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Two Faces of Media Attention: Media Storm Versus Non-Storm Coverage

AMBER E. BOYDSTUN, ANNE HARDY, and STEFAAN WALGRAVE

A media storm is a sudden surge in news coverage of an item, producing high attention for a sustained period. Our study represents the first multi-issue, quantitative analysis of storm behavior. We build a theory of the mechanisms that drive media storms and why the "anatomy" of media storms differs from that of non-storm coverage. Specifically, media storm coverage should change less explosively over time, but be more sharply skewed across issues, compared to non-storm coverage. We offer a new method of operationalizing media storms and apply our operationalization to U.S. and Belgian news. Even in these two very different cases, we find a common empirical storm anatomy with properties that differ from those of non-storm coverage in the predicted fashion. We illustrate the effects of media storms on the public through discussion of four key examples, showing that online search behavior responds strongly to media storms.

Keywords media storm, media hype, media wave, media dynamics, comparative content analysis

Media attention typically rises and falls as issues come and go. At a given point in time, some topics might be high on the media agenda, hitting the front pages and headlines; just a short time later these same topics may have edged out of the limelight until, after a while, they attract renewed attention. Apart from these up-and-down movements, in some instances news outlets suddenly seem to give extremely high attention to an issue or an event, and to do so all of a sudden. Stories about the swine flu and the Gulf of Mexico oil spill, for instance, dominated the U.S. news for weeks. In cases like these, an issue or event suddenly attracts an enormous amount of news coverage, often pushing other issues from the front page. Sometimes the attention makes perfect sense, given the nature of the event or issue. In other cases, the event or issue at the center of the buzz is very similar to other events/issues that somehow do not receive the same attention. In any case, news outlets often become suddenly and strongly riveted to a storyline. We call this phenomenon of sudden, high, and sustained media attention to an event or issue a *media storm*.

Empirically examining media storms in news outlets in two countries, this study makes three points. First, we theorize, and show, that media storms and their dynamics are phenomena that differ from non-storm coverage. The day-to-day change in media attention during a media storm differs in remarkable ways from changes during non-storm episodes. When not in storm mode media coverage is irregular: Long periods with minor changes in

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attention to an issue—many issues do not get any attention at all—alternate with exceptional but very short spikes of attention. That is, the day-to-day change in media attention oscillates explosively between almost no change at all and extreme change. This pattern reflects the behavior of policy agendas more generally: Moderate and gradual changes in issue attention are rare (Baumgartner et al., 2009). Yet the pattern does not hold for media storms; once in storm mode, media attention tends to evolve in a moderate and gradual way. Daily shifts in attention are smooth and approximate a Gaussian (normal distribution) pattern. In short, media storms are a different kind of dynamic species compared to non-storm coverage.

Our study delineates the formal, statistical signature of media storms and compares media storm coverage with non-storm coverage, showing that storms do in fact exhibit different patterns of change. By empirically discerning media storm coverage from other coverage, the study helps advance a recent and growing body of work in communications and political science dealing with media dynamics (see, for example, Boydstun, 2013; Elmelund-Præstekær & Wien, 2008; Giasson, Brin, & Sauvageau, 2010; Kepplinger & Habermeier, 1995; Vasterman, 2005; Wien & Elmelund-Praesteker, 2009; Wolfsfeld & Sheafer, 2006). Our argument is relevant not only for political communication research but also for a large community of scholars, mainly in political science, who have successfully employed the punctuated equilibrium theory applied by Baumgartner and Jones (2009) to tackle policy change. Our contribution to that literature is in demonstrating—in what we believe is the first time—that *during* a large and lengthy punctuation, at least in the media, attention is smooth and changes are moderate.

Second, media storms not only differ in their dynamics from non-storm coverage: Their spread across issues is also more skewed. When not in storm mode, mass media coverage is typically concentrated on a relatively small subset of issues (Boydstun, 2013). Yet this concentration pattern is exacerbated when looking at media storms only. Whereas many issues hardly get substantial amounts of coverage in non-storm times, even fewer issues form the object of a media storm. To the extent that a media storm may in some cases be a prerequisite for the media to draw the public's attention to underlying issues (a question left for future study), media storms are a highly skewed and unbalanced attention generator.

This notion brings us to the study's third contribution. We illustrate that media storms are indeed consequential and can lead to heightened public awareness of the underlying issue when compared with similar events or issues that do not receive media storm coverage. In general, citizens (and elites) depend on media to learn about the existence and severity of issues. News consumers generally assume that the amount of media coverage devoted to a problem corresponds with its importance (Kepplinger & Habermeier, 1995, p. 371). When media increase their attention to an issue, the public (and politics) follows suit: Citizens are more aware of, and care more about, the issue (McCombs & Shaw, 1972). We use four key U.S. media storms to illustrate how storm coverage manages to draw people's attention to events and issues that, absent storm coverage, are not nearly as likely to be noticed. Media storms, thus, are consequential phenomena. This finding speaks directly to a vast body of work dealing with media effects (for a recent overview, see Potter, 2013).

In order to make these three points—that both in dynamics and in spread across issues media storms are a different kind of animal from non-storm coverage, and that they have consequences for public attention—we first need to conceptualize and operationalize the phenomenon of the media storm. Previous authors have laid the groundwork for thinking about media storms (see, for example, Vasterman, 2005), but hardly any effort has been given to conceptualizing media storms in a clear and replicable way (a notable exception is

Wien & Elmelund-Praesteker, 2009). Therefore, the article starts by turning media storms from a "you-know-it-when-you-see-it" phenomenon into a clearly defined media process.

We draw on empirical evidence about media storm and non-storm coverage in two newspapers in two countries (the *New York Times* in the United States and *De Standaard* in Belgium) analyzed over a 10-year-plus period. Extant studies have focused on single issues in single countries (Elmelund-Præstekær & Wien, 2008; Kepplinger & Habermeier, 1995; Vasterman, 2005). Dealing here with all issues and taking a comparative stance, we compare storm and non-storm coverage as they play out across two countries. Our approach thus allows us to assess the generalizability of the differences between storm and non-storm coverage. Regarding the effect of media storms on the public, we use U.S. evidence only.

Conceptualizing Media Storms

Most people are able to identify a media storm when they see one. When media consumers cannot help but know about an issue because it is so prominent in the news, a media storm is underway. Yet, to date, scholars have not agreed upon a generic conceptualization of media storms (Elmelund-Præstekær & Wien, 2008, pp. 248–249). Specifically, none of the existing conceptualizations (see below) offer an operationalization that can effectively be implemented on a larger scale and in a comparative design. Also, previous work has employed different terms to refer to similar but not identical phenomena.

For instance, Vasterman's "media hype"—a term also adopted by Wien and Elmelund-Præstekær (2009)—suggests that the media is somehow responsible for the "exaggerated" coverage; the word "hype" bears with it the connotation that the media attention is out of sync with reality (Vasterman, 2005, p. 509). We think this evaluation should be a matter of empirical investigation rather than of definition. Some increases in attention are warranted by the facts of the case (e.g., war) and do not constitute excessive coverage per se. As another example, Wolfsfeld and Schaefer's (2006) "political waves" are conceptually helpful but potentially misleading in the sense that these are not in the first place *political* waves but rather *media* waves. It is the media that display heightened attention and not (always) political actors. The distinctive feature of these storms is that media, for whatever reason, devote a large amount of attention to a given issue. Kepplinger and Habermeier's (1995) concept of "news wave" does not just refer to the phenomenon of heightened media attention as such but more to the mechanism driving this media attention—key events affecting the subsequent news selection process—which is, again, a matter of empirical investigation rather than of definition. All of these previous conceptualizations share a common core, though, from which we derive our definition.

