Constructing "Climategate" and Tracking Chatter in an Age of Web n.0

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INTRODUCTION

As the social web continues to rapidly expand — reaching, connecting, and creating new publics around the globe — the civic implications and democratic possibilities of Web 2.0 technologies must be better understood. Delving into a nascent field of study, this paper specifically examines how viral discourses — or "memes" — emerge within, and proliferate via, the increasingly networked tissue of cyberspace. In this paper, I demonstrate precisely how one might make sense of Web-based memetic phenomena. Specifically, I present an extensive case study in which I investigate the recent proliferation of the "climategate" meme, by tracking and interpreting the rise and fall of "climategate" between November and December of 2009. In doing so, I present evidence that suggests a discursive relationship between the issue's salience on Twitter and its broader salience within the public imagination. Finally, I conclude this research project with a forward-looking approach, explaining what the "climategate" meme so powerfully indicates and arguing for future research on the ways in which discourse propagates through increasingly networked public media.

The Ontology of a Meme

The term "meme" can be said, in fact, to be a meme itself. In his 1976 book, *The Selfish Gene*, Richard Dawkins put forth a new theory of cultural transmission that is roughly analogous to the transmission, replication, and evolution of genes. Dawkins subsequently truncated the Greek word "mimeme" (meaning "that which is imitated"), and coined "meme" as the discursive parallel to "gene" — a transmissible, replicating element of culture (Dawkins, 1976; Paull, 2009; Noonan, 2007, p. 4). Defining them broadly as "cultural" entities, Dawkins allowed memes to refer to a host of constructs: "In a meme's-eye view of the world, any idea — from a religious belief or a political affiliation to a new style of jeans or a catchy tune — can be seen as a sort of independent agent loosed into the population, where it travels from mind to mind, burrowing into each, colonizing all as widely and ruthlessly as it can" (Wasik, 2009, pp. 25-6). Over time, Dawkin's concept — and the term itself — spread from the confines of Dawkin's manuscript to the public lectures and published work of academics and journalists across the world. As a "theory of *how* history unfolds, one pertaining to the history of mass belief," memetics has become increasingly significant to those who seek to better understand the rapid diffusion and globalized exchange of ideas (Aaron, 1996, p. 37).

The memetic potential of a given discourse is said to be dependent upon a range of attributes: "longevity" of viral repetition over time, "fecundity" of the discourse or its rapidity of adoption, and "copying-fidelity" or its ability to avoid permutation (Dawkins, 1976). Others have focused on the number of linked nodes, density, or "betweenness" of potential hosts (Noonan 2007), and even the psychology of cultural transmission (Wasik, 2009). Still others have devoted considerable time exploring how the pre-existing, clustered nature of hyperlinked content — and the propensity of the Web's linking architecture to fragment audiences and locales — allow some viral discourses to short-circuit, while others circulate broadly (Wasik, 2009, p. 90; Turow & Tsui, 2008, p. 15).

Few, if any, theorists have explicitly identified or examined the fundamental ways in which memes often rely upon culturally recognizable, intertextual discourses as vehicles for transmission and reproduction. Successful memes, I contend, often draw upon pre-existing discourses of their potential hosts. In this sense, a discourse may stand a better chance of "going viral" when it: a) references and draws upon the readily-consumable quality of salient tropes, metaphors, narratives, or phraseologies; and b) uniquely encapsulate a well-distilled, unmistakable frame or concept that is reiterated by the meme itself.

Based on this postulation, it would follow that a particular type of expression, known as "snowclones," may inherently be more likely than most to propegate virally. Coined by Glen Whitman in 2004, snowclones are "multi-use, customizable, instantly recognizable, time-worn, quoted or misquoted phrase[s] or sentence[s] that can be used in an entirely open array of different variants" (Pullum, 2003). To clarify: "An example of a snowclone is 'gray is the new black,' a version of the template 'X is the new Y.' X and Y may be replaced with different words or phrases — for example, 'comedy is the new rock 'n' roll.' Both the generic formula and the new phrases produced from it are called 'snowclones' " (Wikipedia, 2010a). At their core, these formulations are necessarily intertextual phenomena, as snowclones emphasize "the use of a familiar (and often particular) formula and previous cultural knowledge of the reader to express information about an idea. The idea being discussed may be different in meaning from the original formula, but can be understood using the same trope as the original formulation" (ibid.). Memes that utilize snowclone constructs — such as the contemporary example of "Obamacare" (a permutation of "Medicare" and an earlier snowclone, "Hillarycare") — are likely to reproduce and crystallize certain, shared associations within individual and social imaginations. As the following example illustrates, the semiotic logic of the snowclone applies to all culturally symbolic artifacts: characters, texts, icons, images, tunes, and so on.

