

TWITTER AS PUBLIC SALIENCE: AN AGENDA-SETTING ANALYSIS

BY:

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Abstract

Twitter provides an opportunity as a source of public opinion. Therefore, this paper argued Twitter as an indirect measurement of public salience. The issues of BP Oil and The Mortgage and Housing Crisis were given a time series analysis. First and second-level agenda setting variables were coded for television newscasts and newspapers and interpreted as measurements of media salience. Tweets were labeled public salience. A mild relationship between media salience and public salience was shown.

TWITTER AS PUBLIC SALIENCE: AN AGENDA-SETTING ANALYSIS

Introduction

Agenda setting scholars have long looked at the cross-lagged relationship between mainstream media and how they may set the agenda of the public (Servin & Tankard, 2001). Agenda setting has linked the public salience of select issues and the frequency in which those issues are mentioned in mainstream media. In agenda setting, the measurement of issue salience gauges the significance of real-world issues, stories or events. The two most common measurements of issue salience are measurements of the public's agenda and the media's agenda. These two types of issue salience can be referred to as public salience and media salience (Weeks et al., 2010). Media salience has been pegged as a key independent variable of agenda-setting research (Kiousis, 2004). The relationship between dependent variable, issue salience and media salience is a staple analysis of agenda setting and is the core analysis of this paper.

In the past, public salience was measured through public opinion surveys. It was difficult to retrieve accurate and representative samples of the public salience of issues in the media. Surveys concerning politics were generally conducted through both the telephone and the mail. To this day, a large investment in time and cost is still required to establish significant and representative samples. In addition, if these surveys are not treated with the utmost care, they can be subject to various biases by respondents. Agenda setting scholars have long called for a farther-reaching and less obtrusive way to poll for public salience (Shaw, Stevenson and Hamm, 2001). Social networking and microblogging might provide alternative methods. Usage of social networking is now widespread. One out of every four and a half minutes of Internet usage in the United States is spent on blogs and social networking sites (Social Networks, 2010). Users now spend more time than ever sharing their thoughts in a public arena.

Social networking sites allow users to share their own discourses. Anything from opinions, news, thoughts and musings are now shared on three of the Internet's most trafficked websites: Twitter, Facebook and MySpace. The newest and fastest growing of the three, Twitter, now has 17 million users and counting (Edison Research, 2010). Twitter puts a new emphasis on social networking and openness (Miller, 2010). By default, it shares, indexes and search optimizes all of the content users post to their accounts. The result is a mass amount of publically available discourse. Fifty million Tweets are broadcasted daily. As Twitter begins to attract wider demographics, Tweets can be thought of as representation of what the public is saying. Many companies and politicians have begun to use Twitter as a search engine of public opinion. Some political consultants argue that the most accurate way to measure public sentiment is to evaluate the issue in question on Twitter (Brustein, 2010). This paper views Twitter as a source of public opinion and as an indirect measurement of public salience.

Background & Literature Review

Agenda Setting: A Brief Overview

Agenda setting looks to see if the media control what topics the general public holds salient. This key conceptual definition of salience is the keystone of this paper (McCombs & Shaw, 1972). The first study of that hypothesis came in 1972 when McCombs and Shaw looked at the presidential campaign of 1968 and the issues voters perceived as important. They hypothesized that the media would influence the rank of importance of people's top issues in the campaign, and that the coverage would influence the perceived importance of those issues to the viewers. With a high correlation, the study found that there was a relationship between what the news was reporting and people's most importantly perceived issues.

While this breakthrough study was the first to give support for agenda setting, critics were quick to point out the lack of direction in the relationship between the media and the public's most salient political concerns. Were the media simply influenced by the public's agenda, or were the media doing the influencing? A lag needed to be established to determine the true predictor. To answer that question of causal order, McCombs and Shaw conducted another study in 1977 that used two different points in time to help establish the order of relationships. That type of lagged correlation helped show that the media's agenda served as a predictor of the public's agenda.

Iyengar et. al (1982) had more luck establishing relationships in agenda setting. His laboratory-based experiments involved the creation of altered newscasts that manipulated the content of the broadcasts in a way emphasizing some issues more than others. Iyengar was able on multiple occasions to prove that those issues given more emphasis in his altered newscasts were the ones that people would, in turn, rank as more personally important. Those effects were seen rather immediately, as people were often surveyed right after viewing newscasts.

Agenda setting theory has continued to evolve since its conception. Since the theory is so well established, it would be quite a task to cover all of the developments agenda setting has undergone since the conception. This paper only attempts to address parts of agenda setting that apply to the digital media realm.

Second-Level Agenda Setting

The second level of agenda setting serves as an enhancement of the media salience variable for this paper. The first study to combine the first level of agenda setting with existing framing research examined elections in Navarra, Spain in 1995 (McCombs et al., 1997). Second-level agenda setting goes beyond just tracking the media salience for issues in the news.

“The focus is not on coverage of objects, but on coverage of attributes of those objects. While coverage of the object continues to influence the perceived importance of that object –

as first-level agenda setting argues – second-level agenda setting argues that the *attributes linked to the object* in the news media are mentally linked to the object by the public. Thus, while first-level agenda setting suggests media coverage influences what we think about, second-level agenda setting suggests media coverage influences how we think, or frame, the issues we are thinking about (Craft & Wanta, 2004).”

