

AVOIDING MISLEADING MAPS: ENCODING AND DECODING

2018 MIDTERM ELECTION RESULTS IN GRAPHICS

Yanqi Xu

David Herzog, Project Supervisor

ANALYSIS

Online news media nowadays has the capacity to communicate election results to readers in real-time, a feature once enjoyed exclusively by their broadcast counterparts. People do not need to wait till the next day to see the results in print but can follow races closely on election night. Many news organizations provide graphical representation of election results, incorporating tables, maps and charts on their websites.

From the print age, online newsrooms have adopted the shaded area, or choropleth map to display the big picture of the country's political landscape while enabling the audience to find results for a certain state. On election night, the area of the United States became gradually colored by the winner's party in each state or district. Some interactive maps also provided context for races in each state, district and county.

Alicia Parlapiano, a *New York Times'* graphics editor, once conceptualized the two main qualities of accuracy and accessibility of election graphics (Global Editors Network, 2017). While the choropleth maps are accessible for the general audience, they often overrepresent loosely-populated districts and underrepresent many urban districts.

For this project, I interviewed nine data visualization designers and developers who've studied or produced election graphics for different newsrooms to examine their approach to optimizing accuracy and accessibility for readers. They represent a

variety of news organizations, mostly with an emphasis on the online presentation of election graphics (see biographies).

I have three main findings: First, many newsrooms are increasingly compensating for the disproportionality of choropleth maps between votes and areas. Second, newsrooms design their visualizations according to their resources and target audience. Finally, few newsrooms have formal avenues for readers' feedback but increase readers' literacy by exposing them to new forms of visualizations.

Unlike other types of web pages, an election map live results page usually needs to handle a large volume of traffic in a relatively short period of time on election night. The graphics used for analysis afterwards will usually have more variations of graphics to illustrate the trend of vote change, and especially the "shift of power" aspect of the election. On the night, however, the results page is usually dedicated to answering the specific question of "who wins where." The interviewees in this study spoke about the readers' curiosity to find out if there was a "blue wave" favoring Democrats in the U.S. House of Representatives.

Redesigning Election Graphics

Interactive features added to the election graphics usually allow a reader to click through or hover over each district. Tooltips, or pop-ups, will appear with information about candidates as well as their party affiliation, vote counts, vote share, incumbents, the progress of reporting, and the winner.

Notably, [*The New York Times*](#), [*The Washington Post*](#), [Bloomberg](#) and [Axios](#) had tabs for different views of the election results, breaking down categories of races including the House, Senate and gubernatorial races, and some still featured key races. Many offered a cartogram (an abstract form of visualization that maps the

location of each geographical area according to the weight of each unit of area) and a map view, at least for the House race.

The Guardian interactive editor, Josh Holder, said it's appropriate to use a cartogram for a webpage with interactive functionality because readers are able to access more in-depth information. In contrast, they almost “overwhelmingly will use a geographic map” in print papers because of the inability for readers to drill down to smaller units by hovering and searching.

Striking a balance between accuracy and accessibility

“Political representation is about people, and not land,” Bloomberg graphics designer Mira Rojanasakul said. The Bloomberg graphics team designed an election results page that defaults to a cartogram view of House results.

Parlapiano said a choropleth map is not wrong or inaccurate, but it sticks to the geographical representation of where voters live, so more visualizations are usually included to paint a full picture. Hurt echoed this point, saying that the choropleth alone lacks nuance.

