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# Audience Clicks and News Placement: A Study of Time-Lagged Influence in Online Journalism

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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, building on a revised theoretical model that accounts for greater audience engagement in the gatekeeping process. Research suggests that news editors, after long resisting or ignoring audience preferences, are becoming increasingly aware of and adaptive to consumer tastes as manifest via metrics. However, research also finds a gap in the news preferences of editors 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 that (a) audience clicks affect subsequent news placement, based on time-lagged analysis; (b) such influence intensifies during the course of the day; (c) there is no overall lagged effect of news placement on audience clicks; and (d) the lagged effect of audience clicks on news placement is stronger than the inverse. Implications of these findings and suggestions for future research are discussed.

## Keywords

audiences, gatekeeping, journalism, metrics, new media, online news

## Introduction

This article 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

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homepages, to what extent has this development affected editorial decisions, if at all? An emerging body of literature (e.g., see Anderson, 2011a, 2011b; Boczkowski, 2010; Dick, 2011; Loosen & Schmidt, 2012; Lowrey, 2009; MacGregor, 2007) suggests that news editors,<sup>1</sup> 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). This is true both of top editors—who often begin their morning news meetings with a rundown of data points on the most popular stories (Peters, 2010)—as well as online news editors, who, in the course of managing the positioning of news stories on news webpages, often have front-line access to information about which articles receive the most clicks or social media recommendations.<sup>2</sup> Simultaneously, editors are coming to recognize audiences' growing power both to personalize their news experience (Thurman, 2011) and to register publicly their interests, via most viewed or most emailed lists, in a way that shapes the news consumption patterns of fellow users (Thorson, 2008). This sets forth what Anderson (2011b, p. 529) calls an "agenda of the audience," a manifestation of audience-driven interest that would appear to complicate established notions of mass communication such as gatekeeping, agenda setting, and audience influences on media content (Singer, 2011).

Amid this uncertainty about audience influence on professional news judgment, and in the absence of academic literature examining homepage choices of editors and related audience behaviors in a single study, Pablo Boczkowski and his colleagues have made a vital contribution to the literature. Their recent work (in particular, Boczkowski, 2010; Boczkowski, Mitchelstein, & Walter, 2011, in press; Boczkowski & Peer, 2011) has found a significant gap between the news preferences of journalists<sup>3</sup> and consumers: namely, that journalists generally prefer "hard" news (public affairs) while consumers generally prefer "soft" news (nonpublic affairs).<sup>4</sup> 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 article takes up these questions. By examining measures of news placement and audience clicks gathered from the websites of three major U.S. newspapers, we find that, controlling for potential reciprocal effects, (a) audience clicks affect subsequent news placement, based on time-lagged analysis; (b) the strength of audience clicks' effect on news placement intensifies during the course of the day; (c) there is no overall lagged effect of news placement on audience clicks; and (d) the lagged effect of audience clicks on news placement is stronger than the lagged effect of news placement on audience clicks.

The article proceeds with a three-part examination of the literature: a theoretical grounding in gatekeeping, including a revised model by Shoemaker and Vos (2009) that more fully accounts for the audience's role in the gatekeeping process; a discussion of editors' conception of the audience, both historically and in the present era of increasingly sophisticated metrics; and a review of extant empirical research on audience influences in newswork. Thereafter, an elaboration on Boczkowski and colleagues' work serves to introduce this article's hypotheses, research questions, and secondary data analysis. The results section

engages a variety of longitudinal statistical models under the structural equation modeling framework to render a more thorough picture of the data. Implications for newswork and future research on news placement and audience clicks are discussed in the concluding section.

## Literature Review

### *Gatekeeping Theory: The Audience Channel*

Mass communication scholars have long sought to understand the sociology of “making news” (Singer, 2011; Tuchman, 1978), particularly the manner in which editors filter huge quantities of information to settle on a carefully selected set of news reports on a given day—a process referred to as gatekeeping (Shoemaker, 1991). The gatekeeping metaphor, borrowed from Kurt Lewin’s (1947) analysis of channels directing food to the family table and first applied to the news context in David Manning White’s (1950) classic portrayal of “Mr. Gates,” has stimulated a stream of mass media scholarship<sup>5</sup> investigating not only the process of news selection but also broader, multifaceted forces shaping the organization, presentation, and distribution of messages. In synthesizing this literature to advance the theory, Shoemaker and Vos (2009) propose five levels for the study of gatekeeping: *individual* (i.e., the influence of individual communicators, such as personal background), *routines* (i.e., the influence of communication norms, such as the inverted pyramid), *organizational* (i.e., the influence of group-level dynamics, such as media ownership), *social institutional* (i.e., the influence of extra-organizational factors, such as advertisers or government), and the *social system* (i.e., the influence of ideology and culture).

