Visual Persuasion: Presentations in the Era of Big Data

Dale Cyphert
University of Northern Iowa

Abstract

Contemporary public address has entered an era of visual rhetoric, and the technologies of Big Data are expanding and exacerbating the emerging norms of data-driven evidence, visual impact, and interactive delivery. Business might drive the adoption of data visualization, visual analytics, and interactive decision making, but the effects drive rhetorical change. This analysis of a BBC speech by the late Professor Hans Rosling explores these emerging persuasive techniques to illustrate broader implications for emerging norms of *logos*, *pathos*, and *ethos* in contemporary discourse.

Technological advances have brought the business community into an era of Big Data, which influences far more than just data-driven decision-making processes. Communication practices, especially in strategic and persuasive decision-making contexts, necessarily reflect emerging presumptions of what constitutes effective decision making (McLuhan, 1964). The rhetorical norms of any community evolve to accommodate changing social mores, epistemological assumptions, and communication technologies (Cyphert, 2001a), and the history of rhetorical change can be understood as a history of changing communication media (Gronbeck, Farrell, & Soukup, 1991; Innis, 1951; McLuhan, 1964).

In the twentieth century, exploding technological advances began to challenge the normal pace of rhetorical change. Theorists once described rhetorical eras (Ehninger, 1968) that evolved across a history of human perspective (Black, 1980). Then came media, computers, and the internet. We had not yet developed robust norms to discipline televised political discourse (DeLuca & Peeples, 2002; Gronbeck et al., 1991; Jamieson, 1998; McLuhan, 1964; Postman, 1985) or antidotes to computer-generated graphics (Jarvenpaa & Dickson, 1988; Tufte, 1997; Vogel, Dickson, & Lehman, 1986; Winsor, 1988), when we found ourselves immersed in the even more problematic sphere of blogs, social media, and Twitter (Johnson, 2012; Ott, 2016; Pariser, 2012; Slayden & Whilock, 1999). Now, without so much as a decade of breathing space, another challenge already lurks on the horizon: Big Data[1].

---

[1] The "big" in Big Data variously describes the vast amounts of data being generated and collected, the exploding capacity of computing power that allows its analysis, and the point at which human cognition must relate differently to information (Ekbia et al., 2014, p. 1524). Rhetorical scholars address the third aspect, but within this cognitive domain, size does not properly describe the most important characteristic, which involves the amount of the data being analyzed relative to the totality of data available (Mayer-Schönberger & Cukier, 2013). Advances in computing power allow the manipulation of such massive datasets that analysis can now encompass *all* the data without the filtering, segregation, or biases inherent in selecting suitable samples for study. As Rob Kitchin puts it, Big means "n=all" (2013), making obsolete the deductive approach developed "under conditions of scarce data and weak computation" (Kitchin, 2014, p. 6). Rather than focusing on representative data to create a general but necessarily approximate theory, science can now examine every data point in relation to every other data point. In pragmatic terms, science now has tools to cope with variation, contradiction, anomalies, and outliers (Mayer-Schönberger & Cukier, 2013) within dynamically changing complex systems (Chandler, 2015).

We have recognized the immediacy of visual media (Jamieson, 1998), the graphical dominance of PowerPoint (Tufte, 2003), and the infinite circulation of social media (Kedrowicz & Taylor, 2016), but we are just beginning to appreciate the degree to which Big Data exponentially exacerbates the turn from verbal rhetoric toward visual norms of effective presentation (Cyphert, 2017, 2018; Gregg, 2015).

Digital media scholars have been among the first to address the rhetorical, cultural, and social challenges of Big Data (boyd & Crawford, 2012; Fuchs, 2017; Gitelman, 2013; Lupton, 2015, p. 94), focusing their attention on social media's impact on economic equity, individual privacy, and democratic discourse. The surreptitious capture of data from unsuspecting and nonconsensual users raises legitimate legal and ethical concerns (boyd & Crawford, 2012; Crawford, Miltner & Gray, 2014; Ekbia et al,, 2014; Fuchs, 2010; Fuchs, 2017; Gregg, 2015), but we have amassed even bigger data sets from less problematic sources— astronomical data, particle accelerators, genome sequencing labs, governments, and NGOs. In these realms, we might better examine the rhetorical impact of Big Data separately from contemporary socio-economic-political issues.

The extensive business use of Big Data has influenced analysis. Corporate entities are presumed evil by some academics, distrusted for their capitalist motivation (Fuchs, 2017) or because they monopolize data resources (Richards & King, 2013). To others, corporate efforts to develop and market Big Data tools signal a "cultural phenomenon" that arises from a technologically utopian "mythology" promoted with marketing communication but lacking in substance (boyd & Crawford, 2012, p. 663). Regardless of the tendency to equate Big Data with business interests, persuasive uses of Big Data can be found well beyond corporate contexts. For a more neutral perspective, we thus might we might thus look outside the contested spaces of social media and corporate domination to discern the rhetorically universal issues of epistemology, aesthetics, and performance that Big Data seems to raise.

