Audience Preference and Editorial Judgment:  
A Study of Time-Lagged Influence in Online News

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Abstract

The rise of sophisticated tools for tracking audiences online has begun to change the way media producers think about media audiences. This study examines this phenomenon in journalism. Research suggests that journalists, after long resisting or ignoring audience preferences, are becoming increasingly aware of user desires, manifest via metrics. However, research also finds a gap in the news preferences of journalists and audiences. This study asks: who influences whom more in this disparity? Through longitudinal secondary data analysis of three U.S. online newspapers, and using structural equation modeling, this study finds (1) audience preferences affect subsequent editorial placement of news stories, (2) such influence intensifies during the course of the day, (3) editorial judgment does not influence subsequent audience preference for news stories, and (4) audience preferences affect editorial judgments more than the other way around. Implications of these findings and suggestions for future research are discussed.

Keywords: audiences, journalism, metrics, new media, online news
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Introduction

This paper addresses a question of growing relevance for journalistic practice and the scholars who study it: As audiences and their content preferences are rendered increasingly visible through digital tracking metrics and features such as “most viewed” lists on news homepages, to what extent has this development affected editorial decisions, if at all? An emerging body of literature (e.g., see Anderson, 2011a,b; Boczkowski, 2010; Dick, 2011; Loosen & Schmidt, 2012; Lowrey, 2009; MacGregor, 2007) suggests that journalists, after decades of disregarding audience desires as insignificant to the news process, are becoming more aware of and adaptive to consumer tastes, even as they rationalize and reduce the audience to a quantifiable aggregate (Napoli, 2010). Simultaneously, journalists are coming to recognize audiences’ growing power to personalize their news experience (Thurman, 2011) and register their interests in a way that shapes the news patterns of fellow users (Thorson, 2008); this sets forth an “agenda of the audience” (Anderson, 2011b, p. 529) that challenges traditional notions of the gatekeeping and agenda-setting functions of the press (Singer, 2011).

Amid this uncertainty about audience influence on professional news judgment, Pablo Boczkowski and his colleagues have made a vital contribution to the literature with very recent work (in particular, Boczkowski, 2010; Boczkowski, Mitchelstein, & Walter, 2011; Boczkowski & Peer, 2011) that has found a significant gap between the news preferences of journalists and consumers: namely, that journalists generally prefer “hard”
news (public affairs) while consumers generally prefer “soft” news (non-public affairs).\(^1\) Missing from their analysis, however, is an examination of time-lagged influence one way or another. That is, if journalists and audiences indeed want different kinds of content online, who influences whom more in this taste disparity, if at all? If journalists signal that something is important at Time A, are audiences more or less likely to recognize that salience at Time B—and vice versa?

This paper takes up these questions. By examining editorial and consumer preferences gathered from the websites of three major U.S. newspapers, we find that, controlling for potential reciprocal effects, (1) audience preferences affect subsequent editorial placement of news stories, based on time-lagged analysis; (2) the strength of audience preferences’ effect on editorial judgments intensifies during the course of the day; (3) there is no overall lagged effect of editorial judgments on audience preferences, but subsequent analysis suggests this finding may be explained by the dynamic nature of the lagged effects observed during the course of the day; and (4) the lagged effect of audience preferences on editorial judgments is stronger than the lagged effect of editorial judgments on audience preferences.

The article proceeds by exploring journalists’ conception of the audience, both historically and in the present era of increasingly sophisticated metrics, then reviews emerging research on audience influences in newswork. Thereafter, an elaboration on Boczkowski and his colleagues’ work serves to introduce our hypotheses, research questions, and secondary data analysis, followed by a results section that engages a variety of longitudinal statistical models under the Structural Equation Modeling

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\(^1\) For a thorough discussion of the distinctions between hard and soft news, see Reinemann et al. (2012), in addition to the aforementioned work of Boczkowski and colleagues.
framework to render a more thorough picture of this data. Implications for newwork and future research on editorial and audience desires are discussed in the concluding section.

**Literature Review**

**Journalists, Audiences, and Metrics**

In a mid-sized daily newspaper in the American South, administrators have mounted a giant board covered with rows of newspaper front pages from previous weeks. Each page accompanies a chart with circulation and penetration figures for that day. The board’s purpose is clear—it’s an oracle, offering cryptic truths about the hidden connection between news content and audience behavior. And the truths remain cryptic. As one editor puts it, “If anyone in this building tells you they know how to interpret this, they’re full of it.” (Lowrey, 2009, p.44)