This study of news placement relative to audience clicks online implicitly acknowledges professional routines and organizational demands, forces that contribute to determining the placement of news items on a newspaper’s front page, whether virtual or physical. However, this article puts emphasis on the social institutional level of external forces—in this case, the impact of audience behaviors in response to news placement, precisely because scholars know comparatively little about the potential influence that audiences wield in the gatekeeping of news items. In their proposed revision to a gatekeeping model that gives primacy to journalists (media channel) and their source material (source channel), Shoemaker and Vos (2009) suggest that information about events flowing from audience members (audience channel) deserves greater attention for its influence on both media and source channels (see Figure 9.1 on p. 125). Shoemaker and Vos argue that, beyond online media allowing readers to enjoy greater control in selecting issues of personal interest, “perhaps the most significant impact of the audience channel is that it requires the revision of the original gatekeeping model and updates a theory begun in the 1940s for the early 21st century” (p. 129).

Such revisions, they contend, should account for emerging digital forms of “audience gatekeeping” (Shoemaker, Johnson, Seo, & Wang, 2010, p. 61; Shoemaker, Seo, Johnson, & Wang, 2008), wherein readers more readily communicate their preferences back to media professionals and outward to friends, family, and strangers. Because online newspaper sites

routinely use “most emailed” or “most viewed” lists, the “combined judgments” (p. 123) of editors and audiences increasingly are rendered visible alongside each other, raising questions about the nature of influence at the intersection of these dual forms of gatekeeping. And yet, virtually no quantitative-based empirical research has attempted to untangle, through time-lagged analysis, the causal impact of one type of judgment (news placement) on the other (audience clicks), and vice versa, in the context of perhaps the most visible manifestation of audience gatekeeping—the most popular stories on news homepages. To make such a contribution to the literature requires a more thorough understanding of editors’ understanding of audiences in the digital era.

### *Editors, 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 editors’ news decisions relative to audience interests—namely, that they are (or have been) miles apart. Historically, editors 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” (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 fate 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—unique visitors, pageviews, time on site, engagement, “likes,” and so on—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 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 (see 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, capitalist media “manufacture” audiences to be sold as commodities to advertisers (Smythe, 1977; see also Ang, 1991). In this view, audience measurement is not merely a subsidiary 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 Loosen & Schmidt, 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)—and, thus, potentially shape the manner of story placement on news websites. For some time now, studies have shown that homepage updates are increasingly common across all news websites. Early research emphasized that most newspaper sites did not update; further, those that did were generally large-circulation sites (e.g., see Dibean & Garrison, 2001; Lasica, 1997). More recent research, though, has found web updates to be increasingly common practice at all newspapers (Tremayne, Weiss, & Alves, 2007). What is less clear is the precise nature of homepage updates, both in the frequency of changes and in the rationale of those changes. Nevertheless, while the updating process might vary across different sites, the research suggests an industry-wide trend of intensification of monitoring and homepage updates. Indeed, a growing number of newsroom-based qualitative studies (most notably, Anderson, 2011a; Boczkowski, 2010; Dick, 2011; MacGregor, 2007) have shown that journalists, particularly online news editors, 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 editors in different newsrooms (Usher, 2010). However, 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. 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 newsroom staff (as opposed to business-side management alone), amplifying the effect of this metric awareness (Anderson, 2011a). This contributes to "a culture of the click" that, Anderson (2011a) argues, is beginning to permeate contemporary newswork, and editors are struggling to balance this new pursuit of pageviews with a desire to preserve traditional norms, values, and professional judgment—caught between "the competing logics of the occupation and the market" (Boczkowski, 2010, p. 147). However, extant discussion among editors about the influence of audience metrics suggests that while news organizations use the data to make strategic decisions—for example, about which online features to add or drop, such as blogs and podcasts—they claim to avoid slavishly chasing clicks. As then-*The New York Times* executive editor Bill Keller said, "We don't let metrics dictate our assignments and play, because we believe readers come to us for our judgment, not the judgment of the crowd. We're not 'American Idol'" (quoted in Peters, 2010). However, this is what editors say they do—a claim that no published research has assessed empirically. This study tests the premise that editors ignore audience clicks in the placement of day-to-day news items.

