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Data Visualization - CSC 362

14 May 2025

Visualizing Change: An Interactive Analysis of U.S. Climate Concern (2010–2024)

1. Data Cleaning

For our final project, we used data from the Yale Program on Climate Change Communication, specifically from their publicly available *Climate Opinion Maps* dataset (Marlon et al., 2025). This dataset is based on extensive survey research and includes over 200,000 responses about public opinion regarding a wide range of climate-related questions. The original dataset covers national, state, and county-level estimates and includes more than 30 different variables, including variables that measure beliefs about the existence of global warming, perceived risks, and policy preferences. For our visualization, we chose to isolate one particular variable: the percentage of adults in each U.S. state who report being “somewhat or very worried about global warming.” We made this decision intentionally to avoid overwhelming users with too much information at once. By narrowing our focus to a single variable, we aimed to create a clearer and more accessible user experience. The “worried” variable was particularly well-suited for this purpose, as it provided complete data for every state across the entire 15-year period from 2010 to 2024. Unlike many other variables in the dataset, which had missing years or incomplete state-level data, this selection ensured we didn’t need to handle any null values, allowing for a cleaner and more reliable visualization.

In regards to its structure, the dataset was already organized by survey question, with each row representing a U.S. state and each column showing the percentage of "worried" respondents for a given year. After locating the section of the dataset related to our target variable, we copied this portion into a new sheet to isolate it for our project. We then removed unnecessary columns such as "GeoID," which simply numbered the states from 1 to 50, and "GeoType," which indicated whether the data came within a county or state. We continued removing metadata that was not relevant to our visualization, as we were focused exclusively on state-level data and did not need any identifiers beyond state names and yearly percentages. In this format, the items of our dataset are the states and the attributes are both the year of data collection and the percentage value for the "worried" variable. This simplified structure made it easier to bind the data to our D3 choropleth map and ensured that users could clearly interpret changes in concern over time. A snapshot of the final cleaned dataset is shown in Figure 1, which illustrates the format we used throughout the project.

GeoName	variable	x2010	x2011	x2012	x2013	x2014	x2015	x2016	x2017	x2018	x2019	x2020	x2021	x2022	x2023	x2024
Alabama	worried	46.55	44.83	44.44	43.47	44.07	48.11	49.75	49.79	58.54	51.38	56.11	57.56	54.59	54.95	52.98
Alaska	worried	48.99	48.1	47.28	49.1	50.33	53.04	54.66	55.8	62.31	57.8	60.71	63.23	61.53	62.49	59.45
Arizona	worried	50.86	51.52	51.78	50.33	51.29	52.77	56.86	58.7	63.76	60.81	63.58	65.73	63.2	64.32	64.01
Arkansas	worried	47.54	45.74	46.82	43.93	45.56	49.67	50.65	51.73	58.73	53.68	56.56	59.38	55.74	56.21	53.69
California	worried	57.78	58.33	61.85	60.19	58.7	61.5	66.89	67.23	69.74	71.42	70.48	72.7	70.42	71.24	70.54
Colorado	worried	52.02	52.47	54.96	53.29	53.24	54.86	57.02	60.28	64.69	62.57	64.57	65.98	65.75	67.15	65.97
Connecticut	worried	55.55	55.34	60.11	56.15	56.08	59.02	66.11	64.03	68.8	68.35	69.66	69.66	67.89	69.1	70.17
Delaware	worried	51.73	52.57	56.33	52.84	52.64	54.92	58	57.84	63.38	61.12	63.65	64.42	61.73	62.85	63.13
District of Col	worried	59.02	61.34	66.14	65.66	65.23	65.12	69.23	70.62	72.63	74.97	74.27	76.01	74.82	76.05	76.7
Florida	worried	50.92	51.86	53.03	51.17	51.32	54.97	57.03	58.31	64.18	61.94	64.25	64.79	62.73	63.49	62.27
Georgia	worried	49.63	49.18	51.44	49.11	49.28	53.7	56.45	58.06	63.63	59.81	62.55	63.9	60.87	61.86	61.08
Hawaii	worried	57.6	59.5	65.52	64.35	62.41	63.85	69.56	68.53	72.07	73.63	72.66	65.23	69.36	69.9	69.31
Idaho	worried	46.91	46.84	47.64	41.99	45.24	48.58	51.34	52.42	60.54	55.21	59.45	59.36	57.45	57.74	57.41
Illinois	worried	51.66	50.93	54.96	54.8	53.23	56.48	59.11	59.09	64.66	63.73	63.76	67.91	64.6	65.81	64.79
Indiana	worried	45.98	44.82	45.61	45.1	44.87	48.17	45.95	49.03	56.85	50.66	53.87	56.89	52.88	54.03	54.02
Iowa	worried	48.73	45.89	49.64	50.91	48.57	52.96	54.77	52.98	59.71	56.24	58.23	60.96	56.78	58.08	57.63

