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The Rochester Institute of Technology

School of Communication

College of Liberal Arts

Visualizing the News:

An Analysis of a Year in Interactive News from *The New York Times* and *The Washington Post*

by

Maria T. Olivo

A *Thesis* submitted

in partial fulfillment of the Master of Science degree

in Communication and Media Technologies

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The members of the Committee approve the thesis of
Maria T. Olivo presented on November 20, 2015

Patrick Scanlon, Ph.D. Director
and Professor of Communication
School of Communication

Ammina Kothari, Ph.D.
Assistant Professor
School of Communication
Thesis Advisor

Rebecca DeRoo, Ph.D.
Assistant Professor
Department of Performing Arts and Visual
Culture
Thesis Advisor

Grant Cos, Ph.D.
Director, Communication & Media
Technologies Graduate Degree Program and
Associate Professor of Communication
School of Communication

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The Washington Post

Maria T. Olivo

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College of Liberal Arts

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Abstract

In the past decade, newsrooms have been struggling to remain relevant while trying to keep and attract new audiences. Access to diverse online tools and big data has expanded the use of infographics and data visualization in news stories, increasing reader engagement with complex content. The increase of interactive visual content in journalism requires rethinking how journalistic and design elements are incorporated in a story. This study explores how *The New York Times* and *The Washington Post* incorporate principles of design and data visualization to present complex information for their readers. Using a mixed method approach, a sample of 275 articles that span over a period of one year — from August 2014 through August 2015 — were analyzed to identify salient forms of information visualizations.

Keywords: infographics, visual journalism, data visualization, interactive, media, newspaper, online news

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The Washington Post

Journalism is the process of telling people what they previously did not know, particularly matters of significant importance (Franklin, 2009). In democratic societies, journalism is a fundamental aspect of the civil and political life, it holds an important role simply because through news we discover things we would not know otherwise (Schudson, 2008). The practice in itself, Schudson (2008) tells us, does not create a democracy, but, it does provide a series of services to help sustain it. These are: *to inform*, by providing fair and complete information for citizens to make their own choices; *to investigate*: particularly governmental and concentrated sources of power; *to analyze*: by providing coherent frameworks of interpretation to increase the understanding of complex topics; *to build empathy*: citizens can learn about the points of view and lives of other people – especially those less advantaged – when journalists write about them; *public forum*: by providing “a forum for dialogue among citizens and serve as a common carrier of the perspectives of varied groups in a society” (p. 12); and *to mobilize*: by serving as advocates for certain political programs and perspectives and mobilizing people “to act in support of these programs” (p. 12).

In the last two decades, the Internet has changed the practice of news reporting not only in printed news, but in all of the traditional channels. According to Franklin (2009), technological advances are multiplying the outlets for storytelling, and, as a result, changing the way people get their news. By the year 2012, half of Americans were reading their news online, topping all types of traditional media combined (Beaujon, 2012). Furthermore, The Pew Research Center’s “*2015 State of the Media Report*” showed that 44% of newspaper readers used a combination of print and online sources to get their news as opposed to print only (Mitchell,

2015). Changes in audience behavior, combined with shrinking of newspaper workflow are re-inventing how news are produced and presented today. According to Jurkowitz (2014a), there has been a steady increase in journalism-job losses since the year 2005. However, the slow but consistent growth of digital native news outlets – and their staff – could be an indicator that the industry is moving to a new model (Jurkowitz, 2014b).

Newspapers are now generating data-based, media rich stories. Information is presented in visually attractive ways, while allowing readers – now also called users – to filter and manipulate data in ways thought impossible within the limitations of the printed medium. By incorporating interactive infographics in news stories, the media are fulfilling the demands of their audience, who are asking for more transparency in reporting and participatory story telling (Rogers, 2014). In this context, designers play a key role by using their unique set of skills – the understanding of form, function, type and color – to accurately display information from a journalistic perspective.

In this thesis, I examined the current use of interactive infographics, first by reviewing when media started including infographics in the stories published online, and then analyzing a selection of interactive infographics produced by two major news organizations in the US. The analysis focuses on how *The New York Times* and *The Washington Post* incorporate design elements and opportunities for user engagement in their news stories.

From Printed Press to Online News

Overholser and Jamieson (2005) talk about the concept of general interest and journalism of service. Catering to the public interest, this reflects that a healthy society is built on the basis of an informed citizenship (Overholser & Jamieson, 2005). Fink and Schudson (2014) found that, through the decades, the role of journalism has been in constant evolution. Since the 1960s

journalists became more aggressive in the search for news stories and, particularly after the Watergate scandal, took the place of watchdogs, trying to hold politicians accountable in the name of the constituents (Fink & Schudson, 2014). To keep the interests of the citizenry close to heart sounds like an unrealistic expectation for news outlets, owned by corporations often focused on profit margins. Nevertheless, the ideas proposed by Nip (2006), Marchionni (2013), and Overholser and Jamieson (2005) can all be linked to the sentiment of the “public journalism movement,” which links the telling of news with the ability to serve the public, in an attempt to break conventions – like gatekeeping – and truly “connect” with citizens.

The use of digital resources is not new. Multimodal news coverage – making use of pictures, sounds and video – can be traced back twenty years ago, when newspapers started adding multimedia content to their websites, making use of the resources provided by the Internet (Boczkowski, 2004). One of such cases was *The HoustonChronicle.com*, which launched a special section named the *Virtual Voyager*: “a multimedia magazine with storytelling that combined text, still images, audio, video, 360-degree photography, and computer animation” (Boczkowski, 2004, p. 201).

The dynamic and fast-paced character of online communications points to a new age of news institutions as it allows audiences to participate in the form of commentators, critics and (in some cases) even as authors themselves. In the era of social media, we are presented with more channels to independently publish news and almost all of us are capable of serving as witnesses to the events around us. It is only necessary to sign up for an account on Twitter.com, for example, where most news outlets link to the latest news by posting the headlines. All of these scenarios present possibilities of engagement – the successful interaction between digital newsreaders and the content – achievable through tools of participation.

However, even as social media are important means to discover breaking news, people still view information that comes from it with skepticism (*American Press Institute*, 2014). Journalism as a practice is still respected by audiences, but they are just approaching it in different ways. Perhaps as a response to this immediacy of reporting, increasing numbers of readers are going to specialized sources to get reliable information, picking different sources for different topics (*American Press Institute*, 2014). The web, with its electronic immediacy and its ever-changing illusion of immersion, seems to provide the ideal channel to make this happen. But connecting with users is proving a difficult task: a survey of over 500 managing editors revealed the vast majority had a new pressing priority: reader engagement (Mayer, 2011).

Online engagement is achieved when users maintain their interest in the subject matter and is usually characterized by positive emotions (O'Brien & Toms, 2008). Engagement can be procured through certain sensorial attributes that O'Brien and Toms call "point of engagement." Those attributes could be aesthetics, novelty, interest, motivation, or specific or experiential goals (O'Brien & Toms, 2008). Because these attributes don't always rely on the content presented –but in sensorial experience of the reader– the challenge is to maintain quality of the stories at the same time as producing economic benefits.

Newspapers make profit through sales – subscriptions or newsstands – and advertising. A greater number of subscribers and buyers translates into a more valuable placement for advertisement ("Reinventing the newspaper," 2011). Nonetheless, this economic model is being challenged. Since the late 90s, newspapers have had to face a decrease in readership, which coincides with the launching of newspapers' websites (Boczkowski, 2004; Nip, 2006). During this past decade, newspaper circulation is decreasing, along with revenue (Barthel, 2015).

Imitating the offline profit model, digital newspapers are providing subscriptions. These usually work by way of a paywall that blocks access to the website on some of its section, or after a certain number of articles are read (“Reinventing the newspaper,” 2011). Advertising is also present, and much like sales from newsstands and subscriptions are important for advertisement value, the number of visits and the time spent on the website is a motivating factor for advertisers. The possibility of participation – potentially resulting in engagement– is a key factor in keeping readers on a website – and in making them come back (“Reinventing the newspaper,” 2011).

News Audience’s Participation in Data Journalism and Infographics

Schudson (2010) traces the existence of “data” as a source for news reporting to the foundation of professional associations that curated and edited field journals, as well as to the reports of political observatories, whose results were publicly shared by the mandate of the Inspector General Act of 1978. Rogers (2011) writes that several years ago, data was only available in print, in the form of expensive books that contained information and “figures” for reader to interpret. Having the information in a digital form, he argues, data sets became bigger but also more accessible when they were published online.

In 2010, Rogers wrote a piece for the British newspaper, *The Guardian*, in which he mentioned how people around the world wanted to have access to the information their governments collected. Slowly, governments complied and made large databases of information available for the use of anyone who wished to examine it (Rogers, 2010). The ability to read this data and make sense of it is considered a paradigm of modern democracy, according to Rogers (2014) and Schudson (2010). This is because experts are no longer the only interpreters of information, and official sources are no longer controlling access to data. Instead, people are

coming together to use modern tools and channels at hand to put the information out there (Gray, Bounegru, & Chambers, 2012).

Data journalism is enhanced when delivered through electronic means, because through them we can make use of tools that allow us to better analyze (Weber & Rall, 2012), display, and read information (Gray et al., 2012). As a growing number of people consume information via primarily visual channels (Barthel, 2015), there is significant value in using graphics, instead of simply words, in our communication (Lankow, Crooks, & Ritchie, 2012). But making information into images adds great value to the construction of the news articles, since visual representations make it easier to observe patterns that might come up from complex or very large sets of data (Dur, 2014).

Data journalism is the process of analyzing raw information and connecting all the important points for the audience. This type of reporting has been around for decades (Schudson, 2010), but current multidisciplinary newsrooms make it possible for more journalists to practice it (Weber & Rall, 2012). When data stories are a result of crunching numbers, the use of graphics is an obvious choice. When visually represented, numbers reveal their trends and exceptions, and facilitate drawing comparisons through the information (Few, 2012). The ability to make comparisons has an empowering effect on readers, as it allows them to explore the numbers. Without the graphic, they are left to trust solely the word of the writer. While graphics are also a product of the author's interpretation (be it a journalist or designer), information graphics help to organize topics by providing a point of reference. Today, data journalism is a common practice in newsrooms, but critical quality journalism is also possible when investigating small samples of data and straightforward leads. Once the data is analyzed, information in visual form helps educate and guide the reader, or even persuade, depending on the editorial purpose (Dur, 2014).

The topic of education is important because, even as Fleming's visual, auditory and kinesthetic model of types of learning is being contested, research shows that there is a preference for acquiring information through visual channels, and recent advances can make the experience richer (Lankow et al., 2012).

In this sense, visualization of information and data journalism are now two converging disciplines that depend on each other. Weber and Rall (2012) go as far as to say that it was as a result of their convergence that data-driven journalism came to be. In the research conducted by Weber and Rall (2012), it was found that in America, the change of paradigms regarding these disciplines might be already underway, and designers could be more open to identifying themselves as journalists, in contrast to a more defined division of tasks visible in German and Swiss newsrooms. Digital data journalism has been the norm for at least 5 years (Rogers, 2011) and data visualization took center stage in the practice of journalism, with interactive infographics becoming common-place in 2009 (Weber, 2013).

