Design Conventions of COVID-19 Vaccine Infographics: Federal versus State

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Introduction & Literature Review

It is important to have consistent design conventions when presenting information to users (Wong 2021; Nikolov 2017; Gorasia 2020; Krause 2021). “Consistency limits the number of ways actions and operations are represented, ensuring that users do not have to learn new representations for each task” (Wong 2021). Consistency of design conventions is even more imperative for risk communication, specifically risk communication concerning the COVID-19 vaccine, where the difference in a user’s decision may mean life or death.

An article written by Euphemia Wong for the Interaction Design Foundation claims that consistency in design is important to eliminate confusion, and eliminate the need for the user to relearn (Wong 2021). According to Rachel Krause, Jakob Nielsen lists consistency as one of the heuristics for heuristic evaluations, and explains that there are many layers to consistencies—internal, external, page layout, and content—that all impact the user’s experience. This is also reiterated by Anton Nikolov, a writer for UX Collective. Krause mentions that consistency impacts a user’s expectations and reiterates Wong’s claim that one of the main purposes is to prevent the user from re-learning how to interpret something or how to perform a task (Krause 2021). Krause claims that “designing something against conventions will add to your users’ cognitive load,” and that “In most cases, maintaining consistency and meeting user expectations will outweigh breaking a convention” (Krause 2021).

Nikolov also reiterates Wong’s and Krause’s claims that consistency helps to lower confusion, and promotes faster learning by encouraging memory and discouraging ‘re-learning.’ He also mentions that consistency in design is presented in layers—primarily functionally, internally, and externally (Nikolov 2017), and agrees that design conventions should not be broken, but can be bent. Harsh Gorasia, a writer for UX Planet, also comments about the multi-layered nature of design consistency, and reiterates the importance of staying with consistent design conventions (Gorasia 2020).

It appears that the majority of scholars agree that there are multiple layers upon which design must be consistent to eliminate confusion for the user and reduce the cognitive load. In 2016, Haejung Shin, a journalism student at Iowa State University, conducted

her thesis research on epidemics and risk communication and graphics used to divulge risk communication, stating that infographics are often used to divulge large amounts of information in short amounts of time (Shin 2016). Shin's study indirectly reiterates the importance of design consistency for infographics, such as the COVID-19 vaccine infographics, because the user should not need to experience confusion when handling large amounts of complex information and simultaneously making a 'life-or-death' decision.

There is a wealth of research regarding the importance of consistency in design conventions and the implications it has on user experiences, and some research about infographics in conjunction with pandemics, but a gap exists in the research pertaining to the consistency of design conventions concerning communications in infographics about the COVID-19 vaccine. There is a more significant gap regarding the differences in design conventions regarding COVID-19 vaccine infographics across different levels of platforms, such as federal platforms like the Center for Disease Control (CDC) and state health departments (more local areas).

Questions

In this research report, I will investigate the following:

1) What are the design conventions regarding the information about the COVID-19 vaccine on the CDC website?
2) What are the design conventions regarding the information about the COVID-19 vaccine on state health department websites?
3) What are the differences (or gaps) between the design conventions at the national and state levels?

Methods

In order to complete this project, I have collected:

- Five artifacts from the Centers for Disease Control (CDC) regarding COVID-19 information
- Five artifacts from the New York state government regarding COVID-19 vaccine information
- Five artifacts from the California state government regarding COVID-19 vaccine information
- Five artifacts from the Texas state government regarding COVID-19 vaccine information

My rationale for selecting New York and California is that they were two locations in the United States that were heavily impacted during the initial wave of the COVID-19 virus in 2020 and thus have had more incentive to continuously develop risk communication practices and educational resources. I chose Texas because it is one of the more densely populated states behind California and New York, so it should also have some incentive to develop educational resources for the COVID-19 pandemic, despite the recent relaxation of preventive protocols by the state government.