Figure 1: Snapshot of cleaned dataset showing "worried" percentages by state, 2010–2024.

2. Paper Prototypes

Below are two key visual references used during the development process of our final visualization.

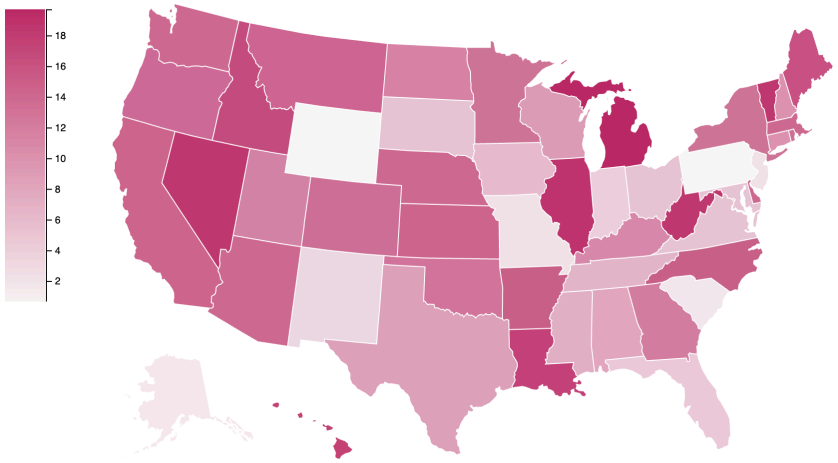


Figure 2: Base choropleth map, sourced from GitHub (Morris, 2021), which served as the base model for the visualization.

