

# ChromeView

Benjamin Jang

Carnegie Mellon University  
+1 (908) 487-4919  
benjaminjang@cmu.edu

Min Noelle Kim

Carnegie Mellon University  
+1 (818) 421-2577  
mnkim@cmu.edu

Zeeshan Rizvi

Carnegie Mellon University  
+1 (412) 420-0647  
zrizvi@cmu.edu

Ryan Sickles

Carnegie Mellon University  
+1 (617) 833-9574  
rsickles@andrew.cmu.edu

## ABSTRACT

In this paper, we discuss the problem of polarization through selective exposure to news on Facebook. We propose a solution in the form of a Google Chrome Extension, called ChromeView, that recommends related news articles to users and helps them monitor their political leanings. In this paper we will focus on the ideation, creation and testing of ChromeView.

## Categories and Subject Descriptors

Human-Centered Computing ~ User Interface Toolkits

## General Terms

Algorithms, Design, Human Factors

## Keywords

Polarization, Facebook, Political Bias, ChromeView, News

## 1. INTRODUCTION

Algorithm models and machine learning systems. Whether we realize it or not, our daily lives center around them and are mediated by these systems that curate the world's information for us. By making assumptions about our habits and practices to make certain recommendations, algorithm models deliberately limit our sources of knowledge. This process is known as selective exposure, a psychological effect that has been exploited heavily by social media websites to cater content for their audience. Research has shown that people prefer to access information that suits their own opinions and worldview and to avoid information that challenges these beliefs (Lazarsfeld et al. 1944). This reduces cognitive load because, by selecting only confirmatory information, they do not need to reaffirm their existing beliefs. It is unfortunate that for many social media sites, their business model revolves around selectively exposing their viewers to content that affirms their existing point of view.

This past election cycle was the first time all of us were actively able to engage in politics and we were all very disheartened by the partisanship we witnessed across the country. We witnessed a deep rift emerged between Americans in real-time, and our team was interested to see how technology played a role in this divide. After we researched the topic, we learned how social media (with

Facebook in particular) for the sake of catering to their users, creates an ideological bubble that traps the user by feeding them only one point of view. Facebook's platform has been instrumental in selective exposure to political viewpoints as it has encapsulated its users within "Filter Bubbles". Eli Pariser describes these filter bubbles as

*"... [a] personal, unique universe of information that you live in online. And what's in your filter bubble depends on who you are, and it depends on what you do. But the thing is that **you don't decide what gets in**. And more importantly, you don't actually see **what gets edited out**."* (Pariser 2011)

To build on this definition, if one's political leaning is listed as "Conservative" on Facebook, they will consistently be shown conservative articles and, conversely, if one identifies themselves as liberal, they will only be shown liberal articles. We hypothesized that this involuntary lack of exposure to the other side's view has been the dominant contributor to the rampant polarization of our society over the past few years. Our goal was to help bridge the gap between viewpoints created by Facebook by providing an application that let users see two sides to the same story

## 2. RELATED WORK

Several other organizations have tried to develop a solution to help users overcome the divide created by Facebook. Most notably, to illustrate the disparity between what political news users see on Facebook, The Wall Street Journal created "Blue Feed, Red Feed" (BFRF), a visualization that provides a side by side comparison of the news users would see on their Facebook newsfeed depending on their political leanings. BFRF served as an early inspiration for our project as we felt it was a non-intrusive method of demonstrating to users that, in politics and news, there are different interpretations of reality. However, we felt BFRF had several shortcomings that limited it as a tool that users could integrate into their news reading experience. For one, BFRF researchers curate the different opinions on specific highly discussed and divisive topics such as healthcare, abortion laws and gun control, leaving out the daily disputes that occur over real-time news.

Furthermore, and foremost, BFRF is housed within The Wall Street Journal's platform and is not available for users as they are actively scrolling through Facebook. This makes the BFRF tool accessible to very few people who put in the effort to consolidate the articles they read on one platform to another.

These shortcomings helped us develop our solution that focused on providing different views not on specific topics, rather on individual articles and would be available as users scroll through Facebook. After heavy criticism for the role it played in polarizing its users, Facebook has also attempted to rethink how it features news on its platform. Unfortunately, their focus has been towards addressing the propagation of "fake news" rather than the disparity created by their platform.