Figure 1. 'I Shamrock Guinness' snowclone (O'Connor 2009)

This "I Shamrock Guinness" snowclone is culturally intelligible because of the intertextual basis provided by the "I ♥ NY" meme, and the broadly permutable "I ♥ X" formulation that it has rendered ubiquitous. Quite significantly, the series of symbols in the above image would not be intelligible without the ability to reference that which is already a part of the cultural lexicon. Snowclones, of course, can also be self- or meta-referential as this telling "Lolcat" parody succinctly demonstrates:

Figure 2. 'Lolcat' snowclone (Crabtree 2008)

As Bill Wasik, the inventor of the flash mob, points out, the Internet's ability to foster viral culture originates from its revolutionary capacity to index social discourse:

> [I]t is worth teasing out just *what* about the Internet has conjured up all these memes all around us. Yes, the Internet allows us to communicate instantaneously with others around the world, but that has been possible since the telegraph. Yes, the Internet allows us to find others with similar intersts and chat among ourselves; but this is just an online analogue of what we always have been able to do in person, even if perhaps not on such a large scale. *What the Internet has done to change culture — to create a new, viral culture — is to archive trillions of our communications, to make them linkable, trackable, searchable, quantifiable, so they can serve as ready grist for yet more conversation.* (Wasik, 2009, pp. 27-8, emphasis added)

Curiously, this archival phenomenon that enables viral expression and allows for the engineering of memes also suggests insightful (if largely unexplored) methodologies for social research:

> In an offline age, we might have had a vague notion that a slang phrase or a song or a perception of a product or an enthusiasm for a candidate was spreading through social groups; but lacking any hard data about *how* it was spreading, why would any of us … really care? Today, though, in the Internet, we have a trillion-terabyte answer that in turn has influenced our questions. We can see how we are embedded in numerical curents, how we precede or lag curves, how we are enmeshed in so-called social netwroks, and how our networks compare to the networks of others. *The Internet has given us not just new ways of communicating but new ways of measuring ourselves.* (ibid., emphasis added).

And in recent years, with the growth of the so-called "semantic web" — a Web that "encourage[s] people to create [shared] metadata, explicit descriptions of what content is and how it relates to

other content on the Web" — user-generated layers of meaning are ushering in an array of uncharted practices and possibilities as they unfold (Leskovec et al, 2009, p. 52).

Twitter and the Semantic Web

The microblogging service Twitter — with its extensive, "hashtag"-based tagging system — epitomizes how cascades of semantic data give rise to new structures of discursive participation that affect how memes crystallize and flow:

> The bottom-up categorization of websites, resulting in what has come to be called 'folksonomies,' represents an alternative to the top-down organization (even when collaboratively created) of taxonomies. [And t]he individual web surfer may have no intention of creating an overarching organizational structure, but in attaching idiosyncratic tags to a given bookmark [or tweet], she is helping to associate it with other pages, and associate herself with other surfers. (Halavais, 2009, p. 166)

With the rise of Twitter and other semantic "Web 2.0" platforms, those now familiar "collective patterns of knowledge-making" circuitously reproduced by the linking architecture of search engines may stand to be renegotiated — or perhaps, reinforced — by a host of new social mechanisms (ibid., p. 180).

Will Twitter follow the path of polarization, bifurcation, and balkanization that many scholars say has plagued the blogosphere (Turow and Lokman, 2008, p. 15)? Wasik suggests that competing forces are at play:

> I would argue that the Internet is working in two contradictory ways on the cultural landscape, and that the interaction between the two forces — the 'Long Tail' effect (toward ever splintering niches) and the bandwagon effect (toward more clustering around the same thing) — is a complicated and intriguing one. Think about just this wrinkle: through the Internet, our microcultures all now have watercoolers of their own, and the social pressure *within* those cultures to rally around common cultural products can be far greater than the old, offline world. Also: our microcultures, being available online to membership by everyone at all times can become magnets for huge followings — at which point arguably, they are not so 'micro' anymore. (Wasik, 2009, pp. 54-5)

In the age of Twitter, in which users categorize and associate an everlasting stream of tweets with hashtags (denoted by the # symbol), the hashtag itself has emerged as a magnetic nexus that serves as *both* the fabric and fabricator of cultural reproduction. To the extent that hashtags further enable selective media exposure, they may serve to accelerate the sociopolitical fragmentation witnessed over recent decades.

While it may be impossible or perhaps undesireable to regulate this discursive realm, the schema of memetic semiotics provides new perspectives for the analysis and interpretation of online discourses. Recognizing the intertextual, iterative, and referential nature of snowclones, for example, allows for a deeper understanding of how and why they propagate, and yields insight for methodological analysis.

CASE STUDY: "CLIMATEGATE" AS A MEMETIC FRAMING DEVICE

The implications of these theories and methods and the importance of synthesizing them are evident when they are applied in practice. In this section, I investigate the so-called "climategate" meme of late 2009, and argue that the term's referability and widespread use — as an implicit framing device — have negatively affected Americans' confidence in the scientific consensus about climate change.

I specifically chose to focus on "climategate" as a case study because I believe it is broadly illustrative of the nature (and potential impact) of viral public media in today's networked environment. Moreover, it exemplifies how and why snowclones can be so incredibly potent, and demonstrates the way in which semantic tags (i.e. Twitter hashtags) serve to reify varied discourses as they catalog and index user-generated content (i.e. tweets). I argue that the succinct, highly-intertextual, and inherently political nature of the term "climategate" catalyzed a scandal that may have otherwise been a lower profile affair.