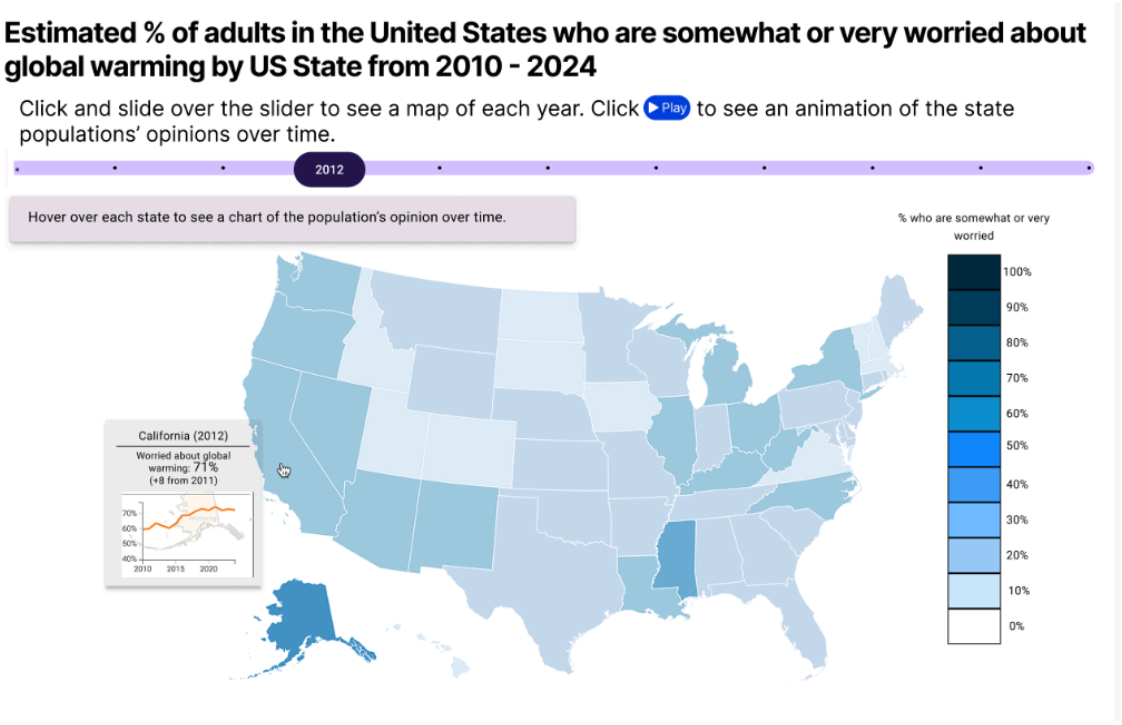


Figure 3: Prototype showing state-level concern about global warming with interactive features.

3A. Task Analysis

Our visualization presents estimated percentages of adults in each U.S. state who express concern about global warming from 2010 to 2024. It includes three primary visual components: a choropleth map that uses color saturation to represent state-level concern by year, an interactive line chart that compares selected states and the national average over time using vertical position and color hue, and a sortable HTML data table with annual concern percentages by state. The data table is screen-reader accessible and structured using ARIA standards for improved navigation.

Task 1: Compare Concern Between States and the National Average:

To compare levels of concern about global warming between specific states and the national average, users can examine both individual values and trends over time. For example, to answer the question, *In 2015, were residents of Colorado more or less worried about global warming than residents of Kansas, and how did both compare to the national average over time?*, a user might select 2015 on the slider or play the animation. On the choropleth map, they interpret color saturation (channel) applied to geographic regions (mark) to assess concern levels—e.g., Colorado at 54.9% and Kansas at 49.8%. They can then click both states to generate line plots, where line marks and vertical position and color channels allow comparison over time with the national average. The table, using text marks and numerical value channels, can optionally support exact value lookup. Together, these views support both momentary comparisons and long-term trend analysis.

Task 2: Determine Range of Concern in a Specific Year

To explore the variability in concern about global warming across states in a given year, users can perform a range-finding task. For example, when asked, *What was the range of climate*

concern across all U.S. states in 2010?, the user selects 2010 using the year slider. On the choropleth map, regions serve as the marks and color lightness as the channel, helping users visually identify the states with the lowest and highest concern levels. By hovering over the states, they access a tooltip that uses text as the channel to display exact percentages (e.g., Wyoming at 43.2% and Vermont at 67.8%). Subtracting these values gives the range (24.6%). As an alternative, the user can consult the HTML data table, where text is the mark and explicit numerical value is the channel, and sort the 2010 column to quickly locate extremes.

Task 3: Order States by Concern in a Given Year

Another key task involves ranking states by their concern levels in a particular year. For example, when asked *In 2022, order Utah, Oregon, Texas, and Florida from least to most concerned about global warming*, the user selects 2022 on the slider. They locate the relevant states on the choropleth map and hover to retrieve values via tooltips, or they directly consult the sortable data table. The map uses region as the mark and color saturation as the channel to give a rough visual ranking, while the tooltip and table use text marks and numerical value channels to support precise ordering. Based on this, the user can determine the correct sequence: Utah (57.5%), Texas (62.4%), Florida (63.5%), and Oregon (66.6%).

3B. Accessibility Analysis

For users accessing this visualization non-visually, such as those using screen readers, each task remains achievable through alternative interaction methods. Although the process may differ from visual navigation and sometimes be less efficient, the visualization has been designed to support inclusive access through structured HTML elements and descriptive content. To compare values across states and over time, a user can navigate to the accompanying HTML data table. This table includes clearly labeled column headers for years and row labels for states,

enabling the user to locate Colorado and Kansas and directly compare their 2015 values—such as 54.9% versus 49.8%. For broader, multi-year trend analysis, the user can either read across the row to follow value changes or listen to a screen-reader-only summary that compares selected states with the national average. To make this possible, the table uses semantic `<table>` elements with scope attributes, skip links or summary navigation aids, and alternative text descriptions. While this approach loses the speed and pattern recognition offered by visual trendlines and color cues, it gains in precision, allowing for accurate, keyboard-navigable comparisons.