Different types of attributes have been shown to frame public opinion in second-level agenda setting studies. Attributes include: subtopics, framing mechanisms, affective elements and cognitive effects (McCombs et al., 1997) (Craft & Wanta, 2004) (Gahnem, 1997). Those can affect the way the public perceives issues. Framing, as second-level agenda-setting theory defines it, is the “central organizing idea for making sense of relevant events and suggesting what is at issue (Gamson, 1989).”

The present study focused on one attribute of second-level agenda setting, framing mechanisms. Framing mechanisms deal “with the emphasis given to topics in the media, such as placement and size as well as other elements that influence the prominence of a news item” (Gahnem, 1997). Framing mechanisms have been shown to more effectively measure the amount of media salience for news stories. By adding additional variables that can account for articles that have been given special prominence or placement, more realistic measurements of media salience can be calculated. For instance, a framing mechanism technique might call for the measurement of news articles’ length in seconds or words. Another measurement might record when or where an article or news story runs in space or time. Realizing that all news stories were not equally prominent and accounting for these different levels better measures the key independent variable of an agenda-setting study, media salience.

Contemporary Agenda Setting: Social Networking, Digital Media & the Internet

There has been a marginal amount of research on the Internet and how it might apply to the germinal findings of agenda setting theory. Older forms of Internet-fueled communication tools, such as bulletin boards and chat rooms, have been found to follow the agendas set by traditional

media (McCombs et al., 2005; Rogers et al., 2002). More recently, Blog agendas have also been shown to follow the agendas of mainstream media (Lee, 2007). Overall, the body of research from the last century suggests that media salience predicts public salience on the Web.

Newer articles have tackled Internet-driven social media. In a 2010 preliminary study of agenda setting and YouTube, Sayre et al. investigated if, when and to what degree videos posted on YouTube may have led or followed traditional news media. They looked at one specific issue: California's Proposition 8, a controversial ballot proposition that would redefine the laws of marriage. The study took daily frequency counts for the story in national cable news programs, national newspapers and YouTube video uploads. The study then applied ARIMA time-series analysis to the three frequency counts and identified when and how traditional media led or followed YouTube content. While the findings had no single time-series model that could fit the entire 14 months in which the study was conducted, some significant conclusions could still be drawn. YouTube was found to both follow and lead. Prior to the day during which the public voted on Proposition 8, YouTube public salience followed mainstream media salience. However, following the election, YouTube public salience was found to lead the way. Speculation aside, the change seen immediately following the vote could not be empirically explained.

Another 2010 study looked at mainstream media and a new measurement, Google Trends, for a possible correlation. That study explored a potential relationship between mainstream media coverage of a particular political rumor concerning Barack Obama being a Muslim and its public salience as measured by online search activity. The results showed that mainstream media coverage, especially television coverage, influenced Google Trends' public salience of the political rumor. This study supports and reinforces the original definition of agenda setting. It suggests that mainstream media still have the power to influence public salience. The study also shows that the

results of agenda setting were most greatly seen the same day. Days in which an issue received increased coverage in mainstream media, in turn, showed a positive response in Google Trends. The study showed that the agenda-setting effect began to wear off on Google Trends as early as day two and all but vanished by days three and four (Weeks et al., 2010). Weeks et al. concluded by calling for the need to investigate possible variables that may have affected the correlation between Google Trends and the traditional mainstream media. They cited blogs as the possible mediating source. The study opens the possibility that reporters and writers for mainstream media could be influenced by blogs they read. Such research acts as an invitation for an agenda-setting investigation to be conducted on Twitter, the world's most popular microblogging platform.

Twitter As Public Opinion

Twitter is already regarded as an electronic word-of-mouth platform for businesses seeking to gauge consumers' feelings about certain products (Jansen et al., 2009). Jansen found that Twitter users enjoy commenting on subjects that they think about in everyday life. While he cited that 19 percent of these postings often involved a brand or product, he also noted that Twitter users were increasingly likely to post about a product if it was "newsworthy" or if the brand was related to a current event. The study was able to effectively scope how Twitter users felt about certain brands. Expanding on this idea, other studies have suggested that Twitter also effectively summarizes how users feel about events, news stories and persons.

In 2010, a time-series analysis was applied to political public opinion polls and Twitter messages that mentioned President Barack Obama (O'Connor et al., 2010). Using software that measured for the sentiment in Twitter messages, they were able to compare the public sentiment of Obama to traditionally collected public opinion polls. A high correlation between the two collection methods was found. Authors of the study go as far as to suggest that future uses of Twitter might

include the “substitute and supplement [of Twitter Sentiment Analysis] for traditional polling” and argue that Twitter is an accurate measurement of public opinion.

Promising research shows that Twitter users as a whole are more intrinsically motivated to Tweet as compared to other social networking or microblogging websites (Agrifoglio et al., 2010). Users are not found to Tweet to reach external goals, such as visibility, or to reach perceived-expert status on a topic. Instead, typical users Tweet for the pure enjoyment of interacting with the platform itself. This lack of extrinsic motivation allows users to Tweet more candidly and without external motivation bias. The lack of external motivation encourages users to post without reservation or polarized opinion while still exhibiting high levels of involvement. Consider a Twitter user posting for the joy of using the channel as compared to a blogger posting on particular news beats. While both may prove factual, the first is more likely to candidly reflect the opinions of the user. The latter is more likely to show an agenda similar to a news website and less like a public opinion poll.