The topical nature of "climategate" also reflects the proclivity of complex public issues — especially environmental issues — to be inadequately considered within a media universe that is growing more fast-paced:

> [I]n the era of the Internet, and the literally six-hour-long news cycle that online media (together with cable television) have engendered, too much data is the order of the day… Indeed, when we do manage to focus on some crucial, fundamental story, we are often able to apprehend it only as a series of tiny, meaningless nanostories. This has been the case with global warming, an indisputably enormous problem that succeeds at staying in the popular consciousness only by way of scores of short-lived stories or controversies: cannibal polar bears, heightened hurricanes, ice-shelf collapses, the various exploits of Al Gore, etc. … The problem with this approach is that it is so easily countered by sowers of doubt. Much of the splashiest stories about global warming tend, unsurprisingly, to be those that are most speculative or even false in their factual basis. (Wasik, 2009, pp. 151-2)

As Wasik suggests, anecdotal "nanostories" about global warming tend to come and go, as readily-consumable narratives prop up its public salience. "Climategate," of course, is fundamentally no different; it just happens to have proliferated as a well-crafted and highly-referable meme — one that was engineered within a fecund, 21st century ecosystem: the networked Web of cyberspace.

Background

On November 17, 2009 advocates fighting for governmental intervention on the looming climate crisis faced a significant setback. A server at the University of East Anglia's Climactic Research Unit was hacked, and thousands of climatology memos and internal research threads were copied and publicly revealed on the Web. Within days, thousands of climate change skeptics from around the world began feverishly exploiting the leak as an opportunity to go on the offensive. Appropriating the highly-resonant "Watergate" snowclone — which has given rise to over 140 scandal-laden permutations since its memetic birth point in the early 1970s — climate change skeptics soon began referring to the incident as "climategate."[1] While it is impossible to tell precisely who first coined

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[1] E.g., *Blagogate, GateCrasherGate, Contragate, Katrinagate, Monicagate, Rathergate, Tigergate*, etc. (Wikipedia, 2010b).

"climategate," it is possible to map out how the term spontaneously emerged, proliferated across the Web, and solidified within our shared lexicon.

The controversy began on November 17, 2009 at around 6:20 a.m. EST, when the RealClimate server, operated by the University of East Anglia's Climactic Research Unit, was hacked. About one hour later, a link to stolen data — personal emails and research documents — was anonymously posted to the Climate Audit blog, but immediately removed by the site administrator. Two days passed before links to the stolen data were suddenly posted to two other conservative blogs: *The Air Vent* and *Watts Up With That* (Id, 2009; Watts, 2009). Within hours of the breaking news, commenters on *Watts Up With That* coined the phrase "climategate" and even began to call for its strategic deployment as a framing device (Watts, 2009). Soon thereafter, a prominent conservative blogger in the United Kingdom ran a headline referring to the incident as "climategate," and Twitter users began to follow suit (Delingpole, 2009):

Table 1
The Birth of "Climategate"

Date	Time (EST)	Event
Nov. 17, 2009	6:20 a.m.	University of East Anglia's RealClimate server hacked
Nov. 17, 2009	7:24 a.m.	Link to stolen data first posted to a blog, but immediately deleted
Nov. 19, 2009	1:35 p.m.	Initial links to stolen data reposted to two conservative climatology blogs: *The Air Vent* and *Watts Up With That* (WUWT)
Nov. 19, 2009	3:52 p.m.	WUWT commenter 'Bulldust' writes "Hmmm how long before this is dubbed Climategate?"
Nov. 19, 2009	4:11 p.m.	WUWT commenter 'Tonyb' reposts the above comment
Nov. 19, 2009	7:21 p.m.	WUWT commenter 'Mr Lynn' recommends using "climategate" trope as a strategic framing device: It's nice that someone has dropped a big comb of honey onto this ants' nest. But all of the inside chatter in these emails, revealing though it may be to those lapping it up, won't mean a thing to the average news reporter, media outlet, and the public in general. What's needed is a panel of unimpeachable individuals (i.e. no one named in this data drop) who can go through the file, vouch for its authenticity, and issue a quick white paper explaining its implications. The media are clueless. They need to be helped to understand the significance of — CLIMATEGATE! LEAK OF SECRET EMAILS SHOWS TOP CLIMATE SCIENTISTS ENGAGED IN MASSIVE FRAUD! GLOBAL WARMING WAS HOAX DESIGNED TO ENRICH POLITICIANS AND RESEARCHERS! /Mr Lynn
Nov. 20, 2009	8:08 a.m.; 8:48 a.m.	The first two tweets emerge referencing the "East Anglia" incident.
Nov. 20, 2009	9:00 a.m.	James Delingpole, a blogger for Telegraph.co.uk, publishes an exposé-style post on his prominent blog. The post is entitled: "Climategate: the final nail in the coffin of 'Anthropogenic Global Warming'?
Nov. 20, 2009	9:13 a.m.	BBC first reports hacking incident in article entitled "Hackers target leading climate research unit" (BBC New, 2009).
Nov. 20, 2009	10:00 a.m. – 3:00 p.m.	Fourteen tweets emerge referencing the incident, all referring to it as "climategate." The hashtag #climategate first emerges.

Over the next several hours, the term "climategate" propagated through blogs and on Twitter, and began to supplant the proper noun "east anglia" as an indexical and referable moniker. With the early, near-ubiquitous adoption of such a straightforward snowclone, the incident became implicitly controversial and scandalous by its very name. Environmentalists challenging the nascent meme could do little to stop its spread, and in fact, may have inadvertently solidified its name as a framing device.[2] Among the first fourteen tweets explicitly utilizing the "climategate" term — and in fact, the second and third Twitter users to deploy the *#climategate* hashtag — were two individuals opposed to the controversy's sudden traction:

> emergentorder: RE: #ClimateGate: What the fuck: supposed global scientific conspiracy. People, Wake Up! The Arctic ice cap has receded by 40% in 5 years!! *on Nov. 20 at 2:09 p.m.*

> enviroknow: The #climategate story is out of control. Get the truth here: http://bit.ly/7RiSVK (Please RT) *on Nov. 20 at 02:59 p.m.*

The quandary, of course, was that to address the users responsible for the meme's origination, environmentalists had little choice but to take up, reproduce, and thus reinforce the very term (and implicit frame) set into motion by climate skeptics. As "climategate" crystallized as the incident's defining signifier, global warming skeptics had succeeded at narrowly crafting the terms and scope of rhetorical engagement; lexically, the proactive adoption of "climategate" as a referable, salient moniker framed the data leak as a necessarily scandalous — and therefore newsworthy — event.