To identify the range of concern in a single year, such as 2010, the user can sort the relevant column within the HTML table. By doing so, they can find the highest and lowest concern values manually. This task is supported by a screen reader live region that announces range summaries, along with clearly structured headers and rows. The trade-off here is the absence of quick visual scanning through color gradients on the map, but the user gains direct access to exact numerical values. To determine the order of states by climate concern, for example in 2022, the user can again rely on the sortable data table. After sorting the 2022 column, they can easily identify the relative concern levels of states such as Utah, Oregon, Texas, and Florida. Accessible sorting controls and the ability to filter by state name further support this task. While the loss includes the intuitive sense of geography offered by the map's layout, users gain the ability to extract values in a consistent, logically ordered format. In sum, while some aspects of the visual experience are inevitably lost in non-visual access, the design offers compensatory gains in numerical clarity, screen reader compatibility, and keyboard operability.

4A. Piloting

Before the piloting phase, we had a mostly-complete visualization and the three main tasks that we designed our visualization to accomplish, which were to compare values, determine range, and evaluate order, as discussed in the previous section. To evaluate our visualization's ability to support these three tasks, we conducted a piloting phase in which we observed a participant attempt each task using our visualization. One team member acted as the speaker, guiding the session using a standardized script, while the other took notes on the participant's behavior, confusion points, and task success. Below is the finalized script we asked our participant, followed by the notes from the pilot session and the adjustments we made after the piloting phase.

Unset

Speaker: "We are evaluating our visualization and are asking you, the participant, to complete some tasks using the visualization and then provide feedback about the visualization and experience. As a reminder, we are evaluating the visualization, not you as a participant, so you don't need to worry about being "right" as you complete these tasks. There are three tasks, followed by a brief feedback session. You may ask clarifying questions, but otherwise you should complete the tasks independently using the visualization. The whole pilot session should take under 5 minutes. Do you consent to participate?"

[Wait for yes]

Speaker: "Thank you for agreeing to participate. We will start with the three tasks. Please 'think aloud' as you complete the task, meaning voice what you are thinking as you work through the task. Your first task is to compare the levels of

climate concern between selected states and the national average, both in a specific year and over several years."

[Pause to allow the participant to complete the task]

Speaker: “Now, your second task is to identify the range of climate concern percentages across the U.S. states in a specific year. In other words, what are the highest and lowest concern levels that you can find?”

[Pause to allow the participant to complete the task]

Speaker: "Your final task is to evaluate the relative order of states by climate concern in a given year. Can you identify a general order from least to most concerned?”

[Pause to allow the participant to complete the task]

Speaker: “That is the end of the third task. For this last bit, we welcome any feedback you may have about the visualization or about your process for completing the tasks.”

[Allow participant to speak first, then informal discussion]

We conducted the pilot session with Claire Cocklin, a Biology major at Davidson. She began the first task by carefully reading aloud through the instructional content on the screen as she clicked through it. Initially, she hovered over a few states but did not immediately realize she could select them. After about 20 seconds of exploration, she discovered the selection functionality and compared Nevada and Wyoming, scrolling through the years and asking aloud what might have happened in 2018 to explain a visible shift in values. She then successfully located and used the bar for selecting a year and viewed the corresponding trends on the line graph, demonstrating increasing comfort with the interface as the task progressed.

For the second task, Claire initially misunderstood how to interact with the color legend. She hovered over several of the color bins one by one and attempted to infer patterns by watching the changes in the map. After about 10 seconds, she remarked, “Oh wait—I can click these?” and began using the bins more deliberately. Once she realized the bins were interactive, she clicked on the darkest and lightest segments and began analyzing which states corresponded to the highest and lowest levels of concern. She navigated directly to the year 2024 using the slider and was able to identify low-concern states such as Wyoming and West Virginia with ease. Compared to the first task, she completed this one more quickly, showing growing confidence in how to use the legend as a filtering tool.

The third task required more deliberate analysis. Upon reading the prompt, Claire quickly assessed the legend and said aloud, “I’ll select the bins one by one and look at the changes.” She then adopted a methodical strategy: clicking through each legend bin in order from the lightest (lowest concern) to the darkest (highest concern), carefully observing which states appeared with each selection. This top-to-bottom approach helped her mentally sort the states by concern levels, and she noted that the progression was “starting to make sense.” While the task demanded attention to visual encoding, Claire’s organized approach made this her quickest task to complete.