For most data journalists enthusiasts like Rogers (2012), infographics – the contraction of information and graphics – are an obvious part of data journalism. Alberto Cairo, head of the Program of Data Journalism and Visualization at the University of Miami, is a vocal promoter of the term “visual journalism” to identify the practice of many professionals that work to make data understandable by means of visual principles (Cairo, 2014). To support their claim, it is sufficient to cite the most basic principles of design, that indicate visual stimuli – such as photographs, illustrations and art – attract the attention at the same time they aid in retention; they inform and entertain while pulling readers into an article (Pasternack & Utt, 1990).

When computer technology began making its way into most professional practices in the 1980s, the media started to incorporate comparative visualizations to go either in tandem with

text, replacing them completely, or complementing the delivery of information (Valero, Català, & Marín, 2014). This practice would allow the words to emphasize other aspects of the news or to extend in their explanation of complex issues (Valero et al., 2014). Later, the introduction of basic programming to the visuals-and-words mix allowed newspapers to work on models of information processing that emulated those used in applied sciences, such as physics and statistics (Valero et al., 2014).

With the arrival of computer graphics and programming, online newspapers began to present new models that emulated those often used in the field of physics and statistics. Although these representations were not new, recent technological innovations are changing the game (Valero et al., 2014). Today, the collaboration that occurs between professionals of different backgrounds yields rich and immersive media results – in which readers feel like part of a virtual experience – often allowing them the ability to interact with each other (Weber & Rall, 2012).

Infographics and interactive infographics.

Cairo, in his book *The Functional Art* (2013), says academic texts sometimes make a distinction between the terms *information graphic* and *visualization*, but claims both things are part of the same “continuum.” A general explanation of “infographic,” however, usually includes any type of visual representation that is a result of information gathering from a source other than the author’s imagination (Friendly, 2009). A statistical chart, a bathroom sign, or a map – of which we have examples as early as the year 6200 B.C. (Friendly, 2009) – are all graphic representations of knowledge that is more convenient (or simple) expressed through images than words. Cairo (2013) prefers to use the term “visualization,” and in that vein, openly prefers a definition by Joan Costa, a well-known Spanish design professor who says: “to visualize is to make certain phenomena and portions of reality visible and understandable” (p. 18).

Cairo (2014) is also an advocate of establishing visual journalism as a career and distinctive branch of journalism much like photojournalism is now. He goes as far as to apply the same ethical principles that journalists are bound to, to the field of data visualization. If we review what people like Cairo – with over 15 years of practice in the field – say about their profession, infographics for news articles are based on the same principles of “accuracy, depth and clarity” journalism is supposed to be based on (Cairo, 2012). Cairo pushes for ethical commitment of designers – or anyone else somehow involved in this process – with truthful representation. According to Cairo (2012), this should not stem from old-fashioned rules of behavior, but on a communitarian goal of happiness. In his article, “Ethical Infographics,” Cairo (2014) elaborates on how best practices in the field of infographics are operationalized.

We don’t “tell the truth” just for the sake of telling the truth, and we are not “honest” because “honesty” is a self-evident “virtue.” Arguably, such notions are risible. Rather, we are honest and we tell the truth because we have evidence to demonstrate that doing so increases the public’s understanding about relevant matters. Better information is correlated to well-being. Generalized knowledge can lead to generalized happiness (para. 2.)

An interactive infographic incorporates different elements, including images, text, and layout into a news item that allows at least one option for navigation or control of the graphic, according to Weber (2013), who defines interactivity as having varying levels. On a lowest scale, this includes “object interactivity,” which results in the response for clicking a button. But if this is done in the context of enlarging a photo, for example, this is not considered interactivity, because “every click should provide access to new information or to the next information sequence” (para. 5). On a mid-level, interactivity consists of hierarchical hyperlinked

interactivity. When users can have a direct effect on the content and are able to navigate through the graphic at their own discretion, we have reached a high level of interactivity.

The news-crafting panorama is now under constant transformation and scrutiny. The digital age transformed old-fashioned investigative journalism into data journalism and infographics – particularly in their interactive form (Weber & Rall., 2012) – are now a necessary component of the journalistic practice (Valero et al., 2014). Infographics have not only become a de facto portion of in-depth journalism, they are also changing the structure of newsrooms everywhere (Weber & Rall, 2012), in particular with the addition of programmers and designers into the investigative process (Valero et al., 2014). Because “data stories” are becoming a crucial part of digital journalism it is important to analyze how data is visualized based on the story subject (Weber & Rall, 2012) and formulate guidelines that help incorporate this practice in newsrooms and journalism classrooms alike. By looking at them in context we can provide guidelines for better practice, as well as information on the best and current practices for the academic environment.

Research Questions

The New York Times (from now on *NYT*) and *The Washington Post* (from now on *WP*) were selected as the sources for the stories to be analyzed. To demonstrate the influence of both institutions on national journalism practices, I should first review some of their statistics. In 2014, according to data provided by Alliance for Audited Media, the total number of unique visitors summed up over 27 million for the *NYT*, paired with a page view count past 477 million. For the *WP*, the count of unique visitors surpassed the 17 millions and the page view count was over 207 (*Alliance for Audited Media*). While these numbers certainly include worldwide audiences, the news outlets’ popularity in their own country is also at the top of the chart: at the

time of this research, these news portals place number 1 and number 2 respectively on the rankings of popularity of newspapers websites for the United States, when measured with *Alexa Ranks* and *Similar Web*. Both institutions have won several Pulitzer prizes. On the same note, both are the corresponding digital platforms for the physical newspapers of the most important cities in the US in terms of economy (McSherry, 2014) and politics, respectively.

The present research analyzes stories from both websites that include interactive infographics, in order to answer the following research questions:

RQ1: How are the selected news outlets making use of infographics to enhance the news-reading experience?

By observing the techniques used to improve the reading experience, we can gauge the efforts made to improve reader participation, an aspect of the journalist-audience relationship that managing editors reportedly look to improve (Mayer, 2011).

RQ2: Is there are difference between the types of stories presented through infographics by the NYT and WP?

Both news outlets cover nation-wide subjects, but differ in editorial style and cater to different audiences (Doctor, 2015).

RQ3: What types of graphics are commonplace?

Closely tied to RQ2, this question will help us evaluate the trends in terms of visualization in the past year as not all stories demand visual representation (Dick, 2014). By analyzing the editorial choices of these newspapers, we might discover the topics identified as those requiring more detailed explanation.

RQ4: How are design elements and source attribution incorporated in the infographics?

While Schudson (2010) claims that data repositories have been in use for decades, Rogers (2010) says it is a recent popular demand that has made data much more accessible and part of journalism.

RQ5: Do the graphics follow the best practices defined by Cairo?

Cairo (2013) defines a Visualization Wheel, through which the complexity and effectiveness of an infographic can be studied. Observing the graphics using his parameters can help us understand the experience of a reader when interacting with some of the stories.

Methodology

Data Collection

To have a current and broad sample, I analyzed a year's worth of interactive stories published by both *NYT* and *WP*, spanning from August 1, 2014 through August 31, 2015. The sample only included interactive infographics, but did not discriminate in terms of categories, topics, or article length. In the selection of the items to evaluate, I included every article that allowed the reader to interact with the content through filtering or manipulating resources impossible to present on print. To this respect, stories that provided detailed information that would have proven difficult to represent on a printed version on account of clutter or length restrictions were considered to fit the criteria. Representations that allowed users to complete secondary actions – like navigating, comparing within a scale, or allowing to put information in different contexts – were also included.

I used the *The New York Times*' search engine and Twitter account *@nytgraphics* to collect all interactive stories published within the time frame of August 1st, 2014 through August 31, 2015. For the *The Washington Post*, I used the archive function of their Tumblr blog

(*postgraphics.tumblr.com*), where the organization documents their graphics department's projects. A total of 275 stories were found: 160 by *NYT* and 115 by the *WP*. They were catalogued with the help of *Evernote* (an application that helps keep "notes" or "clippings" from the web).

Quantitative Analysis

I trained a voluntary outside coder to code; 10% of the data set was coded to check for intercoder reliability. Our agreement ranged from (.80 to 1.0) based on the Scott's Pi reliability test. After passing the 10% reliability test the outsider coder coded the remaining *NYT* stories, while I completed the *WP* stories. To analyze these stories, I used a codebook for content analysis and later ran the answers through SPSS Statistical Analysis program to determine significant relationships. This codebook was designed using initial open-ended coding of the dataset. The information collected on the codebook was processed using IBM-SPSS. I used descriptive statistics and the Chi-Squared test for association was used to check for significant relationships between variables. The Chi-Squared test is used "to determine whether two or more groups of observations differ significantly from one another" (Bhattacharjee, 2012).

The following questions were part of the coding book. I included the possible answers after each question, including the corresponding number for coding purposes.

- **Category:**

- a. Is the graphic part of a story or a standalone entry to the website?

Yes (1) No (2)

- b. Does the graphic describe an event?

Yes (1) No (2)

- c. Does the graphic include the steps or stages of a phenomenon? (Tutorial or diagram)
- Yes (1) No (2)
- d. Section:
- Local (US)
 - International
 - Politics
 - Science and Technology
 - Health
 - Sports
 - Business and Economy
 - Lifestyle (like fashion, food or arts)
- **Most prominent technique**
 - Charts (1)
 - Map (2)
 - Illustrations (3)
 - Photography (4)
 - Videos or animations (5)
 - **Data accessibility**
 - Are users able or invited to filter or input data?
Yes (1) No (2)
 - Is the source of the information clearly provided?
Yes (1) No (2)

- Are users directed to review or download the information?
Yes (1) No (2)
- Does the news source provide a summary of the data?
Yes (1) No (2)
- Does the article include an index or navigation?
Yes (1) No (2)
- **Aesthetic component:**
 - Are there decorative elements present? (Background images, sounds, special effects)
Yes (1) No (2)
 - Does the design of this match the rest of the website's design?
Yes (1) No (2)

Qualitative Analysis: Cairo's Visualization Wheel

Alberto Cairo uses a visualization wheel to plan ahead for his projects. In his book *The Functional Art* (2013), he also uses it to describe a few select infographics. I employed Cairo's model here, to conduct a close reading of a smaller sample of my data. The wheel is divided in two hemispheres, a "more complex and deeper" side and a "more intelligible and shallower" side. Each hemisphere contains 6 features, distributed as the end-points of their axes. Cairo (2013) defines the axes as follows:

Abstraction-Figuration

"An information graphic is completely figurative when the relationship between the referent and its representation is perfectly mimetic" (p. 52).

Functionality-Decoration

This axis refers to the inclusion of visual elements that are not directly used to enhance the comprehension of the material (p. 53).

Density-Lightness

The amount of data it displays in relation to the space it uses (p. 54).

Multidimensionality-Unidimensionality

This axis is a measure of two related variables: the number of layers of depth a graphic lets readers navigate, and the different forms it uses to encode the data (p. 54).

Originality-Familiarity

This axis refers to the level of innovation of a graphic. To better explain it, bar charts and pie charts are very common, therefore very familiar to readers.