Lowrey’s anecdote serves to reinforce a baseline assumption about journalists’ news decisions relative to audience interests—namely, that they are (or have been) miles apart. Historically, journalists have neither understood nor truly cared to understand their audiences’ desires for certain varieties of news content, preferring instead to trust their own professional instincts and the cues provided by peer institutions in making news judgments (Lowrey, 2009; see related discussion in Ettema & Whitney, 1994; Fishman, 1980; Schlesinger, 1987; Schudson, 1992; Tuchman, 1978; Weaver & Wilhoit, 1996). In perhaps the most important study of this disconnect, Gans (2004) found that journalists disregarded both “qualitative” (letters to the editor) and “quantitative” (audience research statistics) forms of feedback, instead preferring to craft content with their bosses and themselves in mind, assuming that “what interested them would interest the audience” (2004, p. 229; see discussion in Anderson, 2011b, p. 531). And yet, even as journalists
traditionally have “ignored, rationalized away, or redefined audiences to suit their own
needs or to conform to constraints” (Lowrey, 2009, p. 44), the above anecdote also
suggests that the status quo—like the fortunes of newspapers themselves—is changing, as
news organizations rely less on crude (analog) guesswork and become increasingly
plugged in to relatively precise (digital) tracking of audience behavior online.

For media work broadly, the emergence of increasingly sophisticated analytic
engines for gathering and assessing digital footprints—uniques, pageviews, time on site,
engagement, “likes,” etc.—has begun to transform the way media producers and their
advertisers think about audiences: their present and future behaviors, their context-driven
tastes, and their relative economic value (Napoli, 2010). The rise of these “audience
information systems” has led media workers across all sectors to envision audiences in
quantifiable, data-driven ways, thus privileging a scientific precision over vague
impressions (Napoli, 2010, p. 11). Of course, the “rationalization of audience
understanding” described by Napoli (p. 31)—this effort to bring empirical rigor and
quantitative methods to bear on the process of making sense of audience behavior—is not
merely an internet-era phenomenon (e.g., see Bogart, 1957), but is, in fact, part of a larger
and ongoing effort in the media industries to facilitate greater management of and control
over audiences by virtue of knowledge about them (c.f., Ettema & Whitney, 1994;
Turow, 2005). For media scholars, particularly those coming from a political economy
viewpoint, this “audience as product” perspective is central to the critique that, above all,
capitalistic media “manufacture” audiences to be sold as commodities to advertisers
(Smythe, 1977; c.f., Ang, 1991). In this view, audience measurement is not merely a
subsidary spot-check of size and demographics, but represents a complex integration of
actors, technologies, and behaviors—“a set of measurement procedures that are shaped by both industry dynamics and the technological and usage patterns of the media whose audience is manufactured” (Bermejo, 2009, p. 138; see also Schmidt & Loosen, 2012). In the shift from the broadcast era to the digital era, the tools used for tracking audiences have changed (Bermejo, 2009), as have the types of audience “commodities” sold to advertisers (Lee, 2011), but nevertheless the core function of rationalizing audiences remains integral to media production and distribution processes. Likewise, market-driven forms of journalism (Cohen, 2002; McManus, 1994) are by no means unique to the internet era and the audience-tracking enhancements it presents. What is unique about the present moment is the sheer volume of audience data, generated by the ease and ubiquity of digital tracking technologies, as well as the extent to which that data can serve to influence media work by more fully communicating audience preferences.

For newswork, this development would appear to challenge the “journalistic gut feeling” typically associated with individual and collective decision-making about newsworthiness (Schultz, 2007). A growing number of newsroom-based studies (most notably Anderson, 2011a; Bozckowski, 2010; Dick, 2011; MacGregor, 2007) have shown that journalists are becoming more conscious of and responsive to audience traffic statistics, notwithstanding the frequent discrepancies and problems inherent in such data (Graves & Kelly, 2010; see also Bermejo, 2009).

This management-driven emphasis on metrics has been interpreted differently by journalists in different newsrooms (Usher, 2010). But in many cases there is an implicit, if not outright, encouragement for search engine optimization (SEO) in the selection and editing of news (Dick, 2011)—that is, an often subtle but sometimes deliberate pursuit of
topics and terminology most likely to attract traffic via search algorithms and viral social channels. Usher (2010) describes the consternation this has caused for some journalists:

> The demand that every story generate traffic creates, in their minds, horrible pressure to produce work that will be measured only by how much it is read. The more they can seed their work with SEO terms and then promote their work on social media platforms, the better their metrics and the happier their bosses. But that formula can make for some very exhausted journalists. (para. 3)

What’s striking about the present use of audience metrics in newswork is that the data are increasingly specific (tracked story-by-story, user-by-user, and even journalist-by-journalist; see Garber, 2011) and also more widely circulated among reporters and editors (as opposed to business-side management alone), amplifying the effect of this metric awareness (Anderson, 2011a). This contributes to “a culture of the click” kind of logic that is beginning to permeate contemporary newswork, and journalists are struggling to balance this new pursuit of pageviews with a desire to preserve traditional norms, values, and professional judgment (Anderson, 2011a). The overall presumption is that audience-tracking data are contributing to editorial decision-making like never before.