### 3. METHODOLOGY

#### 3.1 Background Research

Currently, Facebook's newsfeed algorithm has two main design goals:

1. To show everyone the right content at the right time so they don't miss the stories that are important to them.
2. To have newsfeed display posts more prominently that will generate more interaction or engagement.

Both of these goals have led Facebook to successfully engage many like-minded people with each other, but encouraging an accurate and unbiased news digest isn't a priority. We propose that any social media site add another goal: to diversify news content to help make users become wise news consumers, and to empower them to be more knowledgeable about the world (not to mention, it would also add to the user delight at finding ideas that are novel to them). Because despite Facebook describing as their role as simply "connecting people and delivering information", a significant amount of the world's population reads the news through these sites. Thus, they have a journalistic responsibility to their readers.

Diakopoulos and Koliska define transparency as "the ways in which people, both inside and external to journalism, are given a chance to **monitor, check, criticize** and even **intervene** in the journalistic process." It allows users access to more information, "which can influence power relationships between governments and citizens, business and customers, news outlets and audiences." (Diakopoulos, 2016). We asked ourselves, how can we leverage design to provide users a way to "**monitor, check, criticize, and intervene**" in the carefully curated journalism they are fed through Facebook. Inspired by Diakopoulos and Koliska's ideals, we are hypothesizing that we could start tackling the problem of passive news consumption practices by letting

users observe their own behavior on social media and empowering them with tools with which they might interact with news and algorithms in different ways, it would help them become more mindful of their news consumption practices.

This informed our two main hypotheses:

1. **We can leverage design to enable everyone to question their versions of reality, and;**
2. **If the users are reminded of the fact that they contribute to their own filter bubbles, it will motivate users to be more equally informed of ideologies from both sides of the spectrum.**

Based off these hypothesis, we wireframed our application with two primary features. Fig. 1 is our proposed solution to the first hypothesis. It is a prototype of a hover-tool that automatically pops up when a user scrolls on a Facebook news article and provides them with other similar articles from other news sources. This gives users the opportunity to easily explore different views and opinions if they choose to do so. Fig. 2 is a mockup of a "political leaning meter" that solves our second hypothesis. We believe that by showing users a visual representation of their political leanings, we can help them come to the realization that they do not have the "whole picture", and this cognitive dissonance will motivate them to seek out other points of views. (Festinger 1957).



Fig.1: The hover-tool that has been designed off hypothesis 1 to provide related article recommendations.

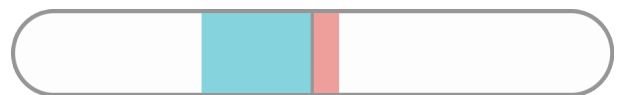


Fig.2: The meter-tool that displays a user's political leanings based on the types of articles they have been reading. As shown in this figure, this user skew heavily to left leaning articles.

To test our mockups, we conducted a lightweight rapid prototype testing, we presented paper prototypes in front of a limited pool of five study participants. Overall, the responses were 2 positive ("If you make it past Facebook, and target people that really care about news, it'd be useful."), 2 mixed ("I'd use it if it comes free of charge," and "I feel like the meter's judging me; what is it basing its meter shifts on?"), and 1 negative ("I wouldn't use it, I'm comfortable with my filter bubble."). We decided that the

results from our testing were satisfactory and we proceeded to create a working application.

## 3.2 Technical Implementation

In order to achieve the desired functionality, our team decided to develop a lightweight, scalable, and easy to use chrome extension, called *ChromeView*, that would operate in the Facebook newsfeed environment. In order to properly develop this application, the process used was Agile in nature - through which the application features were developed, tested, reviewed then iterated on by the team. The main technology stack for our project was HTML5, CSS, and JQUERY 3.2. Our project also included the integration of two API's: the Lateral.io news recommender API (<https://lateral.io/docs/news-recommender>), and the Google Chrome Browser API (<https://developer.chrome.com/apps/browser>). The project development and design was broken down into three parts: the interaction with the Facebook news card and feed, the individual recommended news articles, and political bias meter in that order. The project is currently being hosted as an open source project on GitHub:

[https://github.com/rsickles/SM\\_Chrome\\_Ext](https://github.com/rsickles/SM_Chrome_Ext) and is also available on the Google Chrome Extension Store: <https://chrome.google.com/webstore/detail/chromeview/imcdfjpbjgmhcdikgkhogbnebhifdch>

### 3.2.1 Facebook News Feed Interaction

In iteration one of the Agile process, the team thought it was best to have a hover interaction with the news feed articles. This interaction would require the user to hover over any part of the article card as shown in Fig. 3.