Twitter: A Quantifiable Source of Public Salience

Social networking has generally been perceived as a tool in which friends and family communicate and interact online. Generally this engagement is in the form of internal conversations that are intended to be private (person-to-person) or semi-private (person-to-friends). When treated as private or semi-private, social networking demands confidentiality. Sites such as Facebook, which adopt this model of private or semi-private communication, have faced outside pressure to increase their privacy efforts (Fogel & Nehmad, 2008). Twitter has avoided this issue by placing an emphasis on being a public channel. Twitter pays little attention to privacy when it comes to the distribution of the messages that users posts, pegging itself as: “...a platform for you to influence what’s being talked about around the world. Search results spread across Twitter and in other ways across the Web so you can discover what’s happening on and off of Twitter.com. (About Us, 2010)”

The overwhelming majority of Twitter accounts are created for public viewing. Free for all to see, search and analyze, general accounts are as public as Web pages or blogs. Making public what once was treated as private, Twitter has taken social networking and has progressed it into a scalable and knowable body of information. This discourse can be considered a sample of conversations from all different types of demographics. In this way, Tweets themselves can serve as indirect measurements of topics that are salient to the general public. Twitter's body of knowledge should now be considered a part of the ever-changing media landscape.

Since its conception in 2006, Twitter has become the ninth most populated website on the Internet and is still gaining users at an exponential rate. This amasses to a lot of Tweets: 50 million to 140 million daily on average. Today, 17 million Americans actively use twitter at least once a week. While the ages and demographics of users are not quite even, they are approaching a more even equilibrium (Webster, 2010). The true innovation of Twitter – the reason why this social networking tool lends itself well to data analysis – is the fact that virtually all of the Tweets on Twitter are searchable and quantifiable. Various search tools have been created using Twitter's API that track trends, daily mentions and keywords on Twitter. These tools make Twitter a viable option for quantitative research (Java & Song, 2007).

Purpose and Hypotheses

To date, there has been a limited amount of research on social networking conversations and how such conversations might follow or set the media salience of mainstream media such as national television news and newspapers. No research has been conducted concerning the possible link between national television news, newspapers and Twitter as it would apply to agenda setting. This study aimed to investigate such a correlation. As Twitter grows in overall usage and importance, it becomes a digital platform that carries undeniable influence. Currently, 13 percent of all online

adults now use Twitter (Smith, 2011). With that number ever rising, businesses now see Twitter as a credible, populous platform that allow them to communicate and engage with a percentage of their patrons.

Hypotheses

This paper expected to see an agenda-setting effect similar to one observed in recent studies that incorporated digital measurements of public salience, YouTube and Google Trends (Weeks et al., 2010) (Sayre et al., 2008). Twitter provides a similar measurement that also tracks the overall public popularity of issues over time. The observations gathered in the YouTube and Google Trends studies were in general agreement with one another. Moreover, the studies were in agreement with the general body of agenda-setting work that states that media salience should be a predictor for public salience (Rogers et al., 2002). The effect observed should be similar for all three selected issues. Agenda-setting research states that the effect observed should be similar for both newspapers and television (Wanta & Foote, 1994).

H1: A day's mainstream television coverage of selected issues is a positive predictor of the volume of Tweets published on that same day.

H2: A day's mainstream newspaper coverage of selected issues is a positive predictor of the volume of Tweets published on that same day.

H3: Media salience will transfer to public salience with a zero day lag and be the strongest on the same day.

This paper did expect agenda-setting effects to be more rapid than agenda-setting on more traditional media. This acceleration has largely been attributed to the ability to instantly post news and opinions on new digital media, such as Twitter. Public opinion was once a calculation that was set on intervals of a day or larger. Digital media, such as Twitter, now allow real-time, constant collection. With these changes to the collection of public opinion and using new digital media agenda-setting studies as a guide, this paper expected to see an accelerated effect that occurred on the same day.

Method

Dependent Variable: Twitter Activity (Tweets)

A Tweet is a post or status update on Twitter. “Tweet” is as much a play on the size of the message as it is on the audible similarity to Twitter. Technically, a Tweet can be a combination of any 140 characters. No existing academic research has analyzed Twitter to see what types of issues are most commonly discussed. However, Dr. Abdur Chadbury, currently Chief Scientist at Twitter, recently analyzed a large set of Tweets and published the results on his blog. His research showed three main types of Tweets to exist on Twitter:

“First, there are status-updates of every day occurrences such as, ‘getting coffee,’ ‘check out this post on X,’ ‘going to sleep,’ or other common life events. Second, there are short-term-memes where many people talk about some event before, during, or after it. These conversations are usually short lived – ranging from a few minutes to a few hours. The final type of discussion we see on Twitter, are long-term-memes. These are topics of interest that people talk about for days, weeks, or even months. Politics or new video games are great examples of these longer term discussions happening on the platform (Catone, 2008).”

