



HOW ARE EUROPEAN VIEWS ON POLITICS AND SOCIETY CHANGING?

COM-480 Data Visualization

Process Book

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CHART TOPPERS

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MISSION STATEMENT

Our website aims to distill a sprawling, multi-year survey of disparate European countries into a concise but visually striking story about the ideological divide between genders. We empower users to explore gender-based ideological differences by country, generation, and time on an unbiased platform with guardrails that prevent information overload. Our visualizations target this goal by balancing simplicity with robust user freedom.

INTRODUCTION

INSPIRATION

When exploring potential project ideas, we discovered an article published in The Economist entitled “Why young men and women are drifting apart.”¹ This article employs data from the European Social Survey (ESS) to illustrate the ideological drift occurring between young men and women in Europe. Upon investigating the ESS online platform, we found a wealth of data accessible via a simple portal but no public-facing tool that could enable us to readily glean insights from said data. We soon decided to pursue a project that could fill this void by presenting a subset of the ESS data in a format that (1) builds on The Economist’s gender-based analysis, (2) allows users freedom educational exploration, and (3) demonstrates the value of ESS data to the layman.

Selecting a handful of variables from hundreds was no easy task. Ultimately, we read through the entire ESS data dictionary and documented those ideological, behavioral, or lifestyle variables we believed could yield fruitful analysis along the lines of gender. Knowing further that we wanted to ‘shield’ viewers from having to learn data particulars, we decided to focus on ordinal variables so interpretation would exist along the lines of “more” or “less”. Further filtering depended on the data preprocessing explained in the next section.

¹ Why young men and women are drifting apart. (2024, March 13). *The Economist* (US).
<https://www.economist.com/international/2024/03/13/why-the-growing-gulf-between-young-men-and-women>

DATA PREPROCESSING

We organized our variables of interest into seven categories based on similarity of the topic addressed (for example, "How often do you pray?" and "How religious are you?" were grouped together because they both addressed the respondent's religiosity). We then mapped each variable to the range [1,6], where 1 indicates the respondent answered with the lowest value of the provided range and 6 the highest value of the provided range. Finally, we removed any variables uniquely missing data relative to other variables in their category or any variables not at least moderately positively correlated with other variables in their category. We were left with 16 variables across seven categories; intra-category variable indices were averaged to create one aggregate index per category. These we calculated by age, gender, and year as needed for visualizations.

TECHNICAL TOOLS

For our foundation, we utilized the React HTML framework, CSS, and JavaScript. We employed Python, specifically the pandas library, for data processing tasks which included creating and aggregating indices for our categories of interest, grouping survey respondents into age cohorts, and verifying intra-category variable correlations. D3.js served as our primary resource for accessing the elements necessary to create dynamic, interactive data visualizations hosted in a web browser. We also utilized the Tailwind CSS framework and imported various libraries to support our development, specifically for our map and slider implementations.

IMPLEMENTATION

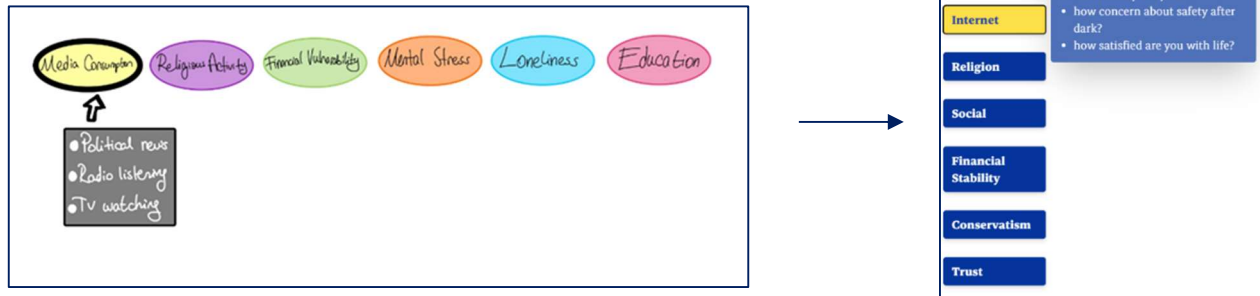
COLOR CODE SELECTION

For our website's primary colors, we selected the colors of the flag of the European Union: navy blue and yellow. We emphasized this palette on our landing page and our category buttons in particular. This palette was a logical choice given the nature of our dataset.