However, technical roadblocks presented themselves at this stage since we were not building a native application and were working with the Facebook source code from a third party system. One of our roadblocks was that Facebook has many links in each newsfeed including profile links, sidebar links, comment links, etc. so it became a challenge to figure out how to best decide if the link the user was hovering over was in fact a news card link or not. This was an important design decision because our application would become useless and fail if a user hovered over a profile link and our system tried to recommend news articles from a profile picture. After careful testing and analysis of how Facebook structures their source code for links, it was identified that news card's to sources such as CNN or Fox included a shortened URL such as

`cnn.it/<random_unique_string>`. The domain name of this link was decided to be the best indicator of links that our application were to run on if they included whitelisted strings such as "cnn". However, this link would only appear when either the image or heading were hovered over in the card. Therefore, in iteration two of this stage our team decided that we would change the user interaction to be that over those two areas of the card.

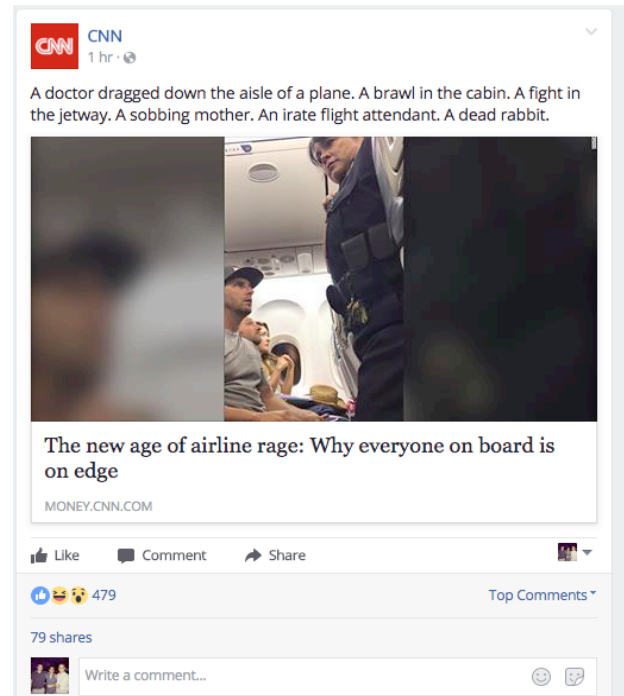


Fig.3: Image of a news article as it appears on the Facebook newsfeed.

When beginning to design stage 2 of implementing data from a third party API for news recommendation it was found that an iteration 3 of this stage was needed. We found that, when trying to scrape the Facebook newsfeed article heading in order to send it to the API for recommendation, the only area that had the heading was accessible by JQUERY. Therefore, for the final iteration of the design of this interaction it was decided that the user would hover over the heading of the article.

### 3.2.2 News Recommendation

When designing and implementing the news recommendation modal view with the news cards we again followed the Agile development processes with iterations. In iteration one it was decided that JQuery would be used to dynamically create a modal view on top of the Facebook news feed to allow the user to focus in on our application. The modal view was to be responsive with regards to the news feed in order to always be placed in the middle of the

screen and would move if the user started to scroll down the page. It was also decided during iteration one to include a close button in the modal to reverse the operation of opening the application. The designs of the three cards were also decided during the iteration where the following specifications were as follows: three individual cards, one recommended article per card, each card has the associated heading and image, and each image is a clickable link that would open a new tab with the recommended article. Iteration two of this design was started by deciding to use JQUERY again to dynamically create the cards HTML5 based on the hovered over article in the news feed. It was also decided the order that which the cards would be dynamically created which is shown in Fig. 4 below.