In general, the types of Tweets in which this study was interested in came in the form of the latter two types. These Tweets tap into the behaviors of its users such that they are theoretically crucial manifestations of users’ agendas. Combined, all the users of Twitter should then amass a public agenda. Because this collection of salience was passive and not active, it was not subject to survey biases. Scholars such as Shaw, Stevenson and Hamm (2001) had called for future tests to better analyze public opinion with better gauges of “contemporary social behavior.” Twitter should be able to answer this call. Thus, this paper proposes Twitter as an indirect measure of public salience.

Issue Selection

To test the hypotheses and identify a potential agenda-setting effect in Twitter, key issues that exist on a nationwide scale were selected on *TweetReports.com* for monitoring. The overarching goal was to choose ongoing issues that had little chance of immediate resolution. Salient public issues

with an ongoing flow of coverage provided the best data in which to analyze. Several issues were analyzed. Issues needed to have search terms that were unique enough to report highly correlated results. Issues had to also have the potential for longevity, as the study needed to run for at least a month to obtain enough data. Several issues were tried against these criteria. Given the search constraints, only issues that had frequent and accurate results were selected. The two issues that satisfied these conditions were found to be: The BP Oil Spill and The Mortgage and Housing Crisis.

After many sample searches, the term “bp oil” was found to be the most effective search term for the BP Oil crisis. For the Mortgage and Housing crisis, “housing crisis” and “mortgage crisis” results were combined.

Quantifying and Analyzing Tweets

Ideally, this paper would have chosen issues that occurred in the past. Following prior studies, a look at archives of newspapers, television transcripts and Tweets would reveal the dates and frequencies of coverage on these issues. Unfortunately, while one can monitor current issues using Twitter search methods, Twitter did not provide exhaustive archives of past Tweets. With that limitation in mind, issues had to be tracked on a daily basis. As mentioned earlier, Twitter’s public search engine is not exhaustive. In fact, it fails to even provide a comprehensive search of Tweets from any given day. Instead, it caps its searches at 1,500 results per query. Fortunately, third-party Twitter search options exist. Again, these search engines did not include exhaustive Tweet archives from the past but did allow exhaustive daily reporting when tracking keywords.

The issues chosen and tracked were premeditated. *TweetReports.com* was chosen for its third party Application Program Interface (API) connection to Twitter. It offers the ability to deliver daily reports on custom keyword searches.

For each issue that was chosen, a daily frequency count was taken for how many times the topic was mentioned in Tweets inside of the United States. For the purposes of this paper, this frequency count represents public salience.

Independent Variables: Quantifying and Analyzing Traditional Mass Media

The Vanderbilt Television News Archive served as a representation of the United States national television networks. This archive touts itself as the world's most extensive and complete archive of television news. It covers regularly scheduled newscasts on *ABC*, *CBS*, *NBC*, *CNN* and *Fox News*. All of the broadcast transcripts from all of the networks for all of the 92 days were manually coded for the relevant topics. The collection range started Oct. 12, 2010 and concluded on Jan. 11, 2011. When a story's abstract matched one of the selected topics, the article was counted in a daily frequency count. The database also includes the length of time in which news stories run and the time during the broadcast in which they appear. The total duration in number of seconds was recorded for each story that matched the three tracked issues. The time in which the story appeared in the broadcast was also coded. These two measurements, alongside a daily frequency count for each issue, were the core measurements of media salience for TV articles.

The final database utilized all of the newspaper articles available from the mainstream national newspapers in the *ProQuest NewsStand* archive. It accessed archives of 10 major newspapers: *The New York Times*, *The Wall Street Journal*, *Washington Post*, *Los Angeles Times*, *The Christian Science Monitor*, *The Atlanta Journal-Constitution*, *The Boston Globe*, *Chicago Tribune*, *Seattle Post-Intelligencer* and *USA Today*. The archive of these 10 United States newspapers provided a representative sample of the overall coverage in the United States. It included an exhaustive daily article and word counts for all mentions of the selected issues. For all of the

results that came from an initial search, each article was manually coded and checked for relevance. Only relevant articles were counted.

Additionally, some second-level agenda-setting measurements were calculated for more accurate measures of media salience. This paper addresses one framing mechanism, or second-level agenda setting attribute, as laid out by Tankard et al. (1991). The total duration in number of words (newspaper) or seconds (television) for each news story acted as a measurement of size as laid out by second-level agenda setting. Alongside a daily frequency count for each issue, these two values were the core measurements of media salience for television articles. Together, they measure media prominence as defined by second-level agenda setting (Gahnem, 1997).

Duration

The data collection period ran consecutively for 92 days. The time period of three months was chosen to satisfy a requirement of at least 30 to 40 data points, an amount beneficial for a significant ARIMA Time Series Model (Sayre et al. 2010). The data collection started on Oct. 12, 2010 and concluded on Jan. 11, 2011. Each day, a raw frequency count was taken for all three issues in newspapers, national television news and tweets.

Results

For an agenda-setting effect to occur, there must be evidence to support a transfer from media salience to public salience (Weeks et al., 2010). To detect this possible transfer, an analysis of the variables associated with media salience and public salience had to occur. More specifically, two time-series analyses, one for each issue, had to be calculated. An ARIMA time-series modeling analysis sufficiently evaluated the effective predictability of each dependent variable.