Novelty-Redundancy

Information graphic can explain many different things once (novelty) or it can explain the same things several times, by different means (redundancy, p. 57).

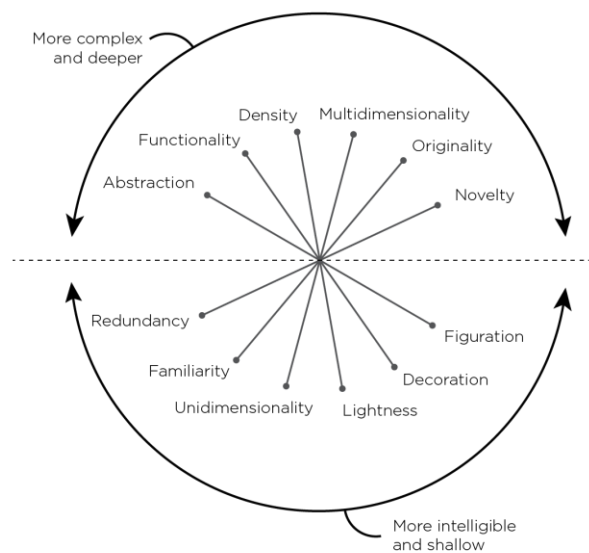


Figure 1. Cairo's Visualization Wheel, showing the 6 different axes and the complexity hemispheres.

Results

Quantitative Analysis

Out of the 275 stories, 36.4% were standalone entries to the website and only 20% referred to an event. When it came to sections, local (18.5%), lifestyle (18.2%), and politics (17.8%) were the most common topics explained through infographics. As for the techniques, maps (38.5%) and charts (37.8%) were the most popular, but these results might be skewed because of a lifestyle recurring column on the *NYT* – Titled “36 hours in ...” – that frequently used maps.

The stories coded showed that in most cases (67.6%), users are not able to input data, nor download the information shown in the article (71.3%). However, the vast majority of articles (84%) did provide the source of the information. It was also found that only 27% of the articles were designed radically different from the rest of the website.

Relationships.

NYT was more likely to integrate a graphic into a story than *WP*, $\chi^2(1, N = 275) = 16.91, p < .01$. I intended to measure the frequency with which infographics are published as standalone entries to their website, to establish whether they are considered journalistic pieces on their own. In the case of *NYT*, infographics were more often than not published with a related article, or as follow up of one.

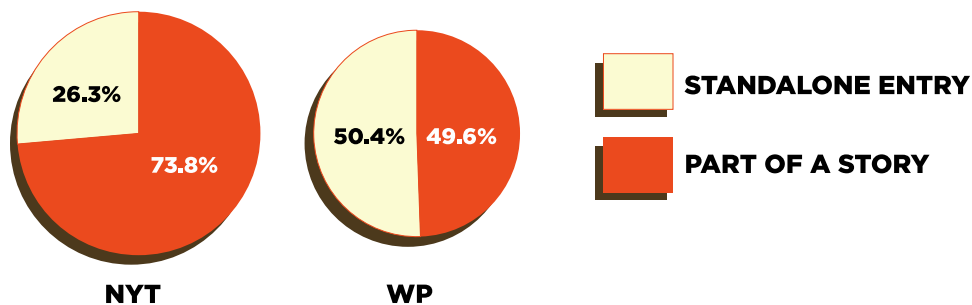


Figure 2. *NYT* was more likely to integrate a graphic into a story than *WP*

NYT was less likely to publish a graphic that described an event than *WP*, $\chi^2(1, N = 275) = 14.58, p < .01$. Chronologies were a common finding in the collection, however, the *WP* dedicated more stories to the description of events, such as the case of a map that marked the progress of riots in Baltimore (Thorp & Lu, 2015).

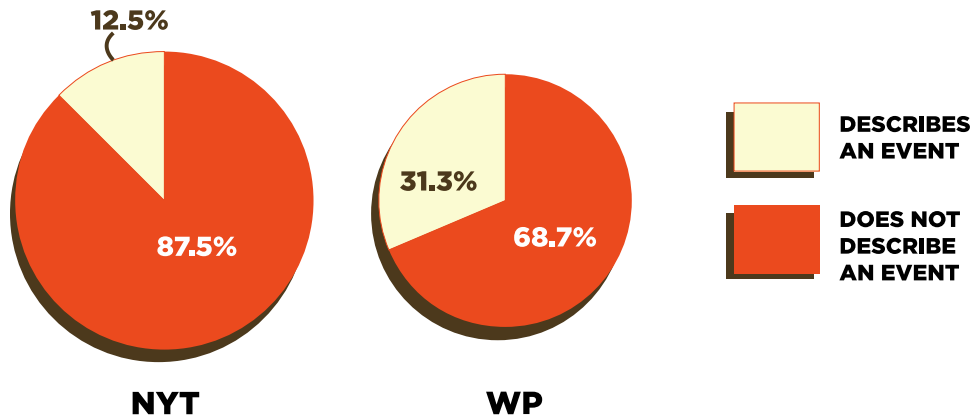


Figure 3. *NYT* was less likely to publish a graphic that described an event than *WP*

WP was more likely to clearly include information about the original source of information for a graphic than *NYT*, $\chi^2(1, N = 275) = 13.66, p < .01$. *NYT* usually showed information that resulted from their own research and cited their sources in the context of the article. In contrast, *WP* articles included a credits section at the bottom, where often users could find a link to the source – be it a government organization, private agency, event, or a public access document.

WP was more likely to include decorative elements with a graphic than *NYT*, $\chi^2(1, N = 275) = 24.98, p < .01$. *WP*'s articles often included visual elements that lacked functionality and served aesthetic purposes only (see Figure 4).

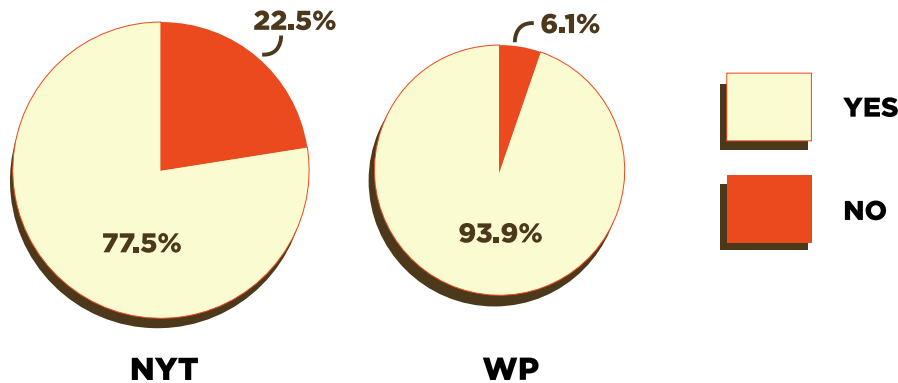
IS THE SOURCE OF THE INFORMATION CLEARLY PROVIDED?

Figure 4. WP was more likely to clearly include information about the original source of information for a graphic than NYT

Graphics published under the political section were more likely to offer options for users to input or filter data, $\chi^2 2 (7, N = 275) = 28.92, p < .01$. Both newspapers had extensive coverage of the elections, and offered interactive features where readers could set the parameters for various electoral outcomes. Also, the topics of budget and funding featured options for filtering and organizing the numbers.

Analysis of the Selected Stories

I randomly picked six articles (three from the *NYT* sample and three from the *WP* sample) to conduct a textual analysis to explore effectiveness of the graphics from the end-user's perspective using Cairo's visualization. From the Evernote collection, I picked six random articles and accessed them through a web browser. Once opened, I navigated through the articles, finding all possible interactions and taking notes based on the Cairo's (2013) wheel's axes. The following results include the title of the article, its source, the date it was published, and the authors. I included screen grabs of the specific functionalities of the article, to give a better understanding of what is described.

1. Title: Who will pick D.C.'s new mayor?

Source: *The Washington Post* | Published: Sept. 12, 2014 | By Denise Lu, Ted Mellnik and Samuel Granados.

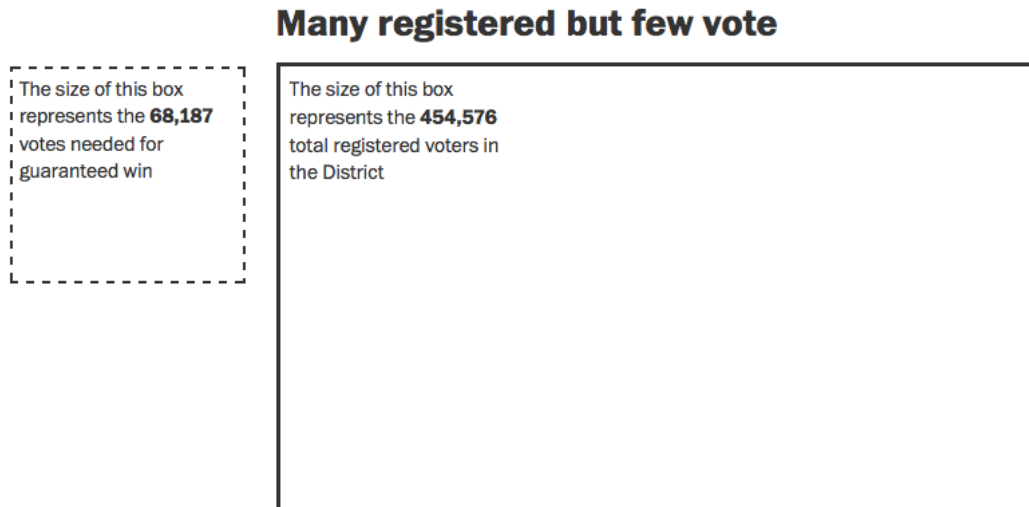


Figure 5. Shows the introductory scale, with the number of voters compared next to the amount of votes needed to win the elections. (Fraction of the graphic)

This graphic falls into the “Charts” category. The users are given a box as a scale to compare a value – the number of votes needed to win the mayoral election – against the voting population. The total of voters is first introduced in a white box, for references and is later divided by race and voting trends. Right after this introduction – that sets a standard for future comparison within the story – there is a scale that divides said trends, on which the color blue represents “Democrats”, and “Independent and Republicans” who are grouped together and represented with beige.

The chart is divided into three main areas, “Mixed Precincts,” “Predominantly White Precincts,” and “Predominantly Black Precincts.” Users are able to filter the chart by “Race” or

Party,” changing the appearance of the chart and showing different parts of the data. On the “Race” filter, users are able to see a white rectangle with the total of voters for that section, with no additional possibilities for interaction.