### *Audience Preferences and Power*

Even as audiences are seen in an "algorithmic" fashion, reduced to statistical flatness (Anderson, 2011b; see also Napoli, 2010), 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, Ford, & Green, in press; Jönsson & Örnebring, 2011; Lewis, 2012; Lewis, Kaufhold, & Lasorsa, 2010; Mitchelstein & Boczkowski, 2009, 2010; Postigo, 2011; Robinson, 2011; Singer et al., 2011). These analyses suggest that digital media afford audience members greater leverage and autonomy in personalizing their media, filtering the news, and otherwise disregarding the editorial cues provided by editors (see related discussion in Mersey, 2010; Thurman, 2011), thus exercising a selectivity of exposure that scholars suggested would become a defining feature of 21st-century media (Chaffee & Metzger, 2001).

In this conception, the audience is seen 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 (Loosen & Schmidt, 2012; see also, Lewis, 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) and social media spaces such as Twitter (Hermida, Lewis, & Zamith, 2012; 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 (Singer et al., 2011), 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 to editors 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 editors) and externally (by audiences). In sum, scholars have suggested that such forms of public visibility and audience endorsement, made possible by the affordances of digital technologies and audience information systems (Napoli, 2010), might have an impact on news placement as editors take gatekeeping cues from audience clicks (Singer, 2011; see also Chaffee & Metzger, 2001). Such presumptions, however, have not been proven via empirical quantitative analysis; this study intends to address that gap.

### *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 article’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 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—akin to the editor-audience alignment found in a study of Yahoo! News by Curtain, Dougall, and Mersey (2007). 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, p. 636).

However, Singer’s (2011) finding is limited by a research design that neither captures ethnographic-rich complexity nor quantitative precision with regard to actual news placement versus audience clicks. Meanwhile, there is a limited but growing body of qualitative evidence from newsroom-based ethnographies and interviews that have focused on audience metrics. In his study of British online journalism, MacGregor found that newswriters,



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 editors 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 that MacGregor found was to the news “instinct”: “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 editors generally held their ground against the encroachment of audience desires made visible via clicks (p. 253).

This tension between what audiences *want* to read and what editors think they *should* read thus functions as the flashpoint 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 organizations are designing schema to optimize content for audiences (Dick, 2011), and individual journalists are widely being encouraged to “connect” with audiences (Robinson, 2011, p. 1130), thereby compressing old barriers of time and space between journalist and news consumer (Schmitz Weiss & Higgins Joyce, 2009)—and yet, there remains an underlying preservation of and perseverance for professional ideals (Singer, 2011). Just as Dick found that SEO strategy implementation varied by news organization, Anderson (2011a, 2011b), in his study of two large U.S. newsrooms, discovered that at one newspaper the reporters and editors 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 (Anderson, 2011b, p. 536). At the other newspaper, meanwhile, metrics received less attention from management and thus had less day-to-day influence on the ground-level work of journalists (Anderson, 2011a).

Boczkowski’s earlier research (Boczkowski, 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., Graves & Kelly, 2010; Peters, 2010; 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 editors 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 *qualitative* 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 recent times, Boczkowski and his colleagues (see especially Boczkowski et al., 2011, in press; Boczkowski & Peer, 2011) have begun to address this gap by calculating the relative congruence between editors' choices (signaled by story placement on news homepages) and audiences' clicks (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, 2011) and assessing this "snapshot" of thematic preferences, that is, 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 editors' and consumers' news choices—the former preferring "hard" news and the latter preferring "soft" news.

Boczkowski and colleagues thus found that editors 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, causal influence—in effect, a more thorough accounting for particular stories and their longitudinal lifespan, either on the editors' top 10 list (as represented by story placement), the audience's top 10 list (as represented on "most viewed" lists), or both. If editors give prominence to a news story at Time 1, are audiences more or less likely to have clicked on that story at Time 2, thus making it a "most viewed" story? And how does that process work in reverse, such that editors take cues from audience clicks reflected in "most viewed" lists?