BANNER OF CATEGORIES

Our seven categories are included as buttons on our site which, when clicked, populate each visualization with pertinent data. Users can also hover over the buttons to see which variables are aggregated in a category. Initially, these buttons were in a horizontal hover-activated banner near the top of their browser. They were subsequently moved them to a hover-activated vertical banner on the left so they obscured less content, and they use the EU color palette.

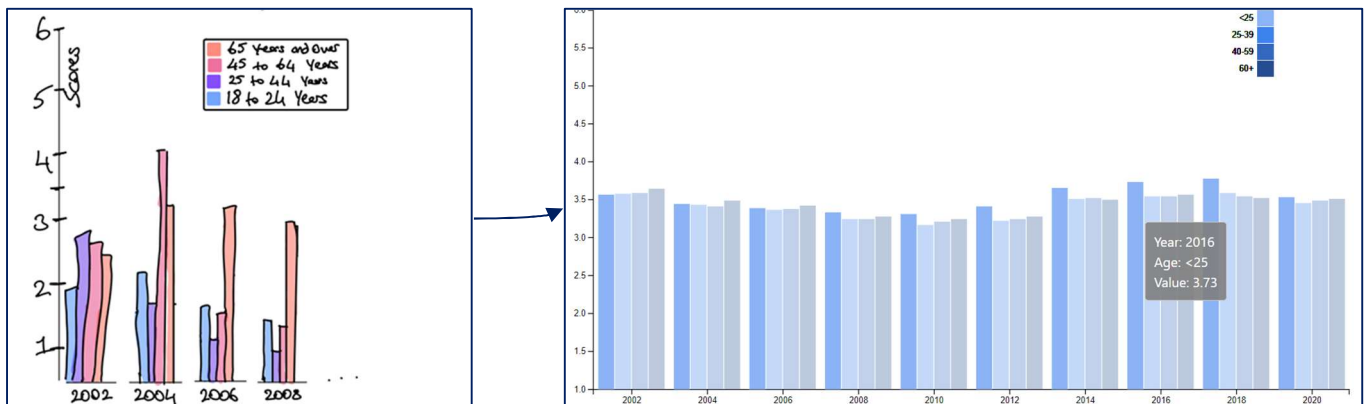


BAR CHART

Our first visualization is a bar chart intended to orient the user to our dataset. The chart displays a Europe-wide average of the active ('clicked') category over time for four different age cohorts: <25, 25-39, 40-59, 60+. Users should glean trends in our variables of interest using this bar chart before delving into gender disparities, acclimating themselves to our data and the fact that it can be stratified age-wise.

We initially had difficulty showcasing trends given our relatively stable data. This inspired the decision to highlight an entire age cohort when the user hovered over one of its observations, thereby pushing away the 'noise' of other data when one cohort is under consideration.

