43		Yes	Yes, 1	None	None
WHO44	Yes	Yes		None	None
WHO45		Yes	Yes, always	None	None
WHO46	Yes	Yes	Yes, once	None	Once (distance)
WHO47	Yes	Yes		None	None
WHO48	Yes	Yes		None	None
WHO49		Yes		None	None
WHO50		Yes		None	2 times (Age)
WHO51		yes		None	None
WHO52	yes	yes		None	None
WHO53	Yes	Yes	Yes, always	None	None
WHO54	Yes	Yes	Yes, 1	Yes, 1	Once (distance)
WHO55	Yes	Yes	Yes, 1	None	None

Creating emphasis	Communicating risk by indicating the virus
Caps, Bigger font size, colored text boxes, cross marks	No indication of virus.
Caps, Bigger font size, colored text boxes, cross marks	No indication of virus.
Caps, Bigger font size, colored text boxes	No indication of virus.
caps, cross marks, arrows, colored text boxes, bigger font	No indication of virus.
Caps, bigger fonts, green v. red backgrounds, colored text boxes, cross marks	No indication of virus.
Caps, Bigger font size, colored text boxes, cross marks	No indication of virus.
Caps, Bigger font size, colored text boxes	No indication of virus.
Font color	No indication of virus.
Font color, bigger graphic, listed text	No indication of virus.
Font color	No indication of virus.
Colored text boxes; bigger graphics	No indication of virus.
Colored text boxes; bigger graphics	No indication of virus.
Colored text boxes; Text color; Outlines to columns	No indication of virus.
Colored text boxes; Text color; Outlines to columns	No indication of virus.
Colored text boxes; Text color; Outlines to columns	No indication of virus.
Use of hashtags; text color; numbering	No indication of virus.
Use of hashtags; text color; use of callouts; bigger numbers and graphic	No indication of virus.
Use of hashtags; text color; font size; caps	No indication of virus.
Use of hashtags; text color; overlap in graphics and numbering	No indication of virus.
Use of hashtags; text color; use of callouts; bigger numbers and graphic	No indication of virus.
Use of hashtags; text color; use of callouts; bigger graphics	No indication of virus.
Use of hastags; text color; font size; caps	No indication of virus.
Text color; use of hashtags; mythbusting	No indication of virus.
Text color; use of hashtags; mythbusting	No indication of virus.
Text color; use of hashtags; mythbusting	No indication of virus.
Text color; use of hashtags; mythbusting	No indication of virus.
Text color; use of hashtags; mythbusting	No indication of virus.
Text color; use of hashtags; mythbusting	No indication of virus.
Caps; use of hashtags; text color	**Yes,** virus shown as an icon 2 times.
Caps; use of hashtags; text color	**Yes,** virus shown as an icon 2 times.
Caps; use of hashtags; text color	**Yes,** virus shown as an icon once.
Caps; use of hashtags; text color; bolding of text	**Yes,** virus shown as an icon once.
Caps; use of hashtags; text color	**Yes,** virus shown as an icon once.
Caps; use of hashtags; bigger fonts; text color	**Yes,** virus shown as an icon once.
Caps; use of hashtags; bigger fonts; large COVID icon; text color	**Yes,** virus shown as an icon once.
Caps; use of hashtags; bigger fonts; large COVID icon; text color	**Yes,** virus shown as an icon once.
Caps; use of hashtags; bigger fonts; large COVID icon; text color	**Yes,** virus shown as an icon once.
Bigger font size; colored text box; showing virus transmission; big graphics	**Yes,** virus transmission is showed.
Use of more graphics; colored text box	**Yes,** virus is shown as left on objects.
Colored text box; use of cross marks; bigger fonts; use of more graphics	No indication of virus.
Colored text boxes	**Yes,** virus transmission is showed.
Colored text boxes; use of more graphics; text color; showing the virus	**Yes,** virus transmission and virus on objects.
Decorated title; use of hashtags, bigger graphic	**Yes,** virus is shown as an icon 8 times.
Decorated title; use of hashtags, bigger graphic; angry virus	**Yes,** virus shown as an icon once.
Decorated title; use of double headed arrows, bigger graphic	No indication of virus.
Decorated title; text color; caps; use of hashtags	No indication of virus.
text color; use of more icons	No indication of virus.
Text color; bigger fonts; use of green vs. red	No indication of virus.
Text color; bigger fonts	No indication of virus.
Use of italics; colored text boxes; caps; bigger fonts	No indication of virus.
Bigger graphics; bigger fonts; graphic bubbles	No indication of virus.
Using cross marks; decorated titles; colored text; caps	No indication of virus.
Decorated titles; colored text; caps	No indication of virus.
Decorated titles; colored text; caps; use of cross marks	No indication of virus.
Decorated titles; colored text; caps	No indication of virus.