Singer (2011) identified this as a critical deficiency in the study of editors 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 article, a first-of-its-kind empirical, quantitative assessment of time-lagged influence in newspaper homepage clicks, takes up that problem. Using fixed-effects regression models, we seek to advance scholarly and professional understandings of the causal relationship between technological quantification (e.g., audience metrics) and human qualifications (e.g., news placements) 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 clicks having a lagged influence on news placement. Newsroom editors, in their gatekeeping work, are exposed to more and more information via the audience channel, particularly in regard to the aggregate popularity of certain news items (Shoemaker & Vos, 2009). Research suggests that editors, even if they say otherwise (Boczkowski, 2010; Peters, 2010; Singer, 2011), might be influenced to position stories for greater traffic (Anderson, 2011a; MacGregor, 2007). For these reasons, we hypothesize:

*Hypothesis 1 (H1):* Audience clicks have a significant overall lagged effect on news placements, controlling for potential reciprocal effects.

*Research Question (RQ1):* What is the nature of the lagged effect of audience clicks on news placement?

Moreover, while time-lagged effects have not, to our knowledge, been examined empirically, research suggests that audience preferences are driving story placements despite resistance on the part of editors, 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 clicks and news placement. Nonetheless, given the cumulative and sophisticated nature of audience information systems (Napoli, 2010), such that as the day goes on newsrooms likely have *more* data on audience clicks and more time to assess that data within the gatekeeping process, we hypothesize that the effect of audience clicks on news placement will intensify over the course of an average day:

*Hypothesis 2 (H2):* The effect of audience clicks on news placements will intensify across the four recorded time points.

Shoemaker and Vos' (2009) revised model for gatekeeping theory, while more inclusive of audience-driven forms of gatekeeping online, nevertheless retains and reinforces the primary and powerful role of mass media in the flow of information. Therefore, even if audience clicks are likely to have lagged effect on editorial placement of online news items because audiences can more readily communicate their interests, there is also good reason to believe that news placement will have a lagged effect on what audiences choose to read. Following this logic, we propose:

*Hypothesis 3 (H3):* News placements have a significant overall lagged effect on audience clicks, controlling for potential reciprocal effects.

*Research Question 2 (RQ2):* What is the nature of the relationship between the lagged effects of news placements on audience clicks?

Nevertheless, while causal relationships between audience clicks and news placements make theoretical sense in both directions, controlling for potential reciprocal effects in analysis, given the popularization and promises of computer algorithms (Napoli, 2010), coupled with most U.S. commercial newsrooms' pressure to drive online traffic and pageviews to please their advertisers (Anderson, 2011a; Graves & Kelly, 2010), the following hypothesis is proposed:

*Hypothesis 4 (H4):* The lagged effect of audience clicks on news placements will be greater than the lagged effect of news placements on audience clicks.

## Method

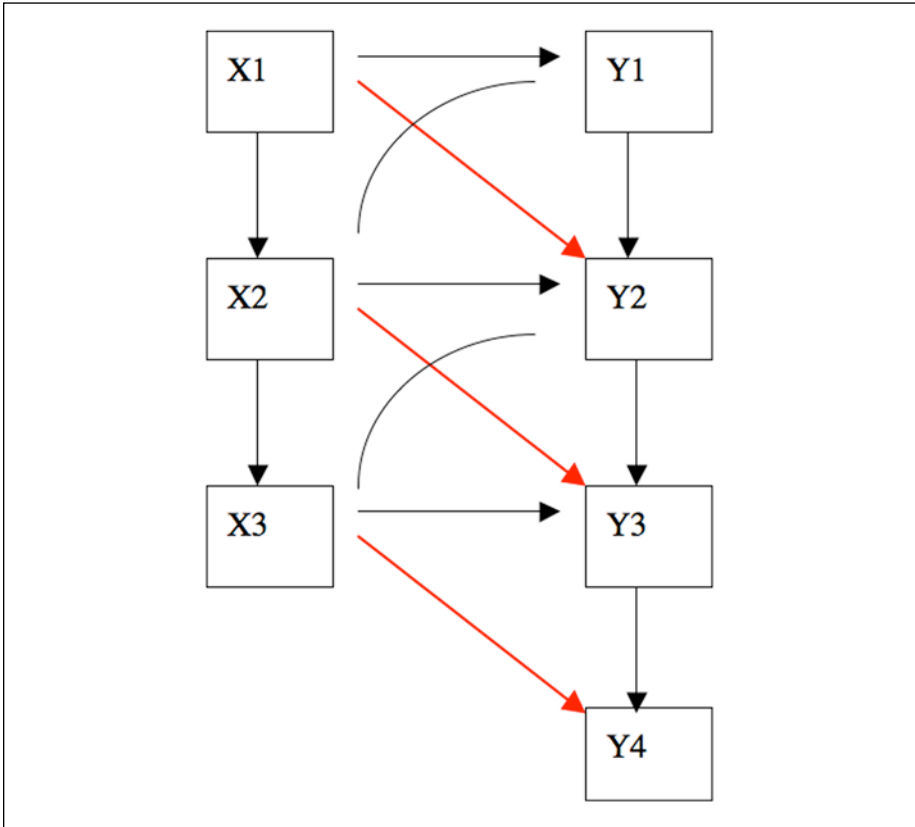
This study performs secondary analysis on a set of data that were collected from three New York-based news sites<sup>6</sup>: *NYTimes.com*, *NYPost.com*, and *NYDailyNews.com*—representing