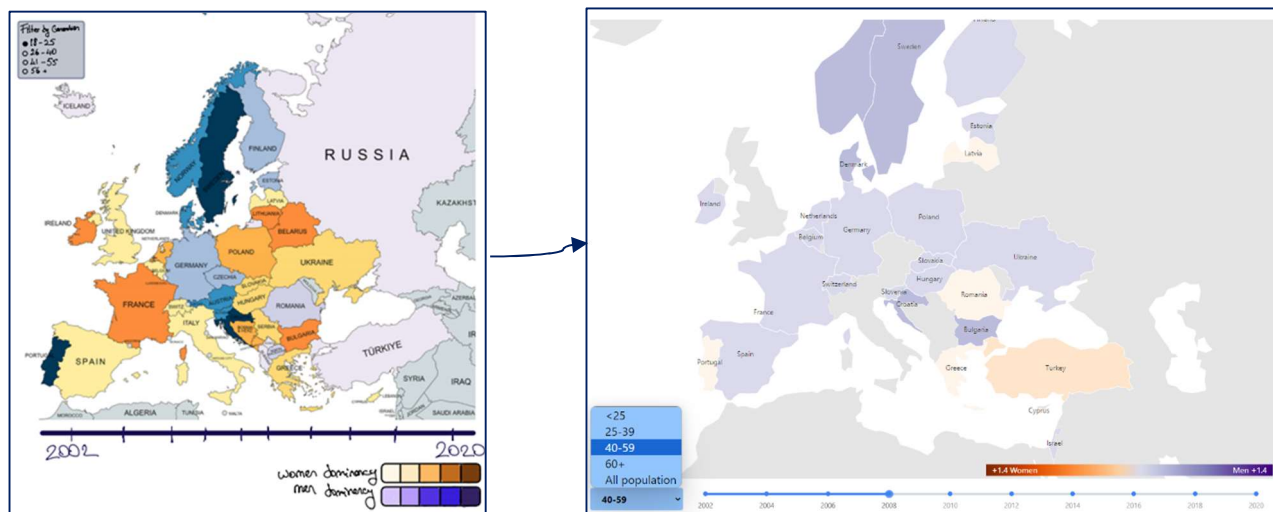
Another change we made from our initial plan was to use four shades of the same color for our



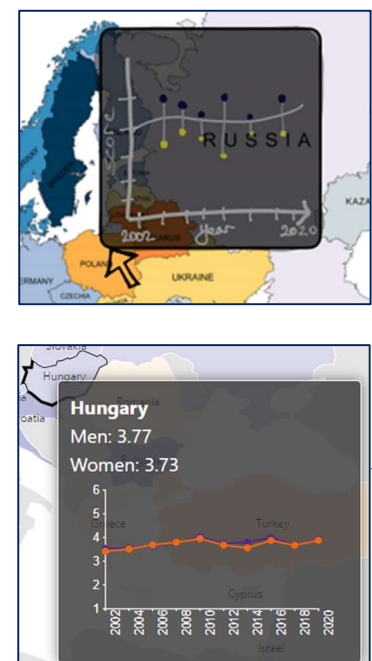
cohorts rather than four separate colors. The gradient in color aligned with the gradient in age, enabling users to encode the stratification by age sooner.

CHOROPLETH

Our second visualization is a choropleth map of Europe. When women have a higher index value than men for the active category, the country is shaded orange. The country is shaded blue when the opposite is true. Originally, we intended to show two axes beneath the map: one for each gender gap scenario. However, we realized this implied each country could exist on both axes, when in fact each can only exist on one. This is why we concatenated the gradients and displayed the concatenation as one legend. Making the age filter a dropdown list next to our timeline was another change made to the initial design. Filtering is now more user-friendly and contained to one area.