Previous definitions consider the *size* of media attention as a crucial characteristic. Also, they all explicitly or implicitly take the suddenness, or *explosiveness*, of the rise in attention into account. On this point, Kepplinger and Habermeier (1992), Vasterman (2005), and Wien and Elmelund-Præstekær (2009) talk about certain (unforeseen) events that trigger attention. Finally, all definitions talk about the *duration* of the heightened attention, for example by saying that the peak is "short-lived" (Kepplinger & Habermeier, 1995) but with an implicit understanding that it will last at least a short duration (e.g., longer than a day). Thus, we define a media storm as *an explosive increase in news coverage of a specific item (event or issue) constituting a substantial share of the total news agenda during a certain time.*

Importantly, even if a news item meets the three criteria we outline here such that we label it a media storm, a fourth dimension of evaluation exists: the "multi-media-ness" of the storm. Our operationalization of media storms begins—necessarily, given available

data—with single news outlets (one in the United States, one in Belgium). Yet we conceptualize true media storms as being those that meet our three formal criteria *and* that register as such across multiple news outlets in a given media system. The operationalization we offer thus represents the foundational steps to identify media storms, steps that could be combined with additional simultaneous or subsequent evaluation with respect to multi-media-ness. Approaching the task in this order is appropriate insofar as those "storms" found in one major news source like the *New York Times* are likely to be multi-media storms (and indeed, in empirical checks not presented here the majority of the *Times* storms were storms in most other U.S. newspapers as well). As we discuss below, the driving forces behind media storms are such that, in most cases, media outlets that go into storm mode do so together.

We focus then on the (first) three criteria of a media storm: size, explosiveness, and duration. We consider these criteria to be equally important for identifying media storms. That said, some of these criteria are probably more distinctive when it comes to distinguishing storm from non-storm coverage. As we argue in the next section, media coverage in general is highly explosive in nature. Also, that media sometimes devote an exceedingly high amount of attention to an event or issue seems to be inherent to the fluctuating nature of media coverage. The most distinctive feature of a media storm is that, after an initial explosion of attention, the high level of attention is extended for a longer period of time. Media storms are not short spikes of attention but consist of longer "plateaus" of very high attention.

Our definition remains general, and still needs to be operationalized. After completing our theoretical discussion and presenting our data and methods in the following sections, we will further specify the exact size, the precise degree of explosiveness, and the concrete duration we use in this specific study to isolate the media storms in the U.S. *New York Times* and the Belgian *De Standaard*.

The Mechanisms of Media Storms

A definition of a phenomenon does not constitute a theory. Our conceptualization alone does not allow us to derive hypotheses about differences between storm and non-storm coverage, nor does it provide leverage for speculating about media storms' effects. Therefore, we need a theory of why media storms come about and how this process differs from non-storm coverage. It is because of its internal mechanisms that a media storm is a different animal. Note that, in this article, we do not directly examine whether the processes that we theorize are indeed the ones that lead to a media storm. We only investigate the consequences of these argued processes: a specific type of media phenomenon with particular features. Still, without talking about the internal mechanisms, we cannot sensibly speak about what the end result should look like.

Why do media outlets go into storm mode? We see two complementary mechanisms as causing media storms: (a) lower gatekeeping thresholds (when a spectacular event or issue develops, news outlets temporarily change their news selection process and lower the thresholds of newsworthiness for related events and issues, helping to produce a storm) and (b) imitation (news outlets' tendencies to imitate one another's news selection decisions help generate and then fuel media storms).

Regarding the first process, extant work has showed that key events—remarkable events generating a lot of media coverage—lower the media gatekeeping threshold for similar later events and for "after" events (Brosius & Eps, 1995; Kepplinger & Habermeier, 1995). This logic goes back to the "continuity effect" already identified by Galtung and

Ruge (1965, p. 82): "Once an event has 'made it' the news channel will be more readily open for the follow-up events, at a lower threshold value." After a key event, journalists start covering even similar past events that occurred before the key event took place. Journalists and editors know that a key event can elicit high levels of public attention, leading to a demand for more information. Mass media try to satisfy this hunger by providing more news about the same issue. Even events that would in other circumstances not have been salient enough to make it into the news often pass the media gates and get covered, once the gates have been opened by a related event or issue.

This first mechanism helps explain why media storms are not 1-day phenomena but instead go on for a few days at a minimum. It also helps explain why media storms feature particularly high levels of attention. The process of the opening of the media gates can be related to Downs's (1972) issue attention cycle argument. Once an issue has forcefully caught the attention of the media, says Downs, it stays there for a while until, inevitably, it fades away again as journalists start looking for—or are suddenly pulled away by—other, fresh news (and, relatedly, as citizens and policymakers realize the costs associated with addressing the issue). The key element in Downs's account is that spectacularly heightened news attention to an issue is temporary. Sooner or later, the public and the media will get bored or distracted and turn away. The precise length of a storm, then, depends on the duration of the temporary change in news criteria journalists and editors use. As long as the public stays tuned, the media will keep covering the storm issue. Added to that, if new events connected to the media storm keep unfolding, journalists will continue covering them (and the threshold for covering events linked to the storm will remain low). In that sense, the duration of a storm likely depends, and critically so, on how political or other relevant actors deal with it. If elites keep talking and, especially, disagreeing about the issue—and, in so doing, keep producing events that are worth covering—the storm continues.

Whereas the first process refers to an intra-medium phenomenon—a single news outlet can temporarily employ less strict criteria for newsworthiness and increase its coverage of an event or issue irrespective of what other news outlets are doing—the second mechanism is a multi-media one: News outlets imitate one another's news coverage. Directly competing outlets especially take notice of each other's news selection decisions and tend to embrace those issues that the competition is covering or has covered before (e.g., Boyle, 2001; Vliegenthart & Walgrave, 2008). Scholars working on media storms and related processes have often referred to such self-referential processes, disconnected from the outside world, leading to pressure on every news desk to join the pack (Kitzinger & Reilly, 1997; Vasterman, 2005). Taken together, these emulating micro-decisions can produce a media storm on the aggregate level.

This second media-storm-generating process helps explain all three aspects of storms as we have defined them. Imitation affects the level of media attention during a storm, with individual news outlets striving to outshine competitors' coverage. Imitation also helps drive the explosiveness of a storm, since mimicking on a large scale leads to quickly peaking but then fixated and entrenched media attention. And imitation plays a big role in determining the duration of a storm; until another hot item hits, news outlets are loathe to be the first to drop coverage of an ongoing storm, even if the event or issue itself has run its course (Boydstun, 2013). In contrast to the first mechanism, this second process implies that media storms are essentially multi-media phenomena. An important reason that storms happen at all is that they happen in different news outlets at the same time, yielding a collective dynamic of increasing coverage. And then once a storm erupts, this collective dynamic continues in self-reinforcing fashion, further fueling individual news outlets' incentives to stay locked on the storm.

In summary, media storms are the consequence of shifting news selection processes that, due to a variety of circumstances, produce lower thresholds of newsworthiness and more media imitation of one another's news decisions. To what extent are these mechanisms (lower gatekeeping thresholds and higher imitation) different from what happens when the media operate under non-storm mode? Are media storms only larger versions of non-storm media coverage, or are they in fact a different kind of species? In the next section, we argue that when news outlets go into storm mode, different news-selection patterns kick into play, yielding media storm coverage that exhibits a fundamentally different kind of dynamic from that of non-storm media coverage.

Why Media Storms Are Different: Hypotheses

With regard to media coverage in general, we know that media dynamics are driven not only by events and the gatekeeping of these events, winnowing incoming information into a finite agenda space, but also by key mechanisms of positive feedback (reinforcing change) and negative feedback (muting change). Positive and negative feedback both stem from institutional incentives. For example, newsroom practices of beat reporting, along with underlying journalistic news values, help establish a baseline distribution of coverage across issues (Boydstun, 2013; Galtung & Ruge, 1965; Harcup & O'Neill, 2001). This baseline is resistant to change, and thus acts as a form of negative feedback: It keeps attention relatively steady and ongoing at a high or at a low level. Meanwhile, other forces serve as elements of positive feedback, including news outlets' incentives to jump on the bandwagon of elite policy concerns and, especially, to mimic other outlets' coverage of hot news items (Bennett, 1990; Hollanders & Vliegenthart, 2008; Walgrave & Vliegenthart, 2010). These positive feedback forces reinforce change when it starts to build on the agenda, often triggering the kind of attention cascade that can lead to media storms (Baumgartner & Jones, 2009; Boydstun, 2013; Jones & Baumgartner, 2005; Lawrence, 2000; Shoemaker, 1991; Walgrave & Vliegenthart, 2010).