Organizing the elements of the infographic	People of color	Unusual color/unidentified
Stuctured; clear text-graphic associations; text as caption/explanation to graphics	Yes, 3.	
Stuctured; clear text-graphic associations; text as caption/explanation to graphics	Yes, 4.	
Stuctured; clear text-graphic associations; text as caption/explanation to graphics	Yes, 2	Yes, 5
Stuctured; clear text-graphic associations; text as caption/explanation to graphics, bullet points	Yes, 2	Yes, 8
Stuctured; clear text-graphic associations; text as caption/explanation to graphics	Yes, 6.	Yes, 8
Stuctured; clear text-graphic associations; text as caption/explanation to graphics	Yes, 5	Yes, 7
Stuctured; clear text-graphic associations; text as caption/explanation to graphics	Yes, 4.	Yes, 5
Abstract; clear text-graphic associations; text as explanation to graphics		Yes, 1
Structured; bullet list for text		Yes, 1
Abstract; clear text-graphic associations; text as explanation to graphics		Yes, 2
Structured; alternating colored text boxes and graphics; clear text-graphic associations		
Structured; alternating colored text boxes and graphics; clear text-graphic associations		
Structured; clear text-graphic associations; text as explanation to graphics; use of bullet lists	Yes, always	
Structured; clear text-graphic associations; text as explanation to graphics; use of bullet lists	Yes, 5 times	
Structured; clear text-graphic associations; text as explanation to graphics; use of bullet lists	Yes, 1	
Abstract; text in list based format; scattered graphics	Yes, 3.	
Absract; text in list based format; clear text-graphic association	Yes, 1	
Abstract; text as explanation	Yes, 1	
Structured; text in list based format; clear text-graphic associations	Yes, 2	
Absract; text in list based format; clear text-graphic association	Yes, 1	
Abstract; text as explanation	Yes, 2	
Abstract; text as explanation; clear text-graphic association	Yes, 1	
Abstract; text as answer to a question		
Abstract; text as answer to a question		
Abstract; text as answer to a question		
Abstract; text as answer to a question		
Abstract; text as answer to a question		Yes, always
Abstract; text as answer to a question		Yes, 1
Structured; clear text-graphic associations; text as explanation to graphics		Yes, 7
Structured; clear text-graphic associations; text as explanation to graphics	Yes, 4.	Yes, 1
Structured; text as explanation to graphics; clear text-graphic associations	Yes, 3.	Yes, 2
Structured; text as explanation to graphics; clear text-graphic associations		Yes, 1
Structured; text as explanation to graphics; clear text-graphic associations		
Structured; text as explanation to graphics; clear text-graphic associations	Yes, 1	
Structured; list based text		
Structured; list based text		
Structured; explanatory text; list based text		
Abstract; Use of bullet points		Yes, 2
Abstract; text as explanation; labelled graphics		Yes, 4
Abstract; list based text; text as explanation		Yes, 7
Abstract; clear text-graphic associations; text as explanation to graphics	Yes, 5	Yes, 7
Abstract; bullet lists; text as labels to graphic; text as explanation	Yes, 10	Yes, 7
Abstract; explanatory text	Yes, 2	
Abstract; explanatory text	Yes, 2	
Structured; explanatory text	Yes, 3.	
Abstract; explanatory text	Yes, 2	
Abstract; text as explanation; text as label to graphics		Yes, 4
Structured, 2-column format; explanatory text		
Abstract; explanatory text		
Abstract; explanatory text		yes, 1
Abstract; text as label to graphics	Yes, 1	Yes, 2
Abstract; text as bullet lists	Yes, 3.	Yes, 1
Abstract; explanatory text; clear text-graphic associations	Yes, 1	Yes, 2
Abstract; explanatory text; clear text-graphic associations	Yes, 2	Yes, 2
Abstract; explanatory text; clear text-graphic associations	Yes, 1	Yes, 1

Caucasian people	Introductory text	Delivering general information	Graphic representations of symptoms
Yes, 4.		Yes. "How to wear a medical mask safely"	
Yes, 2 (same person)		Yes. "How to wear a non-medical mask safely"	
Yes, 3		Yes. "How to wear a non-medical mask safely"	
Yes, 2		Yes. "How can children wear non-medical masks"	
Yes, 5		Yes.	
Yes, 7		Yes	
Yes, 3		Yes	
Yes, 1			
		Yes.	
		Yes.	
Yes, 1			Yes
Yes, 4 (Same person)			Yes
Yes, 2			
	Yes	Yes.	
Yes, 1			
	Yes		
		Yes.	
		Yes.	
Maybe, 1			
		Yes.	
	Yes		
			Yes
			Yes
			Yes
Yes, 1			Yes
Yes, 1			Yes
	Yes		Yes
Yes, 3 (Same person)			Yes
Yes, 2			

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