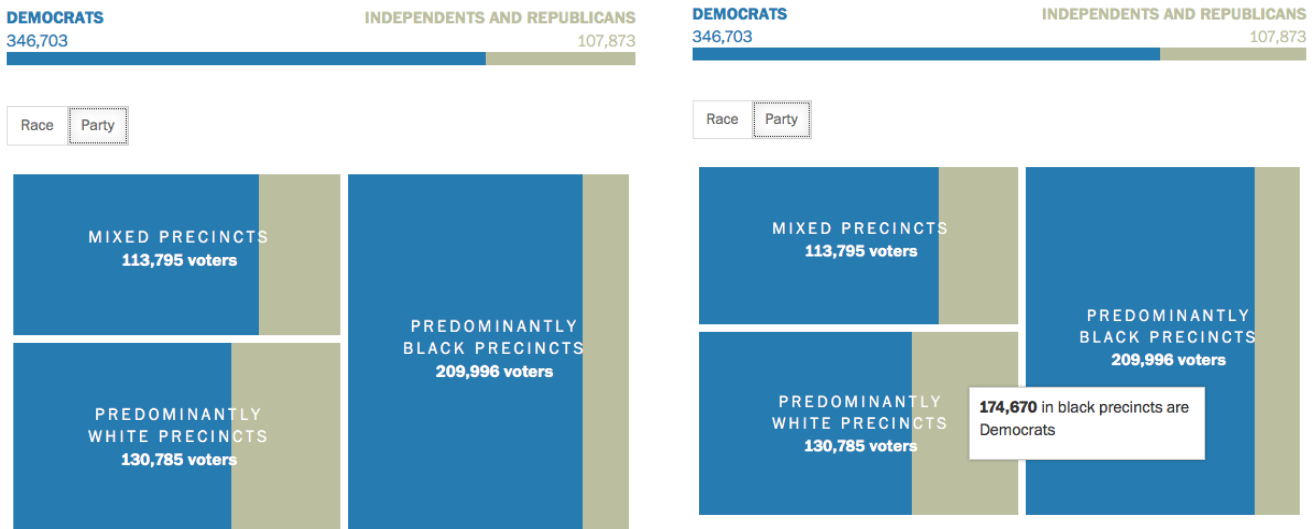


Figure 6. The chart presents data filtered by “Party,” but once users place their cursors over the colored areas, a description is showed.

Bowser won primary, but with tepid support

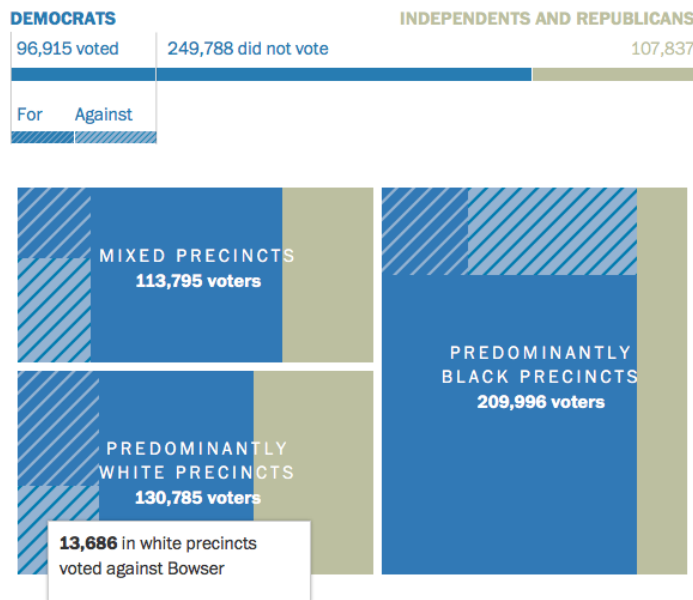


Figure 7. Shows the initial “Party” breakdown, with the shaded areas accounting for democratic vote for and against the democratic candidate. Once they put their cursors over the results, users can see the exact numbers.

However, on the “Party” filter, the graphic shows a division of three main sectors (see Figure 6). If the “Party” filter is selected, users can place their cursors over the chart to see the numerical breakdown of the population. For example, if users were to locate their cursor over the “Predominantly black precincts” section, over the blue area

(Democrats), they would see a legend pop up, explaining: “174,000 in black precincts are Democrats.” Users are able to identify the democratic majority on the chart just by looking at it, but the interactive element also allows them to know the exact number that accounts for this visual representation.

These numbers are estimates that the *WP* put together, projecting a democratic win where the black population would have a great influence in the results. The story was updated after the elections to include a second chart, showing the final count. Here, the “Race/Party” filter was not an option, but users could see a more detailed division, according to those who voted – for and against – and those who did not vote.

Cairo’s Visualization Wheel analysis.

According to Cairo’s wheel, this chart is far more abstract than figurative: the elements used are charts and geometric figures, which are not mimetic representation of the voting population. There is also a great level of familiarity, since these types of graphic representation are fairly common.

This graphic is also not dense, but it is very redundant, because users are able to see the same information from different perspectives, at will, and there is also a before and after that are very descriptive. When evaluating the Multidimensionality-Unidimensionality axis, the graphic tilts towards Multidimensionality, but this is balanced by the lightness we described

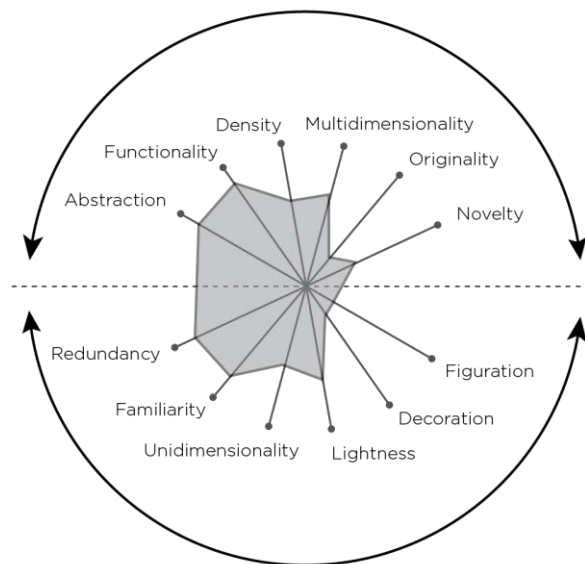


Figure 8. The visualization when representing the tendencies for “Who will pick D.C.’s new mayor?”

before. Put together with the lack of decorative elements, these characteristics make the graphic brief and easy to read.

2. Title: The 119 detainees held in secret CIA prisons.

Source: *The Washington Post* | Published: Dec. 9, 2014 | By Kennedy Elliott, Julie

Tate and Swati Sharma.

39 detainees were subjected to the CIA's **enhanced interrogation techniques**

These interrogation techniques include close confinement, sleep deprivation, exposure to cold, prolonged standing, prolonged isolation and waterboarding.



Figure 9. The opening chart describes the portion of detainees that was subject to enhanced interrogation techniques within the population studied.

This article describes some of the findings related to the 119 detainees secretly kept by the CIA, providing information such as their names, the time they were imprisoned, living conditions, and outcome of their incarceration. This story is a chart in which units are represented as “people” icons. Opening with a brief description for context, the data gives a comparison of the population versus the select facts highlighted by the authors. If the reader placed the cursor over one of the icons, they would get information on the specific detainee represented (see Figure 10). When the information was not available, the description to the left would warn about the lack of data. Overall, this feature successfully summarizes a lot of data from the CIA reports because it allows users to find details at will. By keeping some information hidden – and only showing it as a result of interaction – it adds a layer of complexity that would interest some users without overwhelming the average reader. However, there is an aspect of this graphic that might be confusing: the placement of the highlighted icons.

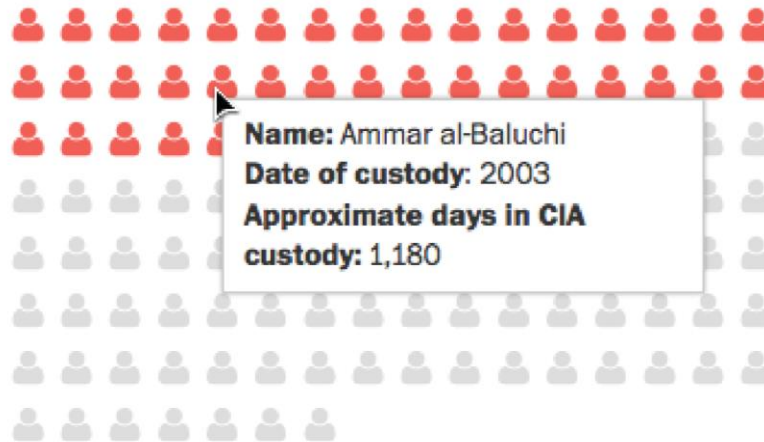


Figure 10. One of the facts presented on the graphic, revealing information on the detainee during an interaction.

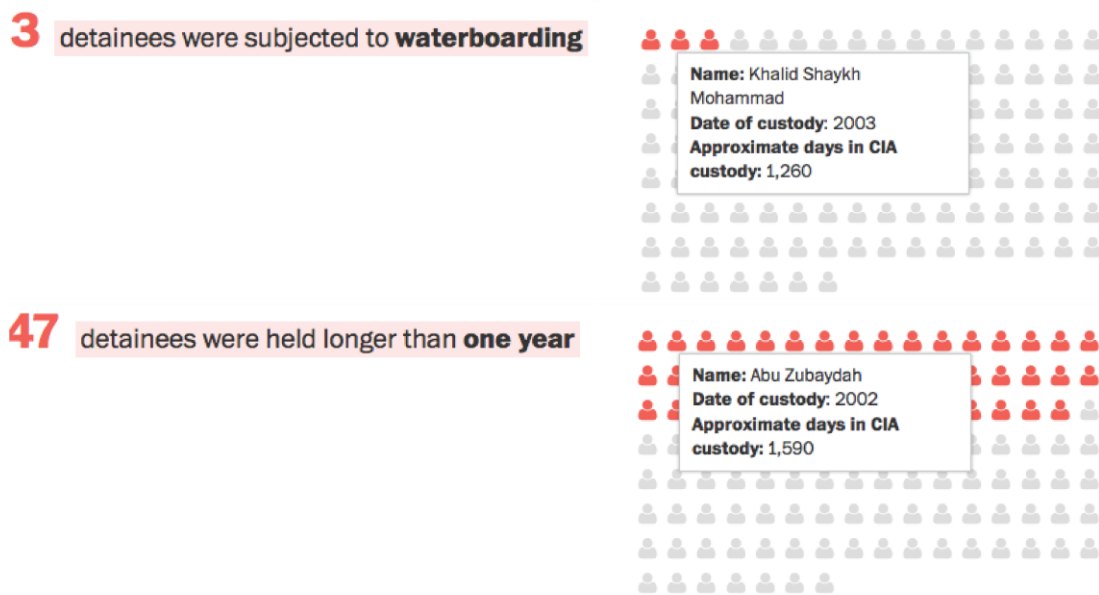


Figure 11. Comparison between facts 7 and 8, in which the names of the detainees do not correspond with the position previously held.

The article presents eight important facts about the detainees. Each fact is included in the cluster of icons by highlighting the number of people said to be involved in it – like the 39 interrogated through “enhanced techniques” – starting always by the first icon, left to right.

Nevertheless, because in almost every fact the icons are named after one of the prisoners, the order of the names is juggled. In Figure 11, we can see how the person identified on the first position is not the same for facts 7 and 8, resulting in the loss of some consistency. This reordering could make it difficult to verify how many times a name stands out on any of these facts, and makes it difficult to keep track of the identities, since all 119 names are moved around.

Cairo's Visualization Wheel

analysis.