The tug-of-war between positive and negative feedback mechanisms produces a high degree of instability in general media coverage. Specifically, as Baumgartner and Jones (2009) describe it, the "friction" caused by the discrepancy between the high volume of incoming information and the scarcity of agenda space leads changes in media attention—and in human attention more generally—to be non-normally distributed. As many different issues vie for newsroom attention but none of them appear exceptionally important (or unimportant), journalists can only manage these diverse incoming signals by ignoring most of them most of the time (i.e., by not devoting any attention at all), by keeping their attention on the same steady level, or, alternately, by suddenly devoting a disproportionate amount of attention to them. As a result, the media agenda—of any given news outlet, as well as across a nation's media system—tends to move in fits and starts, fluctuating between periods of relative stasis, when news outlets fixate on a (usually common) hot issue or event, and very brief periods of dramatic change, when news outlets lurch (usually together) to a new hot item. These "punctuated equilibrium" dynamics yield change values that describe a leptokurtic distribution, characterized by a tall central peak produced by a predominance of instances of small (or no) change, weak shoulders produced by relatively few instances of moderate change, and wide tails produced by an important handful of instances of huge change (Baumgartner & Jones, 2009; Boydstun, 2013). The punctuated equilibrium nature of news coverage in general, and the leptokurtic distribution of change values produced, has been found in different countries and for different news outlets (Baumgartner et al., 2009).

Are media storms the same kind of dynamic animal on a larger scale? We think not. We expect that, once a media storm breaks, its dynamic signature is actually much more "temperate" than that of non-storm coverage, with fewer extreme increases or spectacular decreases during the storm. So, while over-time changes in non-storm coverage will exhibit a leptokurtic distribution entirely in line with punctuated equilibrium dynamics, changes in media storm coverage will exhibit a distribution that is close to normal. Why? Because once a news room's attention—and that of the national media in general—is drawn and journalists have been assigned to the news item in question, the media have incentives to shift from "alarm" to "patrol" mode, following daily developments closely and reacting to new information surrounding that item as it unfolds in close to real time (Boydstun, 2013). In other words, a media storm serves to overcome the friction of general news operations. Once this friction is overcome and attention *is* devoted, attention to the news item is adjusted on a daily basis in a moderate way with many middle-sized changes in attention, producing changes in coverage that approach a normal distribution. In short, the general dynamics of media coverage do not apply to storm coverage.

To make sure, we do not argue that non-storm coverage would be "regular" coverage or that storm coverage is "exceptional." As we see it, both storm and non-storm coverage *together* constitute regular coverage. Media storms are by no means exceptional phenomena; they are an essential part of day-by-day coverage. But, importantly, media storms are not just an extreme on a continuum of media coverage. Due to our strict set of criteria they can, of course, be classified as being situated at the far end of a media coverage continuum. But our point is that somewhere on that imaginary continuum the rules change. As media storms break through the status quo negative feedback and draw high levels of attention, they develop more smoothly. In our operationalization below, we take into account not only the plateau of high attention once a storm has hit but also the initial surge leading to the media storm in the first place. That media storms exhibit fundamentally different dynamics is thus not caused by eliminating the surge itself. Also, as we will show, it is not the higher level of attention as such that explains the more smooth development of media storms.

In sum, we expect the daily change in attention to the underlying issue to be different for media storms compared to non-storm coverage, leading to the following hypothesis: *The day-to-day change in media attention during a media storm is less explosive (more normally distributed) than during non-storm coverage* (H1).

Not only the day-to-day dynamics of media storms differ from what happens when general coverage prevails. The topical content of storms also varies in a systematic way from that of non-storm coverage. Or put in another way: While some issues are more prone than others to provoke media attention in general, this restriction is even more true of media storms. Our reasoning is straightforward. The two mechanisms bringing about media storms—the temporary lowering of the news threshold following a key event and the short-term increase in emulative news selection behavior—are more likely to materialize for some issues than for others.

Some issues (e.g., natural disasters) are in general more probable to be affected by sudden key events compared to other issues (e.g., cultural news); some news is more event-driven than other news (for example, see Lawrence, 1996). Additionally, some issues are simply more likely to produce events of high newsworthiness (Gans, 2005). These facts imply that some issues in general, and irrespective of the media outlet, should display more media storms than others. Added to this idea comes the expectation that not each news outlet will engage in mimicking other media coverage to the same extent for all issues. Media outlets have their own distinct issue profile and readership. When other media go in storm

mode regarding an issue that a specific medium considers to be its own, chances increase that this outlet will pick it up and take cues from other news outlets, as outlets dislike being overtaken on their own turf. As we will explain in the next section, the two outlets under study here, the *New York Times* in the United States and *De Standaard* in Belgium, are the leading broadsheets for national, political, foreign, financial-economic, and social news. Other outlets have distinct profiles as well, often with more local, crime, human interest, showbiz, and sensational news, for example. The point is that what an outlet goes into storm mode about is not random. Some issues in general are more prone to get "media stormed," and especially issues at the core of an outlet's "identity" are disproportionally covered in storm mode.

As a consequence, we expect the topic distribution of media storms to be even more narrow, or skewed, than the average topic distribution for non-storm coverage. Our reasoning is very similar to Boydstun's alarm/patrol hybrid model of news generation (Boydstun, 2013). She states that skewed media attention is an inherent feature of news coverage, driven by negative and positive feedback; skew is hard-wired into the media's logic, and in general the higher the positive feedback, the stronger the skew. And media storms—which map onto Boydstun's "sustained media explosions"—are the product of the positive feedback forces that lurch media to pay attention to specific events/issues in the first place, *compounded* with the media's extended fixation on those events/issues. The result: strong over-representation of some issues among storm coverage at the neglect of others. Thus, given the self-reinforcing mechanisms we have discussed, we add here that the omnipresent issue skew is even further exacerbated by media storms. This understanding leads to our second hypothesis: *The thematic distribution of issues is more skewed for media storms than for non-storm coverage* (H2).

Thus, we have contended that media storms are characterized by less explosive day-to-day dynamics and by a stronger degree of skew in thematic content than non-storm coverage. Our third hypothesis relates to the effects media storms may have on public attention. It probably is one of the most well-known facts in the broad field of media effects that the sheer amount of media coverage regarding an issue has an effect on how important people consider that issue to be (for an older but still very useful overview, see Dearing & Rogers, 1996). This so-called public agenda-setting effect has been examined for coverage in general but not systematically for media storm coverage.

Typically, agenda-setting scholars examine media coverage over a longer period of time and across all issues, assessing the extent to which the public's priorities are congruent with the media's preceding priorities (McCombs, 2004). No study, as far as we know, has focused on the public agenda-setting effects produced by media storms specifically. Sparse case-study evidence suggests that surges of media coverage can prompt important changes in public perceptions and governmental actions toward underlying policy issues, such as capital punishment (Baumgartner, De Boef, & Boydstun, 2008), AIDS research (Pollock, 1994), or police reform (Walgrave & Varone, 2008). High-level media attention also provides opportunities for political actors to highlight their stances while "riding the wave" (Elmelund-Præstekær & Wien, 2008; Wolfsfeld & Sheafer, 2006). We expect the agenda-setting effects of media storm coverage on the public to be different—larger—compared to coverage below the storm level. We do not have the necessary empirical evidence to systematically compare effects of storm and general coverage. Therefore, we suffice here by just stating that media storms have an effect on public attention: *Media storms have an impact on the public's perceptions of what is important in the world around them* (H3).

Data and Methods

In this study, we examine media attention on the front page of arguably the leading newspaper in the United States, the *New York Times* (NYT)—shown to be largely representative of U.S. news in general (Althaus, Edy, & Phalen, 2001)—and the front section of the leading newspaper in Belgium (Flanders), *De Standaard* (DS)—shown to have an issue agenda that is in line with that of other Belgian media (Vliegenthart & Walgrave, 2008). Our use of only one newspaper in each country has evident drawbacks, as we do not test whether the storms we identify in these outlets also play out as storms in other outlets. But we have no reason to assume that the two mechanisms leading to media storms—changing news thresholds and mimicking behavior—would apply less to other media outlets than to those we study here. In other words, the mechanisms of media storms are multi-media in nature, but then we should be able to track storm presence in any single (national) news source. The empirical approach we offer to studying storms *across all issues* in one outlet in two countries has the distinct advantage of being feasible, because we have full census data sets of all NYT and DS front-page stories coded by issue. Our choice to use two newspapers in two countries is a good point of departure, offering at minimum a strong test of the general nature of media storms, and their difference with non-storm coverage, across two very different political and media contexts.