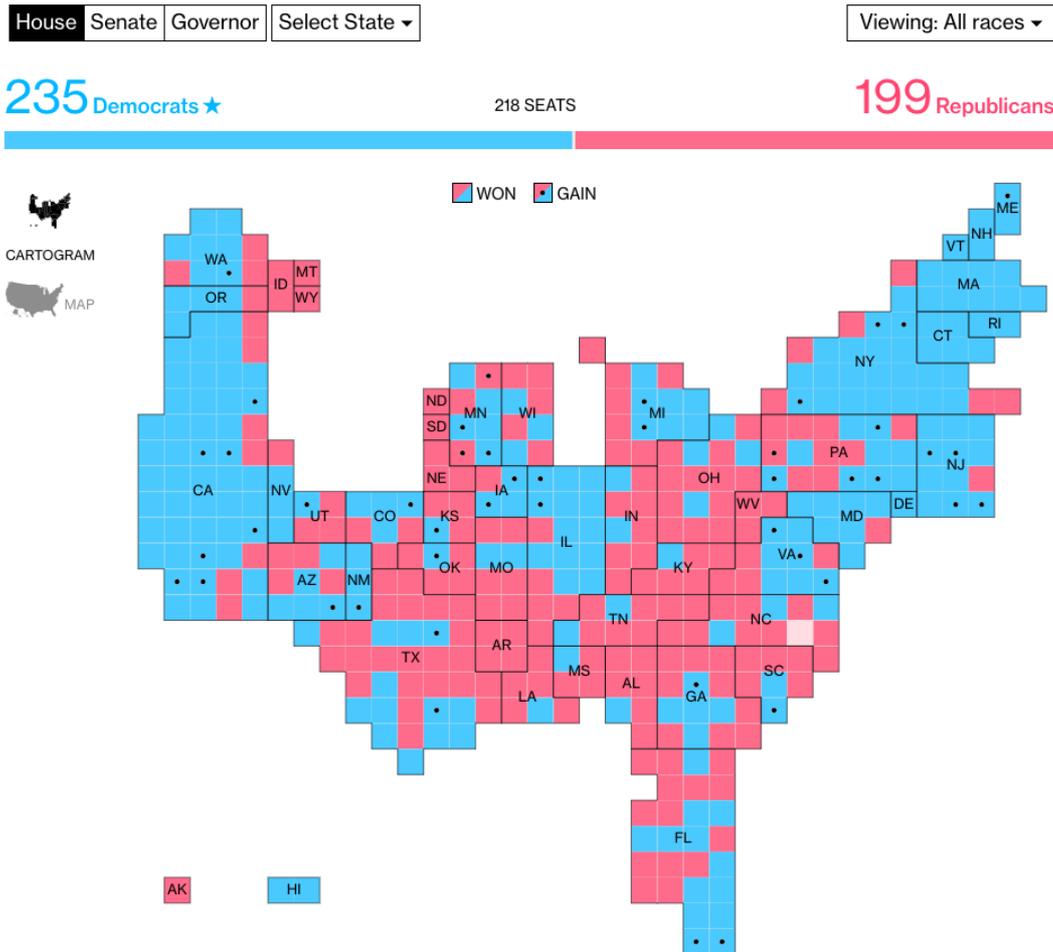


Figure 1 2018 MIDTERM ELECTIONS, House Election Results In Bloomberg, November 7, 2018, Retrieved April 10, 2019, from <https://www.bloomberg.com/graphics/2018-midterm-election-results/?view=H&filter=none>

A handful of newsrooms have included cartograms in their coverage in the past, particularly for forecasting in the runup to the election to illustrate how candidates can win 270 electoral votes. They tapped into the advantages of equal area characteristics of cartograms for analysis purposes, but most stuck to choropleth maps on election night.

Holder said that generally, cartograms are good for displaying the balance of power after the election is concluded, but a choropleth does a better job when the election is ongoing to show geographic trends.

Hurt also said that a candidate doesn't necessarily win all the delegates of a single state, for example, in Maine and Nebraska. Each candidate may share the number of delegates' votes with other candidates based on their vote shares and to color a state will fail to represent the results in the most truthful way.

Besides the disproportionality of votes and areas, Axios graphics editor, Lazaro Gamio, also pointed out that some districts are too small for readers to separate them from other districts and click through to view results properly, especially on mobile devices.

In a cartogram, each area is equal in weight. It is not only more accurate but helps to solve the problem of clustering small districts.

No newsroom whose election graphics were examined in the page displayed a choropleth only as the main visual in the 2018 midterms. Most included cartogram views and some scrapped choropleth maps altogether.

However, cartograms fall short in accessibility. In some renderings, readers can find it hard to understand what they are looking at quickly. For a cartogram, the shape of each state isn't fully retained by the graphical representation of tiles or blocks. Therefore, readers rely on an important visual encoding — geographical location of each state — to make sense of what the tiles or blocks correspond to. Looking at the cartograms, readers interested in each state's results will normally need to have some knowledge of where the state of interest is located in the country, or use labels to find each state. Holder also mentioned that building a cartogram to match the number of votes will distort the northern U.S. boundary because sparsely-populated states like Maine and Wyoming will shrink, and northeastern states will appear larger in size.