*The New York Times*, *New York Post*, and *New York Daily News*, respectively. Data were gathered daily for 2 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 10 stories selected by journalists and by audiences were identified. “Top” stories from each newspaper’s “most viewed” list were used to measure audience clicks, and prominence of news items on the homepage were used to measure news placements.

**Theoretical model explication.** This study is focused on estimating two theoretical models at four distinct time points (9 a.m., 12 p.m., 3 p.m., and 6 p.m.) 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 controls for potential reciprocal effects between exogenous and endogenous variables where we account for the correlation between  $Y$  at Time ( $x$ ) and  $X$  at ( $x + 1$ ), as well as the effect of  $Y$  at Time ( $x$ ) on  $Y$  at Time ( $x + 1$ ) and the effect of  $X$  at Time ( $x$ ) on  $X$  at Time ( $x + 1$ ) in all estimated models (see Figure 1). All of the statistical analyses presented in this article are done using maximum-likelihood estimation of simultaneous multiple regression analyses under the structural equation modeling 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 substory within a particular story. At the point of data analysis, we removed such substories from the sample. The stories selected as the top 10 journalistic stories were the 10 most prominently displayed below the newspaper masthead. Adopting conventional editorial standard, and consistent with the operationalization of other empirical work involving coding of news placements (Boczkowski et al., in press; Lim, 2012), prominence of news items is determined by location in a grid-like fashion from top to the bottom, and left to the right.<sup>7</sup> Stories identified as the top 10 audience clicks were located in a section halfway down the page, variously titled “Most Clicked,” “Most Popular,” or “Most Read.”<sup>8</sup> Based on the mechanical and objective nature of both variables and the lack of data disagreements during pretests, tests of intercoder reliability were not computed.

**Variables.** The following variables were used in this secondary analysis study: news placement, audience rank, and story ID. News placement 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 one place and not the other, a value of 11 was given to the nonexistent 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,  $\alpha^9$ , was created to be included in all linear regression structural equation models.



**Figure 1.** Path diagram of estimated fixed-effects models.

Note: Fixed-effect control for all stable characteristics of news stories. For visual simplicity, not included in this diagram are correlation paths between  $\alpha$ , a news story-specific latent variable, and each of the time-varying predictors.

*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 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<sup>10</sup> 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, FE 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 FE 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 ( $p < .001$ ) suggest that in addition to its theoretical justifications, fixed effects are also more appropriate, statistically, for models estimated in this study than random effects models.

Benefits of estimating FE models as a linear structural equation model with a latent variable include its enabling (a) a likelihood ratio test for fixed versus random effects to better assess the feasibility of each model, (b) estimations of models with reciprocal effects among endogenous and exogenous variables, (c) assessments of models with latent variables that have multiple indicators, and (d) 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 Clicks on News Placements*

Supportive of H1, there exists a significant overall lagged effect of audience clicks on news placements ( $p < .001$ ), controlling for effects of earlier news placements on later news placements as well as potential reciprocal effects between news placements and subsequent audience clicks. Also, there is no evidence (*ns*) for a reciprocal effect between editorial placement of news items and subsequent audience clicks.