ARIMA analysis is synonymous with time-series agenda-setting analysis. ARIMA was first proposed for journalism research in 1981 (Maisel & Wunsch, 1981). A decade later, the first noted

study to utilize ARIMA in agenda setting occurred in a study of AIDS in the news and public opinion (Rogers et al. 1991). The study had a key advantage over previous time-series analyses in that the ARIMA test was able to better mathematically model stationary and autocorrelation components (Gonzenbach, 1996). Since that breakthrough, the overwhelming majority of agenda-setting research has relied on ARIMA modeling for time series analyses.

This study used ARIMA to mathematically model the three major time series components collected. The results showed how the different time series were related (Gonzenbach, 1996). Understanding the relationship and lag between the variables datasets ultimately addressed all three hypotheses.

Before the ARIMAs were calculated, two additional prerequisite calculations were done to validate the correlation of data sets. First, the dependent variable, Tweets, was assessed for a bivariate correlation with the independent variables, media coverage. Then, if significant relationships existed, an ordinary least squares (OLS) regression test, with the Durbin-Watson statistic, was also calculated.

The Durbin-Watson statistic inside of the OLS regression determines the relationship between dependent and independent variables separated from each other by a given time lag. Provided that the Durbin-Watson assessment could address the autocorrelation of the dependent and independent variables, then the autocorrelation was a violation of typical OLS assumptions. If the bivariate correlations were also significant, and the autocorrelation check was satisfied, the ARIMA model could then be calculated.

Findings

To test hypotheses H1 and H2, a look at the bivariate relationships between television stories, newspaper stories and same-day Tweet volumes for the selected issues was needed. The results are shown in Table 1.

***** TABLE 1 HERE *****

For the issue BP, two independent variables were significant at the .01 level: Television Number of Stories ($r = .337$) and Newspaper Number of Stories ($r = .374$). Additionally, two independent variables were significant at the .05 level: Television Number of Seconds ($r = .265$) and Newspaper Number of Words ($r = .208$). For the second issue, Mortgage and Housing Crisis, all four independent variables were significantly correlated at the .01 level: Television Number of Seconds ($r = .514$), Television Number of Stories ($r = .575$), Newspaper Number of Stories ($r = .460$) and Newspaper Number of Words ($r = .395$).

Because there was significant correlation for both issues in at least one or more independent variable, at least partial support was expected for H1, H2 and H3. Additionally, an OLS regression was calculated with a Durbin-Watson statistic. The test yielded a 1.85 value for BP Oil and a 1.922 value for Mortgage and Housing crisis. All values were less than two and suggested a positive serial correlation among residuals.

An ARIMA 1, 0, 7 model was applied to BP Oil Tweets and all of its corresponding independent variables that were significant through bivariate correlation and OLS regression (Table 2). The model found two independent variables to be significant predictors: Television Number of Stories and Newspaper Number of Stories. With a combined R^2 of .486 ($p < .05$) and a non-significant Ljung-Box Q value of .563 ($p < .10$), it was safe to say that the model was correctly specified and that the model used eliminated autocorrelation among residuals.

******* TABLE 2 HERE *******

An ARIMA 0, 1, 14 model was applied to Mortgage and Housing Crisis Tweets and all of its corresponding independent variables that were significant through bivariate correlation and OLS regression (Table 3). The model found two independent variables to be significant predictors: Television Number of Seconds and Newspaper Number of Stories. With four outliers, a combined R^2 of .749 ($p < .05$) and a non-significant Ljung-Box Q value of 17.099 ($p < .10$), the model was correctly specified and eliminated autocorrelation among residuals.

******* TABLE 3 HERE *******

In summary, H1 was given mild support by one or more independent variables for all three issues. H2 was also given mild support by one or more independent variables for BP Oil and The Mortgage and Housing Crisis issues.

H1 and H2 were given additional support graphically. When the dependent variables and the predicting independent variables were scaled to percentages and graphed over time, similar spikes and trends were shown (Figures 1 & 2). This relationship has been argued as additional predictor support for time series analysis (Wanta & Foote, 1994).

******* FIGURES 1 & 2 HERE *******

H3 predicted that the correlations between Tweets, television coverage and newspaper coverage would be stronger on the same day than compared to the days immediately following the coverage. This hypothesis was also given partial support (see Tables 2 & 3). For all ARIMA calculations, a zero-day lag yield was the only significant correlation. For the issue BP Oil, BP Television Number of Stories ($p \leq .001$) and BP Newspaper Number of stories ($p = .003$) were also significant on the same day. For the issue Mortgage and Housing Crisis, Television Number of

Seconds and Television Number of Stories were significant on the same day ($p = .000$). Additionally, for Newspaper Number of Stories, the values were also significant on the same day at $p = .01$

Discussion

As expected, the results give some support that would suggest media salience as a predictor of public salience. The correlation was most observed in two out of four independent variables for both issues. The Mortgage and Housing Crisis had independent variables Television Number of Seconds, and Newspaper Number of Stories. The BP Oil issue has possible predictors in independent variables Television Number of Stories and Newspaper Number of Stories. Correlations of a same-day, or zero-day, lag were found for all the significant predictor independent variables.