Squares (Bloomberg, *The New York Times*) and hexagons ([The Guardian](#)) are common units to form a grid to represent each state. Sometimes each state is

represented by individual boxes sized to their electoral weights ([NPR, 2016](#)). visualization designers arrange the elements on a canvas. There is no uniform way to present each state in cartograms, and the audience would need more visual cues to discern each state. Most recently, refinement of election maps revolved around increasing the legibility of each state. Usually, annotations of states abbreviations are added, and the tiles are often used to approximate the shape of the states.

For the 2018 election, Bloomberg toned down the color scheme of the cartogram and made it easier to label the states accordingly, Rojanasakul said. They also labeled the seats gained by a certain party with dots.

For the governors' races, *The Guardian's* visuals team first considered mapping governors' power according to the number of constituents but finally decided to go with a regular map layered with each hexagon for a governor's seat, so the states are easier to locate, but each visual cue and hexagon carries the same weight.

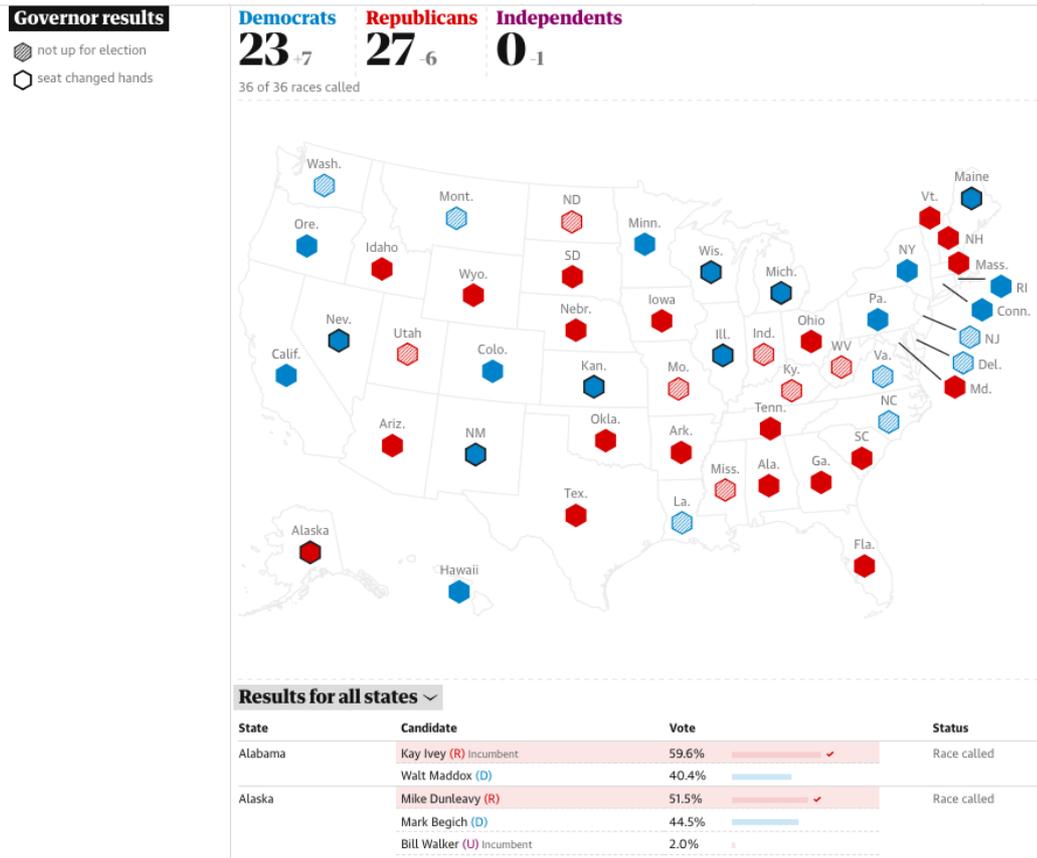


Figure 2 Governors' race in US Midterms 2018 Live Results
 In The Guardian, November 7, 2018, Retrieved April 14, 2019, from
<https://www.theguardian.com/us-news/ng-interactive/2018/nov/06/midterm-elections-2018-live-results-latest-winners-and-seats>

FiveThirtyEight, though, took another approach to emphasize the populations of states and visualized gubernatorial races in a variant of a tree map (they also have a traditional choropleth below), where rectangles representing each state were sized to match its relative population.