*Goodness-of-fit tests for H1 and 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 nonsignificant for nonsaturated models; however, given this study’s large sample and chi-square tests’ sensitivity to sample size, the statistical significance found in this particular GOF test is expected. 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. Moreover, assessment of the modification indices suggests no sizeable, theoretically meaningful points of ill fit in the estimated model.

In response to RQ1, regardless of which model one focuses on, audience clicks have an overall *negative* lagged influence on news placements in that a news story's one-rank advancement on the "most viewed" list at Time ( $x$ ) is associated with such story's subsequently decline ( $B = -.15, p < .001$ ) in news placement at Time ( $x + 1$ ), controlling for everything else.

Supportive of H2, lagged effects of audience clicks on news placement does intensify steadily throughout the four recorded time points, controlling for everything else. Particularly, audience clicks explains for 4% of the variance at 9 a.m., 15% of the variance at 12 p.m., 14% of the variance at 3 p.m., and 25% of the variance at 6 p.m. in the model. 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,  $\chi^2(5) = 61.99, p < .01$ , which is consistent with the theory-driven constraints imposed on this model. As aforementioned, given this study's large sample 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 RMSEA is .09, CFI .98, TLI .92, and the SRMR .04. Additionally, evaluation of the modification indices suggests no sizeable, theoretically meaningful points of ill fit in the estimated model.

### *Lagged Effects of News Placements on Audience Clicks*

Unsupportive of H3, news placements have no overall lagged effects on audience clicks (*ns*).

*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,  $\chi^2(7) = 87.26, p < .01$ , which is consistent with the theory-driven constraints imposed on this model. As aforementioned, significant chi-square test of overall model fit is expected given the large sample used in this study. On the other hand, the relatively small chi-square value lends support to the fitness of the proposed model. The RMSEA is .09, CFI .98, and TLI .94, and the SRMR is .05. Moreover, assessment of the modification indices suggests no sizeable, theoretically meaningful points of ill fit in the estimated model.

In response to RQ2, there is no overall lagged effect of news placements on audience clicks.

Supportive of H4, comparing results found in H1 and H3, lagged effect of audience clicks on news placements is greater than the lagged effect of news placements on audience clicks.

## **Discussion**

This article raised the question about the directionality of influence between news placements and audience clicks. This study suggests that data aggregation of audience clicks

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 during a given 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 the popularity of news items in order to maximize their presentation of content that audiences will be more likely to click on.

To summarize our key findings, we found that (a) controlling for potential reciprocal effects, audience clicks affect subsequent news placements, based on a time-lagged analysis. Moreover, (b) the strength of this effect on news placements intensifies during the course of the day. Meanwhile, looking the other direction, (c) there is no overall lagged effect of news placements on audience clicks. Finally, (d) the lagged effect of audience clicks on news placements is stronger than the inverse relationship.

That audience clicks have greater impact, at least in this initial study, contributes to Shoemaker and Vos' (2009) updated model for gatekeeping theory, demonstrating that the "audience channel" indeed has a growing role to play in the overall gatekeeping of news and public information online. In particular, digital audiences are driving a subsidiary gatekeeping process that picks up where mass media leave off, as they share news items with friends and colleagues, and as they communicate collective interest via the aggregate popularity of certain stories. Previous studies have examined features such as most viewed or most emailed lists of stories, but only with the content of such material in mind (Shoemaker et al., 2010, 2008), or the relative differences in content choices between editors and readers (Boczkowski et al., 2011). What this study provides is an assessment of time-lagged, or causal, influence between audience members and editors. As Shoemaker and Vos articulate, "We don't know whether journalists pay any attention to the most emailed list or use it to make gatekeeping decisions. But we do know that the dotted line representing a weak audience feedback loop in mass communication models can now be made solid" (p. 7). This study, while looking at most viewed rather than most emailed lists of news items, demonstrates that editors appear to be paying attention to such data and benchmarking at least some of their news placement accordingly.

This finding would suggest that, all things being equal, editors 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 (Boczkowski, 2010; Boczkowski et al., 2011, in press; 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 article 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 placements of homepage editors even while editors—at least to some degree—appear to be influenced by what they know about what audiences are clicking on.