**Audience Preferences and Power**

Simultaneously, even as audiences are seen in an “algorithmic” fashion, reduced to statistical flatness (Anderson, 2011b), the rise of user-generated content sites and social media spaces has generated much discussion about the relative empowerment of the “people formerly known as the audience” (Rosen, 2006; see also discussion in Bruns, 2008; Gillmor, 2004; Harrison & Barthel, 2009; Jenkins et al., forthcoming; Jönsson & Örnebring, 2011; Lewis, Kaufhold, & Lasorsa, 2010; Mitchelstein & Boczkowski, 2009,
Audiences, in this view, are assumed to be more autonomous in personalizing their media, filtering the news, and otherwise disregarding the editorial cues provided by journalists (see related discussion in Mersey, 2010, and Thurman, 2011)—exercising a selectivity of exposure that scholars suggested would become a defining feature of 21st century media (Chaffee & Metzger, 2001).

This conception of the audience sees the audience neither as a group of people appropriating media as recipients, nor being appropriated by media industries as commodities, but rather as active participants in a digital network of communication, collaborating in the creation and diffusion of information (Schmidt & Loosen, 2012). The effect of such activity is the individual and collective manifestation of audience desire: qualitatively in the texts produced through user-generated content across a range of personal and public online spaces, or quantitatively in the metrics derived from tracking how users share, “like,” and annotate media. For news, this occurs as audience choices become more visible on “most popular” lists on news sites (Thorson, 2008), and as audience-supplied content becomes more integrated into the news process, both via news organization websites (Robinson, 2011; Singer et al., 2011) and social media spaces such as Twitter (Hermida, 2010; Lasorsa, Lewis, & Holton, 2012). While it’s true that most audience members neither want to participate in news production on a large scale nor are allowed to do so meaningfully on most news sites (Domingo et al., 2008), nonetheless they may contribute simply by clicking on a story and enhancing its popularity, signaling a level of salience that both captures and communicates publicly an audience’s collective interest.
This aggregated “agenda of the audience” (Anderson, 2011b, p. 529) is revealed not only below the surface via tracking data but also—and perhaps more importantly—above the surface, even on news homepages themselves, via interactive features such as lists of “most viewed” or “most emailed” stories (Boczkowski & Mitchelstein, 2012). Thorson (2008) refers to such lists as “news recommendation engines” that serve as a way to access content, and an accumulation of actions taken around that content (p. 477). Such lists offer a “public endorsement” (p. 475) that is neither entirely institutional nor individual in nature, but nevertheless represents an aggregate wisdom of site visitors, and therefore has a shaping influence on how certain articles are evaluated, internally (by journalists) and externally (by audiences). These forms of public visibility and audience endorsement are presumed to have a growing impact on editorial decisions as journalists take agenda-setting cues from the popularity of certain stories or genres (Chaffee & Metzger, 2001; c.f., McCombs, 2005).

**Who is Influencing Whom?**

Putting these two trends in concert—the concurrent rise of audience metrics and audience influence—raises an important question taken up in this paper’s analysis: To what extent do user preferences affect editorial decisions? Scholarly research is only beginning to untangle this question.

In a survey of the British local press, Singer (2011) asked top editors to identify their newspaper’s best online work from the previous year as well as their online content that generated the most traffic. Her subsequent analysis found that only a third of the items cited as sources of pride were also the most popular with audiences, though there was some degree of “agenda overlap” on topics such as sports. Overall, and “despite
excruciatingly detailed ‘hit log’ data, online audience preferences do not seem to be having a notable … agenda-setting impact on local editors” (Singer, 2011, 636). This supports the general finding in journalism studies that, amid opportunities for audience participation and inclusion in the news process, journalists keep at the margins those outside influences that might reshape their values or practices (Singer et al., 2011).

However, Singer’s (2011) finding is limited by a research design that neither captures ethnographic-rich complexity nor quantitative precision with regard to actual editorial vs. audience preferences. More revealing is the limited but growing body of evidence from newsroom-based ethnographies and interviews that have focused on audience metrics. In his study of British online journalism, MacGregor (2007) found that newsworkers, especially web editors, rely on audience tracking as handy feedback, sometimes monitoring metrics “obsessively” and occasionally “re-weighting” editorial priorities as a result. From some of his respondents, however, it became apparent that journalists feared “any slide towards populism” and its associated “slavery” to audience fancy, thus reinforcing the professional resistance described by Gans (2004) and Schlesinger (1987) in their studies of pre-internet journalism. Overall, the most prominent change MacGregor found was to the news “instinct” (c.f., Schultz, 2007): “Some admit now that they double-check their instinctive guesses with tracking data. They no longer implicitly trust themselves” (MacGregor, 2007, p. 294). A similar kind of hesitation and unease is apparent in Boczkowski’s (2010) study of South American newsrooms—and yet he found that journalists generally held their ground against the encroachment of audience desires. Boczkowski notes that, as journalists become increasingly aware of audience preferences for “softer” news in contrast to their
professional desires for hard news, they experience a tension between the overall preferences revealed by these choices and dominant occupational values, yet they stick to these values in the face of dissonant consumer preferences. [Thus] … the logic of the occupation prevails over the logic of the market… (p. 253)