These results fall in alignment with recent studies investigating YouTube and Google Trends. Both studies found traditional mainstream media salience to be a predictor of public salience (Weeks et al., 2010) (Sayre et al., 2008). Weeks's study on Google Trends also found the timing of said agenda-setting effect to be rather instantaneous. Results correlated most highly on the same day. This prediction follows Weeks's findings when examining Google Trends. Research from the study found that results correlated most highly on the same day. While performing a search on Google was not precisely the same as broadcasting a Tweet, both are relatively instantaneous and require little premeditation. In these ways, Tweets were thought to mimic the temporal effect found with Google.

Alternate Conclusion: Public Salience as the True Influencer

A plausible alternative to hypotheses H1 and H2 was a reverse transfer of agenda setting. Instead of media salience transferring to public salience, it was conceivable that with this new platform, public salience could predict media salience. This would assume that reporters from mainstream media outlets used Twitter as a basis for breaking emerging stories. Research has found that audiences find this type of user-generated content to be desirable, authentic and real (Wahl-

Jorgensen et al., 2010). There have been several documented cases where stories have been brought to mainstream media's attention through blogs (Lewis, 2009). In these cases, there was little doubt that the measure of public salience, Tweets, would have preceded the measure of media salience.

To test support for this scenario, the dependent and independent variables were swapped for one another. Media salience served as dependent variables and public salience served as independent variables. For all variables that were significantly correlated in the initial bivariate correlation (Table 1), additional Durbin-Watson statistics were run with Tweets as the independent variable. According to the parameters of the Durbin-Watson test, if the results yielded stronger values – values closer to one – the relationship between values would then be more closely correlated over time. This tighter relationship would serve as support for a reversed version of H1 and H2.

Durbin-Watson values closest to two were perceived to have values that, on overall average, differ from one another. Conversely, values closest to one have the strongest correlation with one another. These values with the strongest correlation are highlighted in yellow and denoted with an asterisk in Table 4. All Durbin-Watson values for BP were more highly correlated in the originally conceived direction of hypotheses H1 and H2. For the issue Mortgage and Housing Crisis, there were three values that supported the original H1 and H2. However, one value did support the alternative hypotheses, and one value virtually tied. While the results were mixed for this issue, the values were close in margin and lack overpowering support. Therefore, this paper failed to give support for the alternative hypotheses of a transfer of public salience to media salience.

***** **TABLE 4 HERE** *****

Daily Versus Hourly Intervals

This paper may have better revealed the duration of the agenda-setting transfer if the time interval in the data collection process had been increased. Because the data collected in this paper

only allowed analysis at a daily interval and because the agenda-setting effect observed happened so quickly, it was impossible to empirically determine exactly when and in what direction public salience and media salience affected one another. If further studies are conducted at the hourly interval, a directional relationship may be better established. Such a study would set a seminal example for agenda setting and online platforms. Currently, no known research exists addressing agenda setting at the hour interval for online media.

The Twitter data provider chosen, *TweetReports.com*, did report Tweets at the hourly interval. The *ProQuest* database and *The Vanderbilt Television News Archive*, however, only reported stories at the daily interval. Newer databases that meld several media sources into one, such as Google News, did report news stories at an hourly interval. It would then be possible, given these two databases' intervals, to analyze both against one another at the hourly interval. This opens a possibility for further research that would to better address temporal order issue observed here.

Real World Cues as a Mediating Variable for Mass Media & Twitter

While this study suggested that there was mild support for independent variables as predictors of the dependent variables, it was possible that the relationship could have been dependent on a mediating variable, such as the natural occurrence of events. An existence of real-world conditions may have actually affected the media in question. It is presumable that the relationships of these variables were actually the results of events and actions that occurred concerning these stories. This effect in agenda-setting research is known as real-world cues (Ebring et al., 1980). Research has shown that these prevailing conditions and events did, indeed, directly and indirectly affect newspapers and television broadcasts (Behr & Iyengar, 1985) (Ebring, 1980).

With the data collected in this paper, it was impossible statistically to detect such an occurrence. However, given the lack of extraordinary events that occurred during this period, the

effect of real-world cues was perceived to be minimal. This paper chose events that were already ongoing national discussions prior to collecting data. These issues already had seminal events occur that sparked national media interest. The coverage that was tracked was subsequent of these events. While small developments in these stories occurred throughout the three-month period, no significant developments occurred during observation. The stories in the mainstream media were, by in large, commentary, opinion and conjecture of earlier events. This lack of natural occurrence should eliminate the potential influence for real-world cues as a mediating variable. If a follow-up study was conducted, various counts of real-world cues might be included. For these issues, values such as the daily oil price in gallons, daily number of border arrests or the daily national foreclosure rate might provide interesting results.

These variables could then be considered as event independent variables in ARIMA analysis.

News Organizations Using Twitter

While at the time of this paper roughly 95 percent of all Twitter users were consumers, some of the most active Twitter accounts were not public accounts. Instead, they were organizations, companies or news media. There was no easy way to discriminate these Tweets from others when taking daily frequency counts. Therefore, in some cases, the Tweets that were collected as a measurement of public salience were actually media salience. Some of the most active Twitter accounts on the Web come from sources including *CNN*, *Fox News* and *NBC*. It is also now common procedure for news sources to syndicate their news stories on Twitter as well as on air and in print. This simultaneous reporting method could have inflated or exaggerated the results.