The visualization wheel for this graphic places it in a high level of abstraction. While the visual cue of a “person” icon is nearly ubiquitous, it is far from a figurative representation such as a photo or a realistic portrait. While sometimes the icons could not reveal further data, each one represented a detainee and the color cues were present

to create a scale from which to compare the percentage of people involved in each fact. This means that the graphic is much more inclined towards the functional end than it is towards the decorative one. When analyzing the density axis, one can see how there is a lot of information presented, conveniently tucked away thanks to the interactive features that digital publishing allows. This graphic, while dense, is nearly unidimensional since there is only one type of interaction possible. On the other hand, because the eight facts are presented in almost an

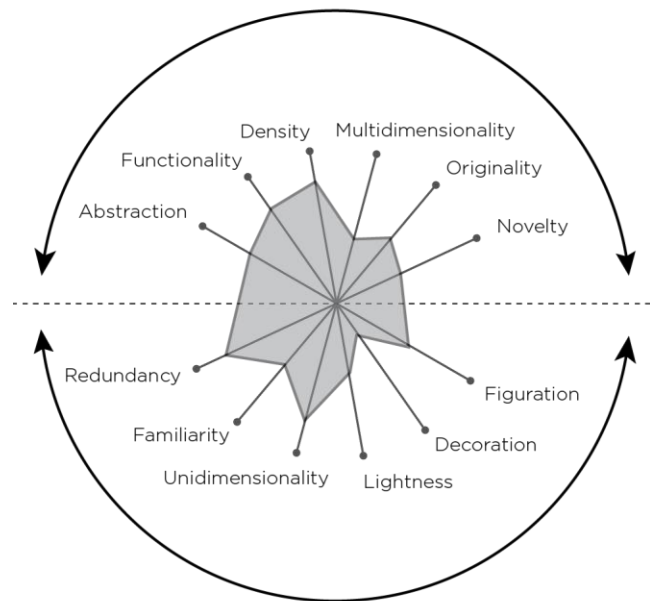


Figure 12. “The 119 detainees held in secret CIA prisons” - visualization wheel.

identical manner, we can say there is some redundancy, even if undermined by the random name assignment.

3. Title: *Valar Morghulis: An illustrated guide to all 456 deaths in “Game of Thrones.”*

Source: *The Washington Post* | Published: April 6, 2015 | By Shelly Tan and Alberto Cuadra



Figure 13. The headline and by-line for this article are presented in a more utilized manner than regular news articles on the *WP*.

This is a very complex infographic, showing illustrations, maps, and various levels of abstraction. The topic at hand is the tally of deaths that took place within the imaginary universe of *Game of Thrones*, a hit television show produced by HBO, famous for its gorey and constant depictions of death. The title of the article “Valar Morghulis” (which on the show means “all men must die”) is a direct reference to a phrase often – and very appropriately – used by numerous characters. This feature differs from other articles in its presentation: it almost resembles a microsite, with navigation elements that vary significantly from those of the *Washington Post*’s website (see Figure 13). The particular aesthetic choices make this article an independent website, providing an alternate experience to reading the news on the regular format of the *WP*.

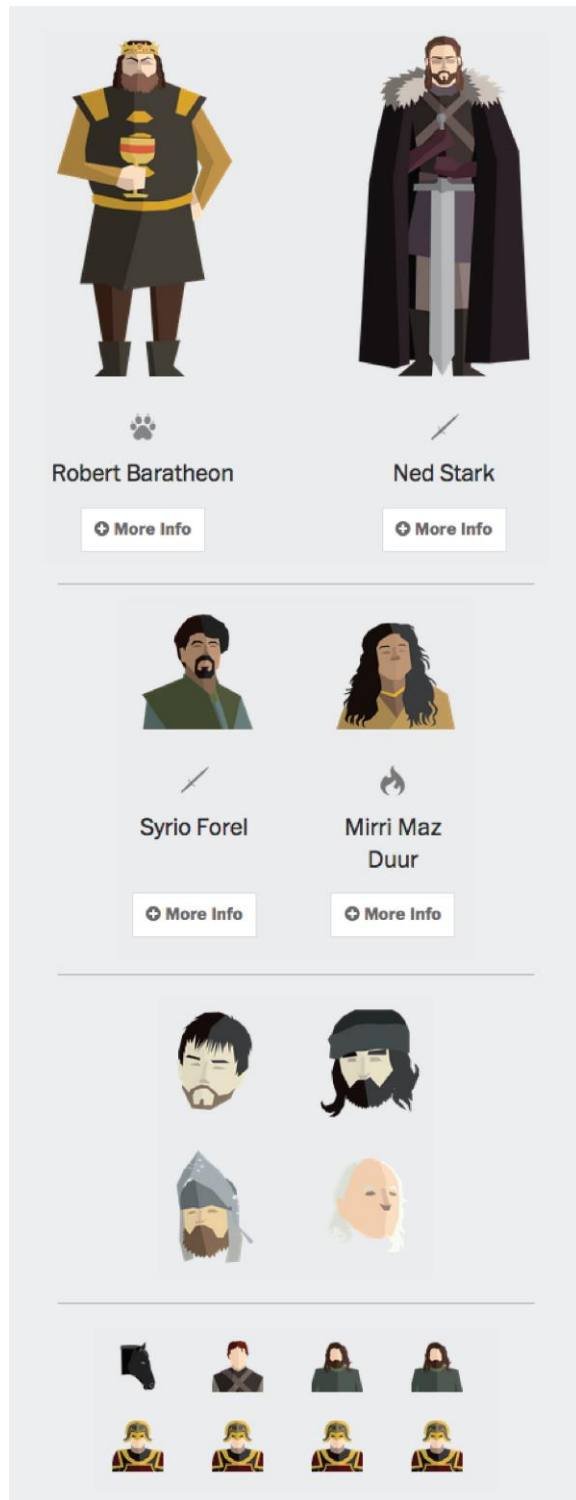


Figure 14. The characters' relevance on the show would determine their hierarchy on the articles representation.

The information is divided into the four seasons that had aired at the time of publication, starting by giving the number of deaths per season, with the possibility of clicking on the number to discover more details. Once in view of a particular season, there is a summary of the events to the left, and representations of each deceased character to the right. If the reader wants to know more about a character in particular, they can click on the corresponding illustration and the pertaining information would show to the left, where the season summary used to be.

Major characters are presented first, in the order of their demise, followed by supporting and minor characters, albeit pictured with smaller illustrations. Extras and unnamed characters are represented in even smaller portraits, often given a generic representation based on nationality, occupation or allegiance (see Figure 14.). Only major and supporting characters have their names and “method of death” displayed.

Just after season one’s summary, there is a map, showing the “Deadliest” locations on both fictional continents (Westeros and Essos). The map is an illustration placed with some of the interactive characteristic of digital maps found online – users can zoom in and out of a location and drag the map around – but not much detail is revealed from these interactions (see Figure 15). At the end of the article, a list of “The deadliest killers” shows the characters with the highest count of on-screen kills.



Figure 15. A section of the map with the “Deadliest locations”, showing a summary of the places where key events took place.

In contrast to the *Washington Post* stories previously analyzed, this article shows a great level of detail and density. This could be attributed to the show's popularity, and what we could assume is the news outlet's intention to increase its traffic from the buzz generated by the article, as it was published only 6 days before the premiere of season five. Another possibility is that this was an article for content marketing, planned ahead to coincide with the new season's premiere.

Cairo's Visualization Wheel analysis.

This is a very dense graphic. The information presented takes several minutes to go over and a lot of detail and decorative elements were introduced. It is also multidimensional, allowing users to take information at a glance or "dig deeper" and find more information if they wish to do so. There is some degree of redundancy, as readers can see the number of deaths by location and season, and there is a detailed breakdown of the numbers on each season.

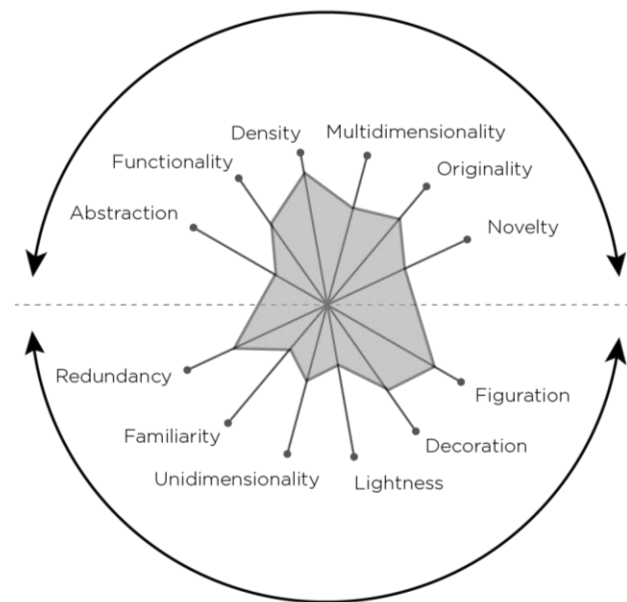


Figure 16. "Valor Morghulis: An illustrated guide to all 456 deaths in 'Game of Thrones'" - visualization wheel.

The graphic is also original in its representation of characters and their methods of death: by assigning an icon to each method, the gruesome nature of their murders is abstracted, making the interaction with these elements entertaining. This technique is certainly not applicable to all articles accounting for the passing of people – much less in the context of a war or armed conflict, as is the case for the television show – but it is original and innovative.

4. Title: Which Colleges Do Students Pick?

Source: *The New York Times* | Published: Sept. 3, 2014 | By Mike Bostock and Neil Irwin

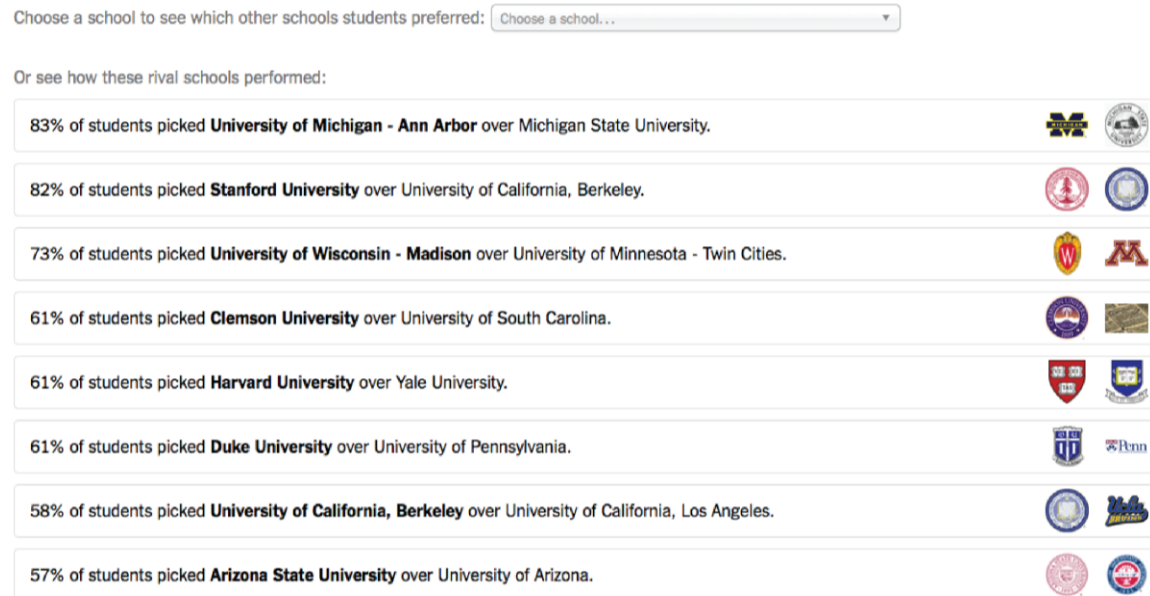


Figure 17. The infographic, at a glance. All of the information is presented, giving users the opportunity to filter.