In the realm of public health data, for instance, neither personal privacy nor corporate gain spark criticism. Further, the late Hans Rosling, a distinguished Swedish professor of international health, was widely praised as one who had mastered the presentational use of Big Data. This project examines one of his best-known presentations (Coleman, 2015; Gapminder, 2015) to examine emerging revisions in *logos*, *ethos*, and *pathos* across our data-soaked rhetorical era.

Rhetorical Attention to Big Data

Rhetorical attention to the Big Data phenomenon, especially in the context of technical and professional communication, builds on already extensive scholarship in data visualization (Kostelnick, 2008; Kostelnick & Hassett, 2003; Spinuzzi, 2003; Tufte, 1983). An initial presumption has been that while graphical displays of information are increasingly common, with importance for both research and instruction (Kostelnick, 2008; Salvo, 2012; Toth, 2013), Big Data technologies simply expand the options for clear, effective delivery of numeric messages (Bodie, n.d.; Brumberger, 2015; Cyphert, 2017; Sorapure, 2010).

Rhetorical treatments of Big Data graphics thus cluster in three areas already identified as key characteristics of visual rhetoric: *inventional potential*, *aesthetic impact*, and *dynamic connectivity*. Visual rhetoric scholars have developed these principles from examination of technologically produced images (e.g. photography, film, graphic design), but as contemporary discourse increasingly reflects the visually dynamic, technologically-enhanced engagement found in mediated venues, we find all forms of public address adapting to and adopting the rhetorical norms of visual display.

Visual challenges to traditional epistemology, social mores, and public performance—the cool immediacy of televised speechmaking (Jamieson, 1998; McLuhan, 1964), the compelling imagery of PowerPoint (Cyphert, 2001b; Shwom & Keller, 2003; Tufte, 2003), and the infinite circulation of TED Talks (Kedrowicz & Taylor, 2016)—seem extended and exacerbated with the ubiquitous adoption of data visualization software ("The success story of Tableau software," 2017). Big Data seems to challenge any lingering presumptions that visual rhetorics represent an auxiliary or inferior form of public discourse. This examination of one exemplar further illustrates both the performative character of contemporary public address and the rhetorical evolution that appears to drive contemporary expectations. One examination cannot yield a definitive answer, but this examination offers a step toward understanding this century's emerging rhetorical norms as an ongoing rehabilitation of visual bases for cognition, persuasion, and credibility.

Big Data visualizations might be ubiquitous on corporate dashboards or in policy analyses, but are less so in oral performance. We have begun to examine Big Data influences on graphical communication (Bodie, n.d.; Cyphert, 2017; Jones, 2014; Porter, 2009), but we are just beginning to appreciate the degree to which Big Data further challenges rhetorical norms of effective persuasion more generally.

Hans Rosling: A Contemporary Presentation

The late Hans Rosling, a distinguished Swedish professor of international health, was widely praised as one who had mastered the presentational use of Big Data (McVeigh, 2017), still a technically challenging and time-consuming process (McCandless, 2010). His BBC broadcast "Don't Panic - How to End Poverty in 15 Years (Coleman, 2015) was delivered before a live audience just two days before representatives from 193 countries would gather at the United Nations to consider what appeared to many as a misguided program to end extreme poverty worldwide by 2030 (Division for Sustainable Development, 2015). By all accounts, Rosling was successful in demonstrating the feasibility of the U.N. proposal, which was adopted two months later, and Rosling's appeals demonstrate the degree to which classical arguments were augmented and arguably changed by a reliance on the proofs afforded by data visualization.

This analysis demonstrates that Big Data challenges the presumptions of what we have come to understand as reasoned public address. Rosling seems to bypass traditional tools designed to carefully examine and draw logical conclusions from just a few data points, demonstrating a *logos* of visual evidence. He relies on aesthetic impact to tap the implicit responses of *pathos*, which we have traditionally avoided for its potential to overwhelm an audience's critical capacity. He makes no traditional appeals to an *ethos* of credible authorship, instead inviting his audience to share in the co-creation of persuasive meaning.

Let the Data Persuade: Challenges to Logocentric Reason

The rhetorical role of the visual has been contested since ancient times (Finnegan, 2004) when appeals to the "emotional, psychological, and physiological" were declared subsidiary to the rational appeals of verbal argument (Kenney, 2002, p. 54). Even with the recognition of visuals as a legitimate topic of rhetorical study (Foss, 2004), most framed them as tools of memory and delivery (Medhurst & DeSousa, 1981) or stylistic devices (McQuarrie & Mick, 1996). Even those arguing that visual displays can communicate claims, evidence, and arguments classified the appeals as *pathos* or *ethos* (Blair, 2004) with their evocative work functioning separately from the "verbal discourse, debate, argument, and thoughtful reflection" (Hill & Helmers, 2004, p. 3) of critical discourse. There might be persuasive effects from the

ordering and framing of images (Lake & Pickering, 1998; Lancioni, 1996), but such arguments were deemed merely enthymematic, susceptible to ambiguity, limited to just one or two simple premises, and lacking any dialectic capacity (Blair, 2004).