However, it could also be argued that as soon as a Tweet was shared or Retweeted by another user of Twitter, it would again be considered public salience and not media salience. Therefore, while news media organizations may have broadcasted a Tweet to their large amount of followers,

doing so would have only inflated the recorded measurement of Tweet frequency by a count of one. Since data was collected solely from the 15 largest national television and newspaper organizations, and only some of these organizations actively rebroadcast stories through Twitter, the total inflation was likely to have been very low.

Initial Study Limitations & Twitter as a Growing Platform

As an initial study of Twitter and agenda-setting, there were several inherent limitations to this paper. This paper decided to analyze a new dependent variable for agenda setting, Tweets.

The agenda-setting effect of the traditional media chosen, newspapers and television, has been tested time and again. Over three hundred known studies have attempted to solidify these media and the roles they play in agenda setting. Twitter is still considered to be in a relative infancy when compared to other websites. At the time of this paper *Alexa's* website information database pegged Twitter as the ninth most trafficked site in the United States. Twitter was also the youngest website listed in the top 10 by three years. In 2006, the platform was born into an “avalanche of incredulity, ridicule and skepticism (Naughton, 2011).” Now, Twitter is trusted with tasks ranging from relaying communications amidst Egypt’s turmoil to discussing celebrity train wrecks (Naughton, 2011). The platform is still constantly evolving as the technology is developed and enhanced. Users are still innovating and discovering new ways to use the microblogging site. Nothing about Twitter remains static.

This growth should not only bring change but competition as well. As more and more Internet websites become temporal fads, it is hard to forecast what role this new platform might hold a century from now. While current data shows nothing but growth for Twitter, it is conceivable that Twitter could gradually derail from the mainstream and become less of a measure of public salience if an improved competitor comes along. All of this uncertainty furthers the need for continued study

of this platform over a longer period of time. Additional work is needed to secure Twitter's function as a new data source in agenda setting.

Table 1: Bivariate Correlations – All Independent Variables & Dependent Variables

Independent Variable		BP Tweets	Mortgage & Housing Crisis Tweets
Tweets	Pearson Correlation	1	1
TV # of Seconds	Pearson Correlation	.265*	.514**
TV # of Stories	Pearson Correlation	.337**	.575**
Newspaper # of Stories	Pearson Correlation	.374**	.460**
Newspaper # of Words	Pearson Correlation	.208*	.395**

** . Correlation is significant at the .05 level (2-tailed).

* . Correlation is significant at the .01 level (2-tailed).

Table 2: ARIMA Model for Issue of Mortgage & Housing Crisis

Independent Variable			Estimate	SE	t	Sig.
(DV) BP Tweets	Constant		6.783	.086	79.001	.000*
	AR	Lag 1	.300	.110	2.717	.008*
	MA	Lag 7	-.450	.114	-3.931	.000*
(IV) TV # of Stories	Numerator	Lag 0	.278	.048	5.813	.000*
		Lag 1	-.117	.046	-2.538	.013*
(IV) Newspaper # of Stories	Numerator	Lag 0	.073	.024	3.049	.003*

Note. $R^2 = .486$; Ljung-Box $Q = 14.482$, $df = 16$, $p = .563$

*. Correlation is significant at the .05 level.

Table 3: ARIMA Model for Issue of Mortgage & Housing Crisis

Independent Variable				Estimate	SE	t	Sig.
Mortgage & Housing Crisis Tweets	No	Difference		1			
	Transformation	MA	Lag 1	.677	.130	5.207	.000*
			Lag 14	-.346	.121	-2.867	.005*
Mortgage & Housing Crisis TV # of Seconds	No	Numerator	Lag 0	.216	.089	2.421	.018*
	Transformation	Difference		1			
Mortgage & Housing Crisis Newspaper # of Stories	No	Delay		1			
	Transformation	Numerator	Lag 0	9.606	4.093	2.347	.021*
		Difference		1			

Note $R^2 = .749$; Ljung Box $Q = 17.099$, $df = 16$, $p = .379$, Outliers = 4

*. Correlation is significant at the .05 level.

Table 4: OLS Regression for Alternative Hypothesis – DVs as IVs and IVs as DVs

	BP Tweets	BP Tweets IV	Mortgage & Housing Crisis Tweets	Mortgage & Housing Crisis Tweets IV
TV # of Seconds	1.737*	2.224	1.549*	1.723
TV # of Stories	1.761*	2.143	1.751	1.681*
Newspaper # of Stories	1.622*	2.286	1.777*	1.836
Newspaper # of Words	1.488*	2.043	1.604*	2.044

Durbin-Watson values closer to one are highlighted in yellow and denoted with an *.

Values closer to 1 are perceived to have the strongest positive serial correlation.