During the feedback portion of the session, Claire offered several helpful suggestions. Claire noted that the background color of the page (#d4d8ec, a light purple) blended too closely with the colors used in the map and legend, making the visual elements harder to distinguish. Based on this feedback, we changed the background color to a neutral gray (#e2e2e2dc) to improve contrast and overall readability. Second, Claire pointed out that being able to select a state while the year-to-year animation was running caused confusion and inconsistent behavior,

causing the selected state to change every year, even if the user didn't select a different state. In response, we disabled ability for a user to select a state while the year-to-year animation was running, and added a popup message that reads "Pause animation to select a state" to clearly communicate this constraint to the user, as shown in Figure 4.

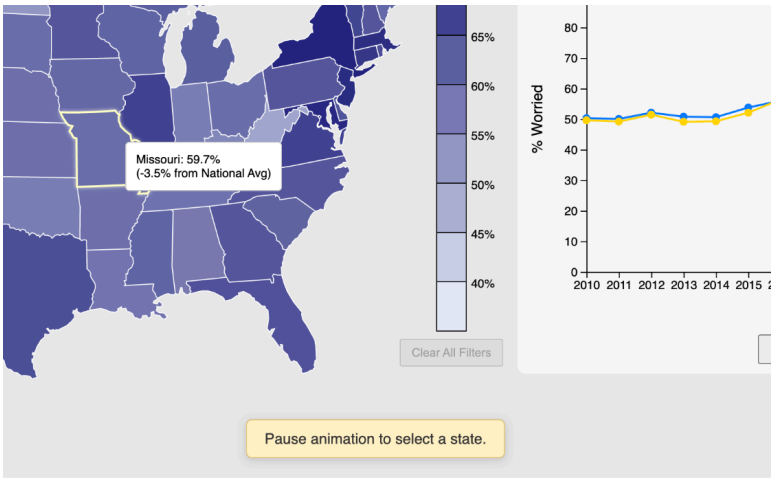
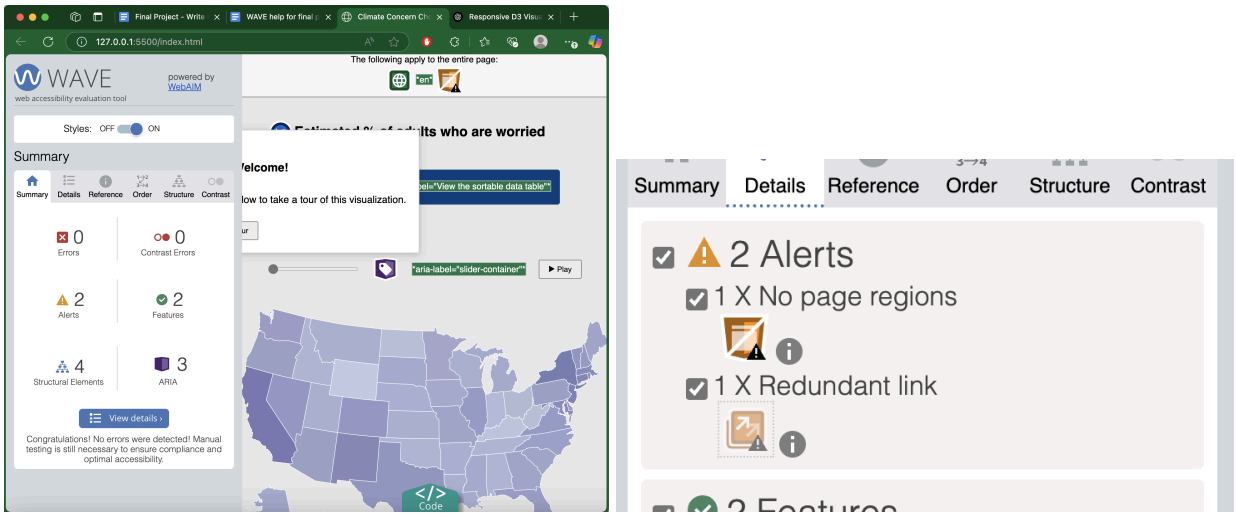


Figure 4: Popup alert shown when a user tries to select a state during the year-to-year animation.