The artifacts I selected focused primarily on education regarding the COVID-19 vaccine and were categorizable as either:

- Printable posters
- Social media graphics/ posters

My rationale for selecting only five artifacts from each site is to encompass the circular process of iterative design practices by completing an initial analysis, upon which initial design conventions can be recommended, before reanalyzing once more with users for the second round of testing, and then repeating the testing a third and perhaps fourth time with users to encompass the standard amount of 15 users for usability testing (Nielsen 2000).

I analyzed the design conventions of the information presented on all artifacts according to the Robin Williams' CRAP (contrast, repetition, alignment, proximity) principles, comparing the design conventions of COVID-19 vaccine education from the CDC, a federal resource, to state government sites, a more localized resource (Williams 2014). After analyzing infographics from the selected platforms, I scored each group of items (CDC, California, Texas, and New York) on a scale from 1-10 for each design principle (1 being a poor score and 10 being the best score), and then averaged the scores before ranking each group for design consistency.

Analysis

Centers for Disease Control

Figure 1: CDC poster about reasons why people should receive the COVID-19 vaccine. (https://www.cdc.gov/coronavirus/2019-ncov/communication/print-resources.html?Sort=Date%3A%3Adesc&Page=7)

Figure 2: CDC poster about why high-risk populations should receive the COVID-19 vaccine first. (https://www.cdc.gov/coronavirus/2019-ncov/communication/print-resources.html?Sort=Date%3A%3Adesc&Page=7)

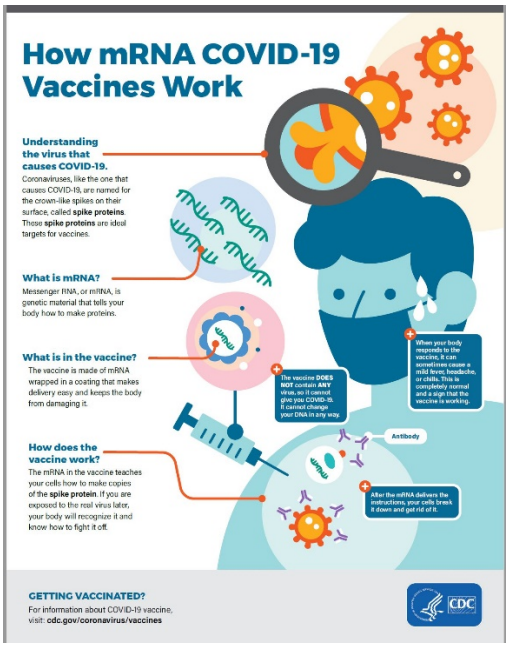

Figure 3: CDC poster educating about mRNA COVID-19 vaccines. (https://www.cdc.gov/coronavirus/2019-ncov/communication/print-resources.html?Sort=Date%3A%3Adesc&Page=4)

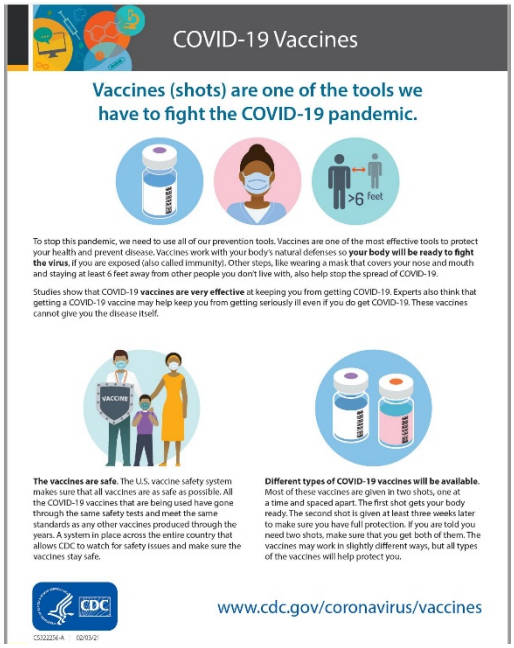

Figure 4: CDC poster about COVID-19 vaccines as a tool to fight the COVID-19 pandemic. (https://www.cdc.gov/coronavirus/2019-ncov/communication/print-resources.html?Sort=Date%3A%3Adesc&Page=4)