This tension between what audiences want to read and what journalists think they should read thus functions as the flash point around which questions of search-engine optimizing, traffic-chasing, and editorial decision-making are negotiated among a range of newsroom actors: managers, homepage editors, technology specialists, and newly emerging “SEO teams.” The scant literature, to date, suggests that while organizations are designing schema to optimize content for audiences (Dick, 2011), and individual journalists are widely being encouraged to “connect” with audiences (Robinson, 2011b, p. 1130), compressing old barriers of time and space between journalist and news consumer (Weiss & de Macedo Higgins Joyce, 2009)—nevertheless, there remains an underlying preservation of and perseverance for professional ideals (Singer, 2011). Dick (2011) describes this impulse in his study of SEO practices at several UK news organizations, from which he concludes:

The culture of SEO in these organisations is visible, but not dogmatic. This research found only one example of a media organisation where SEO directs editorial decision-making, for all others SEO is acknowledged to inform (by varying degrees), but never lead editorial, with significant resistance to this idea in some quarters. It is acknowledged that in yielding to editorial (and style) conventions these organisations are losing out on traffic. But this is broadly
considered a price worth paying in order to preserve the brand, and maintain the news values of the profession. (p. 474)

Just as Dick (2011) found that SEO strategy implementation varied by news organization, Anderson (2011a,b), in his study of two large U.S. newsrooms, discovered that in one journalists were “excited” about the “sudden and immediate glimpse into the mind of their audience” made possible by metrics; this was facilitated by the ready circulation of those metrics by managers eager to use them as strategic tools in shaping newsroom practices (2011b, p. 536). In the other newsroom, meanwhile, metrics received less attention from management and thus had less day-to-day influence on the ground-level work of reporters (Anderson, 2011a).

Boczkowski’s earlier research (2004) has shown that technology is socially shaped in its introduction to newsrooms—that environmental contexts, work patterns, and organizational visions of technology, all intermingled with professional identity and culture, contribute to the so-called “impact” that new tools have for newswork (see Anderson, 2011a, p. 552). Likewise, literature on audience-tracking tools and their incorporation in news settings, combined with anecdotal evidence in industry reports (e.g., Usher, 2010), suggests that adoption varies across organizational settings, depending on management directives and the manner in which they are communicated. However, when considering these case studies in total, a composite picture begins to emerge: The more journalists know about their audience metrics, the more they become “sensitive to the implications of what their audience [is] reading and why,” altogether showing that “the process of ‘deciding what’s news’ is increasingly influenced by quantitative audience measurement techniques” (Anderson, 2011a, p. 563).
These case studies, while thick with description about newsroom culture and practice, nevertheless are thin in providing empirical data from which to measure, *quantitatively*, the extent to which audience behaviors might be influencing editorial decisions. In very recent times, Boczkowski and his colleagues (see especially Boczkowski et al., 2011; Boczkowski & Peer, 2011) have begun to address this gap by calculating the relative congruence between journalists’ choices (signaled by story placement on news homepages) and audiences’ preferences (indicated by “most viewed” lists on the same news homepages). Their methods involved capturing data at a single point in time (Boczkowski et al., 2011) or at several points during the day (Boczkowski & Peer, 2001) and assessing this “snapshot” of thematic preferences, i.e. the relative proportion of public affairs news represented among the top 10 choices for both the journalist and audience groups. Their findings were generally significant and consistent, indicating that there is a major gap between journalists’ and consumers’ news choices—the former preferring “hard” news and the latter preferring “soft” news.

Boczkowski and colleagues thus found that journalists and audiences want different things. But that leaves open the question: Who is influencing whom more in this taste disparity, if at all? What’s missing in the literature is an examination of time-lagged influence—in effect, a more thorough accounting for particular stories and their longitudinal lifespan, either on the journalists’ top 10 list (as represented by story placement), the audience’s top 10 list (as represented on “most viewed” lists), or both. If journalists give prominence to a news story at Time 1, are audiences more or less likely to have recognized that importance at Time 2, by making it a “most viewed” story? And how does that process work in reverse, such that journalists take cues from audience
choices reflected in “most viewed” lists?

These questions point to the shifting nature of gatekeeping (Shoemaker & Vos, 2009) and agenda-setting (McCombs, 2005) in a digital environment that, by nature, reconfigures traditional mass communication roles (Chaffee & Metzger, 2001). To the extent that users take their cues from and are influenced by audience-driven features such as “most viewed” lists—and there is good evidence to suggest that they do (Berger & Milkman, forthcoming)—then whither the “human information filter” (Barzilai-Nahon, 2009) that historically has been the journalist? Moreover, to the extent that journalists likewise take cues from audience desires—e.g., by adjusting the placement of stories to correspond with the level of interest apparent on the “most viewed” list—then whither the agenda-setting function of the press in this process? Clearly, journalists still set forth an agenda and determine what passes through their gates at the point of initial publication. And yet, what happens after that point—how news items generate a reaction among audiences, and how such a reaction might affect later editorial judgment—remains rather unclear and yet vital to explore. Singer (2011) identified this as a critical deficiency in the study of journalists and audience metrics: the lack of a “longitudinal analysis to determine the impact, if any, of user data or input over time” (p. 636).