Although both are leading newspapers in their country, NYT (for more information, see *New York Times*, 2010) and DS (for more information about profile, position, and history, see de Bens & Raeymaeckers, 2010) are quite different, operating in very different news markets. With a weekday circulation of 877,000 subscribers (nearly 1.4 million on Sundays), NYT is a much larger and more resource-endowed medium than DS, with a weekday circulation of 104,746 subscribers (120,471 on weekends). The number of NYT staff writers (around 1,150) is more than 10 times that of DS (less than 100). The larger size of NYT means that these journalists are more specialized and focused, while DS journalists are generalists. Yet, both newspapers face news selection challenges common to all news outlets, as editors in both cases must prioritize what gets covered up front. The "supply" of news is also larger for NYT, which covers a larger geographical territory than DS, which is focused on one of Belgium's regions. Finding that media storms differ from general coverage in similar ways in these two very different outlets would make a strong case for the generic character of media storms across systems.

Notwithstanding the fact that our two newspapers are different, and so are the markets in which they operate, we reckon that the phenomenon of media storms does not equally apply to all countries or outlets. Both mechanisms driving media storms—temporarily changed news thresholds and inter-media imitation—are disposed to play out more in some outlets and in some media systems than in others. Professionalization of news production with journalists following professional norms of newsworthiness, competition between outlets aiming to maximize their market share, and the absence of political parallelism in which news is determined by partisan standards all seem necessary conditions for the two mechanisms we have identified to operate in full force. In the absence of these conditions, media storms may not happen at all or, if they happen, they may happen less frequently and look very differently. In other words, our expectations apply in particular to liberal media systems and to non-partisan outlets (Hallin & Mancini, 2004).

The NYT data span 1996 to 2006, totaling 31,034 stories; DS data span 1999 to 2008, totaling 20,963 stories. The section structures of the newspapers are dissimilar. While NYT had an average of eight stories on the front page during the period studied, following a shift to tabloid format in 2004 DS had only one formal front-page story. For DS, then,

after March 2004 we used the entire "front section," which consists of the first three pages containing the main stories of the day and short intros of main stories in the other sections. On average, the DS front section features six or seven stories.

Both the NYT and DS data sets were coded based on the Comparative Agendas Project (CAP) coding scheme of 233 hierarchically organized subtopics or "issues" (e.g., prescription drugs, freedom of speech, alternative energy) within 19 major policy topic codes (e.g., health, civil rights, energy). For media coding, the CAP codebook is expanded to 27 major issue codes (adding sports, weather, etc.). Using established CAP guidelines, each story was attributed a single issue code based on the *primary* issue under discussion, with rare instances of stories equally covering two issues coded according to a consistent rubric. All coding for issues was done by human coders and not by computers. Inter-coder reliability was very strong for NYT and sufficient for DS given the fine-grained subtopic level.[1]

As the manual issue coding drew on a very detailed codebook of more than 200 subtopic categories, we then developed syntax that automated the process we describe below of identifying media storms in the NYT and DS data sets. In brief, we applied this syntax to each data set in order to isolate all instances during a given week—calculated on a rolling 7-day period—in which an issue (i.e., CAP subtopic) received a very large *and* dramatically increased (compared to the previous week) amount of coverage (more details to follow). These large-amount-and-large-increase weeks were considered as the first week of a *potential* media storm, considered as continuing for as many days after that initial 7-day period as the same high level of attention to the issue was sustained.

For the duration of a potential storm, all individual stories on that issue (subtopic) were considered part of the storm—an approach borne out by empirical evidence. A possible concern with considering all stories on an issue to be part of the same storm was the possibility that two (or more) news events distinct in nature may both fall in the same issue category coinciding in time—imagine two disconnected murders that together lead to a sudden increase in coverage of crime. To test the likelihood of erroneously associating individual storylines in an issue with the storm currently being exhibited in that issue, we *manually* validated the stories within each potential storm to see how many of the stories on the issue in question during the days of an empirically identified potential media storm were actually on the same storyline. All validation was done by one of the authors. For the media storms we discuss below, 97% of the NYT stories we identified as part of a "potential" storm using the automated syntax method turned up as being part of a "real" storm according to human tagging. We thus rely on the purely quantitative approach and treat all stories dealing with a specific issue during a specific period and identified as part of a potential storm as in all likelihood belonging to the same potential storm.

Identifying Media Storms

A media storm is an explosive increase in news coverage of a specific news item constituting a substantial share of the total news agenda during a certain time. Our generic definition leaves many questions open. What is a "certain" time, what is an "explosive" increase, and what is a "substantial" share? Our argument is that media storms differ from non-storm coverage. This argument implies that media storms are not infrequent but also quite distinct phenomena. Putting the threshold too low waters down their distinctiveness. Putting it too high misses many compelling instances that would pass the "know-it-when-you-see-it" test. A useful operationalization must enable us to identify most of these special media phenomena in order to compare them with non-storm coverage.

A media storm is more than just a one-day blip in media attention; a certain duration is needed. Below, we use the criterion of at least one full week of high attention. This cutoff point is arbitrary, of course; why would a 6-day surge not constitute a storm? Both Vasterman (2005) and Wien and Elmelund-Præstekær (2009) take it that a media hype normally takes about 3 weeks to reach its high point and wither afterwards. We use 7 days as a minimum because weeks correspond to the weekly cycle of news presentation. Many outlets operate on some weekly cycle (e.g., weekly news magazines, special Sunday editions of newspapers, less journalists available during slow news weekends), which may generate an effect on the duration of a media storm.

How explosive must an increase in attention be to qualify as a media storm? The audience should easily be able to perceive that the issue has moved up considerably among the media's priorities. Thus, we need to be able to separate sudden bursts of attention that characterize storms from high but relatively unchanging amounts of attention for some issues. Using different explosiveness thresholds, or cut points, leads to identifying different numbers of storms. In practice, and for the two outlets under study here, we use a threshold of a 150% increase in attention to an issue—so more than doubling—from one week to the next.

In terms of the amount of media coverage toward an issue or event, Vasterman (2005) speaks of "wall-to-wall coverage" when talking about what he calls "media hypes." Only on very rare occasions do some news items take up almost the entire news space; modern mass media and newspapers in particular rarely behave this way. We settle on the criterion that, over a 7-day period, one in every five stories (20%) should be devoted to the issue. For NYT this means that of an average of 56 front-page stories printed in a week, at least 11 are devoted to the storm. For DS the numbers are similar, with at least nine stories out of an average of 45 weekly front-section stories.

In summary, in this article media storms are operationalized as instances of a strong increase ($\geq$150%) in attention to an issue/event that lasts at least 1 week *and* that attains a high share of the total agenda ($\geq$20%) during at least that week. After the initial week the storm lasts for as many days as the issue sustains 20% of daily attention. Our method examines each issue on a rolling 7-day cycle to see if it continues to meet our storm criteria; a storm can stop after 7, 8, 9, or any higher number of days—as soon as the rolling week average falls below the threshold of capturing at least 20% of the agenda when we include the next day. Explosive surges *within* an ongoing storm are not counted; that is, storms that "restart" after attention to the issue/event has dropped below the 20% level for the rolling week average are counted as separate storms.

Our operationalization of media storms and its cutoff points are to some extent arbitrary. The threshold criteria may be media outlet specific. In identifying media storms in other outlets, it may be appropriate to apply different cut points in order to capture media storms that represent large surges of attention. Do our criteria manage to delineate a sufficiently distinct set of storms in the two specific outlets we study? Table 1 shows the differential results and the descriptive statistics in the case of NYT (DS data tell the same story) with regard to using different threshold criteria: explosiveness (150% or 200%) and level (15% to 25%).