As critical theorists and contemporary semioticians might readily point out, the bombshell affair that "climategate" now ostensibly refers to, in effect, has been discursively constituted through the reproduction of such a heavily-loaded signifier. The gravity of "climategate" stems from its semantic ability as a signifier to conjure up controversy and frame a particular event as definitionally infamous. The term "climategate," in other words, does not objectively denote some ahistorical "reality," but rather begets and *then* points towards a well-spun *account* of one particular "history" (i.e. a kind of viral, self-fulfilling hyperreality). The commonly imagined referent of "climategate" is a discursive construct, albeit one that is certainly real in its consequences. Indeed, as Wasik observes, "In a conversation dominated by sensational anecdotes, consensus for action [on climate change] is hard to arrive at. Empty controversy is far more easily had; and indeed, in a politics of nanostories, the controversy is more often than not the story" (Wasik, 2009, pp. 151-2).

Analysis

In order to a) better understand how "climategate" supplanted "east anglia" as a referable, taggable, searchable expression, b) examine in a more rigorous manner how the "climategate" meme transpired within and between various on- and offline media, and c) gauge the agenda-building

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[2] In a parallel scenario, one scholar investigating efforts to discredit the "Men are from Mars, Women are from Venus" meme, found that the logic of invoking "a stereotype in order to dispute it" may have "perpetuated the longevity and copying-fidelity of the meme" (Noonan, 2007, p. 53). And in a similar vein, a number of researchers have problematized the prevailing wisdom that myths are merely a product of misinformation that can be corrected through simple information exposure; scholars such as Shankar Vedantam, Farhad Manjoo, Wasik, and others assert that "all research on myths indicates that 'repeating a claim, even if only to refute it, increases its apparent truthfulness'" (Wasik, 2009, pp. 181-2). And so it goes for the moniker that has woven the narrative fabric of "climategate."

effects of the "climategate" phenomenon, I conducted a diachronic analysis of issue salience across various media between November 17, 2009 and December 31, 2009.

To begin my investigation, I borrowed the keyword-driven technique developed by Scharkow and Vogelgesang (2009) and Pôssa (2009) to monitor issue salience using the Google Insights for Search (GIFS) archive of search queries. Because the utility of GIFS does not depend upon or require high volumes of discourse, I chose to use it here to examine if and when "climategate" first displaced "east anglia" as the salient, indexical expression initially associated with the hacking incident. Using GIFS to ascertain the usage patterns of relevant search queries, I compared the frequency of US-based Google queries containing "climategate" to those with "east anglia." As Figure 3 demonstrates, the controversy may have originally been referenced by proper noun (i.e. "east anglia," the location of the incident) before "climategate" caught on as a highly-referable alternative (see days 11/19 through 11/22; the large dip on 11/26 is presumably due to Thanksgiving):
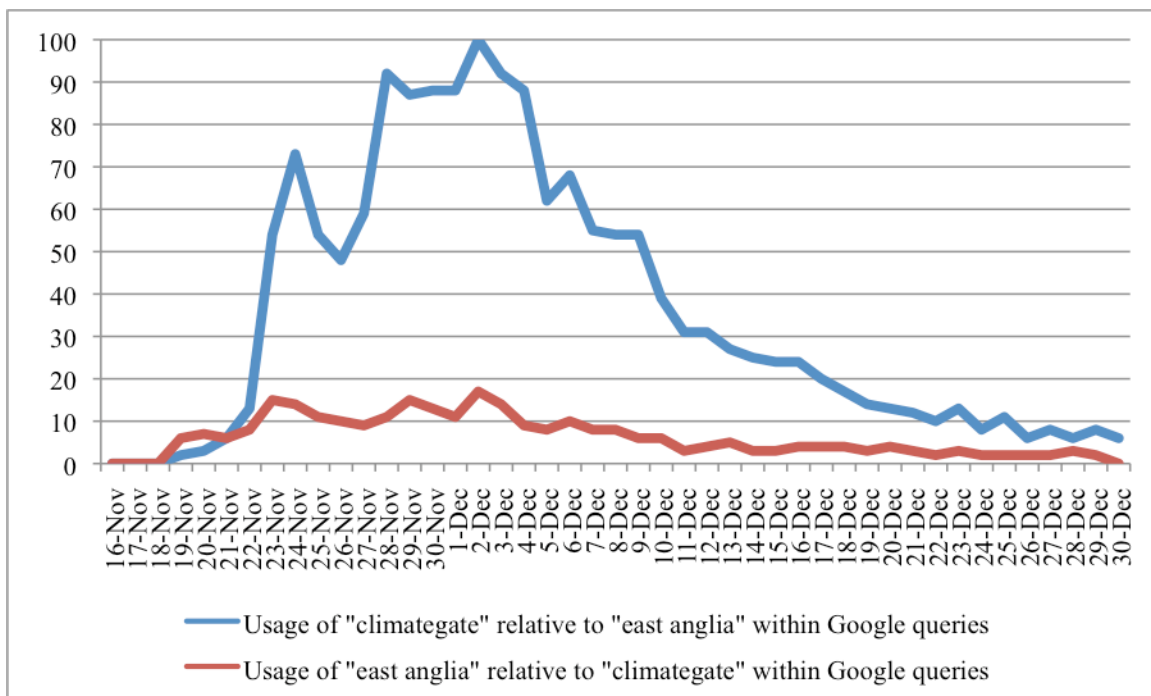