For this feature, the journalists looked into the data provided by a company named Parchment, which provides services for students to submit transcripts to apply to colleges. The information retrieved from Parchment revealed certain trends on the preferences of students when picking a college to attend to, given the chance to choose between two or more.

This graphic is very straightforward, as it shows the most relevant correlations and allows filtering of the information by school using the drop down menu at the top. Once unfolded, there is a breakdown of the percentage of students who would accept any given offer over the school chosen. By picking a school, a user can see how it ranked in relation to the other institutions that accepted the same candidates (see Figure 17).

Something very interesting about this article is that it allows filtering through a search bar. Instead of scrolling or reading all of the options available, readers can look up the name of a college simply by writing it down (see Figure 18). These types of interaction translate into a more organic use of the digital resources that goes beyond placing the mouse over an element to wait for a new hint of information to be revealed.

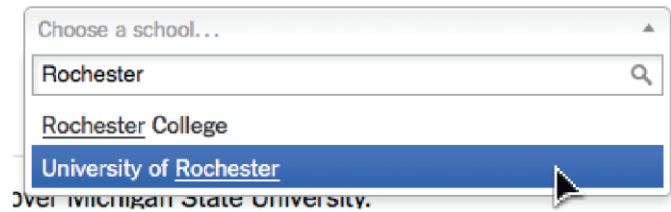


Figure 18. The drop-down menu also serves as a search bar to filter the list of colleges on this article.

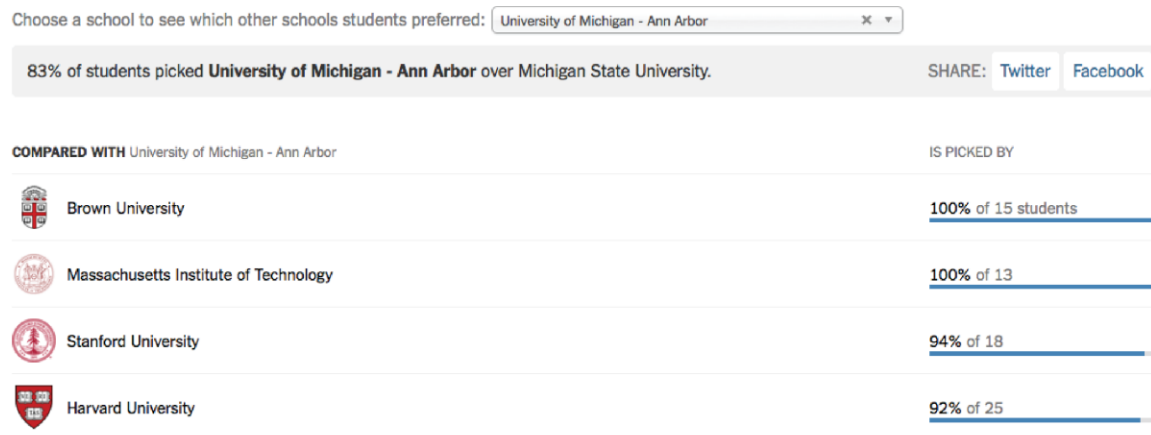


Figure 19. On this scenario, the results compare what percentage of students would choose University of Michigan if admitted at these other institutions.

Cairo's Visualization Wheel

analysis.

This chart displays no decorative elements, marking higher for functionality on this particular axis. It is a very dense graphic, the authors managed to balance the amount of information by providing various layers to the interaction, which places the article on the multidimensional end.

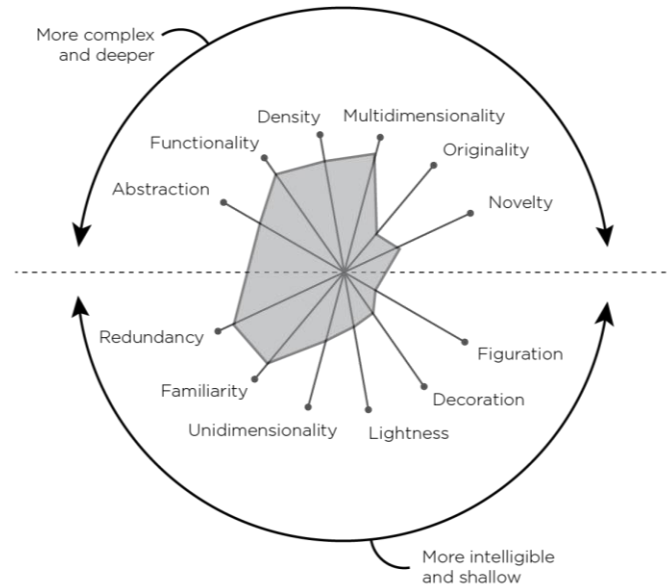


Figure 20. "Which Colleges Do Students Pick?" - Visualization wheel

The use of filters and a novel search bar make for an innovative interactive experience, but the overall display of information is very familiar, as once the information was filtered, the use of charts was very traditional. To round up the wheel, the ability to hand-pick which colleges to compare on the chart translated as redundant, as users had the chance to evaluate the information from various perspectives.

5. Title: The World According to China.

Source: *The New York Times* | Published: July 24, 2015 | By Gregor Aisch, Josh Keller and K.K. Rebecca Lai

This is another immersive experience that starts with the showcase of one of the most commonly used techniques of representation by the *NYT*: maps. The article is an overview of the worldwide investments made by China since the year 2005. At the bottom left, there is a legend explaining how the scale of the circles was used to mark the size of the investment on the maps –

the larger the circle, the larger the investment— as well as color-coding greatest to lowest risk of investment on a scale from magenta to green (see Figure 21).

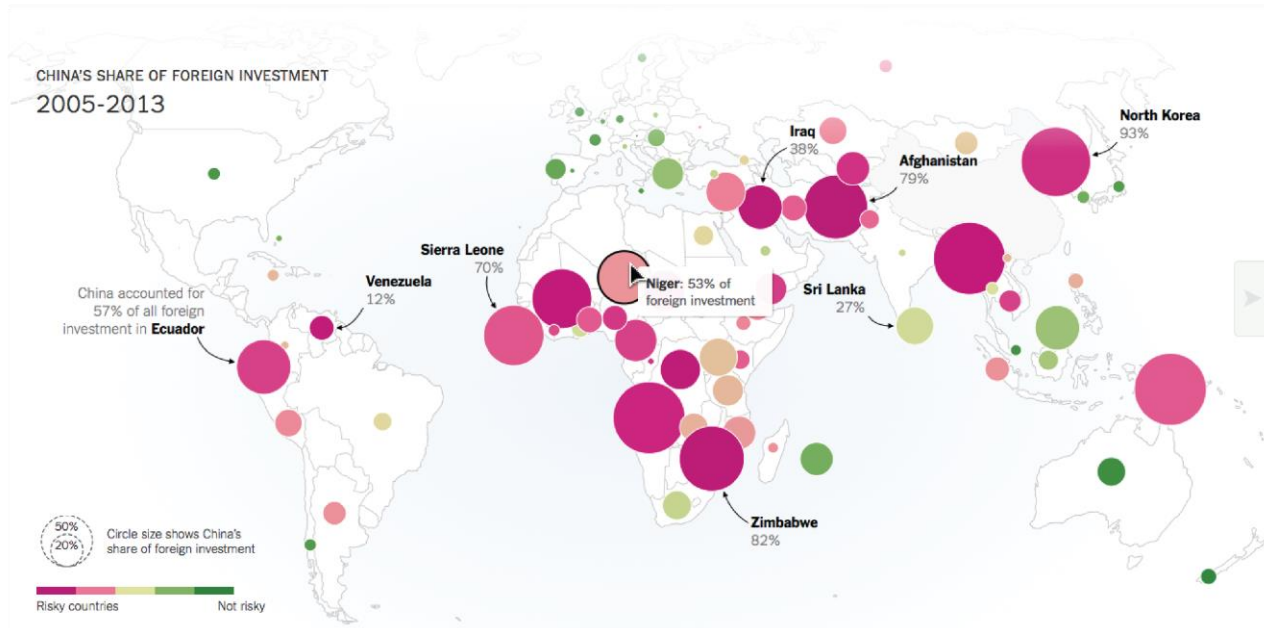


Figure 21. The map shows “China’s share of foreign investment”. According to the legend, the bigger circles show their major investments, while scales of green-to-pink present the risk levels.

On Figure 21, we can see how countries like North Korea and Iraq are a great risk for investment (depicted by their magenta colored circles); yet Chinese investment is of great significance to those countries. Once a user places their cursor over a circle (instead of marked territory), a rectangle appears, revealing the percentage of international investment made by China there. The example highlighted is Niger, considered a moderately risky area for investment, as the light pink color reveals, and where Chinese capital represents 53% of foreign investment.

Users are prompted to scroll down to discover more information, and as a transition to another type of representation, a quote with a summary of the information appears over a blank background. This is a design decision that allows users to take a break from the color clusters

just presented, while allowing for a smooth transition to another set of information (see Figure 22). Because the blank background covers all of the previously shown elements, it creates an immersive experience as readers scroll down, removed from any element that could distract them from the topic in question, and generating a sense of expectation.

China's foreign investments grew nearly tenfold from 2005 to 2013, helping it win new allies, increase trade and secure oil and other natural resources.

Figure 22. A transitioning phrase against a white background helps creating an immersive experience.

Another map is revealed, with different color scheme and a new set of scales. Still in circles, the investments are now all represented by the color blue, and instead of percentages, we can see the sum in millions of dollars. The first set of data on this map is marked to be from 2005. As we keep scrolling, it transitions to 2013 and new, bigger circles appear.

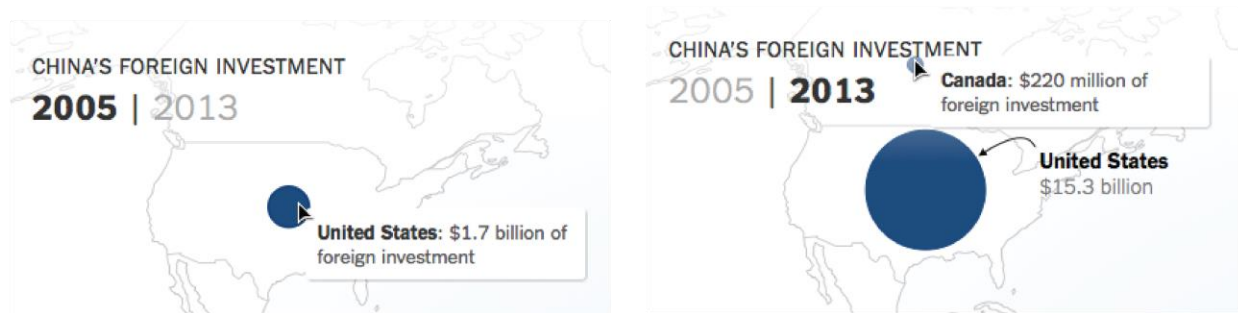


Figure 23. Contrast - after scrolling away from the 2003 sums, readers are shown the 2013 investments made by China. This fragment shows the change in parts of North America.