Claire also provided feedback on the line graph interaction. As she selected more states, she noted that it became increasingly difficult to hover over the exact data point she wanted. Many of the points were close together or overlapped, and she expressed frustration trying to determine which state each point represented. She mentioned that it wasn't always clear which line or point was being highlighted during hover events. To address this issue, we implemented two changes: (1) we added a slight horizontal offset to each state's data points to reduce direct overlap, and (2) we enhanced the hover interaction by increasing the stroke width and point radius of the hovered line while simultaneously lowering the opacity of all other lines. These changes made it significantly easier to tell which state was being observed and improved clarity when multiple lines were present on the graph.

4B. WAVE Overview



Figures 5A and 5B: WAVE evaluation of the visualization before edits.

As shown in Figures 5A and 5B, running the WAVE accessibility evaluation tool on the initial version of the webpage revealed two key alerts. First, WAVE flagged that the page lacked defined regions or ARIA landmarks, which are important for screen reader navigation. To address this, we added a `<main role="main">` tag around the main content of the visualization to clearly define the primary page region for assistive technologies.

Second, WAVE identified a redundant link, which was a hidden `<a>` tag linking to the data table (data.html) that contained an image with alt text identical to the link's purpose. A visible, styled button linking to the same data table was already present, making the hidden link unnecessary and potentially confusing for screen reader users. We had initially included this hidden link to ensure that screen reader users could access the HTML data table, but later decided it was more inclusive to make that content accessible to all users. To resolve this, we removed the redundant hidden link and ensured that the visible "View Sortable Data Table" button included a proper `aria-label`, `role="button"`, and was incorporated into the Intro.js guided tour to enhance both accessibility and usability. These changes improved the semantic

structure of the webpage and reduced unnecessary or repetitive elements, making the visualization easier to navigate and understand using assistive technology.

5. Final Visualization - Link

6. User Testing

User #1 - Jamie Suarez, English Major

For the first task, comparing climate concern levels between selected states and the national average, Jamie approached the prompt by moving the year slider to 2015 and, after hovering over a few states, selecting Hawaii and Kentucky by clicking on each state on the map. After briefly hovering to check their values, she turned her attention to the line graph, saying, "Alright, I want to see how they've changed over time." She visually compared the lines for both states against the national average, observing, "Hawaii seems to stay consistently above the national average, while Kentucky consistently under the national average." Jamie completed this task smoothly, relying primarily on the visual trajectories in the line chart and interpreting their vertical positioning to determine general trends. She did not use the data table for this task, instead focusing on the graphical elements to make her comparisons.

For the second task, which asked her to determine the range of concern across U.S. states in a specific year, Jamie selected the year 2020 using the slider and began scanning the map. "So… I'm looking for the lightest and darkest shades," she narrated, hovering over various states to read their concern percentages. She clicked on a few to verify, then concluded, "Looks like Wyoming is one of the lowest, and California is up near the top." Her strategy was guided by visual contrast and tooltip feedback rather than numerical sorting. Although Hawaii was actually

the highest in 2020 (73.63% compared to California's 71.42%), her approach was reasonable given the task focus on a single year and the challenge of visually distinguishing between closely saturated colors.

For the third and final task, Jamie was asked to identify a general order of states from least to most concerned in a given year. She hesitated momentarily, commenting, "It's hard to tell the full order just from the map." She visually scanned the visualization for around 10 seconds, then she clicked the "View Sortable Data Table" button and then clicked the 2020 year, causing the states with the lowest percentages to appear at the top. As she read through the list, she began naming states aloud in sequence, saying, "Okay, Wyoming, West Virginia, North Dakota... then near the top, we've got Maryland, New York, and Hawaii." Jamie used the sortable table exclusively for this task, relying on the numerical precision and clear ordering it provided rather than interacting further with the map or legend.

In the feedback portion of the session, Jamie praised the flexibility of the visualization. "I liked that I could switch between visual stuff and the table," she said. She found the line graph helpful for comparing trends but mentioned that it became slightly overwhelming when more than three or four states were selected at once. For the second task, she suggested including a clear numeric display of the lowest and highest values near the legend to make range-finding easier. In summary, Jamie Suarez completed all three tasks successfully and demonstrated a thoughtful approach that varied based on the nature of each prompt. She gravitated toward structured data representations, favoring the line graph and data table over the more interpretive map elements. Her feedback affirmed the importance of offering multiple access paths to data, especially for users who prefer textual or tabular formats.