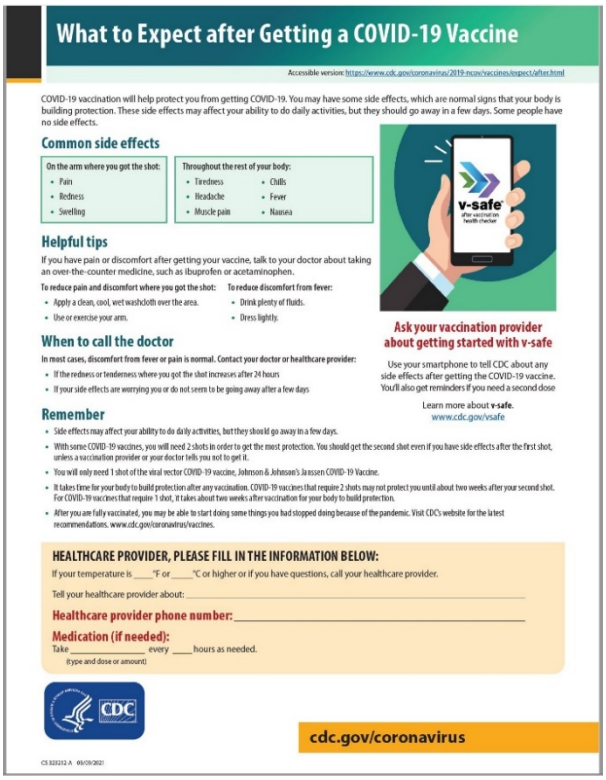

Figure 5: CDC poster concerning what one should expect after receiving the COVID-19 vaccine. (https://www.cdc.gov/coronavirus/2019-ncov/vaccines/pdfs/321466-A_FS_What_Expect_COVID-19_Vax_Final_12.13.20.pdf)

Contrast

Each infographic by the CDC uses appropriate contrast, with text being significantly darker than the background or vice versa.

Repetition

The CDC vaccine posters make poor use of repetition with some of their visual conventions. There is normally text at the top informing the user about the poster's content that is encompassed in a colored block. However, in Figures 1 and 2, the block is grey with some clipart in the top-left corner, while in Figure 3, the block is a blue and green gradient with a teal sub-block and a grey square in the top-right underlined by a thin block of pumpkin orange.

Figures 1, 2, 4, and 5 each contain the CDC logo in the bottom-left corner with a link for the user to learn more about the vaccines in the bottom-right. Figure 3, however, contains the CDC logo graphic in the bottom-right, with the link on the left, while Figure 5 is the only to encompass the link text with a pumpkin-orange block, and figures 1, 2, and 4 merely provide the link in a different color. Figure 3 alters the weight of the font to make it bolder but does not change the color. Font colors for headings are inconsistent across each poster, with Figure 1 having grey headers, Figure 2 having light blue numbers, Figure 3 having dark blue headers, Figure 4 having turquoise (more on the blue side) headers, and Figure 5 having teal (more on the green side) headers. Figure 3 presents the footer in a light-grey block, while none of the other figures use blocks to encompass the footer text. Some of the figures have graphics on the left, while other figures have graphics on the right, and Figure 4 presents multiple graphics of the same size that compete with the graphics of the vaccine doses, distracting from the main purpose of the poster. Figure 3 presents a large graphic, but the main part of the graphic

that conveys how mRNA vaccines function is overpowered by the person wearing the mask.

Alignment

The alignment on the CDC infographics is usually presented as left-aligned unless there is a graphic on the left side of the page. However, there is an instance of randomly center-aligned text in Figure 2 and some inconsistent alignment in Figure 3, by what appears to be text in an informational blob that is not level with the header compared to text level with the header. The information is sometimes presented in paragraph format for Figures 3 and 4 but is presented in bulleted or numbered alignments for all other figures.