As the navigation progresses, the maps zoom in to show specific regions, such as South America and East Asia. This entry portrays a traditionally static way of representation in dynamic ways, which provides a sample of how maps are being used in novel ways to display content. It also turns the transition to a change of scale – something potentially confusing for readers – an activity that reinforces the frames of the story and helps users catch their pace.

Cairos' Visualization Wheel analysis.

“The World According to China” is a very dense, multidimensional infographic that employs little elements of decoration in its making. Yet, it is the treatment of the resources that makes this entry entertaining, as it took a seemingly mundane activity – scrolling down to “read more” – and turned it into an element of interaction unique to digital

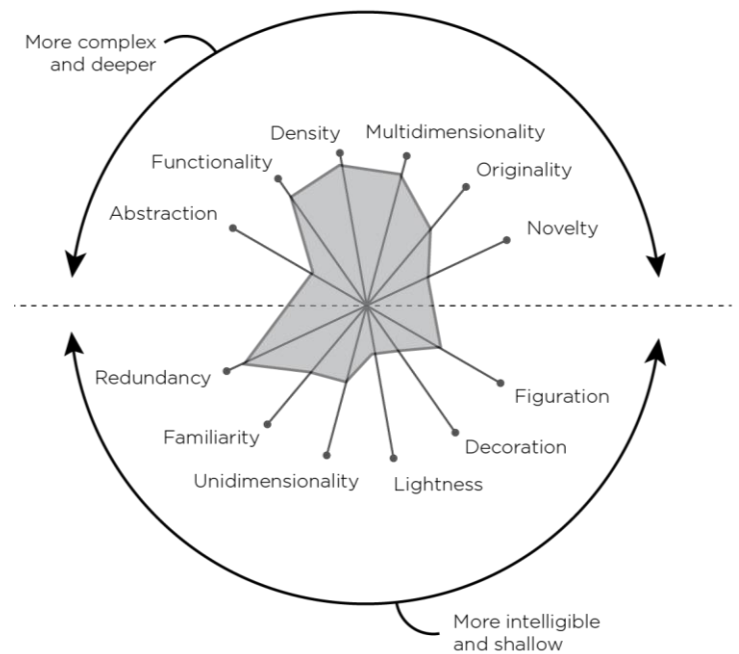


Figure 24: “The World According to China” - visualization wheel

media. I consider the axis of Originality-Familiarity to be evenly split because maps are constantly used in media-rich stories, and part of our everyday lives. However, the innovative design of this article adds a level of originality. As for the Novelty-Redundancy aspect, I consider the entry to fall within the criteria of the latter, because of the many opportunities readers are given to evaluate the same information over and over again.

6. Title: A History of the C.I.A.'s Secret Interrogation Program.

Source: *The New York Times* | Published: Dec. 9, 2014 | By Wilson Andrews and Alicia

Parlapiano.

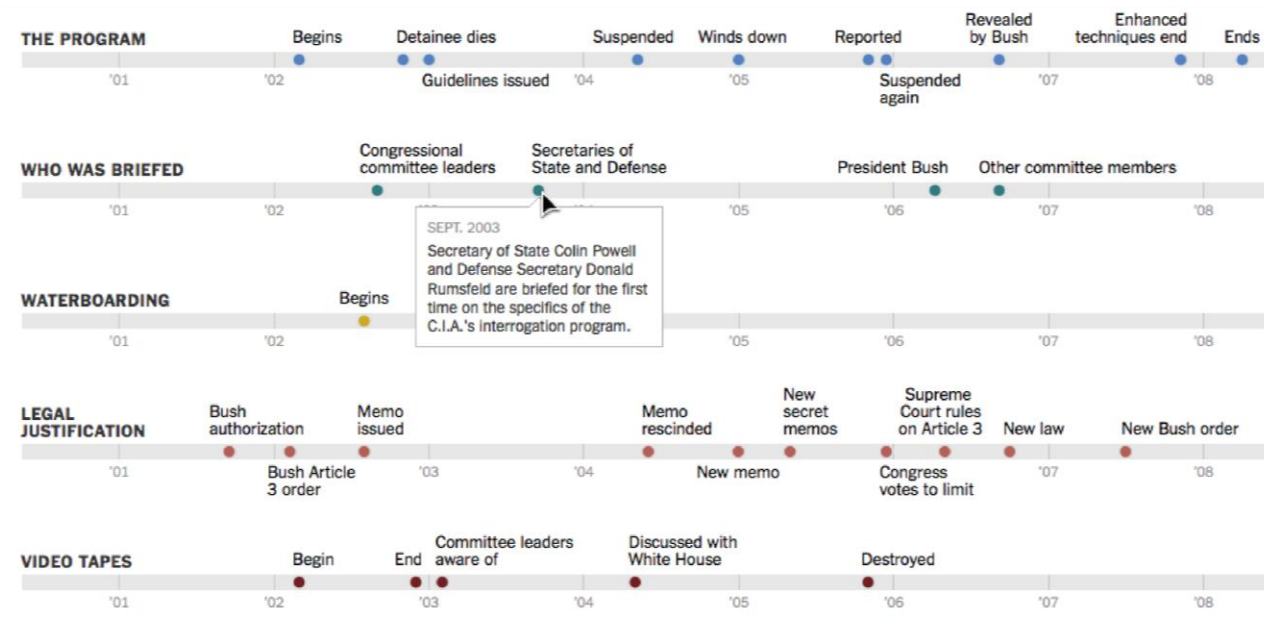


Figure 25. When on mouse over, the events represented by the dots are described on a rectangle.

A chronology of key events pertaining to the C.I.A.'s Secret Interrogation Program is presented in this much summarized interactive infographic. After the headline, there is a brief description of the contents and context of the chronology. Then there is the chronology, divided by the central issues discussed: *The Program*, *Who Was Briefed*, *Waterboarding*, *Legal Justification* and *Video Tapes* – all showing a timeline from 2001 until 2008. On each timeline, the main events are represented by a colored dot. Once the user places their cursor over one of these dots, more detailed information – such as a specific date and a paragraph describing the event – is displayed in a rectangle, very similar to the previously analyzed graphic.

Out of the samples analyzed on this section, this feature is perhaps the most simple, but serves an important reference for readers who are trying to make sense of the revelations of the

report released in late 2009 – like seeing when during the Bush administration the program gained legal justification. By hiding away the details into the dots, we are left with a minimal timeline that is available for user scrutiny.

Cairos' Visualization Wheel analysis.

This infographic is, at first glance, more inclined to lightness than density. However, because it actually summarizes a great deal of information and hides it away through the interactive function, I decided to rate it as balanced between the two. I consider this a well-designed entry, as it managed to arrange a great deal of information in an organized manner, without sacrificing the content for aesthetic purposes. Because we are looking at dates, this would be considered an abstraction, but the purpose of the graphic is not to

represent tangible things, so it is not a dominant axis. However, functionality and familiarity are well placed to their corresponding ends, since this graphic strongly filled the criteria for both. As for redundancy, this graphic explains the events on their corresponding category just once, and because there is only one way to interact with the information, this is definitely a unidimensional graphic.

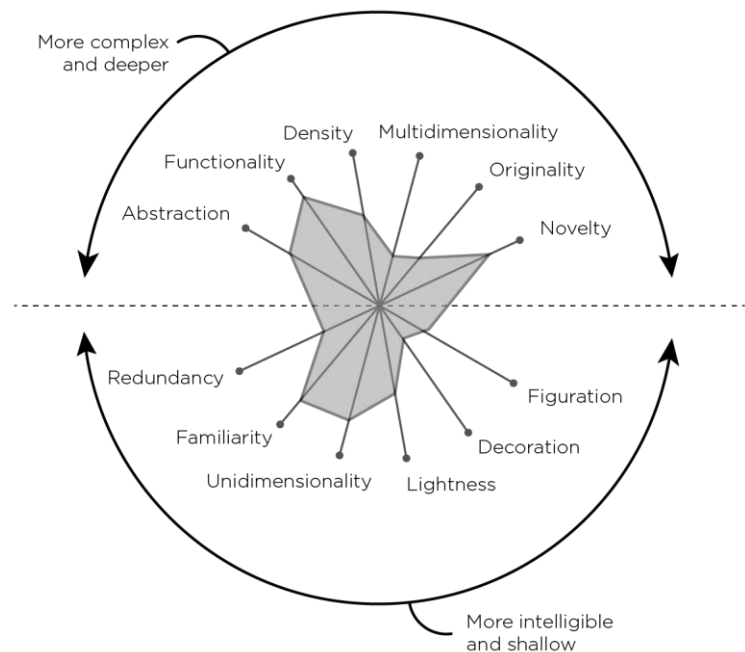


Figure 26. "A History of the C.I.A.'s Secret Interrogation Program" - visualization wheel

Discussion

Two of the most influential newspapers in the US are dedicating time and personnel to a relatively new type of journalism. This should tell us how necessary for the current practice of the trade data and infographics are. The foundations of data journalism (Schudson, 2010) are meeting the needs and demands of the readership (Rogers, 2014) and the evident need for relevance in the news industry (McChesney, 2012). While it is still early to comment on integration of interactive infographics in journalism, the current state of its practice looks promising for the readers, the publishing companies and, of course, the new generations of journalists to come.

Altering the newsroom dynamic is no longer an issue – if it ever was – for these organizations. The *NYT's The Upshot* started with a mixed staff of 15 people (McDuling, 2014), and the *WP* works today with 25 professionals of various backgrounds (Darla Cameron, personal communication, November 14, 2015). In the *WP*, all of the staff had journalistic experience before joining the team, but not all are journalists. As Cameron explained, “some newer team members studied computer science in college, and about 2/3 of the team has web development skills and primarily makes graphics for the digital space” (personal communication, 2015).

It is important to also consider the implications for journalism schools. Cameron (personal communication, November 14, 2015) explained the dynamics of a mixed newsroom, where everybody collaborates and each member of the team approaches news from their particular expertise. While a journalism degree is not necessary to work in the production of data stories, given the popularity and impact of these types of articles, it is only logical to expect academic institutions to consider the implications for their curricula. Multidisciplinary courses

should become more and more common, where students from different colleges collaborate imitating the real-life newsrooms.

After observing how teams are creating richer stories, it's hard not to side with Cairo (2014) in the establishment of visual journalism as a formal branch of the informing practice. Allowing flexibility in the credentials of the makeup of a team can enhance news as a product, potentially creating more opportunities for reader participation and achieving the much-needed engagement Mayer (2011) tells us about. These news organizations are making the most out of the possibilities the electronic medium offers, to expand on the work they do offline. Once printed, content displayed on paper is static, and readers must interpret the information according to what is presented. Some of the samples analyzed would take up several spreads on a printed newspaper, making these featured stories very expensive in terms of production and loss of advertising space. If the information were to be summarized in one or two pages, the potential clutter would be overwhelming for readers, ultimately making them avoid reading the story altogether. Furthermore, digital medium allows for cross-reference using a unique device (i.e., the same computer used to read the news), and interactive infographics often allow journalists to highlight information, making it possible for readers to interpret content on their own.