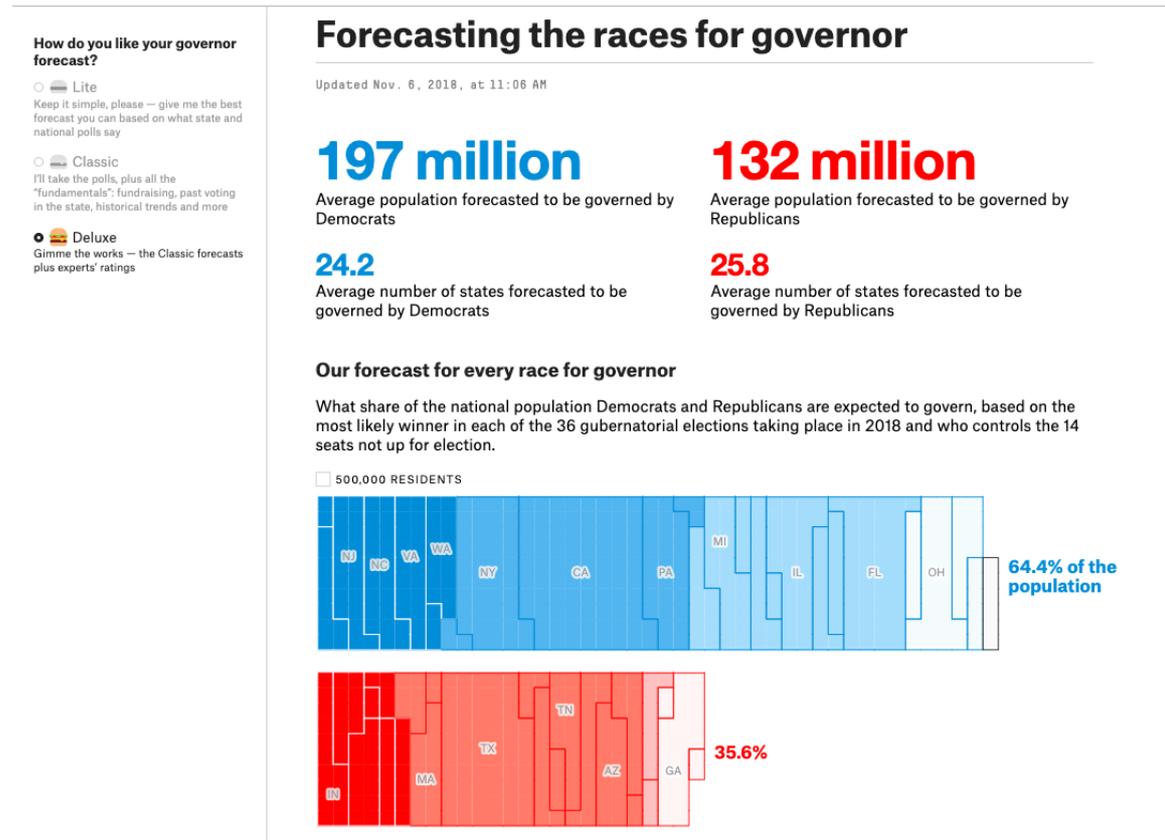


Figure 3. Top chart in *Forecasting the races for governor* in *FiveThirtyEight*, November 6, 2018, Retrieved April 14, 2019, from <https://projects.fivethirtyeight.com/2018-midterm-election-forecast/governor/#deluxe>

Interestingly, while Bloomberg and Axios had a map view and cartogram view for all three races, *The New York Times* and *The Washington Post* only had a cartogram view for the House race, emphasizing the comparison of total House seats held by both parties but leaving geographical areas as is for other races. Reuters embraced a different approach: they used a grid map for the [Senate](#) and [governor](#) races where the number of seats are fixed, emphasizing the equal weight of senators and governors but falling back on a map view for the [House race](#), making it easier for readers to find a specific House district on a map.