Figure 1: Scaled DV and All Predictor IVs for Issue of BP Oil

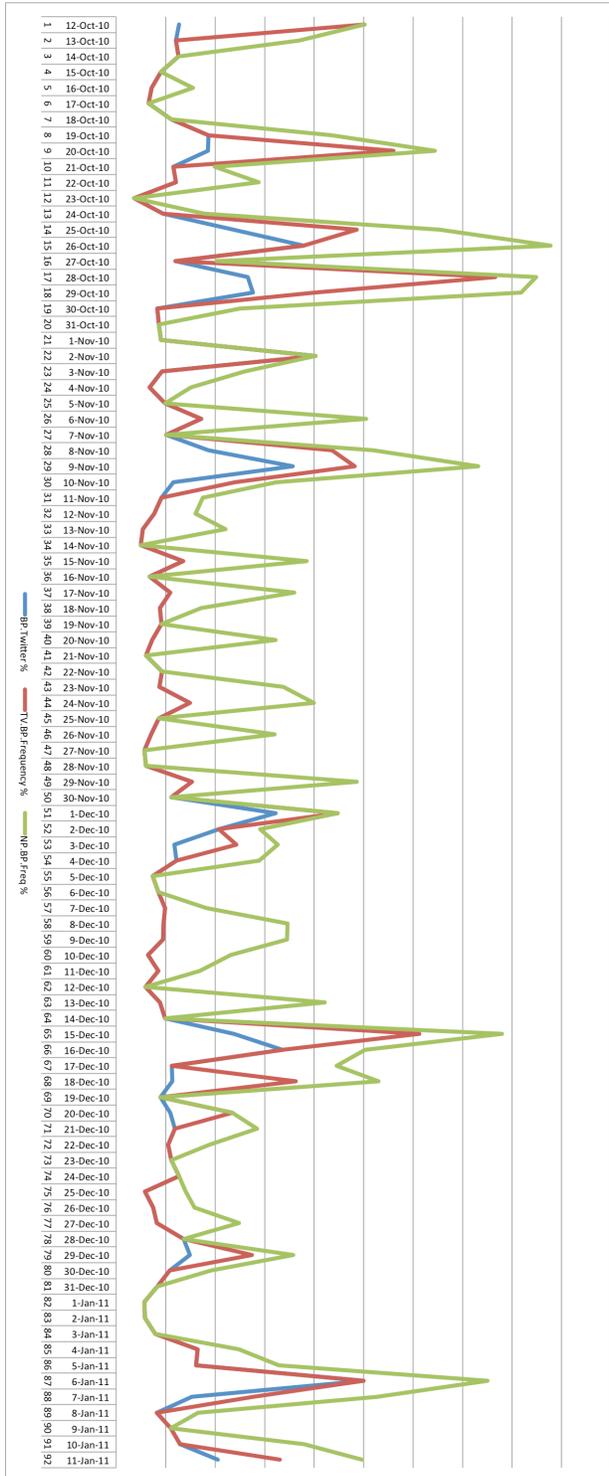
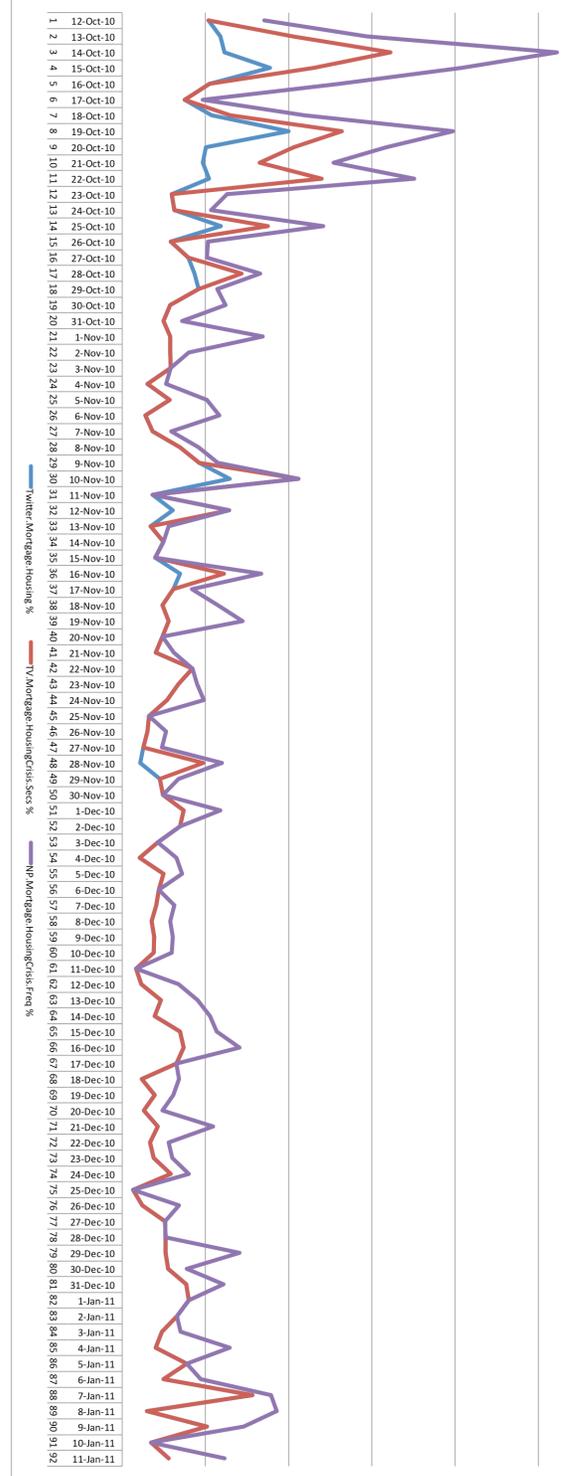


Figure 2: Scaled DV and All Predictor IVs for Issue of Mortgage & Housing Crisis



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