Despite a scholarly attention to the persuasive power of visual rhetoric, presumptions of verbal reasoning dominate our understanding of how it persuades. As Finnegan and Kang (2004) have argued, "images and vision often are interpreted through a logic of subtle iconoclasm that makes visuality subservient to dominant linguistic/rational norms" (p. 396). We find no explicit claims, no complete logic chains, and no verbalized explanations of support and so we conclude that we have found no appeals to *logos*.

The visual analytics of Big Data pose new and potentially more serious challenges to the historically logocentric presumptions of reason. Chris Anderson (2008), editor of *Wired* magazine, prompted a firestorm of protest when he proclaimed the end of theory, describing Google's predictive success as evidence that the scientific method is obsolete. With enough data and processing power, the diagnostic tools of science—building models, developing hypotheses, and testing theories—no longer provide value; now "correlation is enough," to create knowledge (¶13). Critics responded that reliance on Big Data thus demolished "instrumental reason" (Fuchs, 2017, p. 54) by replacing public discourse with decision algorithms. Concerns include fear that machines might override human decisions (Kitchin, 2014) as well as distress that machine users can bypass the "older forms of intellectual craft" (boyd & Crawford, 2012, p. 666) and put civilization at risk by creating policy independently of the "regulating force of philosophy" (Berry, 2011 p. 8).

The most telling concern lies in Big Data's substitution of theories, hypotheses, and statistically validated results with visual displays of data patterns and relationships that an audience can immediately, without conscious effort, interpret as meaningful. Data with bits numbering in the quadrillions cannot be "visualized in its totality" (Anderson, 2008), but computational tools create perceptually meaningful shapes and patterns. Big Data visualization tools move us across an analytical threshold we have seen coming since quantum theorists re-opened ancient debates about the relationship between "data—what the world presents to us through our senses and instruments" and "knowledge of the world—how we understand and interpret what we get" (Ekbia et al., 2014 p. 1528). Big Data is part of an historical trend shifting "success criterion in science from causal explanations to predictive modeling and simulation" (Ekbia et al, 2014 p. 1530).

Hans Rosling creates arguments consisting entirely of data display, illustrating a *logos* of unmediated visual comprehension (timestamps shown from Gapminder Foundation, 2015). Rosling offers no verbal arguments in the classical style of claim-warrant-conclusion. Instead, he displays data: economic, demographic, health, crime, and environmental data gathered from the world's 196 nations since 1800 (Gapminder Foundation, n.d. a), millions of data points, sliced and diced in any conceivable way. Rosling introduces his topic with the counterargument that extreme poverty is intractable and counters, "I think that view of our world is wrong" (1:01) simply by displaying his data. Fully embracing a responsibility to *logos*, he proclaims, "I'm a scientist; I deal in facts" (1:07) and enfolds his evidence in a credibility claim, promising that his persuasive task will be "easy" because he can work "from my huge database" (0:38).

Rosling expects his audience to perceive data as evidence, confident that his audience has already accepted the normative rules of data-driven decision making. His first argument, that current trends demonstrate the possibility of ending extreme poverty, is entirely numeric. Rosling demonstrates his points as quantities and percentages of world population. His claims do not provide any explanatory theory or the claim-warrant structure we traditionally anticipate. Instead, he argues his points just by

demonstrating patterns, variation, and individual experience to prove the material possibility of escaping extreme poverty.

Rosling's visual claim that social spending comes before economic growth similarly lacks any verbal explanation for the mechanism of change. He shows us that smaller families correlate with larger incomes using national bubbles swooping across two centuries of child mortality and GDP per capita (39:46), but when it comes to deciding "which came first" (46:53), a conclusion is not drawn from a theory of cause and effect. Instead, Rosling visually demonstrates the trajectories of the UK, China, South Korea, and Ethiopia to demonstrate "the smart shortcut" to economic growth in terms of pattern match (45:15). Rosling relies on the data as a visual message of both claim and support.

We have long understood data as units of information "waiting to be found and collected by scholars and other analysts" (Helles & Jensen, 2013), and our theories of *logos* describe the explicit reasoning processes we can use to mitigate the difficult process of uncovering hidden information. We deduce, predict, and reason from limited evidence, and our tests of evidence include attention to the credibility of collectors or observers of data. Rosling, able to display the entire dataset of public health facts, needs no deductive crutches. The audience has no need for scholars or scientists to collect and interpret the facts; Rosling simply displays them in all their naked, empirical glory.

Rosling's performance also demonstrates forms of reasoning made possible with the analysis of an entire dataset. The ability to drill down to specific data points, coupled with the computing power to examine every relationship among them, allows Rosling to create claims of individuality based on segmentation of differences instead of claims of generalizability from statistical aggregations. To "define" poverty, Rosling explains that "everyone has their own idea" (5:03) and shows eight video clips of individuals around the world saying, "I'm poor," followed by explanations that range from "We eat only once a day" to "We don't know if we can go to university" (5:11). To clarify, he creates a "yardstick of income" (5:42) along which he demonstrates both variety of experience and variety within nations. Demonstrating the Swedish calculation of national GDP and poverty (6:58 – 7:55), he graphically demonstrates the importance of *differences* across nations.