Revising the choropleth

For the choropleth maps in the 2018 election results coverage examined in this study, many news organizations made modifications to the traditional state-by-state

choropleth maps they produced. Many defaulted to the House view in which the choropleth is broken down into districts. No newsroom examined in this study used shades of red or blue to represent a party's level of dominance, measured by vote share in each district or state, which was commonly seen in the 2016 presidential coverage, especially in county view. For live coverage on election night, though, some used color opacity to show the progress of reporting, with darker red or blue representing more complete vote counts, and lighter colors representing relatively small portions of reported votes. Many do have county-level results view through zoom. Quite a few newsrooms also added borders or dashed lines to represent flipping seats.

In a winner-takes-all system, designer Lisa Charlotte Rost points out that both choropleths and cartograms only tell the story of the winning party and do not capture popular votes. Rost, a German native, suggested having graphics portraying the share of [popular votes](#) alongside maps or cartograms, so that journalists do not reinforce the stereotype that people vote for a certain party if they are from a certain state.

To convey the nuances of each state, an option is to map results by county level. Nonetheless, a more detailed map is likely to even give Republicans more weight because of the strong lead in large rural areas. Parlapiano said it also makes it more difficult for people to add up the votes and see the statewide winner and results.

It doesn't have to be interactive

Some newsrooms, including *The Wall Street Journal* and NPR, scaled back from their visualizations of a national map in 2018 and published a big board of all races. Hurt said these table presentations still conveyed the key information throughout the night for people to see how toss-up states are colored.

Smaller graphics teams show a tendency to use static graphics with simple circles representing seats and bar charts to show vote counts and avoid maps to represent the results in a straightforward way. [Vox](#) made a semi-circle chart representing the House chamber colored by each representative's party affiliation. [BuzzFeed](#) designer Zachary Ares said that their graphic was to imitate "magnets on whiteboard" with stacked circles colored differently.

Although BuzzFeed News and Vox built graphics to represent the House seats populated with real election data in the back end, neither of the graphics was interactive. Developer Ryan Mark at Vox said interactive design for mobile devices usually requires a fundamental redesign of the desktop experience, so he finds himself dropping interactivity in a crunch.

Customizing design for a specific audience

Another finding from this research is that newsrooms usually tailor their approach to designing election graphics for their specific audience. Smaller newsrooms usually don't reinvent the wheel by duplicating what the national newsrooms are doing but invest in producing their niche graphics products. Vox for example, incorporated analysis and explanation of the race in the election graphics page. Mark said he considered maps to be overused since the encoding of shapes of states doesn't really give readers much new information while taking up a considerable portion of screen space, and that the core audience of Vox will mostly care about the direction into which the 2018 midterms will lead the country.

[FiveThirtyEight](#) prioritized its forecast generated by modeling and led their forecast with a histogram showing a 7 in 8 probability of the Democrats winning the House. Aaron Bycoffe said that they considered the overall trend to be the primary focus of the graphic, and readers can click through the cartogram to view states'

forecasts. They also eliminated the fields of key states they highlighted in [2016](#) but streamlined state coverage in the click-through view.

The Guardian's Josh Holder said that while the 2016 presidential election graphics were created by the U.S. team for a U.S. audience, the 2018 Midterms results graphics page was completed by the U.K. team and sought to face an audience from around the globe who would care more about the overall trend instead of their own districts.

One map doesn't answer all the questions

Rost said that a mix of different forms of visualization helps to portray different facets of information in elections.

Unlike most other news organizations I interviewed for this project, *The Guardian* had different views for House, Senate and governors' races results. For the House results, they used hexagons, which they also used for Brexit, and other voting events to approximate the shapes of each state. They left white spaces between state boundaries. Holder said they considered using a cartogram, but found that going that route added too many complexities for the readers to unpack.

The Guardian also did not use a cartogram throughout the page. They led with the chart representing battleground seats in Congress.