Figure 3. The prevalence of "climategate" and "east anglia" within Google queries

Next, to better identify when (and perhaps why) "climategate" accelerated as a signifier of the controversy, and to investigate the relationship between the term's usage on Twitter and its usage as an oft-searched term, I used Trendistic.com's archival Twitter database to compile a dataset of tweets containing "climategate." Figure 4 displays the daily volume of Google queries containing either "climategate" or "east anglia" as expressed as a relative percentage (as rounded by GIFS); the line graph overlaying this visualization of search terminology represents the salience of tweets containing "climategate" as expressed as a daily percentage of all US-based tweets (there were too few tweets containing "east anglia" to compile a corresponding dataset).
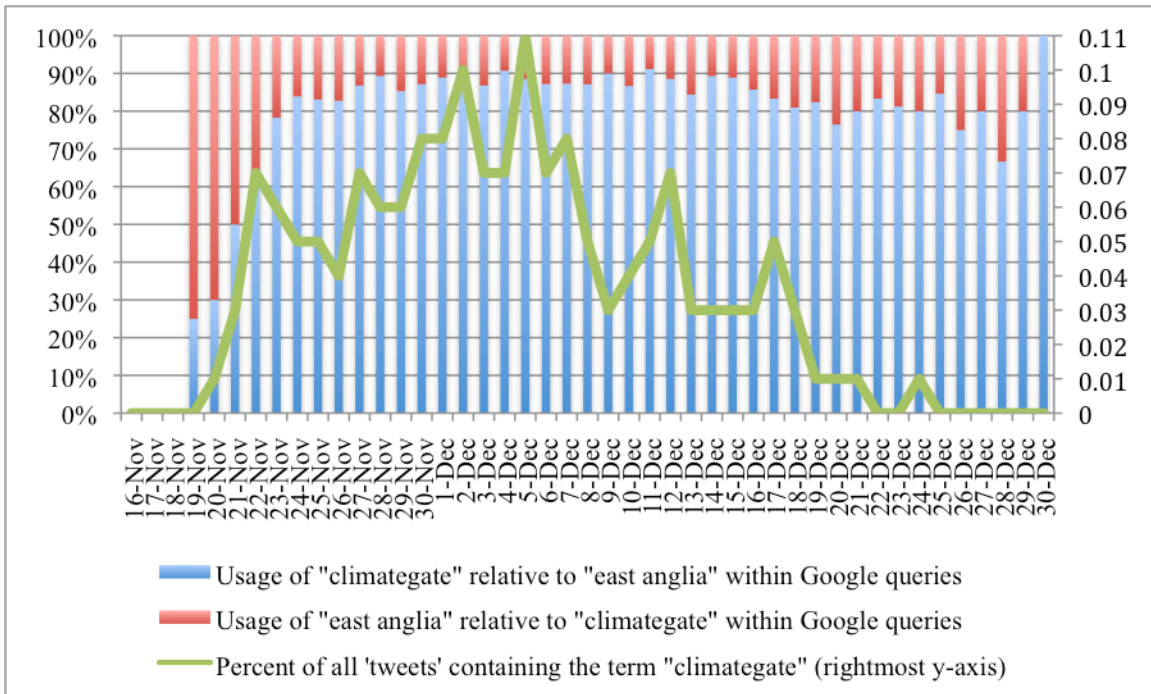
Figure 4. Use of "climategate" relative to "east anglia" as search terms, and tweets with "climategate"