Fig.4: Image of a recommended news article that shows up on the hover tool.

In order to create the HTML, JQUERY was used to create a parent container div to house all three cards, the meter, and close button. Then three news divs were created to house each card with data included. Finally, a heading div and image div were created with an anchor HTML element wrapped around the image. Iteration three of the news card creation included pulling in data from the lateral.io API in order to get recommend articles with associated headings, images, and links to the articles from their sources. After acquiring a free 2 week API key, the request AJAX call constructed was a POST request to '<https://news-api.lateral.io/documents/similar-to-text>' with parameters: API key and data where data was the heading text of the article hovered over. The text from the header was what was used by the API's algorithm to search it's up to date database of current news articles related. AJAX was used throughout the application as the primary means of streaming data in order to provide a smooth asynchronous experience for the user so that as the data came in and was appended to the div's with JQUERY each one would load

one at time with no UX interruption. The Lateral.io API would return 10 unique recommended articles with associated URL's, headings, and images for each. In increasing order, each article the API returned was sorted by relevance to the heading sent in the request. It was thus decided in this iteration that the top three articles would be the ones chosen every time to be displayed to the user in order to preserve the highest probability of likeness. Each returned article was constructed as a JSON object so JQUERY was used to pull each individual heading, image, and URL data from each object. Each data point was saved into a variable and then added to an internally constructed JSON object. Then, when the "onsuccess" function of the AJAX call was triggered, this JSON object was sent to a "createNewsBox" function that would append each data point to the correct div. At the end of the createNewsBox function, a callback was triggered which would return the dynamically created container with data and append it to the body of the Facebook News Feed. The CSS for the modal view and cards were all created from scratch while also referring to the Facebook Style guide for colors and fonts ([https://facebookbrand.com/wp-content/uploads/2016/08/facebook\\_brandassetsguide.pdf](https://facebookbrand.com/wp-content/uploads/2016/08/facebook_brandassetsguide.pdf)).

### 3.2.3 Political Bias Meter

The final piece to our application was the political bias meter in the upper left hand corner of the modal view. The objective of the meter is to help users visualize their current political leaning based on what articles they are reading. The bluer the meter is the more liberal articles you are reading and the redder the meter is the more conservative articles you are reading. A look at what the meter looks like is shown below in Fig. 5.

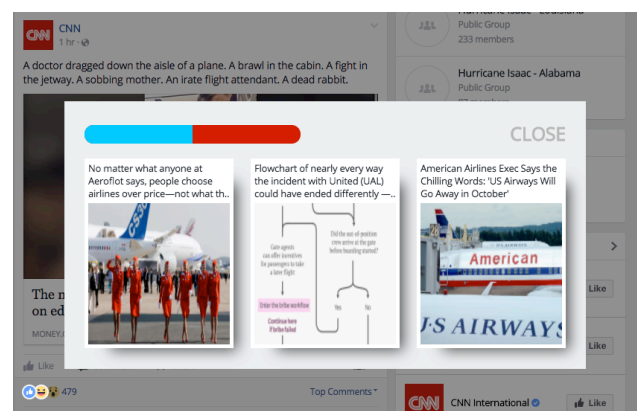


Fig.5: The hover tool with three related articles and the meter.

The development of the meter followed the same Agile process as the previous two components. During iteration one it was decided that the meter wouldn't be colored two colors and that only one color would be used. However, during iteration two the two color system was decided upon. How it works is that a user will click on an article recommended to them in the modal view. After doing so, a



JavaScript script will be alerted of the action and record exactly what article was clicked on. After iterating on the scoring system of how each article would affect one's meter it was decided to use a simple decimal ranking system as stated by an article from Pew Research ([http://www.pewresearch.org/pj\\_14-10-21\\_mediapolarization-08-2/](http://www.pewresearch.org/pj_14-10-21_mediapolarization-08-2/)).