A more meaningful way to look at poverty, Rosling claims, involves knowledge of individual families' daily struggles to find enough food to stay alive. With video and photos of specific families in Malawi, Burundi, India, Zimbabwe, Nigeria, and Papua New Guinea, Rosling answers his rhetorical question, "What does that mean to them, day to day?" (8:49). Comparing pictures of the real houses of real people, he proclaims, "I can really understand that they want to build a new house" (16:25). Rosling's Gapminder foundation, he explains, sponsors the Dollar Street project (n.d. b), a visualization tool designed to "show the difference in living situations" (16:34), with thousands of details about specific households across income levels across nations. A spinning graphic of utensils and tools emphasizes the myriad data points included. In the end, Rosling's visual compilation of unique, individual lives creates a claim that the hard life at $1 income per day warrants agreement on the "importance of the United Nations goal 1.1" (19:23).

Computational power allows more than just gathering petabyte sized arrays of Big Data. We can draw "the whole picture" by representing how each unique point is connected to every other data point (McCandless, 2010, p. 12:10). The ability to see all the unique relationships as a network among multiple data points allows attention to difference. Without any need to extrapolate "from limited or selected data on the basis of rules or regularities"; users of Big Data can contextualize "the individual case. . . promising personalized or individualized" policy, service, or regulatory results (Chandler, 2015, p. 486). No piece of

data need be excluded or rejected because a theory fails to consider it relevant or because it is different from the aggregated average or norm (Chandler, 2015).

We can see this *logos* of individual cases demonstrated in Rosling's talk. Whenever explanation becomes necessary, Rosling turns to individual cases: "What we have to do is look at those who recently came from extreme poverty and into the middle to learn, what does it take to go from here to there?" (27:58). Eleven minutes of documentary footage shows a Cambodian family's living conditions, economic fragility, and response to a medical emergency to demonstrate the impact of free medical care: without it the family might have quickly returned to extreme poverty. Rosling buttresses their story by introducing other families, from the Philippines, Rwanda, Colombia, and Bangladesh, to find a pattern: on this first step above extreme poverty, all have "electricity, electricity, electricity, electricity" (34:41). One story of building a dam in Malawi serves as the example, the unique but possible path. Rosling's story, inherently optimistic, concludes with a call for creative, innovative, inexpensive but locally tailored steps to end extreme poverty worldwide.

Big Data challenges the purpose of what we have come to understand as reasoned public address. With the availability of data, we seem able to bypass any need for the tools to carefully examine and draw logical conclusions from just a few data points. We have not, however, escaped the need to respond intelligently to a display of facts. Microsoft's Kate Crawford coined the phrase, "data fundamentalism," to describe the fallacy of believing that massive data sets or predictive analytics necessarily reveal "objective truth" (Crawford, 2013). Some traditional tests of evidence no longer apply; sample validity, for example, has no relevance when the entire population can be examined. On the other hand, assurances that complete and relevant data have been collected or that data labels have been consistently applied now become important questions. We no longer need to dismiss personal narratives or single examples because they cannot be generalized, but now we require forms of reasoning that locate their proper role in public decision making. We are not starting from scratch, but work needs to be done to develop an understanding of *logos* that is appropriate for Big Data.

Aesthetic Inducements: Tapping the Warrants of Social Being

Much critique of Big Data concerns its output as algorithm-generated graphic display, with considerable debate surrounding the ways in which humans apprehend or interpret visually presented data (Ekbia et al, 2014). Big Data tools, often admired for awesome aesthetics that facilitate an audience's swift comprehension of complex relationships, also raise concern that awesomeness short circuits rational thought (Bodie, n.d.; Gregg, 2015). The visceral reaction of aesthetic pleasure echoes emotional responses to ecstatic dance, sexual activity, or mind-altering drugs, long ago excluded from appropriate civic discourse. Plato sought to protect the value of explicit reasoning, banning the poets so their intuitive, implicit inducements could no longer contaminate public discourse (Havelock, 1968). Rhetorical theory acknowledges the inducements of *pathos*, but as a horse to be controlled with significant effort in order to reach wisdom. Others worry that Big Data exceeds the capacity of a single human mind to apprehend, thus requiring computers or people to cooperatively mediate the data through trans-disciplinary layers "of selection, ordering, interpretation, and distribution/access" (Ekbia et al., 2014, p. 1527), a requirement that visual data display necessarily "renders the accuracy of the claims problematic" (Ekbia et al., 2014, p. 1532).

Audiences have been taking aesthetic pleasure in Rosling's data displays since his TED Talk debut in 2006, titled simply, "You've never seen data presented like this," and nearly 12 million viewers have watched the

"statistics guru" talk about economic conditions "with the drama and urgency of a sportscaster" (TED Conferences, n.d.). What, except great aesthetic value, could possibly motivate millions of people to watch a 20-minute speech on economic statistics? Rosling's equally compelling BBC performance (Coleman, 2015) illustrates the tight link between the analysis of Big Data and its attractive display.