This paper takes up that problem. Using fixed effects regression models to plot time-lagged analysis, we seek to advance scholarly and professional understandings of the causal relationship between technological quantification (e.g., audience metrics) and human qualifications (e.g., editorial decisions) in dictating the future of journalistic gatekeeping.
Hypotheses

While the relative lack of existing empirical studies prevents us from making directional hypotheses (i.e., whether the lagged impact is positive or negative), the evolution of online journalism and extant research do indicate the possibility of audience preferences having a lagged influence on editorial decisions as newsroom editors gradually base the placement of homepage news stories on aggregated popularity of certain news items. Following this logic, we propose:

**H1:** Audience preferences (e.g., “most viewed” ranks) have a significant overall lagged effect on online editorial judgments (e.g., placement of news stories on homepages), controlling for potential reciprocal effects.

**RQ1:** What is the nature of the lagged effect of audience preferences on editorial judgments?

Moreover, while time-lagged effects have not, to our knowledge, been examined empirically, research seems to suggest that audience preferences are having some effect on editorial judgments wherein they are driving story placements despite resistance on the part of journalists, as Boczkowski’s recent work indicates. Such tension between what journalists think audiences should read (e.g., public affairs topics) and what audiences prefer reading (e.g., non-public affairs topics) paints a mixed picture at best regarding the relationship between audience preferences and editorial judgments. Nonetheless, given the cumulative nature of tracking devices today, such that as the day goes on newsrooms will only have *more* data on audiences’ likes and dislikes as more people consume news online, we hypothesize that the effect of audience rank on editorial rank will strengthen over the course of an average day:

**H2:** The effect of audience preferences on editorial judgments will increase steadily across the four recorded time points on an average day.
Just as audience rank is likely to have lagged effect on editorial rank, and extending the rationale from classic gatekeeping studies, there is also reason to believe that editorial rank will have a lagged effect on what audiences choose to read. Following this logic, we propose:

**H3:** Editorial judgments (e.g., placement of news stories on homepages) have a significant overall lagged effect on audience preferences (e.g., “most viewed” ranks), controlling for potential reciprocal effects.

**RQ2:** What is the nature of the relationship between the lagged effects of editorial judgments on audience preferences?

Nevertheless, while causal relationships between audience preferences and editorial judgments make theoretical sense in both directions, controlling for potential reciprocal effects in analysis, we believe that the overall lagged effect of audience preferences on editorial preferences will be stronger than the opposite lagged effect given the popularization and promises of computer algorithms, coupled with most U.S. commercial newsrooms’ pressure to drive online traffic and pageviews to please their advertisers:

**H4:** The lagged effect of audience preferences on editorial judgments will be greater than the lagged effect of editorial judgments on audience preferences.

**Method**

This study performs secondary analysis on a set of data that were collected from three New York-based news sites: NYTimes.com, NYPost.com, and NYDailyNews.com—representing The New York Times, New York Post, and New York Daily News, respectively. Data were gathered daily for two weeks, beginning June 1, 2010, and ending June 14, 2010. On each day, data were collected at 9 a.m., 12 p.m., 3 p.m. and 6
p.m. Eastern Standard Time (EST), resulting in a total of 56 distinct collection shifts (14 days x 4 times per day) at each site and 1,550 total unique news stories. In each shift, the top ten stories selected by journalists and by audiences were identified. “Top” stories in terms of audience ranks (e.g., “most viewed” stories) and prominence of news story placements were used as indicators of audience preferences and editorial judgments, respectively.

**Theoretical model explication.** This study is essentially focused on estimating two theoretical models at four distinct time points (9am, 12pm, 3pm and 6pm) over the course of a day: The first looks at the lagged effect of editorial judgments at Time (X) on audience preferences at Time (X+1), and the second looks at the lagged effect of audience preferences at Time (X) on editorial judgments at Time (X+1). To bolster claim about the direction of causality, this study also assesses potential reciprocal effects of exogenous and endogenous variables where we account for the correlation between Y at time 2 (12pm) and X at time 3 (3pm) in all estimated models. All of the statistical analyses presented in this paper are done using maximum likelihood estimates, and under the structural equation model framework.

**Unit of analysis.** Our unit of analysis is the story, which, following Boczkowski and Peer (2011), we define as “text-based packages that include a headline” (p. 11). Occasionally, a site would embed a sub-story within a particular story. At the point of data analysis, we removed such sub-stories from the sample. The stories selected as the top ten journalistic stories were the ten most prominently displayed, moving from below the newspaper masthead and proceeding down the page. In the case of NYPost.com, only five stories are listed; thus, at the data transformation stage, its rankings were multiplied
by two to enable a crude but comparable approximation. Stories identified as the top ten audience preferences were located in a section halfway down the page, variously titled “Most Clicked,” “Most Popular,” or “Most Read.”