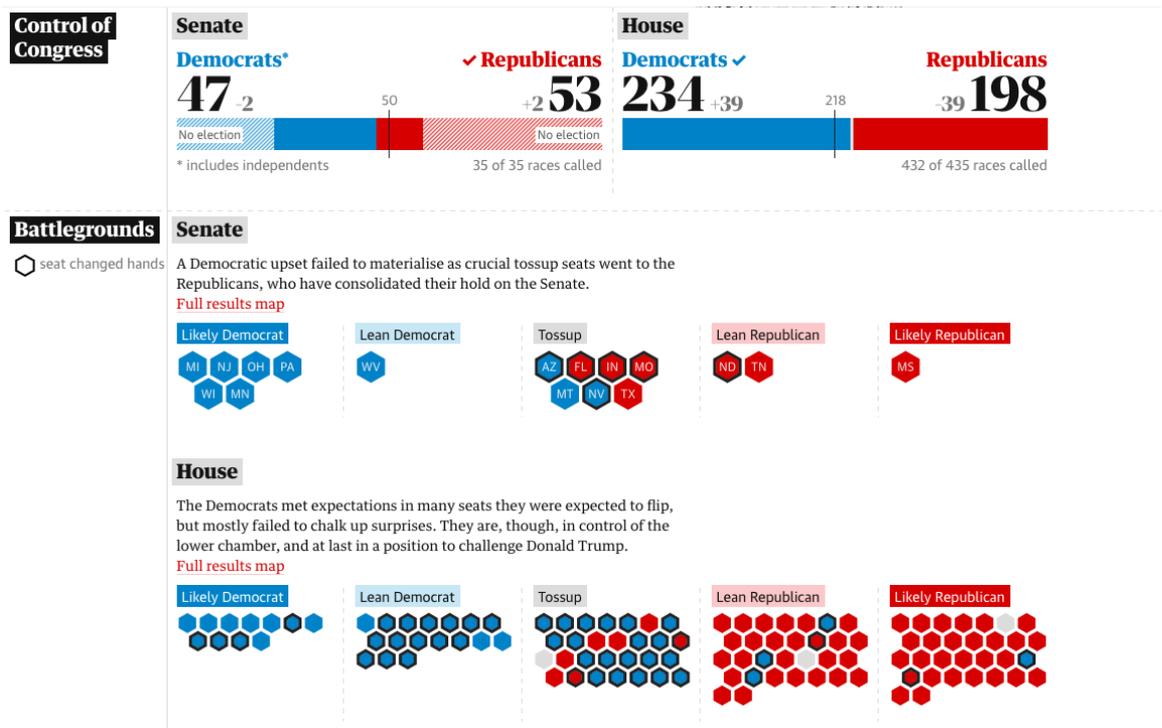


Figure 4 Top chart in US Midterms 2018 Live Results
 In The Guardian, November 7, 2018, Retrieved April 14, 2019, from
<https://www.theguardian.com/us-news/ng-interactive/2018/nov/06/midterm-elections-2018-live-results-latest-winners-and-seats>

For election night results, Holder pointed out that because Northeastern states results are called first, and that the states mostly turn blue, it might mislead the readers to believe that Democrats are gaining sweeping grounds at the beginning of the election night. As a result, the team pinned the battlegrounds chart at the top. Holder said that the 2018 election results were built by the U.K. team to focus on a global user experience for readers around the world to come in and quickly tell the winners.

FiveThirtyEight showcased a histogram of the probability of the Democrats controlling the House. The website also displayed many trend line charts and probability graphs that demonstrated results from its statistical analysis. On election night, they utilized live forecasts to predict winners of each district and compared the

actual results of each seat to the likelihood of winning predicted by the website in a waffle chart. These key races show an emphasis on the polling.

Different designs for different mediums

Graphics for one particular medium often requires redesign for another because of different screen/page size, and aspect ratios. Legacy newsrooms like *The New York Times* and *The Guardian* preferred choropleth maps on paper for the second day's print edition. Alicia Parlapiano mentioned in a [talk](#) previously with Seoul Editors Lab (Global Editors Network, 2017) that with more space on the spread, print graphics prevail in displaying more detailed view and juxtapose different graphics because of a larger page size.

BuzzFeed's website did not display a cartogram, or a map for their Midterms live results web page. Zachary Ares, BuzzFeed graphics designer said they focused more on the mobile experience and prioritized the speed of displaying results for the live show that BuzzFeed streamed. They produced shaded area county maps for their show Election Night Live and prioritized reporting on certain key races in states like Florida and Georgia. Ares said that with a county-by-county view to see which countries' results were in, the audience would be better informed of each candidate's chances of winning considering votes in what counties had already been counted.

Despite the difference between graphics used in different mediums, certain elements of design can be retained. For example, BuzzFeed [election night show](#) hosts colored the “magnets” accordingly when election nights came in, updating results with the website graphic concurrently. *The Guardian* reused some graphics built by the JavaScript library D3 on the web for its print edition.