Rosling's displays meet design expectations for clarity, simplicity, and beauty, and a few are decidedly low tech. With Rosling's "giant poverty tracker" (19:34) he uses "his bare hands" to build a graph from giant boards and pegs. Rosling utilizes contrast—a tried and true design trope—along with entertaining delivery and a bit of humor to maintain his audiences' interest. As he animates regional income distribution percentages across the past two-hundred years, for instance, he physically follows the changes shown on colorful and enormous mountain graphs. The speaker becomes the aid to the visual, gesturing toward colorfully morphing hills as he verbally explains the changes: the industrial revolution, World Wars. Bright colors, clean design, and simple presentation suggest that the data itself must be equally simple, straightforward, and utterly convincing.

As Rosling builds his graph, he chats about each of the percentage points, but never explicitly explains their representation of world poverty. A contemporary audience can be trusted to read a trend line and consider the validity of its scope, and Rosling acknowledges that "some of you have already spotted" (23:46) a fallacy in using population percentages without considering population growth. A minimalist graph, built of glowing blue and red lines floating on an invisible, grid-free plane in front of Rosling, convinces his audience through their own intuitive grasp of an ever-steeper negative slope. Rosling trusts his audience to conclude with him that "it is indeed possible to continue down to zero" (25:53). Rosling's performance is captivatingly convincing but demonstrates the Big Data critics' central concern: audiences' willingness to uncritically trust their own implicit cognitive processes might be exacerbated by design aesthetics that lead to over-simplification, distortion, and erroneous conclusions (Ekbia et al., 2014; Viégas & Wattenberg, 2007).

Hans Rosling's enthusiastic storytelling drives this BBC performance, and his statistical presentations benefit from his performative delivery. He engages in literal hand waving, seeming to guide the bubbles of national GDP across the screen of time. Yet Rosling's words merely explain the color codes, time scales, and implications of his massive, dynamic visual displays. The wait-for-it moments lie in the dynamic displays of data, which offer evidence along with the entertainment factor so crucial in a "fast-surfing" digital era (Kedrowicz & Taylor, 2016, p. 356). The proportion of textual and visual content in Rosling's arguments illustrates the potential impact of Big Data. Without visuals, the text is cryptic (Rosling, n.d). Furthermore, the data displays do not function as illustrations or proofs in support of verbal claims.

We have been taught to condemn the demagogue who exploits the intuitive, uncontrollable responses of a crowd's passion. Over millennia, philosophers have developed theories of moral wisdom, promoted habits of life and mind to control or avoid emotional response, and steadfastly framed reasoning as explicit cognition within the individual mind. Our understanding of rhetoric as explicit, verbal inducement to consciously believe and mindfully choose respects those ancient cognitive boundaries. Only within the last century have we had to grapple with the quantum collapse of certain reality (Kline, 1980; Prigogine, 1997) and complexity (Capra, 1997; Wolfram, 2002), along with neurobiological understanding of implicit reasoning (Reber, 1993; Sun, 2001), social cognition (Cole, 1996; Surowiecki, 2004), and collective learning (Hayes & Allinson, 1998; Senge, 1994).

Theorists in visual rhetoric have addressed these developments, recognizing the fallacy of a simple distinction between the rational and the emotional (Hill, 2004), along with the inventional potential of

aesthetic rhetoric to locate and establish truth within a responding audience (Reeves & Stoneman, 2014). The inevitable sharing of digital images has led, as well, to a recognition that primary rhetorical processes involve the social circulation of meaning, in stark contrast with the traditional focus on a persuasive transmission of meaning from rhetor to audience (Finnegan & Kang, 2004).

Visual displays of information never involved neutral presentations of raw data (Gitelman, 2013; Kostelnick, 2004), but have nevertheless been framed as tools to achieve clear, accurate, instrumental communication. Illustration and graphic design have traditionally been constrained, careful not to put creative aesthetics ahead of explicit meaning (Kostelnick & Hassett, 2003; Tufte, 1983) and serving as tools of delivery rather than invention (Cyphert, 2018). Rosling's performance demonstrates the potential for an audience's visual perception of patterns and relationships to induce their implicit understanding of otherwise unsaid—and perhaps unsayable—claims about the world. Data visualization tools exploit the implicit cognitive processes of physiological and emotional response, and a contemporary understanding of *pathos* appeals must include the persuasive inducements of aesthetic performance.

Networks of Performance: Ethical Proof in the Circulation of Meaning

The media age called forth new methods in public address, although some trace the contemporary rehabilitation of delivery to Winans' and Hudson's reminder that "a speech is not merely an essay standing on its hind legs" (1931, p. 17). By the 1960s, television had transformed political oratory into conversational self-disclosure, visuality, and verbal distillation discourse (Haynes, 1988, 1989, 1990; Jamieson, 1998). Contemporary audiences now engage with political, civic, and business speakers by way of YouTube and TED Talks, expecting to be engaged with enthusiasm, storytelling, visuals, and connection (Kedrowicz & Taylor, 2016). Today's typical venue features a live audience and a huge screen behind the speaker. As the interactive tools of Big Data make their way onto the desktops of business executives, politicians, and lobbyists, those screens increasingly feature similarly dynamic, interactive displays of data.