Proximity

According to Robin Williams, to “get” proximity, one should attempt to close one’s eyes and count the number of visual elements on a page by noting how many times the gaze sets (Williams 2014). Figure 1 contains seven visual elements, while Figure 2 contains eight visual elements, Figure 3 contains eight visual elements, Figure 4 contains 12 visual elements, and Figure 5 contains 13 visual elements. Each visual element is well-spaced according to its function, so the CDC posters do well with their proximities concerning visual elements; however, the largest difference between visual elements in CDC infographics is 6, which is higher than the difference presented by some state governments.

New York

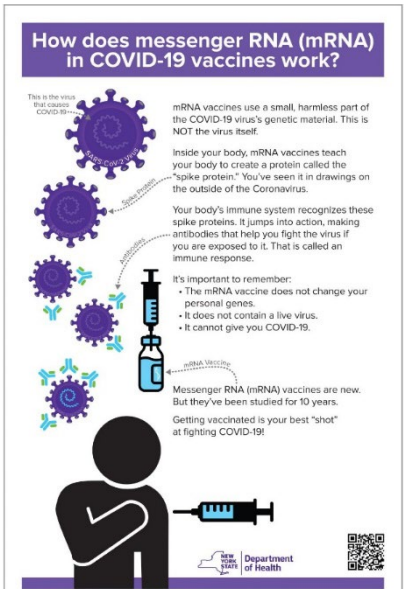

Figure 6: Poster from NY government educating how mRNA vaccines work. (https://covid19vaccine.health.ny.gov/education)

Figure 7: Poster from NY government educating about the COVID-19 vaccine. (https://covid19vaccine.health.ny.gov/education)

Figure 8: Poster from NY government encouraging people to get the COVID-19 vaccine. (https://covid19vaccine.health.ny.gov/education)

Figure 9: Twitter social media graphic from NY government encouraging people to get vaccinated for COVID-19. (https://covid19vaccine.health.ny.gov/education)

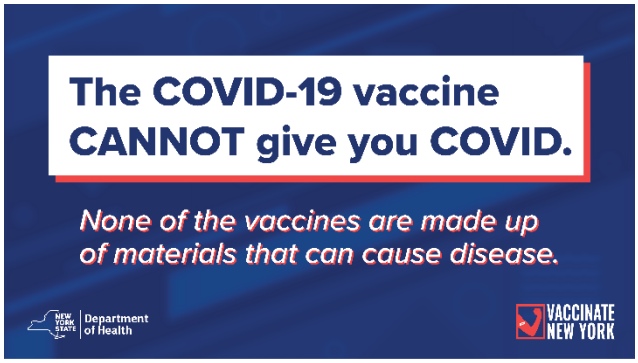

Figure 10: Twitter social media graphic from NY government educating about the COVID-19 vaccine while dispelling a common myth about the vaccination. (https://covid19vaccine.health.ny.gov/education)

Contrast

Figures 6, 7, 8, 9, and 10 all present appropriate contrast, with the text being significantly lighter than the background or vice versa.

Repetition

The repetition for conventions in the COVID-19 vaccine artifacts from the New York government is more consistent than the CDC, with header and footer conventions

remaining consistent with white text in purple blocks. However, some of the items in the footer, such as the 'New York Department of Health' logo and Q.R. codes, are inconsistently placed within the footer, and some elements that are present in some footers, such as the 'Vaccinate New York' slogan and the Q.R. codes or links are present in some infographics but not others. The color conventions for graphics 6-9 are purple and white, but the infographic in figure 10 uses blue and red, which is inconsistent with the other infographics from the N.Y. government.

Alignment

Text alignment is centered for infographics in figures 6-8 but left-aligned for infographics in figures 9 and 10, demonstrating that the text alignment is inconsistent.

Proximity

According to Williams' method of testing proximity, Figure 6 has eight visual elements, Figure 7 has eight visual elements, Figure 8 has six visual elements, Figure 9 has four visual elements, and Figure 10 has four visual elements. The largest difference in the number of visual elements in infographics from the N.Y. government is 4, and items are well-spaced so that one visual element does not blur with another.