Readers' Perceptions

Parlapiano said that *The New York Times* produced a cartogram after Twitter users requested one. Editors expected the viewers of the cartogram to already have a good understanding of the cartograms, an indication of a relatively high level of graphic literacy.

Nowadays, as readers are increasingly consuming results on a mobile device, they are spending less time diving in and interacting with election graphics but quickly scrolling.

Holder said that although *The Guardian* election graphics were general-facing, analytics showed that 15% to 20% of readers clicked to expand the results tables, demonstrating readers' interests in more details of the election.

Instructions are rare

Newsrooms sometimes give readers instructions about what interaction with each navigation tab will entail. For example, the editors at Axios noted on the webpage that “The ‘cartogram’ view makes it easier to compare areas of different size but equal electoral importance.” FiveThirtyEight also had three different views from basic to deep analysis for readers of different levels of curiosity.

In terms of interacting, most news organizations in this study offered different views to click through, except *The Washington Post* offered explicit instructions about gestures of interaction, for example, hover and click to expand.

Bycoffe of FiveThirtyEight said that the now-cast tab under the 2016 election that predicted results if the election had been held that day was confusing for some readers, and they eliminated that view in the 2018 coverage.

Holder said the design of election graphics went through iterations and user testing in the newsroom, including tech-savvy and less tech-savvy people, and asked

what they read from the screen and the time it took for them to draw insights from different forms of visualization.

Parlapiano said that the designers tried to get away with not giving many instructions on the page but focused on intuitive design. Moreover, data visualization designers often encode redundant information in different forms of visualizations. If readers want more state level or more granular view of election results, they can access the information from the tables, or in the tooltips, or with a search box that sometimes redirect them to a different page.

Most interviewees said that their newsrooms could do more user testing, but few actually did. *The New York Times*, in particular, created the cartogram to cater to readers' comments on Twitter that requested the paper to make a cartogram.

Future of election graphics

Rost characterized the production of a new form of graphic as a compromise between how much the users get out of a different design and how much more complicated it is to read the graphic.

The study found that although information designers have different approaches to the primary visual for the midterm election results, they agree that cramming all the information in one graphic will likely fail to capture certain nuances in the political landscape due to area-population disproportionality. It can also be overwhelming to present all the information for average readers whose graphic literacy are usually not on par with designers themselves.

Different forms of visualization have their own merits and shortcomings. For example, choropleth maps are good at making geographical boundaries stand out, while cartograms do better at portraying electoral votes. Retaining geographical boundaries while encoding electoral weights normally require a meshing of two types

of graphics, a geographical base layer map, and a graphical layer portraying sizes of electoral votes of each state. For each form of visualization, design choices about color scheme, shapes, white spaces, text labels and tooltips can affect the effectiveness of graphics, and there is always room for improvement.

Many newsrooms made modifications to the plain choropleth maps and cartograms in the 2018 election coverage, to emphasize individual U.S. House seats. Sometimes, just because a map or cartogram shows geographical trends, it does not mean they are indispensable, and journalists can communicate their most important messages to readers in other forms and utilize their resources to prioritize their special coverage.

Besides graphics themselves, page layout and text elements can also affect understanding. Leading a results page with a certain type of visualization to show the balance of power is recommended to establish the direction after the election.

What comes next for 2020 and beyond? As of this writing, many newsrooms have already been planning the coverage for the next year of a presidential election. Holder said that every election is different with different stories, and the key features in the graphics will likely need to keep pace with the elections. The primary graphics of 2020 will likely be the presidential election results. Newsrooms will likely find themselves carefully crafting graphics that seek to paint a more nuanced picture of geographically diverse, and arguably more polarizing America.

Now that cartograms have become more prevalent, especially after 2018, and could remedy the area-population disproportionality, will we see more of them in the coming election? Some would say that the wide use of cartograms for House results in 2018 can be attributed to the fact that every unit or tile can be used to represent individual seats, but the cartogram view may not fit the presidential election well for

the latter's emphasis on the state-level results. However, some do not see it as a problem to continue using more cartograms for presidential years, saying that electoral college system lends itself nicely to the representation of cartograms, which can accurately portray the overall votes gained by each presidential candidate.