Scholars of written rhetoric have recognized the need to re-theorize delivery to account for the range of technological choices now available for both composition and circulation of a digital message (Porter, 2009), as have theorists of visual rhetoric who focus on the mediation, re-presentation, and co-creation of meaning made possible by the circulation of images across digital media (Finnegan & Kang, 2004). The multiplicity of networked transmission expands the audience but necessarily introduces ambiguities (Sayers, 2012), and the design of interactive online communication remains an ongoing area of research within technical communication (Stephens, DeLorme, & Hagan, 2015).

Thus far, nearly all critique of Big Data has focused on written texts, but Rosling's energetic, data-focused delivery clearly produces an effect on his digitally dispersed audience. Here, the emerging norms of oral delivery suggest potential shifts in the traditional conceptualization of ethos. Competence, sincerity, and affinity remain workable categories, but the expectation of enthusiastic storytelling seems to shift their priority for effective public address. Outside of referring to himself vaguely as a "scientist" (1:07) and later as a "professor" (6:00), Rosling verbally offers no credentials. Nor does he mention the sources of his data. Yet Rosling's visuals represent an important contribution to his *ethos*. All those numbers, dancing colorfully across holographic space, radiate competence. Perhaps because graphical data displays remain the province of scientific and technical disciplines, they convey credibility.

The presentation had been planned from the start as a television documentary, but like TED Talks and political campaign speeches, the presence of a live studio audience adds a crucial element of audience

interaction. Rosling directs his energy toward engaging, entertaining, and educating the live audience at the BBC production studio. His highly interactive performance includes an audience quiz, complete with quiz-show graphics (2:44). Data journalist David McCandless describes data visualization as "a form of knowledge compression… a way of squeezing an enormous amount of information and understanding into a small space" (2010, 13:49), which can be observed as Rosling collapses verbal cues of competence into a visual display of *ethos*: No credentials, no citations, no proclamations of credibility—just big, bright, beautiful, convincing data.

At the same time, Rosling's performance does not exist as a single event before a single audience. The individuals in the BBC studio knew they would themselves be part of the broadcast, and while they looked and acted like an audience, they functioned as another proof of Rosling's *ethos* rather than as authentic auditors of his claims. The performance was then broadcast on the BBC Two channel on three different occasions, two of which occurred *after* the United Nations vote that defined Rosling's rhetorical context. Multiple short clips of the speech have appeared both on the BBC website and YouTube, and Gapminder hosts a copy of the performance along with its sources, access to his databases, and free use of the Gapminder tools that generated his visuals.

Electronic media, especially internet communication, have dramatically changed the nature of the public that speakers must address. While enthusiastic interaction with a live audience offers important visual cues, the audience includes "a broader audience of people both in real time, through live-streaming video, and after the fact" (Kedrowicz & Taylor, 2016, p. 370). James Porter (2009) argues for a theoretical framework of digital delivery that includes elements of accessibility, distribution, and ownership as well as attention to digitally created identity and interaction. The digital traces of Rosling's original performance can be paused and rewound, watched without sound, sampled, and shared. Unlike transcripts or even videotapes of speeches, these digital echoes become unique instances of address to multiple unique publics. The speaker in the digital data era addresses both a face-to-face audience and virtual audiences whose responses "demonstrate their co-ownership of a presentation" (Kedrowicz & Taylor, 2016, p. 369).

Mediated interactivity had become a characteristic of contemporary public address before the advent of Big Data, but Rosling's performance illustrates its potential for pushing that envelope. Big Data introduces the genre of the dashboard (Geckoboard, n.d.), an increasingly popular display tool that allows users to "co-create" understanding (Kim & DiSalvo, 2010) by exploring and manipulating data for themselves. Obviously, a live audience member cannot touch Rosling to drill down on a data point, but he anticipates and fulfills that urge, zooming in on a graph (41:01) or illustrating a country's dot with video of a single family (41:41). Not every speaker can invite audience members to play with the data on their own at a website dashboard (Gapminder Foundation, n.d. c), but contemporary professional and political speakers increasingly recognize the critical role of an interactive Q&A (Neher & Heidewald, 2015) or town hall venue. Big Data expands the tools of *kairos,* offering an audience the means to find "just what she needs— the information, the pattern, or the anomaly—at that moment she needs it" (Bodie, n.d., p. 9).

Visual Inducements of Big Data

The rhetorical effectiveness of Big Data does not come about because its visualization creates arguments in the same way that words do, or fosters better verbal discussion, or mimics the dialogic ideal of public discourse. The evidence from Rosling's rhetoric seems to show quite the opposite. Implicit, visual pattern recognition offers a second path of reasoning, and visual display can locate and demonstrate relationships and concepts that cannot be expressed with words. The dynamic, interactive, manipulation of visualized

data explodes the idealistic public conversation into myriad kairotic moments. We need not abandon our ancient canons, but we must recognize that they evolve as rhetorical presumptions and conditions evolve.