California

Figure 11: Poster from the California government educating about the COVID-19 vaccine. (https://toolkit.covid19.ca.gov/)

Figure 12: Poster from the California government educating about the COVID-19 vaccine. (https://toolkit.covid19.ca.gov/)

Figure 13: Poster from the California government educating about the COVID-19 vaccine. (https://toolkit.covid19.ca.gov/)

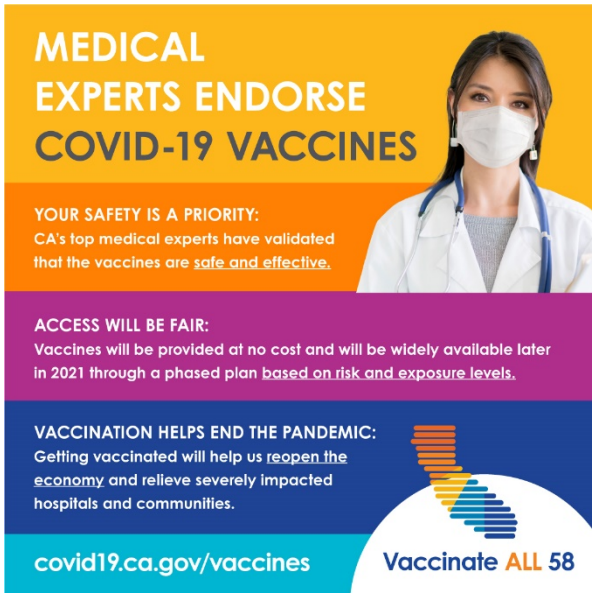

Figure 14: Poster from the California government educating about the COVID-19 vaccine. (https://toolkit.covid19.ca.gov/)

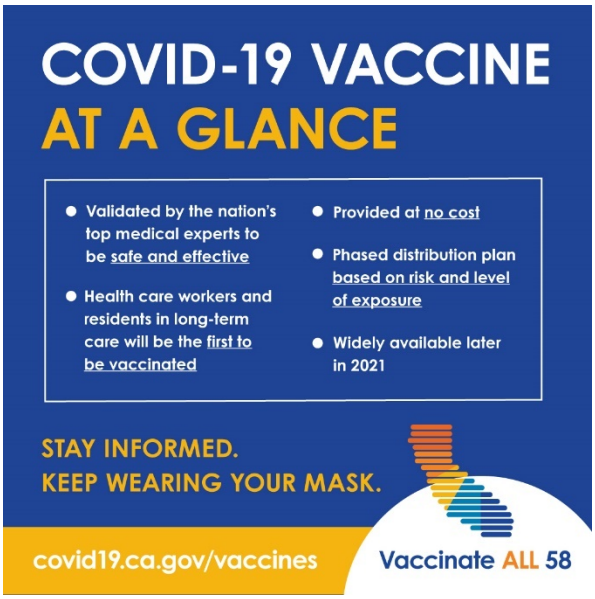

Figure 15: Poster from the California government educating about the COVID-19 vaccine. (https://toolkit.covid19.ca.gov/)

Contrast

The majority of posters from the government of California perform well with contrast, except for an instance in Figure 13 where dark yellow text is presented on a slightly lighter yellow background, and in Figures 14 and 15, where white text is presented on a yellow background (light on light colors). While the dark blue text on the light blue background in Figure 11 and the dark yellow text on the dark blue background in Figure 15 does not present the ideal contrast, the contrast still provides a more legible type than the contrast issues in Figures 13 and 15. Similarly, there is poor contrast between two visual elements in Figure 14, with the header block being yellow and the second block of the page being only a slightly darker color.

Repetition

Figures 11-13 present consistency of visual elements, with the only variation being the color and graphic used in the infographic. Figure 14 utilizes different color stripes as

blocks to mark different chunks of information, while Figure 15 lacks a graphic (other than the image of California in the bottom-right corner that all other infographics have) and presents information in two bulleted columns instead of a single bulleted column.