While the printed versions of both *NYT* and *WP* are incredibly popular and iconic, the transition to the web has opened many doors papers just cannot handle. However, as I reviewed existing literature on this topic, these changes in the industry are likely being pushed by the need to stay relevant and profitable. We can only expect newspapers to follow the readers, and the readers are online, like Beaujon (2012) tells us.

The results from the quantitative analysis show that the *NYT* is more likely to publish infographics as part of larger stories instead of presenting them as news items on their own. This

serves to answer RQ1 and RQ2, as it is possible *NYT* is relying in the use of interactive elements within the article to enhance the reading experience, thus increasing user participation. We can also see that most of the infographics (63%) were actually linked to a story, which means that data visualization is being used as a way to enrich stories, but not necessarily to create new ones, as Rogers (2010) suggested.

RQ3 is answered by the breakdown of the sections: local (18.5%), lifestyle (18.2%), and politics (17.8%). If we pair these with the relationship found between political articles and the ability to filter data, we can also learn that these stories are meant to be tools for comparison and accountability. RQ3 had a predictable result, with the predominance of charts (37.8%) and maps (38.5%). Both of these methods of representation are traditional and would fit in Cairo's axis of familiarity (2012) and were probably used because of practical reasons. Charts allow for quick comparison and organization and tools like Google Maps allow for easy insertion of a map on any website (as it was often used, by the *NYT*). The recurrence of politics as a topic, and the extensive electoral coverage might have something to do with their popularity on these results.

Techniques like illustration and video were less common. In the case of *WP*, their stories featured more illustrations, and also more decorative elements, as we could see on the results. This could be attributed to editorial style, as they were also more likely to include decorative elements with little to no functionality. *WP* was also more likely to dedicate interactive features to the description of events, which could be attributed to the fact that it caters to the surrounding communities much more than *NYT*.

A significant section of this thesis is dedicated to the qualitative analysis of the stories. While the methodology did not include a human factor, analyzing the information from a user's point of view is still a very valuable addition to this exploration. Using Alberto Cairo's

Visualization Wheel, I looked at all of the elements that made up six of the interactive infographics. Cairo's wheel is not meant to yield information to create predictions or generalizations. It is, instead, a novel approach to textual analysis, which results in an irregular graphic, placing each story on a "complex" or "intelligible" hemisphere – an appropriate method to show the results in an infographics study.

What is interesting about the wheel is that it does not provide numbers. The quantitative analysis gave us interesting insights about the state of infographics in the past year, but a qualitative analysis goes into details the numbers will not necessary tell us. None of the six stories landed exclusively on either axis. Instead, they were balanced, giving complex information a familiar treatment or simple but relevant data a novel representation.

Following Rogers (2014) claims, information, while more easily available, is not always easy to access for the average reader. *WP* was slightly more likely to link to sources that *NYT*, an aspect I thought worthy of exploration on RQ4. I also looked at the use of non-function (decorative) elements and found that, while *WP* is more likely to use those, they have little prevalence in the design of infographics. Much like Cairo (2014) explained, the participation of designers in the newsroom is steadily gaining reputation as the practice of visual journalism – not to be mixed with photojournalism – since designers are applying the core elements of news storytelling: clarity, accuracy, and depth.

Limitations and Future Research

One of the main limitations of this research is that the year I chose to analyze was coincidentally an election year. While my intention was to gather the most current data, the results were definitely influenced by the coverage of last year's electoral campaign. Topics such as funding, expenses, and electoral predictions often required the use of maps and charts, as

discussed above, and potentially tipped the scale in the direction of those representation techniques. Future research should include a broader sample in terms of time range or news sources, in order to obtain an apt sample for broader generalization. A study focusing on user engagement or audience analysis would help elaborate on how effective these storytelling techniques are in terms of engagement. Observing how users interact freely with the content and perhaps measuring the rate of information retention would certainly give us interesting data, valuable for the industry and future research.

References

- Alliance for Audited Media. (2015). *The New York Times Consolidated Media Report* [Data file]. Retrieved from <http://www.auditedmedia.com>
- Alliance for Audited Media. (2015). *The Washington Post Consolidated Media Report* [Data file]. Retrieved from <http://www.auditedmedia.com>
- American Press Institute (2014). *The rational and attentive news consumer*. americanpressinstitute.org. Retrieved from <http://www.americanpressinstitute.org/publications/reports/survey-research/rational-attentive-news-consumer/>
- Barthel, M. (2015). Newspapers: Fact sheet. *Pew Research Center's Journalism Project*. Retrieved from <http://www.journalism.org/2015/04/29/newspapers-fact-sheet/>
- Beaujon, A. (2012). *Pew: Half of Americans get news digitally, topping newspapers, radio*. Retrieved from <http://www.poynter.org/news/mediawire/189819/pew-tv-viewing-habit-grays-as-digital-news-consumption-tops-print-radio/>
- Bhattacharjee, A. (2012). Social science research: Principles, methods, and practices. *Textbooks collection. Book 3*. Tampa, Florida: University of South Florida.
- Boczkowski, P. J. (2004). The processes of adopting multimedia and interactivity in three online newsrooms. *Journal of Communication*, 54(2), 197-213. doi:10.1093/joc/54.2.197
- Cairo, A. (2012). Reclaiming the word "infographics" *The Functional Art*. Retrieved from <http://www.thefunctionalart.com/2012/12/claiming-word-infographics-back.html>
- Cairo, A. (2013). *The functional art: An introduction to information graphics and visualization*. Berkeley, California: New Riders.

- Cairo, A. (2014). Ethical infographics. Investigative Reporters and Editors, Inc. *The IRE Journal*, 37(2), 25.
- Cairo, A. (2014). Visual journalism. *Targeted News Service*, Miami, Florida, January 8.
- Conboy, M. (2004). *Journalism: A critical history*. Sage Publications.
doi:10.4135/9781446215111
- Dick, M. (2014). Interactive infographics and news values. *Digital Journalism*, 2(4), 490-506.
doi:10.1080/21670811.2013.841368
- Doctor, K. (2015). Is The Washington Post Closing in on The New York Times? *Politico Media*
Retrieved
from <http://www.capitalnewyork.com/article/media/2015/08/8573545/washington-post-closing-times>
- Dur, A. B. (2014). Data Visualization and Infographics in Visual Communication Design
Education at the Age of Information. *Journal of Arts and Humanities* 3(5), May, 2014
- Few, S. (2012). *Show me the numbers: Designing tables and graphs to enlighten*. Burlingame,
California: Analytics Press,
- Fink, K., & Schudson, M. (2014). The rise of contextual journalism, 1950s–2000s. *Journalism*,
15(1), 3-20. doi:10.1177/1464884913479015
- Franklin, B. (2009). Journalism. *Key concepts in Journalism Studies*. London, United Kingdom:
Sage UK. Retrieved from
<http://ezproxy.rit.edu/login?url=http://search.credoreference.com/content/entry/sageukjournal/journalism/0>
- Friendly, M., (2009). *Milestones in the history of thematic cartography, statistical graphics, and data visualization*. Retrieved from <http://www.datavis.ca/milestones>

- Gray, J., Bounegru, L. & Cambers, L. (2012). *The data journalism handbook*. Retrieved from <http://datajournalismhandbook.org/1.0/en/>
- Jurkowitz, M. (2014a). The growth in digital reporting. *Pew Research Center's Journalism Project*. Retrieved from http://www.journalism.org/2014/03/26/the-growth-in-digital-reporting/?beta=true&utm_expid=53098246-2.Lly4CFSVQG2lphsg-KopIg.1
- Jurkowitz, M. (2014b). The losses in legacy. *Pew Research Center's Journalism Project*. Retrieved from <http://www.journalism.org/2014/03/26/the-losses-in-legacy/>
- Lankow, J., Crooks, R., and Ritchie, J. (2012) *Infographics : The Power of Visual Storytelling*. Hoboken, NJ, USA: John Wiley & Sons.
- Marchionni, D. M. (2013). Journalism-as-a-conversation: A concept explication. *Communication Theory*, 23(2), 131-147. doi:10.1111/comt.12007
- Mayer, J. (2011). Highlights from the 2011 journalists engagement survey. *Reynolds Journalism Institute*. Retrieved from <https://www.rjionline.org/stories/highlights-2011-journalists-engagement-survey>
- McChesney, R. W. (2012). Farewell to Journalism? *Journalism Studies*, Vol. 13(5-6), 2012, 682-694. doi:10.1080/1461670X.2012.679868
- Mcsherry, M. (2014, March 18). New York Replaces London as Financial Capital of the World. *The Independent*. Retrieved from <http://www.independent.co.uk/news/business/news/new-york-replaces-london-as-financial-capital-of-the-world-9198274.html>
- Mitchell, A. (2015). State of the news media 2015. *Pew Research Center's Journalism Project*. Retrieved from <http://www.journalism.org/2015/04/29/state-of-the-news-media-2015/>

- Nip, J. Y. M. (2008). The last days of civic journalism. *Journalism Practice*, 2(2), 179-196.
doi:10.1080/17512780801999352
- Overholser, G., & Jamieson, K. H. (2005). *The institutions of American democracy: The press*. Oxford University Press on Demand.
- O'Brien, H. L., & Toms, E. G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology*, 59(6), 938-955. doi:10.1002/asi.20801
- Rogers, S. (2010) *Information is Power*. The Guardian. Retrieved from:
<http://www.theguardian.com/media/2010/may/24/data-journalism>
- Rogers, S. (2011). Data journalism at the Guardian: What is it and how do we do it? *The Guardian*. Retrieved from www.theguardian.com/news/datablog/2011/jul/28/data-journalism
- Rogers, S. (2014) *Data journalism is the new punk* doi:10.1177/0956474814538181
- Pasternack, S., & Utt, S. H. (1990). Reader use and understanding of newspaper infographics. *Newspaper Research Journal*, 11(2), 28-41.
- Schudson, M. (2008). *Why democracies need an unlovable press*. Cambridge: Polity Press.
- Schudson, M. (2010). Political observatories, databases & news in the emerging ecology of public information. *Daedalus*, 139(2), 100-109. doi:10.1162/daed.2010.139.2.100
- Valero, J., Català, J., & Marín, B. E. (2014). An approach to the taxonomy of data visualisation. *Revista Latina de Comunicación Social*, 69, pp. 486-507. doi:10.4185/RLCS-2014-1021en

Weber, W., & Rall, H. (2012). Data visualization in online journalism and its implications for the production process. *16th International Conference on Information Visualisation (IV)*, 2012 349-356. doi:10.1109/IV.2012.65

Weber, W. (2013) What is an interactive information graphic? *Malofiej* Retrieved from <http://www.malofiejgraphics.com/what-is-an-interactive-information-graphic/>