The lower the criteria, the more media storms. If we put the explosiveness criterion at 150% and the level criterion at 15%, we get 246 storms in 11 years of NYT front pages. If we use the strictest criteria (200% increase/25% of attention), we only get 52 storms. Bigger storms happen less frequently than smaller storms. Lower threshold storms tend to be shorter (e.g., 14.50 days for 150%/15% storms against 16.23 days for 200%/25% storms). Our 150%/20% operationalization generates a sufficiently large amount of media

Table 1
Number and statistical features of media storms in the *New York Times* (1996–2006) depending on different cut points (explosiveness and level)

Storm criteria						
% change in attention	150%	150%	150%	200%	200%	200%
% of attention	15%	20%	25%	15%	20%	25%
Storms detected						
No. of Storms	246	121	67	215	92	52
No. of storms at day 14	77	43	33	70	38	27
No. of storms at day 21	29	22	12	31	20	9
Storm attention						
Average duration (in days)	14.50	16.22	16.10	14.93	16.67	16.23
Total no. of storm stories	5,101	3,572	2,442	4,591	2,978	1,929
Total no. of storm/day obs.	3,568	1,865	1,079	3,209	1,534	844
Distinct days with storm	2,598	1,678	1,024	2,385	1,392	797
Descriptive statistics (based on daily proportions of attention)						
Mean proportion	0.17	0.23	0.28	0.17	0.23	0.29
Standard deviation	0.13	0.15	0.17	0.13	0.16	0.18
Minimum proportion	0.01	0.02	0.05	0.00	0.02	0.05
Maximum proportion	0.43	0.54	0.62	0.44	0.54	0.64

Note. Total number of coded *New York Times* front-page stories, 1996–2006 = 31,034. The table shows descriptive statistics for the media storms identified under different cut points for our two criteria: change in % attention, and % attention. We isolate a combination of 150% increase in attention and a minimum of 20% of the front-page agenda space as the most appropriate thresholds, although the table shows similar descriptive statistics under each cut point.

storms to support statistical analysis—we identify 121 media storms in NYT and 60 in DS—while respecting the distinct character of a media storm. The identified 150%/20% storms represent around 3,500 stories in NYT. This is a considerable but still small fraction of the total NYT agenda (31,034 stories total). Approximately one out of every nine stories contributes to a media storm.

The media storms identified cover many instances of peak media attention that most media consumers in the United States and Belgium would readily remember. In NYT among the 121 storms we find the Clinton/Lewinsky scandal, 9/11, Enron, and the Terri Schiavo debate. In DS, the 60 storms recorded include discussions about the scission of the electoral circumscription BHV, the government formation negotiations of 2007, and the dioxin crisis. In other words, the storms isolated here cover most if not all of the well-known, big-ticket news stories of the decade.

Media Storms Compared to Non-Storms

Our first two hypotheses—that daily media storm dynamics are different from non-storm coverage and that the thematic skew of media storms is larger than that of non-storm coverage—require comparable non-storm evidence. Therefore, Table 2 shows the results from running an identical set of analyses on the NYT and DS storm data and then, again,

Table 2
Weekly statistical signature of non-storm coverage and storm coverage for the *New York Times* and *De Standaard*

	Non-storm coverage	←*t* test→	Media storms
New York Times			($N = 121$)
Mean proportion[a]	0.031	*	0.228
Standard deviation	0.005	*	0.060
Minimum proportion	0.019		0.159
Maximum proportion	0.053	*	0.572
L-kurtosis[b]	0.818	*	0.089
L-skew[c]	0.583	*	0.739
De Standaard			($N = 60$)
Mean proportion[a]	0.036	*	0.220
Standard deviation	0.011	*	0.042
Minimum proportion	0.018		0.153
Maximum proportion	0.133	*	0.361
L-kurtosis[b]	0.833	*	0.149
L-skew[c]	0.532	*	0.827

Note. The table presents statistics for non-storm coverage vs. media storm coverage, by week, for the *New York Times* and *De Standaard*, showing that for both newspapers non-storm coverage is more explosive but less skewed than media storm coverage.

[a]Of front-page coverage per subtopic per week for general coverage; of front-page coverage per storm for storm coverage.

[b]Across subtopic daily change values, counting each storm's prior day as part of the storm coverage.

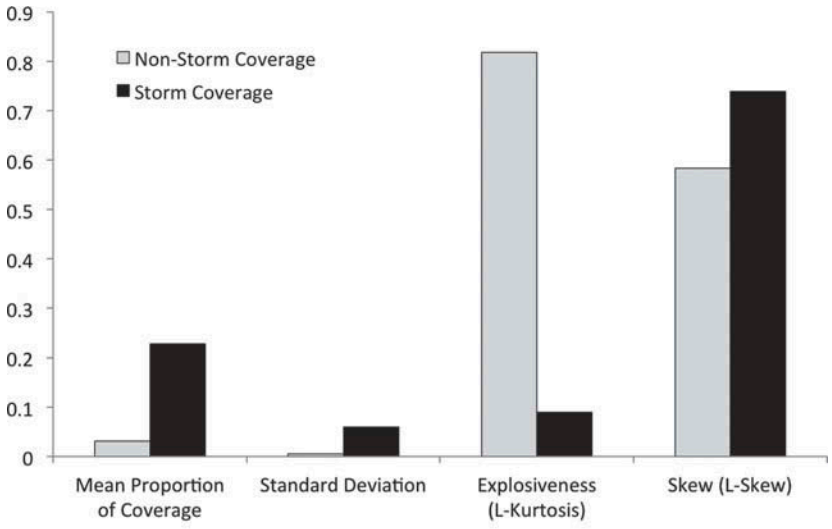
[c]Across subtopic total proportions.

*$p \leq .001$.

for the non-storm data (i.e., on each full data set, NYT and DS, after removing all stories that contributed to a storm; all subtopics with no stories were also dropped so as to avoid inflation). Figure 1 shows the key findings from Table 2 in visual form. The first data column in Table 2 shows values based on non-storm coverage evidence. The third data column shows values for storms only. The *t*-test asterisks indicate whether the value in the first column is significantly different from the value in the third column. We can evaluate our first two hypotheses by comparing the L-kurtosis and L-skew values, respectively, shown in each data column. But first, we discuss the descriptive statistics.

The upper part of both the NYT and DS sections of Table 2 offers a descriptive comparison between storm and non-storm coverage. Statistics show the mean proportion, the standard deviation, and the minimum and maximum proportion of front-page coverage each subtopic receives *per week* during general coverage, compared with these statistics for subtopic coverage *per storm* during storm coverage.[2] The descriptive differences between non-storm and storm coverage are statistically strongly significant. Also, comparing storm behavior in NYT and DS, we see a very similar pattern. All measures of storm coverage in Table 2 are fairly close to one another, indicating analogous differences between non-storm coverage and storm coverage in two different media systems. For instance, for both newspapers the daily mean non-storm attention to *any* of the 233 issues is (as good as) zero (0.03). With only six to eight stories on the front page/section, this finding is not

a. *New York Times*



b. *De Standaard*

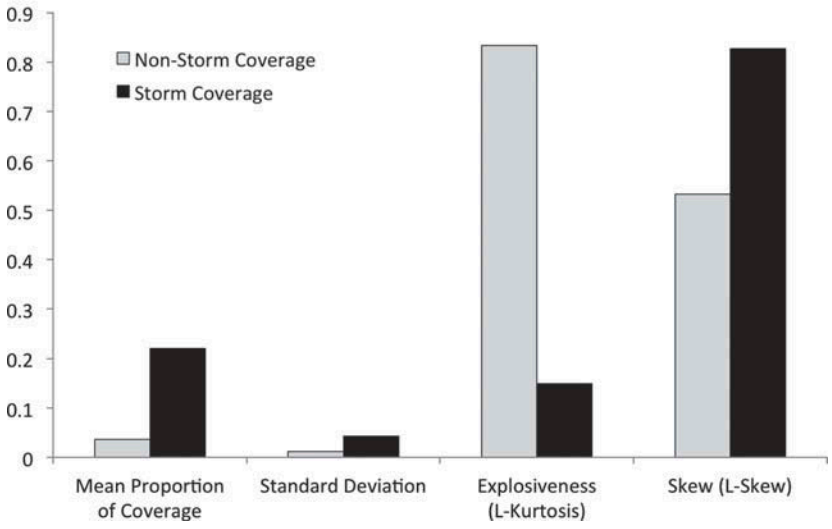


Figure 1. Statistical signature of non-storm vs. storm coverage.

surprising. In line with our 150%/20% criterion, the mean proportional attention for an issue during a storm is 0.228 in NYT and 0.220 in DS.[3] The standard deviation is much higher for storm coverage, and so is the maximum value. Figure 1 captures the stark differences in mean proportion of coverage and standard deviation between non-storm and storm coverage for both newspapers examined.