Alignment

Alignment is consistently left-aligned in all posters, but Figure 14 is the only infographic that does not present information in a bulleted list, while Figure 15 presents information in two bulleted columns (despite that the information in columns is still left-aligned). All other elements are consistently aligned in each poster.

Proximity

According to Williams' method, Figures 11-13 all have four visual elements, but there should be 5 when the two graphics are separated. However, since the graphic of California bleeds into the graphic of the person, there appear to be four visual elements. Figure 14 seems to have six visual elements but has 7; however, the elements appear to blend together because of the poor contrast in the colors between the header block and the block encompassing the first chunk of information. Figure 15 appears to have seven visual elements but only has six because the two columns of bulleted text appear separate yet should be part of the same visual element (meaning that the spacing between the two columns should be reduced to make them appear as one visual element. Despite a couple of instances regarding poor spacing, the largest difference between visual elements in infographics from the California government is 2, which is less difference than both the CDC (6) and NY (4) government (meaning that infographic design conventions regarding the COVID-19 vaccine are more consistent in California than in infographics from the CDC or the N.Y. government).

Texas

Figure 16: Poster from the TX government informing about Pfizer COVID-19 side-effects. (https://www.dshs.texas.gov/coronavirus/tools/vaccine-comm.aspx)

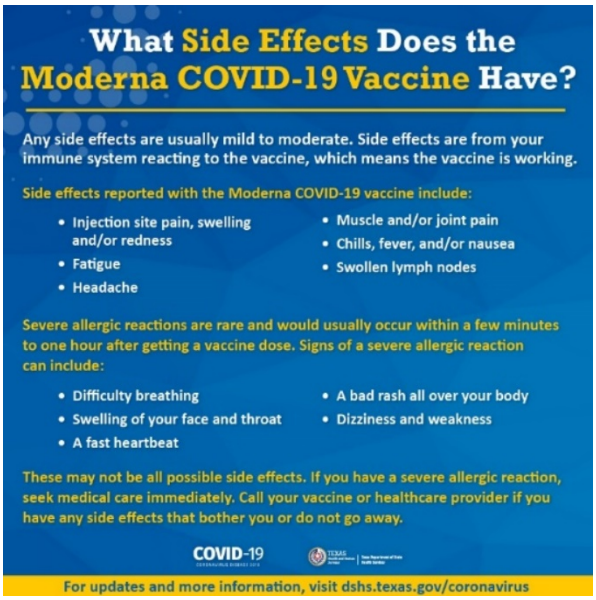

Figure 17: Poster from the TX government informing about Moderna COVID-19 side-effects. (https://www.dshs.texas.gov/coronavirus/tools/vaccine-comm.aspx)

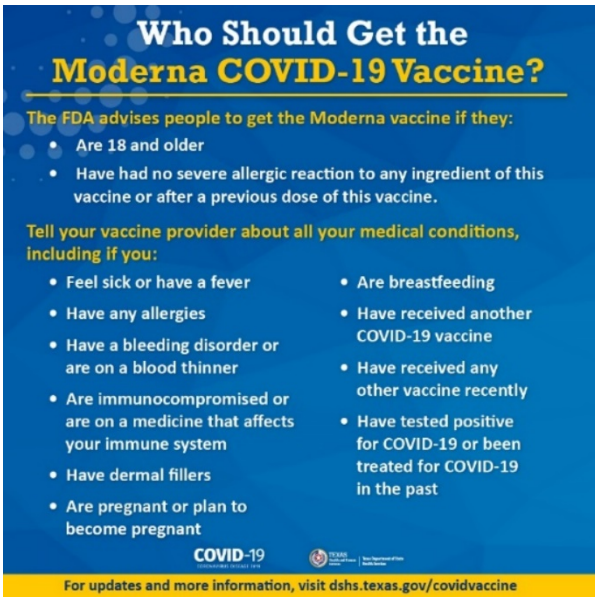

Figure 18: Poster from the TX government informing about who should receive the Moderna COVID-19 vaccine. (https://www.dshs.texas.gov/coronavirus/tools/vaccine-comm.aspx)