User #2 - Maggie Woodward, Biology major

For the first task, which asked participants to compare climate concern levels between selected states and the national average, Maggie took a more exploratory and visually-driven approach. She identified herself as a visual learner and she opted to skip most of the introductory tour and attempted to interact with the visualization while the tour was still active. This was a valuable point of feedback suggesting our tour might benefit from more interactivity or clearer guidance. To complete the first task, Maggie remained on the default year from the landing page (2010) and began selecting states of personal interest, starting with Colorado, then moving to California, New York, Arizona, Ohio, and Wyoming. She hovered over each to examine their concern percentages and compared them to the national average shown on the pop-up chart. She pointed out that states like California and New York seemed to align with her expectations of having higher concern levels. After clicking through the first five states, she tried clicking a sixth and noted the restriction message that appeared after selecting more than five states. Rather than using the slider to compare years, Maggie preferred to examine long-term trends directly through the line chart, which updates based on selected states. She stated that this gave her a clearer view of the patterns over time. For instance, she noted an upward trend around 2018 across several states and observed that trends notable in 2010 tended to persist over the decade. She unselected states mid-task to explore additional ones like New Hampshire and Vermont, further emphasizing her desire to see how regional concern varied and she noted that northeastern states seemed to exude more concern. Overall, Maggie completed the task accurately and used a valid strategy, favoring the view in the line chart over year-by-year map comparison.

For the second task, which asked her to determine the range of concern across U.S. states in a single year, Maggie selected 2024 using the slider. She began by scanning the map visually,

looking for the darkest and lightest shaded states, and then hovered to check exact percentages. She identified Massachusetts as one of the highest and Wyoming and North Dakota as among the lowest. After examining those and stating that those showed the lowest concern levels, she revisited the map and identified West Virginia, which “has an even lower value”. Though she did not use the color legend at all during this process, her strategy was effective. However, while she did identify West Virginia as the lowest for 2024, she did not correctly identify District of Columbia as the highest, so her method of hovering over and eyeballing the task was not fully accurate. Maggie later acknowledged that while the legend could have helped, she simply didn’t notice its interactive functionality, such as its hover over function and the selection function.

For the third task, which asked her to determine the general order of states by concern in a specific year, Maggie again relied on her visual scanning and memory. Based on her earlier hovering and selections, she listed New York, California, Vermont, Massachusetts, Washington, and Hawaii among the most concerned states. While she omitted several top-ranked states (like Connecticut, New Jersey, Maryland, and D.C.), her selections were still reasonably accurate. For the least concerned, she named Wyoming, North Dakota, West Virginia, Kentucky, and broadly referenced “a lot of the Midwest like Tennessee.” Though a few low-concern states like Arkansas, Alabama, and Mississippi were missed, her ordering was still representative of overall patterns, especially considering her approach didn’t involve the sortable data table.

During the feedback session, Maggie described the interface as intuitive and “easy to navigate.” She did, however, express surprise upon discovering that the color legend was clickable and could be used to filter data. She noted that had she known about it, she would have used it to complete the tasks more precisely. She also suggested improving color contrast on the

map, especially between closely related blue shades, to make visual distinctions clearer. “I liked this a lot,” she said, “but perhaps the color contrast could be higher.”

In summary, Maggie completed all three tasks using a highly visual, exploratory strategy. She did not rely on structured data like the data table or use the year slider extensively, but she was still able to form accurate conclusions using map shading, hover data, and the line chart. Her experience highlighted the need to make interactivity more obvious for users who skip guided assistance and perhaps acknowledge the discoverability aspect of our visualization.

User #3 - Penelope Hobbie, Hispanic Studies major

For the first task, which asked participants to compare climate concern levels between selected states and the national average, Penelope initially appeared uncertain about whether she should follow the introductory guide, asking aloud, “Should I go through the guide of what to do?” She proceeded by hovering over the states on the map and discovered some of the interactive elements, such as the tooltips showing concern percentages. However, she did not initially understand that clicking on states would populate the line chart view, nor that the slider could be used to change the displayed year.