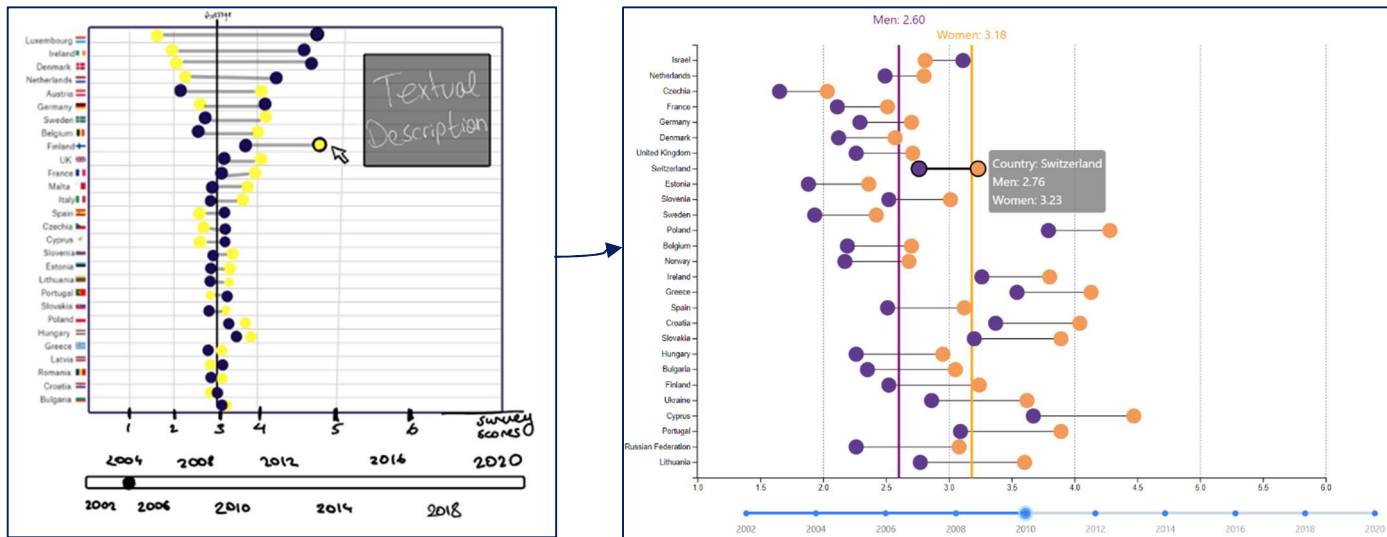


To declutter the display, we removed names from countries without any ESS data in a given year. To enhance usability, we focused the map view specifically on the EU region, creating a consistent visual scope. Finally, we implemented the informative, hover-activated pop-up boxes with country-level history for the active category almost exactly as envisioned – except in our final visualization we include the specific category index value for the country being hovered over and, for ease of readability, make minor changes to how the gender-stratified line graph appears.



ORDINAL COUNTRY LIST

With the choropleth map, we provide a geographic overview of a metric's evolution and highlight outliers. Meanwhile, our ordinal visualization emphasizes cross-country comparison by displaying country lists ordered according to the magnitude of the active metric's gender disparity in a given year. For consistency, we match our color palette to the choropleth map rather than our original design, preserving the strict EU flag palette for elsewhere.



As planned, an automated description of exact numbers pops up next to hovered-over points, though we excluded stratification age-wise to prevent information overload. Instead we decompose the originally planned global average into two averages: one for men and one for women. This allows the user to scan through time and encode the evolution of the gender gap magnitude. We can confirm that it is a delight to trace a country's ranking through time using this visualization tool.

One challenge we faced with this visualization was accommodating missing data. Rather than disappear, year-category combinations with missing data would simply retain the values from the most recently visualized non-missing data. This was solved by removing the color from observations when missing data was encountered.