With each rhetorical incarnation, a community adjusts to internal or external pressures. New communication technologies pose a triple threat in their potential to simultaneously challenge the norms of social access, epistemology, and the performance of public discourse (Cyphert, 2010). Critics have condemned Big Data as a challenge to discourse; Hans Rosling demonstrates the ways in which public address might embrace its potential. These appear to be commensurate challenges, and our task as communication scholars must include understanding rhetorical change. In the end, we might determine Rosling's demonstration of data to have been incomplete or inadequate reasoning. We might judge the intuitive response to aesthetic elements to be unacceptable emotional responses. We might reject any obligation to consider the mediated dissemination of public address. We cannot, however, refuse to consider the performance as rhetorically effective. Media, over close to a century, now reinforced with technologically produced and disseminated data display, offers new ways for speakers and audiences to negotiate meaning and evolving norms of *logos*, *pathos*, and *ethos*.

References

Anderson, C. (2008). The end of theory: The data deluge makes the scientific method obsolete. *Wired*. Retrieved from https://www.wired.com/2008/06/pb-theory/

Berry, D. M. (2011). The computational turn: Thinking about the digital humanities. *Culture Machine*, 12, 1-22. Retrieved from http://www.culturemachine.net/index.php/cm/article/view/440/470.

Black, E. (1980). The mutability of rhetoric. In E. E. White (Ed.), *Rhetoric in transition: Studies in the nature and uses of rhetoric* (pp. 71-83). University Park: The Pennsylvania State University Press.

Blair, J. A. (2004). The rhetoric of visual arguments. In C. A. Hill & M. Helmers (Eds.), *Defining visual rhetorics* (pp. 41-61). Mahwah, NJ: Lawrence Erlbaum.

Bodie, M. (n.d.). *Rhetoric in tech and context: Big data in the college, culture, and classroom*. Academia. Retrieved from https://www.academia.edu/14761131/Rhetoric_in_Tech_and_Context_Big_Data_in_the_College_Culture_and_Classroom

boyd, d., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication & Society, 15*(5), 662-679.

Brumberger, E. R. (2015). *Professional communication competencies for today's workplace: An analysis of job postings*. Paper presented at the 80th Annual International Conference, Seattle, WA.

Capra, F. (1997). *The web of life: A new scientific understanding of living systems*. New York: Anchor Books, Doubleday.

Chandler, D. (2015). A world without causation: Big data and the coming of age of posthumanism. *Millennium: Journal of International Studies, 43*(3), 833-581.

Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Belknap Press of Harvard University Press.

Coleman, D. (Director) (2015). Don't panic - How to end poverty in 15 years [*This World*]. United Kingdom: BBC TWO.

Crawford, K. (2013, 1 April). The hidden biases in big data. *Harvard Business Review*. Retrieved from https://hbr.org/2013/04/the-hidden-biases-in-big-data

Crawford, K., Miltner, K., & Gray, M. L. (2014). Critiquing big data: Politics, ethics, epistemology. *International Journal of Communication, 8*, 1663-1672.

Cyphert, D. (2001a). Ideology, knowledge and text: Pulling at the knot in Ariadne's thread. *Quarterly Journal of Speech, 87*(4), 378-395.

Cyphert, D. (2001b). *Visual aids vs. visual rhetorics: Lessons from the PowerPoint controversy*. Paper presented at the National Communication Association Annual Convention, Atlanta, GA.

Cyphert, D. (2010). Obscene, mundane, and frivolous technologies: Maintaining the boundaries of decorum. *Explorations in Media Ecology, 9*(1), 21-36.

Cyphert, D. (2017). *Big data visualization: What do our students need to know?* Paper presented at the Annual International Conference of the Association for Business Communication, Dublin.

Cyphert, D. (2018). Theorizing the role of big data visualization: Moving visuals from delivery to invention. In K. Getchell & P. Lentz (Eds.), *Theory and praxis in the business communication classroom* (pp. 161-185). New York: Routledge.

DeLuca, K. M., & Peeples, J. (2002). From public sphere to public screen: Democracy, activism, and the "violence" of Seattle. *Critical Studies in Mass Communication, 19*, 125-151.

Division for Sustainable Development. (2015). UN adopts new global goals, charting sustainable development for people and planet by 2030. Retrieved from https://sustainabledevelopment.un.org/?page=view&nr=971&type=230&menu=2059

Ehninger, D. (1968). On systems of rhetoric. *Philosophy and Rhetoric, 1*, 327-339.

Ekbia, H., Mattloll, M., Kouper, I., Arave, G., Ghazinejad, A., Bowman, T., . . . Sugimoto, C. R. (2014). Big data, bigger dilemmas: A critical review. *Journal of the Association for Information Science and Technology, 66*(8), 1523-1545.

Finnegan, C. A. (2004). Doing rhetorical history of the visual: The photograph and the archive. In C. A. Hill & M. Helmers (Eds.), *Defining visual rhetorics* (pp. 195-214). Mahwah, NJ: Lawrence Erlbaum Associates.

Finnegan, C. A., & Kang, J. (2004). "Sighting" the public: Iconoclasm and public sphere theory. *Quarterly Journal of Speech, 90*(4), 377-402.

Foss, S. K. (2004). Framing the study of visual rhetoric. In C. A. Hill & M. Helmers (Eds.), *Defining visual rhetorics* (pp. 303-313). Mahwah, NJ: Lawrence Erlbaum Associates.