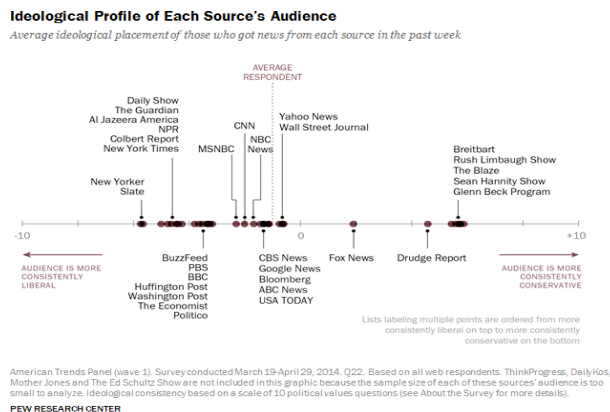


Fig. 6: Graphic from Pew Research's study on Media Polarization.

As shown in the below infographic each source was scored based on which side of the middle it was on from 0. For example; if a user clicked on an article from The Guardian, the user's political score would go -1. The following JSON object was the programmatic way we scored each source based on the below infographic:

```
{
  far_liberal: -2,
  liberal: -1,
  neutral: 0,
  conservative: 1,
  far_conservative: 2,
}
```

After the JavaScript records the user score, in order to save the meter's score for later use the Google Chrome Browser API was used to store the score in the browser's storage. In this way, even if the user logs out of the browser, Facebook or the session, the score will be stored and never removed unless done programmatically. Therefore, every time the score needs updating and the meter needs adjusting the application retrieves the score stored in the user's browser, updates it then changes the meter accordingly. The meter itself is merely a HTML5 meter element that was styled using CSS and is simply changed by adjusting the value attribute with JQUERY once the new score is retrieved and updated.

## 4. RESULTS

Our research found some interesting contradictions in users' news consumption patterns online. In a survey we administered before development of our application, we asked users if they believed it was important to get unbiased news. We shared this survey through our personal Facebook accounts to our connections. An overwhelming majority of the 153 respondents that took our survey agreed that it was important to keep your news consumption unbiased yet very few of them actively searched for a different view point after reading an article on Facebook. Another surprising result was that 74.7% of respondents were strongly in favor of someone they know in their social circle using ChromeView to see other's perspectives and to be more aware of their own bias, yet many of these respondents were skeptical of using ChromeView themselves. We were interested to see why users were eager for others to benefit from ChromeView but were reluctant to adopt it themselves. To determine this, showed users a video prototype of the functionality of our application and we then asked them to isolate specific functions of the application that they disliked. We were able to pinpoint the majority of the concern to the meter. Respondents were skeptical about the meter's ranking of news articles and if the score they received would accurately reflect their own political leanings. According to one respondent, the meter would be a redundant feature because "likely someone with a bias (because everyone has one), would be ranking how left or right leaning the article is, which would render such judgments moot". From these findings, we were faced with a complicated dilemma. Users were hesitant to adopt our application because they didn't trust the meter, but the meter was essential to help users visualize their political leanings and we did not want to do away with it. Therefore, to guide future research, we tried to answer the two following questions:

1. How can we get users to be more willing to adopt our application?
2. How can we make the meter as unbiased as possible when it comes to ranking media outlets?

### 4.1 Increasing User Adoption

To answer the first question, we sent out a follow-up survey to see if the inclusion of certain additional, value-added features could improve the adoption of our application. We first showed our respondents a video of ChromeView in use to help them understand how the application worked and then asked users to rate on a 7 point Likert scale "how likely they were to download and use ChromeView". Next, we showed them a prototype of various additional features that could potentially be a part of ChromeView and we asked them "how likely they were to download and use ChromeView with the addition of this feature." The features that we asked them to rate included the following:

- **Badges and Ranks:** This solution would allow users to demonstrably share their personal record of news consumption with others when having political news conversations online. The idea is that based off your usage of ChromeView, you are rewarded with a badge that you can display next to your profile picture. This adds credibility to you having an informed opinion which you can prove to other users.
- **Daily Consumption Tracking Meter:** On the Facebook news feed, profile pictures of individuals will show a “health level” to the left side of the photo, indicating how many articles they have read throughout the week. The chart will be red if a majority of the articles were conservative sources, blue if the majority of the articles were liberal sources, and purple if the sources were evenly distributed. Additionally, the bar will be refreshed every week (7 days).
- **Analysis Reports:** ChromeView will track the news you read and based on a personally selected interval, will send you a report on your news consumption trends. This report will describe articles you have read recently, the authors, the publications and other general information. It will also provide a detailed analysis of other users who have read the same articles as you and patterns linking users who have consumed the same news articles
- **POV Filters:** ChromeView will provide an option to choose related news articles from different writers’ POV. It would parse through a database for various different types of writers that represent different types of voices.