**Variables.** The following variables were used in this secondary analysis study: editorial placement, audience rank, story ID. Editorial rank and audience rank, numbered 1 to 10, are simply the rank given to a particular story during a given collection period. For a story displayed in only editorial and not audience rank (or vice versa), a value of 11 was given to the non-existent value as a way of flagging its rank as being less prominent than any other possibility. New story IDs were assigned at 9 a.m. each day. These numbers were then reverse coded during analysis to facilitate data interpretation, where news stories that are not in the top 10 ranks are now given the value of 1, and new stories that got ranked the most popular are given the value of 11. In other words, following this new coding scheme, one unit increase in the reported coefficients is associated with the effect of one rank increase (i.e., change from rank 5 to rank 4) in the exogenous variables on the endogenous variables. Moreover, a news story-specific latent variable, $\alpha^3$, was created to be included in all linear regression structural equation models.

**Statistical models.** This study estimates all the models using fixed effects regression methods under the Structural Equation Modeling (SEM) framework where simultaneous regression analyses were performed. H2 in particular enables interaction

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2 Aside from “most viewed,” New York Times also has “most emailed,” “most blogged,” and “most searched,” and the New York Post has “most read” and “most commented.” On the other hand, the New York Daily News only has “most read,” “most discussed,” and “most emailed” categories, and we made the subjective decision that “most read” most closely resembles “most viewed” in the other two papers.

3 For models that estimate the lagged effect of editorial judgments on audience preferences, $\alpha$ is a latent variable measured by holding audience rank at time 2, 3, and 4 at 1, whereas for models that estimate the lagged effect of audience preferences on editorial judgments, $\alpha$ is a latent variable measured by holding editorial rank at time 2, 3, and 4 at 1.
with time to allow for observation of differential effects of the independent variables on the dependent variables across the four observed time points; the rest of the models (H1, RQ1, H3, RQ2, and H4) constrain the effects of independent variables on the dependent variables to be the same across the four observed time points. Likelihood ratio comparison test using differences in chi-square and degrees of freedoms were computed to ensure that fixed effects analysis is not only theoretically, but also statistically, fit for models estimated in this study. Data used in this analysis were transformed from “long form” to “wide form” using the reshaping command in STATA for subsequent SEM analysis in MPlus.

**Fixed effects (FE) models.** Fixed effects models are often used to analyze longitudinal data with repeated measures on both independent and dependent variables. FE models by default yield estimates that control for all stable characteristics of news stories (whether observed or not), and allow for correlations between \( \alpha \), a news story-specific latent variable, and each of the time-varying predictors. Moreover, fixed effects model discard all between-news story variations in pursuit of “pure” results that are approximately less biased than random effects models. Nevertheless, one of the shortcomings of fixed effects models is that its pursuit of unbiased estimates is done at the expense of model efficiency, which results in higher standard error estimates when compared to random effects (Allison, 2005). Likelihood ratio comparison test using differences in chi-square and degrees of freedom were computed, and the results \( p<0.001 \) suggest that in addition to its theoretical justifications, fixed effects are also

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4 Note that this only tests the over-identifying restrictions, and is sensitive to sample size.
more appropriate, statistically, for models estimated in this study than that of random effects models.

Benefits of estimating fixed effects models as a linear structural equation model with a latent variable include its enabling (1) a likelihood ratio test for fixed versus random effects to better assess the feasibility of each model, (2) estimations of models with reciprocal effects among endogenous and exogenous variables, (3) assessments of models with latent variables that have multiple indicators, and (4) evaluations of panel data where some variables are believed to have lagged or reciprocal effects on each other (Allison, 2009).

Results

Lagged effects of audience preferences on editorial judgments

Supportive of H1, there exists a significant overall lagged effect of audience preferences on editorial judgments \( (p<0.001) \), controlling for effects of earlier editorial judgments on later editorial judgments, as well as potential reciprocal effects between editorial judgments and subsequent audience preferences. Also, there is no evidence \( (n.s.) \) for a reciprocal effect between audience preferences at time 2 on editorial judgments at time 3 in this estimated model.

Goodness of Fit tests for H1 & RQ1. Converging evidence of a variety of Goodness of Fit (GOF) tests suggests that the estimated model is a relatively good fit for the data: The overall chi-square test of model fit suggests that the estimated model is not a just-identified model, \( \chi^2 (7) = 64.77, p<.01 \), which is consistent with the theory-driven constraints imposed on this model. Ideally, we would want the chi-square test for overall model fit to be non-significant for non-saturated models like ours; however, given this
study’s large sample size and chi-square tests’ sensitivity to sample size, the statistical significance found in this particular GOF test is not surprising. On the other hand, the relatively small chi-square test value offers support for the fitness of our proposed model. The Root Mean Square Error of Approximation (RMSEA) is .07. The Comparative Fit Index (CFI) is .98. The Tucker-Lewis Fit Index (TLI) is .94. The Standardized Root Mean Square Residual (SRMR) is .04.