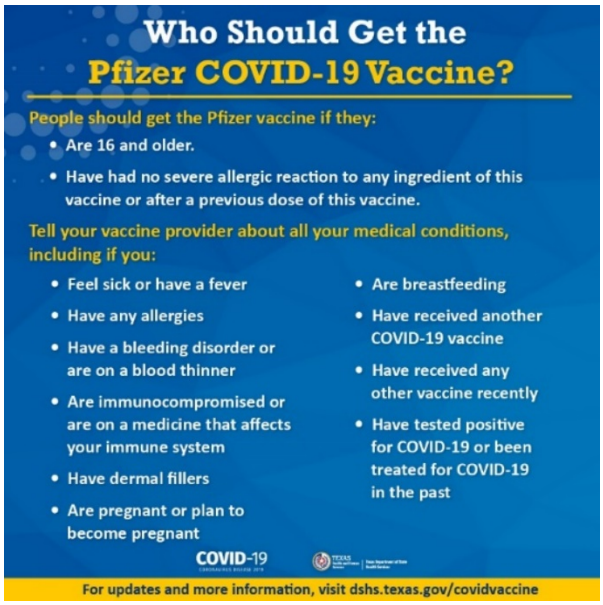

Figure 19: Poster from the TX government informing about who should receive the Pfizer COVID-19 vaccine. (https://www.dshs.texas.gov/coronavirus/tools/vaccine-comm.aspx)

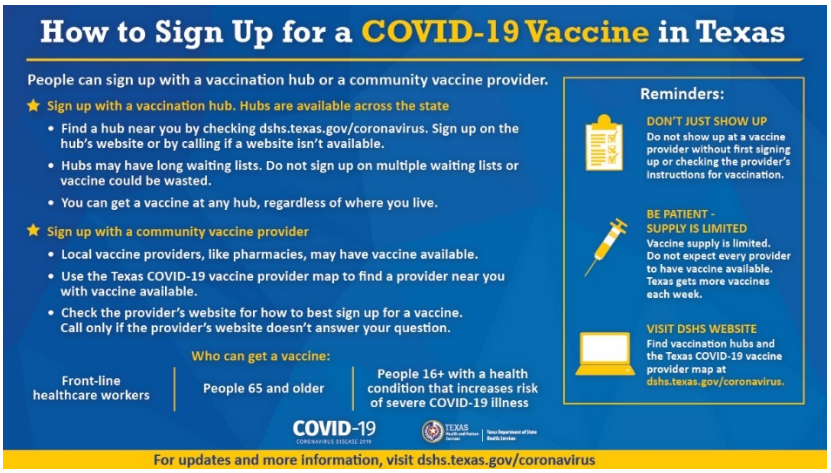

Figure 20: Poster from the TX government informing about the sign-up process for the COVID-19 vaccination. (https://www.dshs.texas.gov/coronavirus/tools/vaccine-comm.aspx)

Contrast

The contrast presented in Figures 16-20 is decent, with light-colored texts (white and yellow) on dark blue backgrounds or dark blue text on yellow backgrounds (provided in the footers of each infographic).

Repetition

Items in the headers and footers of each infographic are consistently placed, and the placement of all visual elements is consistent across all infographics presented in Figures 16-20.

Alignment

Header and footer text in all infographics from the TX government is center-aligned, while all other text is left-aligned (except for the information at the bottom of Figure 20, which is the only center-aligned body text amongst all of the infographics from the TX government).

Proximity

According to Williams' method of testing proximity, Figures 16 and 17 have 12 visual elements, while Figures 18 and 19 have nine visual elements, and Figure 20 has 12 visual elements. The largest difference between visual elements in infographics from the TX government is 3, meaning that the consistency of visual elements is less than California but more consistent than infographics from N.Y. and the CDC. Visual elements are well-spaced.