Our findings showed that respondents were much more likely to download and use ChromeView if one, or a combination, of these were implemented.

## 4.2 Creating an Unbiased Rating System

Our initial mock-up of the ChromeView extension was a scale that was calibrated based on the weightings for each news outlet provided by the Pew Study of Political Polarization and Media Habits. The Pew Study conducted numbers based research on about 25 major news outlets, and graded them individually in accordance with a scale. The meter we had initially drafted up had a center which was marked as being neutral political leanings, while the left indicated liberal leanings and the right indicated conservative leanings. For instance, CNN was graded as being (-1) in its political leanings, indicating that it was slightly liberal in the news that it reported. Conversely, Breitbart was graded as being (+3) in its political leanings, indicating that it was very conservative in the news that it reported.

As we realized that there were many more news outlets present across the web with various political leanings, we

recognized the flaws with our initial model. We wanted to develop a more accurate and unbiased method for assigning scores to articles and therefore, we came up with a method using geographical data which will effectively score the articles of news outlets on a more effective and accurate basis. Keeping in mind the population of the United States, we figured that creating a meter weighing on the entire nation’s population and the Electoral College would calibrate the meter so that we can accurately score the news articles. Using the breakdown of votes coming from each state based on population as well as the political leanings of each individual states, we believe we can use the population ratios as well as the political leanings to scale out the grade for each individual article as it is viewed in certain parts of the nation. We aim to integrate mobile sensing technology when developing this grading scale to accurately determine the location a user is reading an article from. (Ganti et al. 2011)

We recognize the immense scale of additional research and data study that would need to be conducted in order to make sure that our calibration of the meter is correct and that the grading of the articles pulling from various areas across the United States is up to date and accurate. To effectively build such a database, we would need to approach our methodology with care, making sure that extensive data research is conducted to accurately capture the political leanings of states, individuals and news outlets.

## 5. DISCUSSION

### 5.1 Limitations

There are several limitations to our project and our research methodology that we acknowledge and hope to build on through future research.

The most fundamental limitation to our current work is that it revolves around a hypothesis that providing balanced news will help bridge the divide between people. At best, we theorize that a balanced consumption of different viewpoint will help reduce the polarization that has been created through Facebook; at worst, it may serve to make the divide greater. Though we believe the optimistic scenario is more likely, we cannot say for certainty what the outcome will be.

Another shortcoming to our research is the audience that we were able to reach for our surveys. Due to limited resources at our disposal, we were only able to administer our surveys to friends within our own Facebook circles. This undoubtedly biases the demographic we surveyed to be relatively wealthy, educated and liberally aligned. In an ideal scenario, we would be able to gain more insight from a more diverse set of respondents to help cater our application for a wider demographic.

## 5.2 Future Work

The problem of polarization online is a complicated and multifaceted one. Finding a solution to this problem requires a holistic and unbiased approach to change how users read news. Our hope is that our application will inspire social network sites, like Facebook, to take responsibility for their role in the dissemination of news. Future development on ChromeView would aim to better integrate it into Facebook's platform for a seamless reading experience for the user. At the moment, the hover tool requires the user to interrupt what they are doing to read the recommendations. We wonder if there is a better way to achieve the same functionality without being intrusive to our users.

We also hope to develop an unbiased method to score news outlets on their political bias. The idea to use election data to map scores based on where articles are being viewed is purely hypothetical and we are not sure how this would affect our ratings. Even if it turns out to be a fail safe method for assigning political bias to news outlets, how will we be able to communicate this to our users and get them to trust our application? Could there be a better way to create a ranking system that is easy to develop and easy to explain?

## 6. CONCLUSION

We believe that with further refinement, ChromeView has the potential to change the news reading experience on Facebook and can help reduce the divide that has been created between people. This application has been created as a reminder to users that there are always other opinions out there deserve consideration and understanding. ChromeView is available for free online in the Google Chrome Store and we hope that others will use and further develop our application.