As Figure 4 illustrates, there is a remarkably strong positive correlation between the usage of "climategate" on Twitter and Google, especially during its inception and early adoption phase, which indicates that "climategate" may have supplanted "east anglia" as the former term became a memetic signifier. While it may be impossible to ascertain causal direction from the preceding graphic, it clearly suggests that the initial growth of "climategate" as a term deployed by Twitter users corresponds to its usage as an online search term. One might wonder, though, if the term's growth on Twitter preceded its growth as a search term. To answer this specific question, and to pinpoint precisely when and to what extent "climategate" proliferated throughout other media environments, I compiled four time-series datasets that gauge the relative salience of "climategate" in Twitter tweets, Google queries, television news programs, and newspaper articles. I used the aforementioned techniques for the two former online media platforms, and LexisNexis to compile data about the prevalence of "climategate" within television transcripts (CNN, MSNBC, FOX News, NBC, ABC, CBS), and the vast corpus of US newspapers indexed by the LexisNexis database. Figure 5 illustrates this comparison.
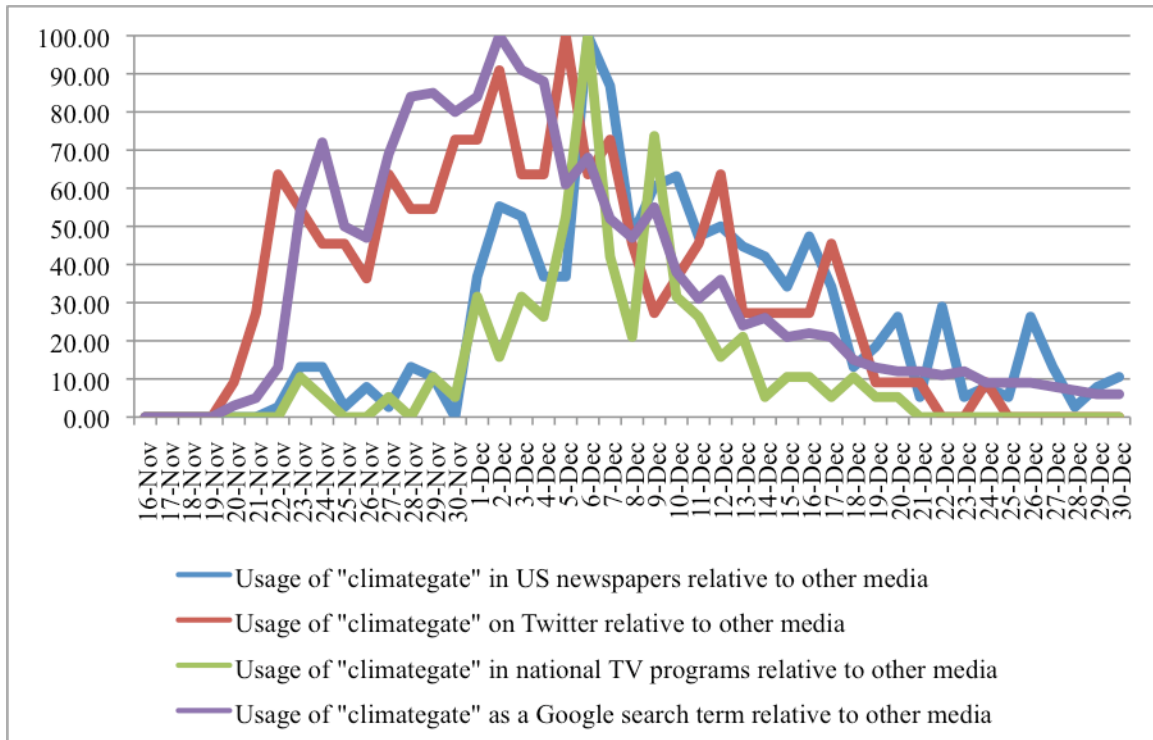
Figure 5. The relative salience of "climategate" within various media[3]

As the above figure shows, usage of the expression on Twitter highly correlates with usage within Google search queries ($r = 0.84$), while television and print sources correspond ($r = 0.81$); furthermore, there is significant correlation between *all four* channels of discourse (e.g. newspapers and Google searches: $r = 0.41$).[4] Notably, between 11/20 and 11/23, the explosive use of "climategate" on Twitter precedes the growth of the catchphrase within all other domains. This strongly suggests that the "climategate" meme originated within the (micro)blogosphere (i.e. Twitter), *then* became a well-hyperlinked affair that attracted substantial curiosity amongst Web-savvy audiences, and *subsequently* caught the attention of mainstream media outlets (i.e. print and television).

While this graph demonstrates how the salience of "climategate" corresponds across various media channels, it does not provide much insight into how coverage of "climategate" dominated each medium at various points in time. Figure 5 provides a comparative depiction of the coverage of "climategate" within each communication channel (expressed in relation to peak usage within each dataset). So, in the first couple days prior to November 23 and 24, for example, the expression "climategate" was exclusively salient within the online domain; although "climategate" first appeared in print and television media on those respective days, the signifier did not achieve a sustained level of salience within offline media until early December.

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[3] Each data set has been normalized and displayed on a scale that represents the relative usage of each medium over time (each medium has been scaled by dividing each data point by the highest data point within each set). So, for example, instances of "climategate" reached a zenith on Twitter on December 6th, while they peaked within both print and television media on December 7th.