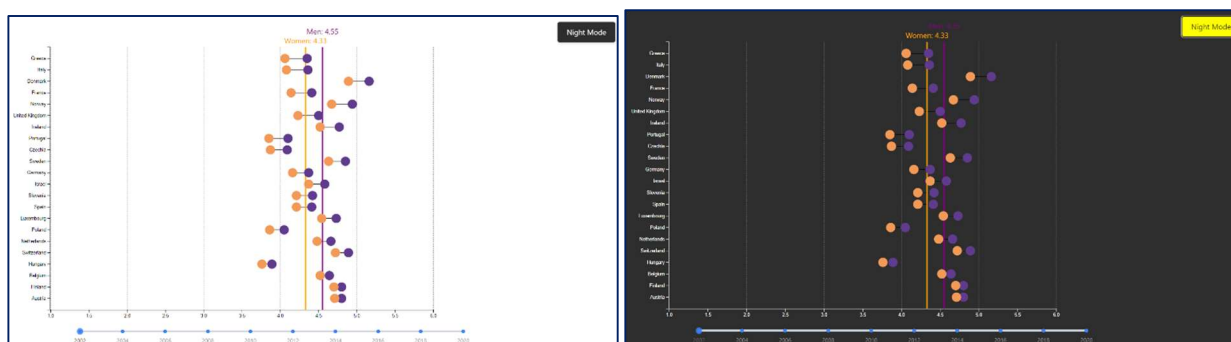
HIGHLIGHTS SECTION

We include a summary section as our website's final screen. The eye-catching boxes are highlighted with vibrant versions of our website's two primary colors. Rather than list every possible insight from our visualizations, we believe concise highlights will encourage users to explore categories they haven't yet seen on their own.



NIGHT MODE

Our choropleth and ordered country list visualizations are dense, and it is not unreasonable to assume some users would peer over their details at night. This contingency along with the widespread practice of setting default browser settings to night mode encouraged us to implement a night mode feature into our site. We sought an efficient color palette to ease the transition between the two site versions. As shown in the figure below, website text changes to white and the background to black or dark grey across all visualizations when moving from the base website (left) to night mode (right).



CHALLENGES

MAP COMPONENT

Most challenging for us was editing the map component for the choropleth visualization. This is because existing geo-data can be restrictive, whether due to discrepancies in country names (eg 'England' in geo-data versus 'United Kingdom' in our data) or variations in the set of countries visible during rescaling. This latter challenge we solved by resizing the frame along with all linked/related components to maintain the overall layout.

INTERACTIVE ELEMENTS: IMPLEMENTING TOOLTIPS AND FILTERS

Interactive elements on visualization 3, the Ordinal Country List, were difficult to implement. Tooltips and filters, while essential, proved to be rather complicated. Tooltips were particularly challenging because they required careful positioning and styling to ensure displayed information didn't obstruct the rest of the view. Ensuring tooltips dynamically adjusted to user-selected data required deep integration with the underlying data structures. Additionally, filters had to be robust and intuitive, allowing users to seamlessly switch between different variables and years. This necessitated the creation of a user-friendly interface that could handle multiple interactive elements simultaneously without overwhelming the user.

HANDLING MISSING DATA

Another significant challenge was dealing with missing data. This issue was prevalent due to inconsistencies in questions asked and countries included throughout different ESS rounds. We wanted the visual representation of missing data to be clear: data indicators disappear or turn grey for missing data, preserving the integrity of the visualization. This involved implementing fallback mechanisms and default values to ensure visualizations did not break or display misleading information.

SLIDER IMPLEMENTATION

Integrating year sliders added another layer of complexity to the project. Sliders had to be intuitive and responsive, allowing users to easily navigate through the years and see corresponding data updates in real-time. Transitions needed to be smooth. Additionally, the slider needed to be visually integrated with the rest of the interface, else it would disrupt the consistency of our design language and trade form for function.

PEER ASSESSMENT

We are a team and we behaved like one. Our first meeting involved each of us bringing 1-2 ideas for a project to the table. At our second, Kaede and Davide investigated the ESS data, developed prototype categories, and along with Nil imagined a rough story to tell. Nil helped solidify this story into tangible visualizations and created the initial sketches from which all our progress would flow.

Kaede was responsible for processing the ESS data by normalizing constituent variables and creating indices. Later, upon Nil and Davide's feedback, he revisited category definitions to ensure uniform data availability and exclude non-positive correlated variables. Davide and Nil used this data to create visualizations 1, 2, and 3; while Davide was primarily responsible for visualizations 1 and 3 and Nil created visualization 2, they assisted one another, and all three of us held meetings during the semester to discuss ongoing progress and settle on ultimate designs.

Each person played some role in writing the website text or codebook. We have worked together closely ahead of the deadline to proudly pull together our result.