In response to **RQ1**, regardless of which model one focuses on, audience preferences appear to have an overall *negative* lagged influence on editorial judgments in that a one-rank advancement in audience preferences for a news story at Time (X) is associated with such story’s subsequently decline ($B = -0.15, p<.001$) in editorial placement at Time (X+1), controlling for everything else.

Supportive of **H2**, lagged effects of audience preferences on editorial judgments do strengthen steadily throughout the four recorded time points on an average day when comparing the percentage of variance explained ($R^2$) by audience preference throughout the day, controlling for effects of earlier audience preferences on later audience preferences, as well as potential reciprocal effects between audience preferences and subsequent editorial judgments. Particularly, audience preference explains for 4% of the variance at 9am, 15% of the variance at 12pm, 14% of the variance at 3pm, and 25% of the variance at 6pm. All four $R^2$ values are statistically significant at $p<.001$.

**Goodness of Fit tests for H2.** A variety of Goodness of Fit (GOF) tests offers converging support that the estimated model is a relatively good fit for the data: The overall chi-square test of model fit suggests that the estimated model is not a just-identified model, $X^2 (5) = 61.99, p<.01$, which is consistent with the theory-driven
constraints imposed on this model. As aforementioned, given this study’s large sample size and chi-square tests’ sensitivity to sample size, the statistical significance found in this particular GOF test is not surprising. On the other hand, the small chi-square value offers support for the fitness of this particular model. The Root Mean Square Error of Approximation (RMSEA) is .09. The Comparative Fit Index (CFI) is .98. The Tucker-Lewis Fit Index (TLI) is .92. The Standardized Root Mean Square Residual (SRMR) is .04.

Lagged effects of editorial judgments on audience preferences

Unsupportive of H3, editorial judgments of news stories has no overall lagged effects on audience preferences (n.s.).

**Goodness of Fit tests for H3.** The overall chi-square test of model fit suggests that the estimated model is not a just-identified model, $X^2 (7) = 87.26, p < .01$, which is consistent with the theory-driven constraints imposed on this model. As aforementioned, significant chi-square test of overall model fit is not surprising given the large sample size used in this study. On the other hand, the relatively small chi-square value lends support to the fitness of the proposed model. The Root Mean Square Error of Approximation (RMSEA) is .09. The Comparative Fit Index (CFI) is .98. The Tucker-Lewis Fit Index (TLI) is .94. The Standardized Root Mean Square Residual (SRMR) is .05.

In response to RQ2, there is no overall lagged effect of editorial judgment on audience preferences.
Supportive of H4, comparing results found in H1 and H3, lagged effect of audience preferences on editorial judgments is greater than the lagged effect of editorial judgments on audience preferences.

**Discussion and Conclusion**

In the beginning of the paper we raised the question about the directionality of influence between editorial news judgments and audience preferences, and the short answer is that the causal influence is not uni-directional. This study suggests that data aggregation of audience preferences plays an intricate and dynamic role in influencing whether and how online newsroom editors decide to feature certain news stories over others at multiple time points a day. While penny press editors in the 1830s might have looked over the shoulders of newspaper readers on city streets to help them make decisions about future story coverage and placement, this study provides a quantitative indication that online newsroom editors today are relying more and more on digital tracking tools to understand audience desires in order to maximize their presentation of content that audiences will find favorable.

To summarize our key findings, we found that, (1) controlling for potential reciprocal effects, audience preferences affect subsequent editorial placement of news stories, based on a time-lagged analysis. Moreover, (2) the strength of this effect on editorial judgments appears to intensify during the course of the day. Meanwhile, looking the other direction, (3) there is no overall lagged effect of editorial judgments on audience preferences—yet subsequent analysis suggests that this finding may be explained by the fluid and conflicting nature of the lagged effects we observed during the
course of the day. Finally, (4) the lagged effect of audience preferences on editorial judgments is stronger than the inverse relationship.

That audience preferences would appear to have greater impact, at least in this initial study, casts in a new light some baseline assumptions about the agenda-setting and gatekeeping functions of news editors. This is particularly so given that such assumptions were established through research conducted long before the widespread newsroom use of audience information systems and sophisticated computer algorithms. The literature has shown that journalists “have long-established processes for assessing information and determining what they believe should go into the news product—and are extremely reluctant to relinquish control over those decisions, despite the greatly increased visibility of user activity on media-affiliated websites” (Singer, 2011, p. 630). And yet an emerging body of ethnographic research (notably Anderson, 2011a,b) also suggests that metrics might be influencing news decisions—at least to some degree and contingent on management expectations—as journalists become increasingly aware of traffic data circulated within the newsroom and of “most viewed” lists prominent on homepages, these artifacts representing both internal and external manifestations of audience desires. Even still, other research (notably Boczkowski et al., 2011) has indicated that the gap between journalists and audiences remains quite large, each group wanting something different from the news experience online.