[4] In the above description of correlation, "*r*" denotes the Pearson product-moment correlation coefficient, a basic measure of statistical significance.
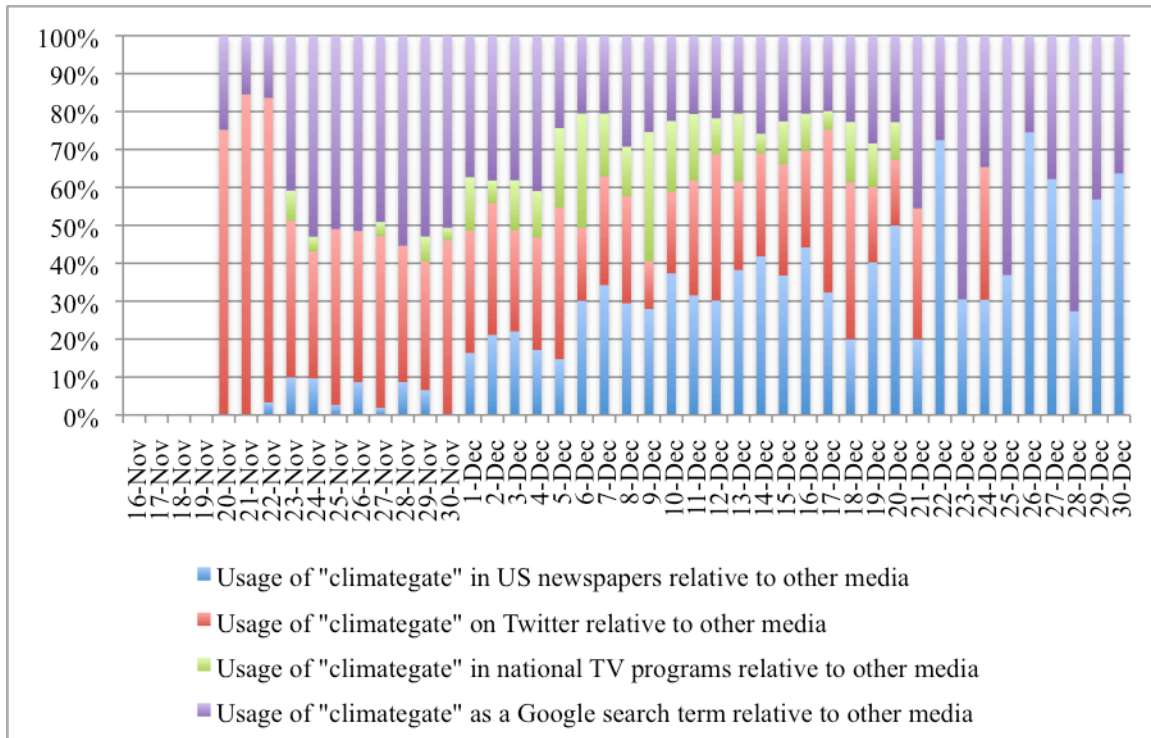
Figure 6. The relative coverage of "climategate," by day, within various media

So, I contend, Figure 6 reveals how online discourses on "climategate" preceded offline discourses, and suggests evidence of an agenda-setting/building phenomenon (which may or may not be specific to this particular meme). Arguably, such a comparative view of these datasets demonstrates that the scandal "climategate" ostensibly refers to took root in the virtual realm. With seeds of controversy planted within the Web, the "climategate" meme emanated from the (micro)blogosphere, and then made its way into the domain of offline media.[5]

Notwithstanding the preponderance of evidence here, it is admittedly impossible to ascertain to what extent Web-based discourses may have impacted the mainstream media agenda, or set the salience of certain policy priorities within the political arena. Nevertheless, based on the data presented, there is certainly a case to be made that the "climategate" meme equipped millions with a highly-referable moniker and implicitly-framed narrative. I contend that these viral discourses roused a climate of public skepticism towards the scientific consensus on global warming, increased opinion intensity amongst the dismissive, and may have even eroded political will just prior to an intergovernmental summit in Copenhagen that could have marked a momentous turn toward

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[5] The causal assumption within this assertion, of course, is difficult to prove, as there may be significant exogenous factors at play. There is, however, statistical rationale behind this inference. I conducted several bivariate Granger causality (time series correlation) tests to examine the directional relationship within and between online and offline media. In comparing, for example, whether usage patterns of "climategate" within Twitter and Google could be used to predict one another, I found Twitter → Google statistically significant ($p = 0.006$) at the 0.01 threshold, and Google → Twitter significant ($p = 0.011$) at the 0.05 threshold. There was also evidence of a more (uni)directional relationship between the usage of "climategate" on Twitter and its salience within US newspapers; the Twitter → newspapers relationship tested significant ($p = 0.03$) at the 0.05 threshold, but the reverse—newspapers → Twitter — did not achieve any level of statistical significance ($p = 0.78$). These measures, of course, do not prove causality (such relationships are nearly impossible to prove with certainty), but they do provide a degree of corroboration.

collective action on the climate crisis.

CONCLUSION: LESSONS FROM "CLIMATEGATE"

In late November 2009, the rapid acceleration of "climategate" within the microblogosphere should have forewarned environmentalists about the narrative's imminent break as a mainstream news story. With the high-profile Copenhagen Summit just around the corner, "climategate" was a well-positioned media anchor. If environmental groups had been monitoring this emergent discourse, they may have been better prepared to respond to the ensuing controversy. Based on this assessment, this paper reveals the necessity of online issue tracking, particularly when it comes to complex issues (like climate change) that so often retain salience through a succession of "nanostories" — anecdotes that serve as narrative morsels (e.g. the stranded polar bear, yesterday's record blizzard, today's melting glacier). By understanding the theoretical principles governing the emergence and spread of viral discourses, and by monitoring the real-time ebb and flow of trending chatter, public communicators can become their own memetic engineers, and better respond to the unexpected.

Theory and Methods

A synthesized understanding of theory and methods is integral for those who seek to practice discourse analysis. Practitioners must be cognizant of the intertextual nature of online discourse, for one cannot fully appreciate the memetic spread and resonance of snowclones (e.g. "climategate," "Obamacare," "Romneycare") without semiotic or cultural familiarity. Semiotic theory ought to serve as a foundation to inform our interpretation of memetic phenomena. The referability of 21st century signifiers — our potential to name, index, and associate Web-based discourses — means that activists have a nascent power to crystallize and propagate certain viewpoints, and even craft strategically-framed hashtags as a means of directing the circular flow of discourse (a process which then reifies partisan structures of participation and polarizes political expression).