The lower part of Table 2 for each newspaper offers direct evidence to test Hypothesis 1, which stated that media storm coverage is less explosive than non-storm coverage, with less extreme day-to-day changes in attention to the storm issue/event. To that effect, we

draw on the L-kurtosis measures. These measures are, contrary to the other measures in the table, calculated at a daily level. Importantly, for these L-kurtosis values alone, we mark the day prior to each storm as part of that storm, so as to not underestimate explosiveness of storm dynamics; by definition, each storm increases suddenly at its start. Including the initial spurt of a storm increases the L-kurtosis value for the storm observations. Change values that are normally distributed exhibit a L-kurtosis value of 0.123, indicating a predominance of instances of moderate change. L-kurtosis values above 0.123 indicate a leptokurtic distribution marked by a pattern of a few extreme changes amidst a sea of non-changes. The higher the L-kurtosis value, the more explosive the pattern of change. L-kurtosis values below 0.123 indicate a platykurtic distribution, with even less explosive change than normal. Again, repeated studies have documented the explosive nature of general media dynamics, that is, change values that exhibit a leptokurtic distribution (Baumgartner & Jones, 2009; Boydstun, 2013). Table 2 confirms this finding, showing that daily changes in non-storm NYT and DS coverage exhibit L-kurtosis values of 0.818 and 0.833, respectively. Non-storm coverage, thus, is an alternation of steady (or absent) coverage and short spurts of frenetic attention.

In contrast to these explosive dynamics of general news coverage, Table 2 shows that the dynamics of media storms are much milder. Figure 1 captures this finding visually, showing how, compared to non-storm coverage, storm coverage changes much more gradually over time. In both newspapers, the distribution of changes in daily storm observations is much closer to a normal distribution compared to the non-storm coverage data (0.089 for NYT, 0.149 for DS). So, the storm observations form a much more smooth distribution clustered around the median and with stronger shoulders (medium amounts of change) and fewer outliers (extremely low and extremely high values). These findings are not affected by the specific cutoff point (150%/20%) we used to delineate media storms from general coverage. Taking different cutoff points shows that higher- or lower-level storms display the same approximately normal pattern; also in these instances L-kurtosis values approach and even drop below the Gaussian indicator of 0.123, implying that the distributions of levels of storm attention are as good as normal.

In summary, we can confirm Hypothesis 1: The day-to-day change in media storm coverage is much less explosive (i.e., more normally distributed) than in non-storm coverage. Media storms constitute a distinct type of coverage following different dynamics compared to other coverage; storms are not just typical coverage on a higher level. The fact that storm coverage of two newspapers in these two different media systems behaves so alike suggests a phenomenon generalizable to similarly professional outlets in liberal media systems.

We now turn to the L-skew measures in Table 2 (as illustrated in Figure 1) in order to examine Hypothesis 2, which stated that thematic coverage is more skewed for media storm coverage than for non-storm coverage. The higher the L-skew measure, the more skewed coverage is—that is, the less diversified attention is across topics. In both Table 2 and Figure 1, we see clear evidence that storm coverage tends to be restricted to a few key issues, while non-storm coverage is distributed more evenly (though still unevenly) across issues. These findings are illustrated by Figures 2 and 3, which show the distribution of non-storm versus storm coverage at the major topic level for NYT and DS, respectively.

Figures 2 and 3 confirm the concentrated pattern of non-storm coverage compared to storm coverage. The similarities between the two different outlets from different countries are striking. Non-storm coverage is unevenly spread over the 27 major categories with a lot of coverage, in both outlets, of topics like international affairs, defense, and government operations, with hardly any coverage of topics like agriculture or foreign trade. This non-storm topic coverage pattern reflects what we earlier called the issue "identity" of broadsheets like NYT and DS. Yet the spread of storm coverage over topics is even more

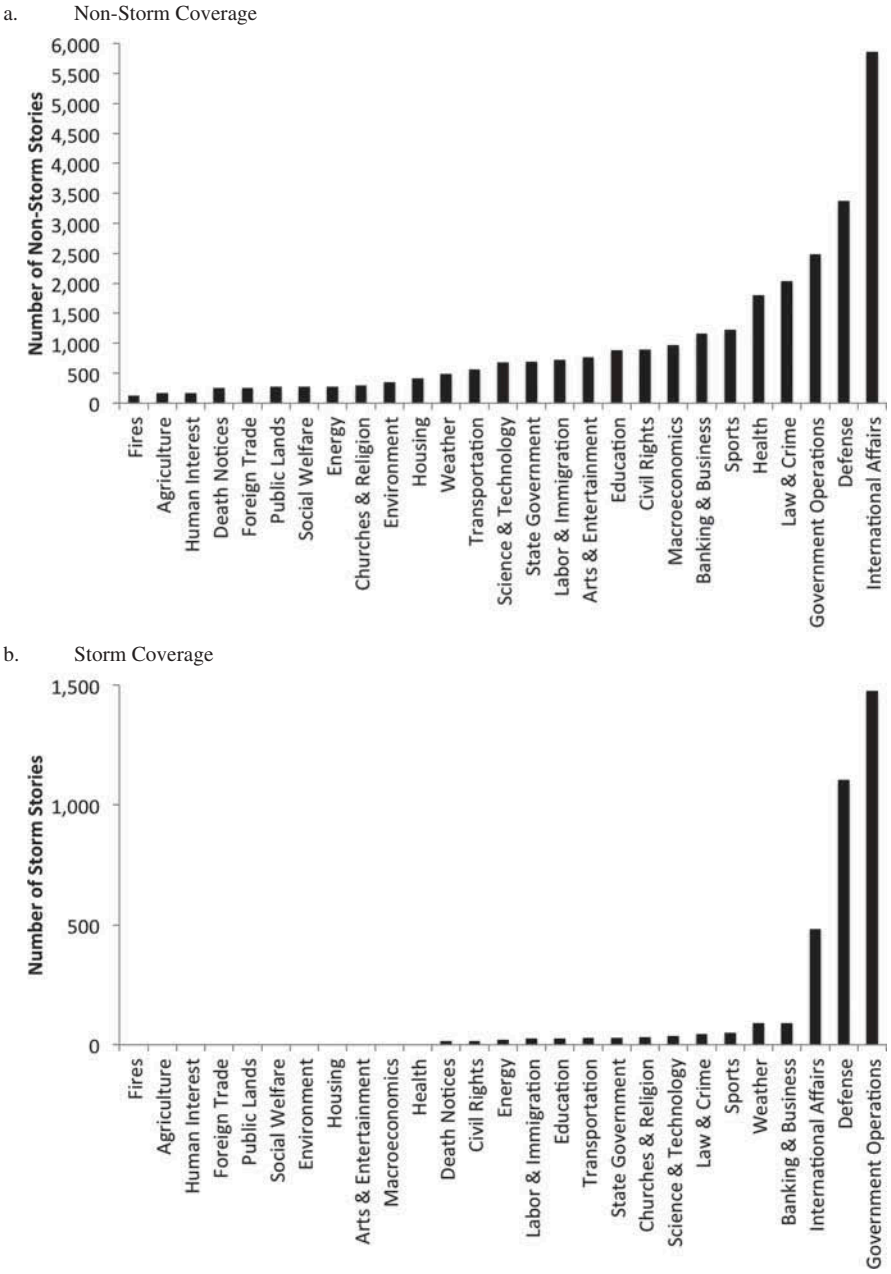


Figure 2. Comparing non-storm vs. storm coverage of issues in NYT. The figure illustrates the sharper degree of skew in storm coverage as compared to non-storm coverage.

skewed. The same topic categories that receive the most non-storm coverage come out on top for storms too, but the other topics are hardly ever covered in storm mode. Offering a systematic test of the patterns we see in Figures 2 and 3, the L-skew statistics displayed in Figure 1 give confirmation of Hypothesis 2: The spread of storm coverage across issues is much more skewed than for non-storm coverage.