Penelope made frequent use of the color legend, particularly its interactive features, toggling bins on and off to better isolate state concern levels. She stated an interest in viewing 2024 and used the slider to navigate there. She commented that “there's not a lot of states that are *really* worried,” noting that the highest percentage did not increase above 75%, and began observing patterns over time by manipulating the slider and watching the map shading evolve. Once she discovered that states could be selected and tracked via the line chart, she selected Alaska and observed that while it was below the national average in 2024, it remained close to

the average across the entire decade. She identified a similar trend for North Carolina, though she noted that it was above the national average in 2024.

In the second task, which asked her to determine the range of concern across states in a specific year, Penelope chose to examine 2020. She used the legend effectively again, clicking through the highest percentage bins and selecting New York, which she identified as having the highest concern level. Though this was not technically correct, as D.C. and Hawaii were higher, her oversight may have stemmed from the small size of those regions on the map, making them harder to spot or click. She then encountered some difficulty unselecting states, before noticing and using the "Unselect All States" button. Penelope repeated her legend-based process for the lower concern bins, comparing Wyoming and West Virginia before determining that Wyoming had the lowest level of concern in 2020, which was accurate.

For the third task, which required her to rank states by concern level in a given year, Penelope navigated to 2014. She immediately observed a marked difference in national concern compared to later years, noting, "Wow, no one is concerned." She toggled through each increasing legend bin and selected one state from each: Oklahoma, North Carolina, Washington, Massachusetts, and New York. She used the line chart to compare these and successfully ordered them from lowest to highest climate concern for that year. This strategy led to an accurate outcome and demonstrated her comfort using the filtering tools to support reasoning.

During the feedback session, Penelope praised the interface tools, especially the interactive legend and filtering capabilities, which she found essential for interpreting the map: "The filters were really helpful—without the filters, it's hard to see how the shades are different from each other." She also appreciated the Unselect and Clear buttons, stating they made it easier to manage her exploration.

In summary, Penelope relied heavily on the legend and filtering functions to complete all three tasks. Although she initially overlooked some of the deeper interactive components (like state selection and the year slider), she adapted quickly and used a structured, thoughtful strategy to identify patterns. Her experience underscores the value of clearly visible and usable filters and offers insight into how small or less-visible regions might be overlooked without stronger visual emphasis or navigation aids. Notably, Penelope did not use the sortable data table.

7. Personal Reflection

Looking back on the process of designing and building our data visualization project, I'm struck by how much growth took place from our initial idea of exploring climate opinion data to the final interactive model. One of the most challenging stages of the project was transitioning from sketches to code. Our early prototypes made intuitive sense on paper, but implementing them in D3, especially with the integration of the original GitHub choropleth map and our custom dataset, required constant problem-solving. Building the line chart interactions, coordinating the hover behavior, and making accessibility adjustments all tested my ability to think both visually and programmatically.

Another unexpected challenge was formatting. Since we were working with multiple SVG elements, including the choropleth map, the line chart, and the legend, plus buttons, pop-up windows, and tooltips, aligning everything cleanly required a lot of trial and error. We constantly adjusted margins, padding, and viewboxes to get things to feel balanced and cohesive. Making sure that elements didn't overlap, that the layout looked consistent across screen sizes, and that the interactive features didn't break the design structure was trickier than I anticipated. It gave

me a new appreciation for layout logic and for how even small spacing issues can affect the overall user experience.

The piloting session was also a crucial moment in the project, offering fresh insight into how someone unfamiliar with our interface might interact with it. Claire's feedback was incredibly helpful, she pointed out things like color contrast issues and the confusing behavior when selecting a state during the animation. But looking back, I also think it might have been useful to do an initial feedback session with someone from our class. While Claire offered valuable outside perspective, someone who had been thinking about user tasks, data marks, and encoding channels all semester might have been able to offer more targeted critiques early on, especially around interaction design and visual consistency. Ultimately, I found it especially rewarding that we were able to completely reimagine the dataset's original visualization and turn it into something that not only represents a topic I care about, but also invites others to explore it in a meaningful way. Transforming a static dataset into an interactive, layered experience made the project feel creative and personal. Overall, I'm really proud of how the final tool turned out, especially the visual and interactive elements, which made the experience both engaging and informative for users.

8. References

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