My finding that the adoption of the term "climategate" on Twitter preceded offline usage suggests that viral, Web-based discourses should be taken seriously; moreover, the consequences of this particular meme demonstrate that activists should avoid reinforcing rival frames (like environmentalists who reiterated the *#climategate* hashtag directly after it was coined), and learn to strategically make use of real-time public insight.

Frameworks for Adaptive Practice

Perhaps because the study of online memetics is so new, and because the field itself is changing so rapidly, there are few analytic rubrics or codified procedures to follow. While there are a few papers that outline how one might conceptualize the life of a meme, or conduct a systematic analysis of a narrative, for example, it is worth clarifying that prior scholarship should should guide rather than direct endeavors in this field.

In his article, "Meme Maps: A Tool for Configuring Memes in Time and Space," for example, John Paull develops a nascent technique that provides memetic scholars a template for "considering the diffusion of elements of culture and the underlying evolution, dissemination and 'natural history' of those elements" (Paull, 2009, p. 12). This paper presents how to construct a Meme Map and use it as a visual tool for configuring 'the life and times' of a meme—of presenting the diffusion of a meme

through time and space" (ibid.). By annotating the Meme Map with "seminal events" (e.g. early published uses of a meme) and "diffusion events" (e.g. novel uses of a meme), and, "precursor events" (e.g. earliest uses of the term or similar terms), Paull suggests that investigators can visualize that which has "lacked a medium of imagery" (ibid., p. 17).

But as my own case study of the "climategate" meme demonstrated, the Meme Map model outlined by Paull is only useful as a template for envisaging memetic development and proliferation when time and geography are relevent dimensions. In the case of "climategate," and arguably many Web-based memes, the geographic location from which one electronically utters the phrase may be less significant than one's ideological position along a political axis. Indeed, when analyzing the "climategate" meme's initial development, I chose to focus on time and political sentiment (i.e. the orientation of the those who first reitterated the *#climategate* hashtag was noteworthy; location was not).

As I have demonstrated, the techniques used by online discourse analysts are constantly evolving as new technologies emerge and social practices shift. And with so many types of media to make use of, it is up to each researcher to resourcefully borrow prior analytic methods and adapt them for newer applications. For example, in their article, "Rapid Issue Tracking: A Method for Taking the Pulse of the Public Discussion of Environmental Policy," Bengston et al. (2009) outline a rubric for monitoring public discourse within online publications:

> By perusing [a chronological list of stories], it is possible to quickly get a rough idea of: (1) the flow and volume of media discussion day by day; (2) how soon the discussion drops off after the initial burst of coverage (e.g., after the relase of a new policy); (3) the geographic distribution of the discussion; (4) the overall tone of the stories based on their titles; and (5) the extent to which one news source or story has dominated discussion of the issue, and so on. (Bengston et al., 2009, pp. 373-4)

Such an approach could be adapted for the study of Twitter-based memes, by taking into account how hashtags affect discursive circulation and ideological reification. In this vein, this paper should be read as descriptive and instructive, rather than prescriptive.

Future Directions

As previously unimagined forms of public expression arise, and innovative forums for discussion take shape, we will need to pioneer theoretical frameworks, descriptive models, and analytic methods that can better track the ebb and flow of online chatter, and assess the civic impact of participatory, synchronous, and multimodal technologies.

There are, of course, a number of forward-thinking endeavors underway. Inspired to develop a "semantic social network analysis tool," Gloor, Krauss, Nann, Fischbach, and Schoder (2008) anticipate what real-time discourse analyses may bring:

> Our vision is to develop a general system for trend prediction, identifying new ideas early on while they are being raised by the trendsetters. At this stage, new ideas have not yet been recognized by the rest of the world, but discovering them can be extremely valuable. Applications of our system might be for politicians trying to find out what the real concerns

> of their constituency are, or for financial regulators trying to identify micro- and macro-trends in financial markets. (Gloor et al., 2008, p. 22)

Likewise, Mathioudakis and Koudas (2010) emphasize that because "trends point to topics that capture the public's attention," they may "point to fast-evolving news stories […] that are high value to news reporters and analysts [as well as] online marketing professionals and opinion tracking companies" (Mathioudakis and Koudas, 2010, p. 1). And just as Google has developed a highly reliable technique to track and predict the spread of influenza (Ginsberg et al, 2009), others are pushing informatics far beyond what had previously been conceivable; interdisciplinary pioneers are bridging critical theory, information science, and a host of social sciences to develop discourse-driven models that can forecast issue salience and news coverage (Zhang, 2010), unemployment trends (Askitas, 2009), box office success (Asur and Huberman, 2010), and even the direction of the stock market (Yi, 2009). And others are beginning to use complex modeling techniques to map precisely how viral discourses permute as they diffuse throughout the Web, offline media, and broader society (Leskovec, Backstrom, and Kleinberg, 2009).[6] Indeed, with the synthesis of theory, methods, and practice that this paper provides, and with the burgeoning intertextual body of literature that it now becomes a part, there are boundless opportunities ahead for future researchers to engage in their own theoretically-informed, analytically-sound endeavors.

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[6] "Our approach to meme-tracking opens an opportunity to pursue long-standing questions that before were effectively impossible to tackle. For example, how can we characterize the dynamics of mutation within phrases? How does information change as it propagates? Over long enough time periods, it may be possible to model the way in which the essential 'core' of a widespread quoted phrase emerges and enters popular discourse more generally" (Leskovec, Backstrom, and Kleinberg, 2009, p. 9).

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