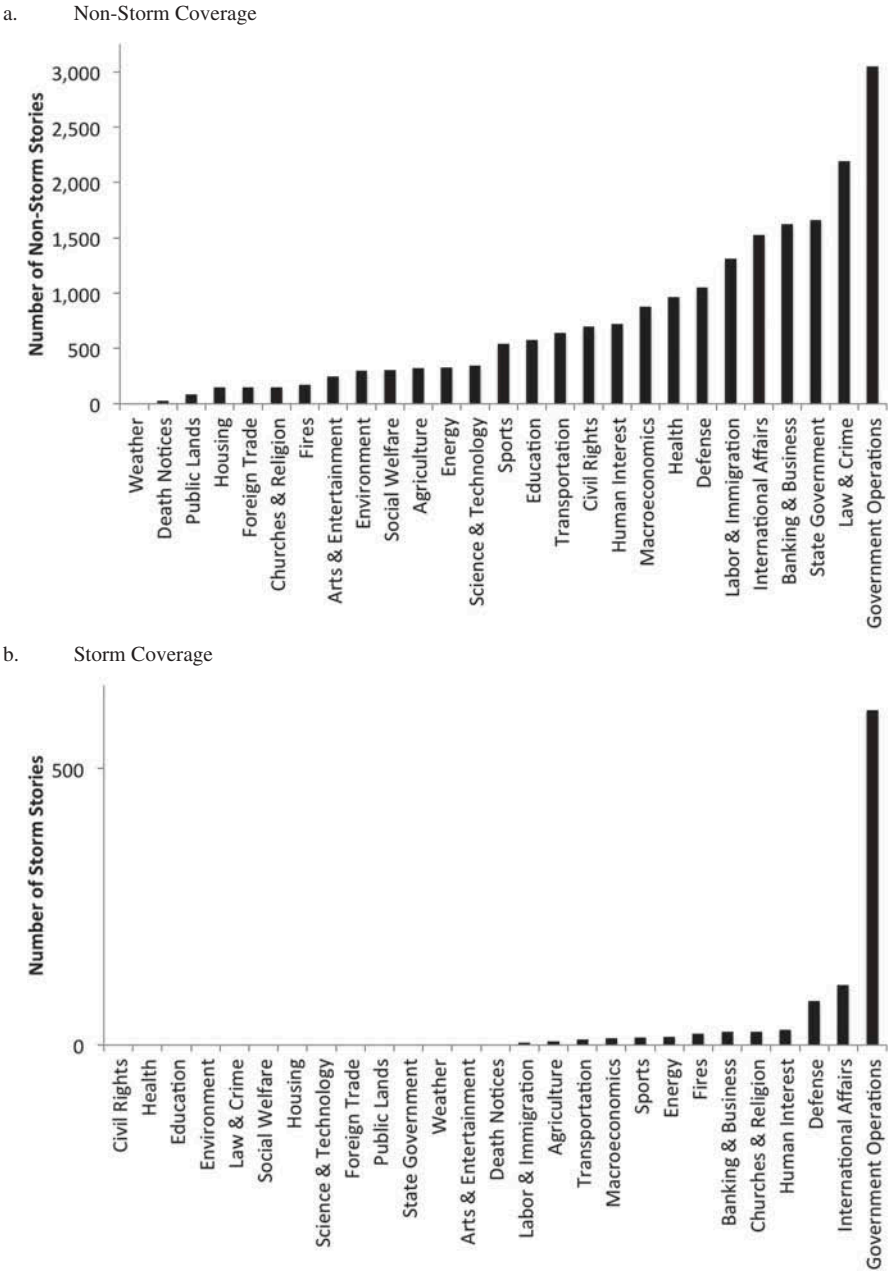


Figure 3. Comparing non-storm vs. storm coverage of issues in DS. The figure illustrates the sharper degree of skew in storm coverage as compared to non-storm coverage.

The Consequences of Media Storms

Hypothesis 3 holds that media storms have an impact on the public's perceptions of what is important in the world around them. We know, of course, that media coverage matters in general; that is, media attention tends to shape public attention (McCombs, 2004). We argue

that media storms in particular affect public attention. To test this hypothesis, we need to show that a storm surge in media attention to an event or issue corresponds with a similar surge in public attention to that event/issue. Moreover, even if we find that media storms correspond with surges of public attention, we need to control for the possibility that both media and public attention are responding to the event/issue itself, rather than the public responding to the media.

We lack systematic evidence allowing us to compare directly the effects of media storm coverage versus non-storm coverage on public attention across all issues, while at the same time being able to control for the possibility that the event/issue is driving surges in both media and public attention. Instead, we rely on Google Trends data for four specific cases of media storms that do meet this important control criterion. Each of these four cases is related to at least one similar event/issue that did *not* produce a media storm, allowing us to confirm that the public response we see in each case is driven by the media storm rather than the nature of the event/issue itself. There are only four obvious cases of this nature in our NYT data set during the time period captured by Google Trends, and so we test all four. Of course, more testing is needed. But the cases we examine provide compelling suggestive evidence that media storms have an effect on the public.

Google Trends is a publicly available archive of Google search queries. Specifically, the archive offers time-series indices of the relative volume of searches that users enter into Google in a given geographic area (Choi & Varian, 2012, p. 3). Trends data capture actual search behavior of individual citizens, in this case across the United States. We thus consider each Google Trends series as an indicator of the importance people attribute to a given event/issue. Arguably, it is a different indicator than the classic Most Important Problem question that is used in most agenda-setting studies, but we believe it similarly gauges the importance attributed to an event/issue. And compared to the Most Important Problem series, the Google Trends series have the advantage of being more fine-grained, both in time (the data are available by day) and in issue specificity (data are available on any search term), as well as offering a public-driven gauge of salience. Google Trends data are archived back to 2004 (Baram-Tsabari & Segev, 2011). The query "index" measure that Google Trends provides for a search term in question is based on query *share*: the total query volume for that search term within a particular geographic region, divided by the total number of queries in that region during the time period in question. Each query exported from Google Trends is normalized such that the maximum query share in the specified time period is set at 100 and the query share on the first day of the time period is set at zero (Choi & Varian, 2012, p. 3).

We investigate Google Trends evidence for four storms in our U.S. sample of storms, all between 2004 and 2006. We identified these four storms by manually considering all storms in the NYT data set between 2004 and 2006 and picking out all storms (these four) that could readily be compared to one or more similar events/issues that occurred during this same period but that, for whatever reason, did *not* receive media storm coverage. In each case, we expect the identified media storm to also get picked up by the public. Just as importantly, we do *not* expect to see similarly explosive surges in Google search behavior to result from similar non-storm events/issues. In this way, our four examples serve as a hardest test case for the significance of media storms. Note that our hypothesis does not state that media storms have "more" impact than general coverage. Just showing that search behavior regarding the storm issue spiked when a storm breaks suffices to test it. But the comparison with similar non-storm news items makes our test more compelling.

We identify four storms: the 2005 Terri Schiavo case, the 2005 London bombings, the 2004 Democratic convention, and the 2005 CIA leak case. For the last three of our four

examples, we found at least one specific instance of non-storm coverage that also rose on the media agenda. These "near-miss" non-storms each captured at least 4% of the NYT front page during a week (compared to the 20% criterion for media storms) but did not meet the level and explosiveness storm criteria.

Beginning with regard to the 2005 discussion surrounding Terri Schiavo's feeding tube removal, this case was only one of many similar cases involving difficult end-of-life decisions. While no other similar case became a near-miss storm in the NYT database, we know that such cases are unfolding across the United States every day. But unlike all other cases, the potent media storm surrounding the Schiavo case led to unprecedented congressional intervention and a several-fold increase in the number of citizens obtaining living will documents (Stacy, 2006). We can see whether these effects play out in Google search behavior by examining whether the term "living will" was indeed employed substantially more in conjunction with the Schiavo media storm than at any other time.

Second, the media storm surrounding the London terrorist bombings in 2005 and the "near-miss" storm about the Madrid terrorist attacks in 2004 are both caused by a similar event: a terrorist event in Europe. While the London bombings met our storm criteria, the Madrid attacks were not covered as extensively, registering as a near-miss non-storm.

Our third example is the 2004 Democratic national convention. This convention produced a media storm, while the Republican national convention that year produced a near-miss non-storm.

Finally, we compare three CIA scandals during the 3-year period. There were two near-miss non-storms: First, in July 2004, it was discovered that the CIA had withheld key intelligence regarding Iraq's (lack of) weapons of mass destruction, and second, in June 2005, the CIA was accused of illegally detaining (i.e., kidnapping) more than 100 terrorist suspects, mostly from Europe, and then rendering them to different countries. And there was one media storm: In October 2005, Lewis "Scooter" Libby received various indictments for his testimony in the grand jury investigation of how Valerie Plame's identity was leaked to the press (note that Plame's name was leaked in 2003, but only the grand jury received a media storm).