Amid somewhat conflicting notions about convergence and divergence of editorial judgment and audience preferences, this study is perhaps the first of its kind to use quantitative methods to identify an actual time-lagged influence one way or another—to tell us something about the relative “power” in this relationship. Thus, our
most striking finding is that editorial judgments of what is “important” do not necessarily transfer to the minds of audiences, if we take “most viewed” as proximal indication of issue salience for audiences (i.e., the “agenda of the audience”). In other words, the influence of audiences upon journalists was found to be significant while the inverse relationship was not. This would suggest that, all things being equal, journalists appear to be more aware of and responsive to audience desires than the other way around. This supports the conclusions of Boczkowski and his colleagues (see Boczkowski, 2010; Boczkowski et al., 2011; Boczkowski & Peer, 2011) that there is a substantial disparity between what audiences want to read and what journalists feel that they should read. But this paper goes further in exploring the relative differences of influence at work in this gap, revealing that, over the course of a typical day, audiences are disregarding the news judgments of homepage editors even while journalists—at least to some degree—appear to be influenced by what they know about audience tastes.

Yet, it is likewise important to note that further research is needed to understand the underlying dynamics; for even when lagged effects were found, after relaxing time constraints, the strength of the effect was minimal. Moreover, regarding these lagged effects, we first found that audience preferences appear to have an overall negative lagged influence on editorial judgments (see RQ1). On its face, this seems a bit counterintuitive: If journalists indeed are being influenced by audience interests, should that relationship not likely be positive—i.e., editors promoting already popular stories to the top of the page, to capitalize on that popularity? Perhaps editors are benchmarking against audience preferences by actively pushing such stories down the homepage, presuming that such stories already have prominent placement merely by being in the
“most viewed” list on the homepage? Additional research, linking both qualitative examinations of newsroom decision-making and quantitative analyses such as this, is needed to untangle the precise nature of this lagged influence. In any case, given online news media’s emphasis on speed and immediate updates (Lee, 2011), this negative coefficient makes sense in that most online newspapers routinely and frequently update their homepages throughout the day as new events occur or existing happenings evolve. Naturally, “newer” news stories will be made more prominent on homepages.

Next, regarding the lagged effects of editorial judgments on audience preferences and vice versa, the juxtaposition of findings from RQ1 and RQ2 points to the ostensible rise of audience power, as news organizations increasingly monitor online visitor traffic patterns and appear to take some cues from this data in story placement on newspaper homepages. Specifically, the findings suggest that whereas online editors are mindful of what news audiences are clicking on, news audiences are not paying as much attention to what news editors think they should read. Instead, if we take “most viewed” ranking as an indication of news story popularity, this study reinforces Boczkowski and colleagues’ finding that editors and audiences want different things from the news—and it further adds to the literature by indicating that, at the crossroad of this taste disparity, news audiences have the upper-hand.

There are additional limitations to this study. One is our reliance on secondary data. Ideally, this study would have included a wider range of newspapers for examination from different geographical markets or newsroom practices to supplement the external validity of our findings. However, as a secondary data analysis, this study bases its analysis on three New York-based newspapers collected in the data set instead,
and thus future studies are encouraged to test our proposed models using other newspapers to help validate the generalizability of our findings to newspapers in other markets and with different newsroom routines. While time-lagged analysis under the Structural Equation Modeling framework is known for its strength in enabling causal testing\textsuperscript{5} in ways that come close to being comparable to the internal validity strengths of true experimental designs, it is not without limitations. One limitation surrounds the subjective justification of the “right time lag” in time-lagged analysis, as it is possible that a 2-hour lagged effect is different from a 4-hour lagged effect, and the best researchers can do is to ensure that the estimated time lag intervals make the best theoretical and practical sense possible. In this study, we interpreted the best time-lag for analysis to be four hours, although future studies are encouraged to embed different time lags in their study design as to experiment whether different time lags contribute to different findings or not. Finally, another limitation is our assumption that “most viewed” equates “audience preferences.” Some may argue they are not the same thing, yet if media choices are assumed to be audience driven—as in the classic approach of uses and gratifications—it is reasonable to use “most viewed” as the best available proxy for measuring audience preferences.

Ultimately, and despite the limitations of this research, we argue that the central finding of this paper—that audience preferences have a lagged effect on editorial judgments, all things held constant—is a provocative one that deserves attention for how it may spur additional work to uncover the complex relationship between audience data and news work, against the theoretical backdrop of agenda-setting and gatekeeping

\textsuperscript{5} SEM facilitates causal testing through its control of potential reciprocal effects between the independent and dependent variables, reliance on temporal precedence, and assessment of model fitness via GOF tests.
theories of journalism. Even as journalists seek to preserve their autonomy and guard against becoming enslaved to audiences’ desires for “softer” news, it is clear that audience metrics are here to stay—and, going forward, are likely to become only more embedded in the process of news judgment. The challenge for researchers, and one that we have sought to take up in this study, is to move beyond self-reports of journalistic perception and behavior, and instead use quantitative methods that reveal a more precise, longitudinal rendering of the relationship between audience and editorial preferences.
References