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 clicks appear to have an overall *negative* lagged influence on news placements (see RQ1). On its face, this seems a bit counterintuitive: If editors indeed are being influenced by audience interests, should that relationship not likely be positive? Would not editors work to promote already popular stories to the top of the page, to capitalize on that popularity? Perhaps editors are benchmarking against audience clicks 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.

The literature has shown that journalists have well-established routines for assessing news judgment and story placement 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). Perhaps, then, this “pushing down” of stories indicates an active resistance on the part of editors to the audience gatekeeping of reader clicks. 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 news placements on audience clicks 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 these 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 the “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<sup>11</sup> in ways that come close to being comparable to the internal validity strengths of true experimental designs, it is not without limitations. Another 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 3 hours, although future studies are encouraged to embed different time lags in their study design to assess whether different time lags contribute to

**Table 1.** Time-Lagged Analyses of the New York Daily News, New York Post, and The New York Times.

	Audience on editorial			Editorial on audience		
	New York Daily News	New York Post	The New York Times	New York Daily News	New York Post	The New York Times
9 a.m. to 12 p.m.	-.24***	—	.17*	—	.06**	.07***
12 p.m. to 3 p.m.	-.18**	—	.02*	—	—	.13***
3 p.m. to 6 p.m.	—	—	—	—	—	—

Note: *N* = 1,550. Cell entries are unstandardized coefficients. Analyses were done using fixed-effects model under the structural equation modeling framework where simultaneous regression analyses were performed. Individual goodness-of-fit statistics are available upon request.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

different findings or not. Additionally, while this study studies time-lagged effects of news placements and audience clicks between 9 a.m. and 6 p.m., which is consistent with the finding that most people consume news at work (Boczkowski, 2010), the design of this study does not account for time-lagged effects outside of the recorded time frames, and future studies are encouraged to estimate the time-lagged models on a 24-hour cycle.

Ultimately, and despite the limitations of this research, we argue that the central finding of this article—that audience clicks have a lagged effect on news placements, all things held constant—is a provocative one, and may spur additional work to uncover the complex relationship between audience data and news work, in the context of gatekeeping theory and its revised articulation for the 21st century. Even as editors 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 behaviors and editorial decisions.

### Directions for Future Research: Post Hoc Analysis

As the first quantitative study to examine the time-lagged effect of audience clicks on news placements and vice versa, this study contributed to the literature by examining the overall time-lagged effects of the two focal constructs across three newspaper homepages. However, given the likely differences among the *New York Daily News*, *New York Post*, and *The New York Times*, it may be expected that the lagged effects of audience clicks on news placements and vice versa are contingent on different organizational norms and newsroom practices. To aid future research, the following post hoc analyses were conducted. As Table 1 suggests, effects of different directions are observed when the three newspapers are analyzed separately. Specifically, for the *New York Daily News*, whereas a negative lagged effect of audience clicks on news placements is observed, there is no lagged effect of news placements on audience clicks.

For the *New York Post*, while there is no lagged effect of audience clicks on news placements, there is a positive lagged effect of news placements on audience clicks in the morning. Nonetheless, this finding may be explained in part by the fact that, despite data transformation for comparable statistical analysis, the *New York Post* has 50% less data than the other two newspapers because its “most viewed” rank only encompasses 5 as opposed to 10 news items. This limits the extent to which a full analysis can be performed on this individual newspaper.

Unlike the other two papers, *The New York Times* observes a positive lagged effect of audience clicks on subsequent news placements and vice versa. This suggests a symbiotic relationship between audience clicks and news placements: Just as a news item that becomes more popular on the “most viewed” list at Time (x) becomes more prominent on the *New York Times* homepage 3 hours later, the reverse is also true. Future studies are encouraged to conduct interviews at these three newspapers for a more in-depth understanding of the implications of these findings.

### Appendix



**Image 1.** Ranking the top editorial stories in the *New York Daily News*. Editorial stories in the *New York Daily News* are ranked top to bottom and left to right, with the first 10 coded as the “top ten” editorial selections.