Figure 4 illustrates Google searches across our four comparison cases, showing a clear pattern of support for Hypothesis 3. Each item in Figure 4 shows an obvious surge in searching behavior for search terms related to the event/issue at hand during or after the media storm in question. People clearly react to the storm by intensifying, often in a spectacular fashion, their search for the underlying event/issue. Also, we see that each media storm receives many more search queries than the similar non-storm events/issues, suggesting at least in these cases that the media storm itself matters, above and beyond the nature of the event/issue. For example, in Figure 4b we see that on the top day of search interest in the Madrid attacks, the "Madrid" search received only one-fifth of the query share defined by the strongest search day for the London bombings. The Terry Schiavo case is even more compelling (Figure 4a). While there were very few searches for "living will" before and after the case, during the unfolding of the drama the number of people searching for "living will" in Google multiplied many times. The convention case (Figure 4c) and the CIA scandal case (Figure 4d) support the same conclusion. These examples, while only four in number, suggest that media storms influence public attention.

Conclusion

Media storms have been a topic of scholarly interest for a while. Previous authors spoke about "media hypes" or "media waves" and laid the foundation for thinking about the

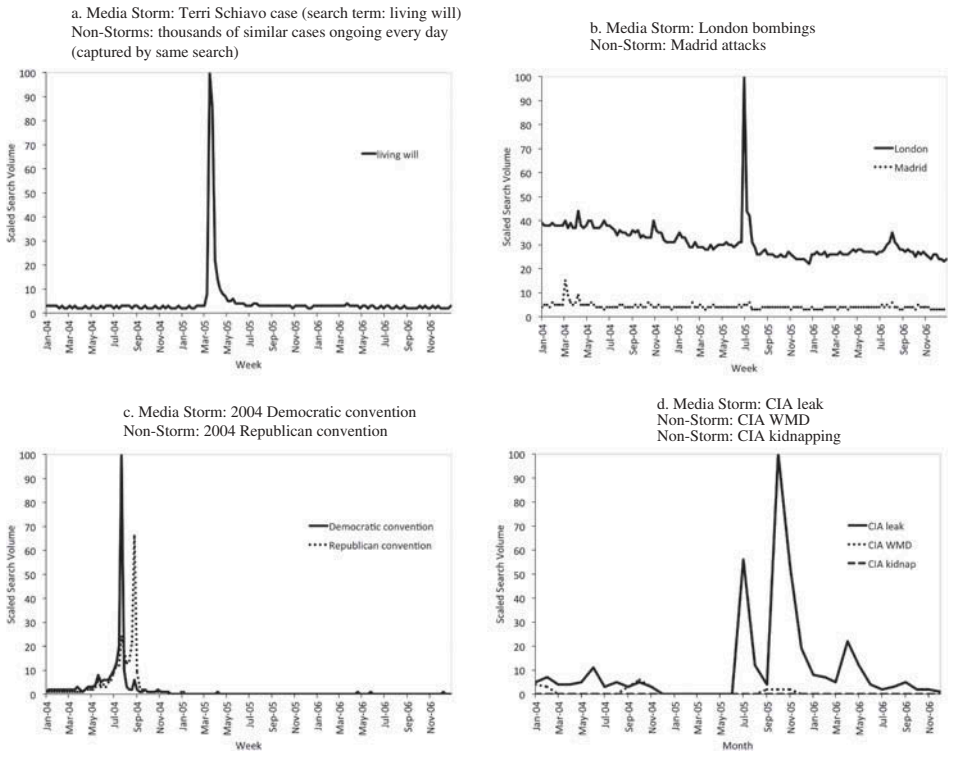


Figure 4. Google search volumes for storms and non-storms: Four example cases. The figure illustrates the effects of four media storms on public attention in the form of Google searches. Search terms are listed in the legends, with the media storm shown as a solid line. In panel a, the Schiavo case was the only case, among similar cases unfolding continually, that drew public attention to living wills. In panels b–d, the additional lines show public responses to the near-miss non-storms surrounding similar issues/events.

phenomenon of sudden surges in media attention. We took the next step and conceptualized media storms as stemming from a distinct news-generation process as compared to that of non-storm coverage. We operationalized media storms empirically based on a straightforward inductive approach using the amount, the increase, and the duration of media attention to a specific issue. And we applied this operationalization to all front-page coverage for all issues across a long time period in two newspapers—the *New York Times* in the United States and *De Standaard* in Belgium—in two very different media systems.

Media storms are a distinctive media beast, we showed. Different dynamics are in play in the case of storms compared to other coverage. The punctuated equilibrium pattern that characterizes non-storm coverage does not apply to media storms. Once media outlets are caught in a storm they behave quite normally, statistically speaking, with attention operating relatively smoothly over time. In other words, media storms are discrete phenomena that do not obey the rules of other media coverage. Also, media storms are concentrated in an exceedingly small number of issue categories. While media coverage in general is obviously not evenly spread across all possible issues, the issue dispersion of media storms is even further skewed. Thus, not only the day-to-day dynamics but also the thematic content of media storms varies systematically from non-storm coverage, supporting the idea that

media storms are something different. Analogous patterns transpire in the two newspapers in two dissimilar media systems, pointing towards a strong common media storm pattern.

Media storms not only are different animals, our study suggests; they are animals with consequences. We did not offer a systematic test of the diverging effects of media storms versus non-storm coverage across all issues, but our four strict case tests do show that media storms have an effect on people's awareness and perceptions of the world around them. When media attention to an event/issue explodes, people start searching for more information regarding the item in a similar explosive fashion. As we showed, these effects cannot be explained away by the type of event/issue at hand.

A key limitation of the study is that it remains confined to two newspapers in two countries, different as these countries are. The mechanisms bringing about media storms may be less present in partisan media outlets and/or in media systems that are less competitive. Also, both NYT and DS are newspapers, of course, and other laws may apply to TV or Internet news. We believe we would probably find similar patterns in TV and Internet coverage, as these outlets are arguably even more strongly driven by news value thresholds and marketplace imitation. Even still, format differences (e.g., news production pace, story length, and, thus, information volume requirements) should make the threshold for storm behavior in TV and Internet outlets even lower than that for newspapers. Also, we investigated the front section of these newspapers only, and it may well be that storms are more frequent and stark in the context of this exclusive agenda.

We see at least two ways in which work on media storms can be further developed. First, the causes and internal dynamics of media storms should be examined empirically. We provided a theoretical account of why media storms occur, but these ideas require systematic analysis. Why are media storms hitting some issues and not others? To what extent is the lowering threshold mechanism or, rather, the emulating inter-media mechanism responsible for bringing about media storms?

Second, and most importantly, the query into the consequences of media storms deserves more systematic attention. Extant work shows that public policy and opinion evolve in a punctuated fashion, describing longer periods of stability and short—but consequential—bursts of attention. Media storms are the media correlates of this general pattern. But what is more, media storms could also be instrumental in bringing about these well-known surges in political and public attention, since news outlets represent how people, both citizens and political elites, process information in general. Thus, media storms may help make us think about media effects in a non-linear, conditional fashion. When media attention to an issue increases, for example, it may not affect political and public attention unless a certain threshold of media attention is overcome. Once this tipping point is reached, both elites and the public may be influenced disproportionately, compared with non-storm coverage. Investigating the consequences of media storm coverage—well beyond the four test cases we offer here—is the most pressing avenue for further research.

Notes

1. Subtopic coding yielded the following inter-coder reliability statistics for NYT: percentage agreement = 90.7%, Cohen's kappa = 0.897, Krippendorff's alpha = 0.898. For DS, percentage agreement = 65.0%, Cohen's kappa = 0.643, Krippendorff's alpha = 0.644.

2. Storms typically last only a couple of weeks (16 days on average for NYT) but rarely for a perfect multiple of 7 days. Thus, collapsing storm proportions on fixed calendar weeks in order to provide a more direct comparison with general coverage would inaccurately reflect the average

volume of storm coverage. By contrast, we can calculate descriptive statistics for non-storm coverage based on fixed calendar weeks because dropping all storm stories does not interrupt the chronology of days for each data set, thereby allowing us to collapse non-storm stories by week. Because we are examining the *average* subtopic proportions during storms versus during non-storm weeks, the comparison is appropriate.

3. Note that the minimum proportion of attention per storm for both NYT and DS is listed below our 20% cut point because these descriptive statistics are calculated by averaging the total proportion of coverage for each storm across its entire period and then taking the mean of all these means. Because each storm is considered a storm as long as the current rolling 7-day period meets our 20% criterion, the overall mean proportion of coverage a subtopic receives across the full storm can be less than 20% (since strong days of coverage can fuel multiple 7-day rolling windows past the cut point, even if the total mean for all days is below it).

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