Results

	CDC	NY	CA	TX
Contrast	10	10	5	10
Repetition	2	6	7	10
Alignment	5	5	8	9
Proximity	4	6	9	8
Average	5.25	6.75	7.25	9.25

Table 1: Conveys collective CRAP principle scores for infographics from each platform (CDC, NY, CA, TX), as well as an average CRAP score for each platform.

Upon scoring each design principle on a scale from 1 to 10, with one being poor and ten being the best, the CDC received a score of 10/10 for contrast, 2/10 for repetition, 5/10 for alignment, 4/10 for proximity, contributing to an overall average of 5.25. New York received 10/10 for contrast, 6/10 for repetition, 8/10 for alignment, 6/10 for proximity, contributing to an overall average of 6.25. California received 5/10 for contrast, 7/10 for repetition, 8/10 for alignment, 9/10 for proximity, contributing to an overall average of 7.25. Texas received 10/10 points for contrast, 10/10 points for repetition, 9/10 for alignment, 8/10 for proximity, contributing to an overall average of 9.25. When the averages of each platform are compared, Texas received the highest CRAP score, followed by California, then New York, and finally the CDC.

I also decided to obtain the vaccine statistics for the U.S., New York, California, and Texas.

	U.S.	NY	CA	TX
1st Dose	43.50%	47.10%	48.2	37.90%
2nd Dose	29.90%	33.80%	29.90%	26.40%

Table 2: Conveys the COVID-19 vaccination statistics of the United States, New York, California, and Texas. (https://news.google.com/covid19/map?hl=en-US&mid=%2Fm%2F07b_l&state=7&gl=US&ceid=US%3Aen)

Table 2 conveys that—out of the platforms viewed for this study—New York had the most percentage of their population fully vaccinated with 33.8% vaccinated, while California and the United States tie for second with 29.90% of people vaccinated, and Texas has the least percentage of people vaccinated with only 26.4% fully vaccinated. While Texas may have the most consistent design practices, the information presented on the vaccine infographics contains far fewer graphics than infographics from other

states, and infographics present a positive influence—specifically in instances of risk communication (Shin 2016). Figures 3 and 4 from the CDC contained graphics explaining how mRNA vaccines work, and Figure 6 from New York contains a similar graphic. However, despite that other platforms contain more graphics in their posters, the graphics may also distract from the main purpose of the poster—the vaccines. Specifically, in Figure 4, 5 graphics are presented, each of equal size, that compete for the viewer's attention, distracting focus from the graphic of the vaccine dose.

Limitations

This study does not consider pre-conceived attitudes toward the COVID-19 vaccine. Despite the reparations that may be implemented toward infographics about the COVID-19 vaccine to ensure consistency of design conventions, reparations may not alter politically-based pre-conceived attitudes to the vaccine. However, consistent design *may* reparate pre-conceived attitudes based only on false myths concerning the vaccine without influencing politically pre-conceived notions concerning the vaccine.

Discussion & Conclusion

Design conventions according to the CRAP principles vary considerably between state sites and federal sites. Graphics were either present or not present, and occasionally the graphics were conflicting and competed with the main purpose of the poster (educating about the vaccine), specifically in Figure 4, an infographic from the CDC. Occasionally, the colors used, while eye-catching, did not provide the best contrast with the text. The implications of this study are a 'call-to-action for technical communicators working with state health departments and the CDC to collaborate to create consistent design conventions across all platforms concerning COVID-19 vaccine communications to prevent confusion for users. Technical communicators creating artifacts for risk communication concerning the COVID-19 vaccine should also ensure that designs are reparated to increase CRAP-based scores and ensure that any graphics that are included *contribute* instead of distracting from educating about the vaccines (i.e., do not enlarge a graphic of a mask or a COVID molecule, instead of a syringe or vaccine bandaid, and do not present equally-sized images that compete for the user's attention. Once design conventions have been decided, and consistency is displayed, further studies can be conducted to assess the effects and make further design recommendations.

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