**NEW YORK POST**  
 Last Updated: Tue., Jul. 27, 2010, 09:56am  
 NYC Weather: 82° CLOUDY  
 PHOTOS VIDEOS BLOGS

News Page Six Sports Entertainment  
 NYC Local Business Opinion Gossip Celeb Photos PopWrap Teams High Schools Scores TV Movies Events Travel

**NYC Now**  
 The Latest News & Events  
 Events Search  
 WHAT? WHEN? WHERE?  
 Select a Category  
 Conan O'Brien at Radio City  
 Cop shoots Harlem teen  
 World Science Festival  
 More Manhattan Events  
 Brooklyn Stabbing at Coney opening  
 Benefit for Stephen Baldwin  
 Brooklyn International Film Festival

**AL & TIPPER CALL IT QUILTS**  
 1  
**Gores separating after 40 years of marriage; call decision mutual**  
 2  
**Cuomo sues debt collector over harassment claims**  
 3  
**\$ arrests announced in NY-Liberia drug case**  
 4  
**State pension fund gains 26 percent**  
 5  
**Photog files suit over Michael Jackson book**  
 6  
**Gun scare prompts lockdown at suburban NY school**  
 7

Don't forget to pack SPF 35 and some S&P 500.  
 Direct NYC → AC  
 Flares start at \$29  
 WEEKEND WHATEVER TRAIN  
 acbs

**Image 2.** Ranking the top editorial stories in the *New York Post*. Editorial stories in the *New York Post* are ranked top to bottom and left to right, with the first 10 coded as the “top ten” editorial selections.



**Image 3.** Ranking the top editorial stories in *The New York Times*. Editorial stories in *The New York Times* are ranked top to bottom and left to right, with the first 10 coded as the “top ten” editorial selections. Story headlines are used as a further indicator of prominence, with larger headlined stories ranking higher than ones with smaller headlines (e.g., Stories 1 and 2 above, in relation to Story 3).

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## Notes

1. While *journalists* and *editors* are often used interchangeably in the academic literature, the latter is more precise for purposes of this study. We examine the relative placement of news items on online newspaper homepages—a journalistic activity driven primarily by online news editors.
2. To cite one example, which is especially relevant to our subsequent analysis: *The New York Times* has a “homepage producer” whose sole responsibility is to monitor, edit, and adjust the nytimes.com homepage offerings 24 hours a day, according to a former senior editor at the newspaper (Kathleen McElroy, personal communication, April 13, 2012).
3. In their work, Boczkowski and colleagues use *journalists* in discussing the editorial judgment that goes into story placement on newspaper homepages. In this article, however, we argue that *editors* is a more appropriate term because editors traditionally have a greater impact on news judgment and ultimate forms of prominence in publication. Nevertheless, their research and ours examine the same phenomenon: the positioning of news content on newspaper homepages.
4. For a thorough discussion of the distinctions between hard and soft news, see Reinemann, Stanyer, Scherr, and Legnante (2012), in addition to the aforementioned work of Boczkowski and colleagues.
5. For evidence of the enduring power of gatekeeping theory in mass communication research, see Reese and Ballinger’s (2001) discussion of White’s (1950) study; Shoemaker and Vos’ (2009) comprehensive review of the literature; theoretical offshoots such as Barzilai-Nahon (2008); and scores of published studies about news production—particularly of the online variety—that have drawn upon the gatekeeping framework (e.g., Bruns, 2005; Lewis et al., 2010; Yu, 2011; Singer, 2001, 2010; Singer et al., 2011).
6. The original study, which remains in progress, examines the extent to which organization norms and newspaper subscription models of the three New York City–based newspapers moderate the relationship between audience clicks and news placement from a mixed-method approach.
7. In the case of the *The New York Times* and *New York Post*, editorial content begins with a carousel containing three stories: For these sites, our coding started with them, moving from left to right and proceeding downwards. For *The New York Times*, prominence was assessed in a similar grid-like fashion, with story headlines used as a further indicator of prominence. For visual illustrations of these decisions, see Images 1 to 3 in the Appendix. To ensure reliability, grids were developed for each site prior to data collection; furthermore, presentation formats at all three sites were static during the period of data collection, minimizing the possibilities of intercoder disagreement.
8. In the case of *NYPPost.com*, only five stories are listed; thus, at the data transformation stage, its rankings were multiplied by 2 to enable a crude but comparable approximation. Aside from “most viewed,” *The 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.
9. 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.
10. Note that this only tests the overidentifying restrictions and is sensitive to sample size.



11. Structural equation modeling 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 goodness-of-fit tests.

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