## 7. ACKNOWLEDGMENTS

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## 9. APPENDIX

### 9.1 Survey 1

This survey was sent out to determine people's existing views on news on social media and their interest in a tool similar to ChromeView. It was sent out just before we began developing the application. We sent it to our social circles on Facebook and got 153 respondents. We asked the following questions in the survey.

#### 9.1.1 Questions on Interaction with News on Facebook

- Q1.) How often do you read, like, or share news on Facebook?
- Never
  - Rarely
  - Occasionally
  - Fairly Often
  - Very Often
- Q2.) Where do you normally get your news?
- Facebook
  - Reddit
  - Twitter
  - Outlet Website
- Q3.) What types of content do you read, like, or share the most on Facebook?
- Updates from friends
  - Shared content
  - News and current events
- Q4.) Which of the following factors motivate you the most to read, like, or share a news content on Facebook?
- Photo of the article
  - Friends sharing or liking a post
  - Article Headline
  - Article Synopsis

#### 9.1.2 Questions After Showing Them the Prototype

- Q1.) Imagine that you've read The Atlantic's refugee article shown above and that the hover tool provided you with opportunities to explore other perspectives. Would you click on the any of the other articles?
- Yes
  - No
  - Maybe

Q2.) Imagine that you're reading an article written by a publication known for views that are different from yours. If you find it informative, would you "like" or share it? Why or why not?

Q3.) When reviewing the video, did you find the tracking meter (pictured below) helpful or annoying? Please explain.

Q4.) If the meter was skewed in one direction would you behave any differently?

- The Atlantic
- Occupy Democrats
- Slate
- Brietbart News
- MSNBC
- The Wall Street Journal
- Fox News
- The Hill
- The Economist
- Reuters
- Al Jazeera
- BBC

### 9.1.3 Questions to Gauge their Interest

Q1.) Please think of someone in your family or friends that might benefit from this tool. What is their relation to you and how do you think this tool would benefit them?

Q2.) If you were to recommend the tool to your family or friends, which of these features would benefit them most?

- Hover tool
- Meter
- Both
- None

### 9.1.4 General News Related Questions

Q1.) In general, how would you describe your political views?

- Liberal
- Mostly liberal
- Slightly liberal
- Moderate
- Slightly conservative
- Mostly Conservative
- Conservative

Q2.) Rank which sources you get your news from in order of most to least.

- CNN
- The Guardian
- The Atlantic
- Occupy Democrats
- Slate
- Brietbart News
- MSNBC
- The Wall Street Journal
- Fox News
- The Hill
- The Economist
- Reuters
- Al Jazeera
- BBC

Q3.) How would you categorize the political bias of the following news outlets (Liberal, Mostly liberal, Slightly liberal, Moderate, Slightly conservative, Mostly Conservative, Conservative)

- CNN
- The Guardian

### 9.1.5 Demographic Question

Q1.) What is your age

Q2.) What is your gender

## 9.2 Survey 2

This survey was sent out to determine what features would help improve user adoption of ChromeView. We showed users mock ups of each of the features (discussed in 4.1) and how they would work, and we asked them to rate how much these options influenced their desire to download ChromeView.

### 9.2.1 Question to determine existing preferences on ChromeView without the additional features

Q1.) Please rate how interested you are in downloading ChromeView

- 1 – 7 Likert Scale (Not Interested – Very Interested)

Q2.) How effective do you think this application would be in getting you to read other news sources

- 1 – 7 Likert Scale (Not Effective – Very Effective)

Q3.) Do you think this extension would be useful when reading articles?

- 1 – 7 Likert Scale (Not Useful– Very Useful)

### 9.2.2 Question to determine with the additional features implemented.

Q1.) Please rate how interested you are in having this feature as a part of ChromeView?

- 1 – 7 Likert Scale (Not Interested – Very Interested)

Q2.) How likely are you to download and use ChromeView if this feature was implemented?

- 1 – 7 Likert Scale (Not Likely – Very Likely)

Q3.) How useful do you think this feature will be when having discussions online?

- 1 – 7 Likert Scale (Not Useful– Very Useful)