Parlapiano said that *The New York Times* normally doesn't make dramatic changes to the election graphics but stays consistent in informing the readers about the most important information of the night in a straightforward way. Parlapiano said that though cartograms will likely be more prevalent, she does not see an industry trend of using more cartograms because the accessibility of these cartograms will be likely restrained.

Gamio, on the other hand, sees it as a positive trend for newsrooms to transition to cartograms as graphic designers continue to educate readers and familiarize them with new forms of visualization. Gamio also said that ultimately visualization designers can divorce the votes from geography and don't have to use maps as the primary visualization at all. Localized election results could be delivered and accessed with search tools.

Whatever the chosen form of visualization, instructions, and text labels should be aids to demonstrate the methods of encoding, such as what cartograms are designed for, and help inform readers how to decode the information by instructing them how to use the visuals. They should also consider design conventions in the past, to avoid giving readers false impressions. For example, sometimes opacity indicates vote ratio, and sometimes it represents population density, and sometimes shows progress of voting on election night. Therefore, journalists should be clear about the encodings.

The author of this analysis suggests including a combination of different graphics and different views of the graphics. Such combination of graphics is not only

a compromise for audience of different preferences and graphic literacy, but an effort to represent the results more fully. Readers can also cross-reference different views to avoid drawing incorrect conclusions from a single graphic. Holder said that editors at *The Guardian* are interested in building other forms of visualization alongside a choropleth for upcoming elections, especially in print. Ares also said they will continue to explore innovative ways of presenting data and design with a visual hierarchy to inform people of the important information of the night.

Finally, user testing and the use of analytics is recommended. Analytics can inform journalists about what the readers would need to know. Although each election is different, results from user testing can help inform journalists of the principles of design and how innovative graphics perform. The communication between readers and journalists are dynamic, journalists may take the opportunity of covering elections in graphics to facilitate greater understanding\ of not only old and new forms of graphics, but also what the graphics portray and why.

Biographies

Zachary Ares is a graphics artist at BuzzFeed on the news graphics and motion graphics department. He has been with Buzzfeed since 2017 with a primary focus on election live shows. Ares has a Master of Fine Arts in visual narration from the School of Visual Arts.

Aaron Bycoffe is a computational journalist at FiveThirtyEight. He was first involved in making graphics in 2008 for *The Virginian Pilot*, helped built the election results pages for 2012 and 2014 elections for The Huffington Post, and worked on the 2016 presidential election and 2018 midterm election, ensuring the functionality of back-end data structure and web performance.

Lazaro Gamio is a graphics editor at Axios. He has a decade of experience with graphics. He was involved in analysis graphics at *The Washington Post* for the 2016 election. Gamio came to Axios and ran the team of interactive journalists to work on the 2018 election results page.

Josh Holder started at *The Guardian* as a software engineer and later as a project editor on the Visuals team, which include developers and graphic artists. Holder mostly works on long-term projects, including multiple election and referendum results trackers.

Alyson Hurt is the graphics editor of NPR Visuals team. She has been involved in making things on the web since college. Hurt started her election coverage in 2010 at NPR and is mainly responsible for laying out the main visuals of election nights.

Ryan Mark is a data editor and engineer at Vox.com and was responsible for the back end of the 2018 election graphics. Previously, he worked as a developer at the Chicago Tribune for about five years. He's been a programmer in journalism for about 10 years and has a MA in journalism from Northwestern University.

Alicia Parlapiano is a graphics editor at *The New York Times*. She is based at *The Times*' Washington D.C. Bureau, designing for print and online. She contributed to the analytical graphics of election results in 2016, and written about election maps for *The Times*.

Mira Rojanasakul is a UI and information designer at Bloomberg. She has made dozens of visualizations for politics, many of them being maps in different forms. Rojanaasakul holds an MFA in communications design from Pratt Institute. Rojanaasakul participated in the design of Bloomberg's 2018 Midterm Elections results, which foregrounds the cartogram and gives the readers an option of viewing the map for the House, Senate and Governor races respectively.

Lisa Charlotte Rost is a data visualization designer at DataWrapper, a charting tool company based in Berlin, Germany. She writes the Weekly Chart blog and helps users understand graphic design principles and applications. Rost was a Mozilla Open News fellow at the NPR Visuals team in 2016, where she worked on some graphics during the 2016 election cycle.