Fuchs, C. (2010). Class, knowledge, and new media. *Media, Culture & Society*, 32(1), 141-150.

Fuchs, C. (2017). *Social media: A critical introduction* (2nd ed.). Los Angeles: Sage.

Gapminder Foundation (n.d. a). Data. Retrieved from https://www.gapminder.org/data/

Gapminder Foundation (n.d. b). Dollar street. Retrieved from https://www.gapminder.org/dollar-street/matrix

Gapminder Foundation (n.d. c). Tools. Retrieved from https://www.gapminder.org/tools/

Gapminder Foundation (2015, Oct 7). *Don't panic – end poverty* [Video recording]. Retrieved from https://www.gapminder.org/videos/dont-panic-end-poverty/

Geckoboard. (n.d.). What is a data dashboard? Retrieved from https://www.geckoboard.com/learn/what-is-a-data-dashboard/#.WNgpn6K1vIU

Gitelman, L. (Ed.) (2013). *Raw data is an oxymoron*. Cambridge, MA: MIT Press.

Gregg, M. (2015). Inside the data spectacle. *Television and News Media, 16*(1), 37-51.

Gronbeck, B. E., Farrell, T. J., & Soukup, P. A. (Eds.). (1991). *Media, consciousness, and culture*. Newbury Park, CA: Sage Publications.

Havelock, E. A. (1968). *Preface to Plato*. Cambridge, MA: Harvard University Press.

Hayes, J., & Allinson, C. W. (1998). Cognitive style and the theory and practice of individual and collective learning in organizations. *Human Relations, 51*(7), 847-871.

Haynes, W. L. (1988). Of that which we cannot write: Some notes on the phenomenology of media. *Quarterly Journal of Speech, 74*, 71-101.

Haynes, W. L. (1989). Shifting media, shifting paradigms, and the growing utility of narrative as metaphor. *Communication Studies, 40*(2), 109-126.

Haynes, W. L. (1990). Public speaking pedagogy in the media age. *Communication Education, 38*(April), 89-102.

Helles, R., & Jensen, K. B. (2013). Making data -- Big data and beyond: Introduction to the special issue. *First Monday*, 18(10).

Hill, C. A. (2004). The psychology of rhetorical images. In C. A. Hill & M. Helmers (Eds.), *Defining visual rhetorics* (pp. 25-40). Mahwah, NJ: Lawrence Erlbaum Associates.

Hill, C. A., & Helmers, M. (2004). Introduction. In C. A. Hill & M. Helmers (Eds.), *Defining visual rhetorics* (pp. 1-23). Mahwah, NJ: Lawrence Erlbaum Associates.

Innis, H. A. (1951). *The bias of communication*. Toronto: University of Toronto Press.

Jamieson, K. H. (1998). *Eloquence in an electronic age: The transformation of political speechmaking*. New York: Oxford University Press.

Jarvenpaa, S. L., & Dickson, G. W. (1988). Graphics and managerial decision making: Research based guidelines. *Communications of the ACM, 31*(6), 764-774.

Johnson, J. (2012). Twitter bites and Romney: Examining the rhetorical situation of the 2012 presidential election in 140 characters. *Journal of Contemporary Rhetoric*, 2(3/4), 54-64.

Jones, B. (2014). *Communicating data with Tableau: Designing, developing, and delivering data visualizations*. Sebastopol, CA: O'Reilly Media.

Kedrowicz, A. A., & Taylor, J. L. (2016). Shifting rhetorial norms and electronic eloquence: TED talks as formal presentations. *Journal of Business and Technical Communication, 30*(3), 352-377.

Kenney, K. (2002). Building visual communication theory by borrowing from rhetoric. *Journal of Visual Literacy, 22*(1), 53-80.

Kim, T., & DiSalvo, C. (2010). *Speculative visualization: A new rhetoric for communicating public concerns.* Paper presented at the Design Research Society (DRS) International Conference Design & Complexity.

Kitchin, R. (2013). Big data and human geography: Opportunities, challenges and risks. *Dialogues in Human Geography, 3*(3), 262-267.

Kitchin, R. (2014). Big data, new epistemological and paradigm shifts. *Big Data and Society,* (April-June), 1(1), 1-12.

Kline, M. (1980). *Mathematics, the loss of certainty*. New York: Oxford University Press.

Kostelnick, C. (2004). Melting-pot ideology, modernist aesthetics, and the emergence of graphical conventions: The statistical atlasas of the United States, 1874-1925. In C. A. Hill & M. Helmers (Eds.), *Defining visual rhetorics* (pp. 215-242). Mahwah, NJ: Lawrence Erlbaum .

Kostelnick, C. (2008). The visual rhetoric of data displays: The conundrum of clarity. *IEEE Transactions of Professional Communication, 51*(1), 116-130.

Kostelnick, C., & Hassett, M. (2003). *Shaping information: The rhetoric of visual conventions*. Carbondale: Southern Illinois Press.

Lake, R. A., & Pickering, B. A. (1998). Argumentation, the visual, and the possibility of refutation: An exploration. *Argumentation, 12*, 79-93.

Lancioni, J. (1996). The rhetoric of the frame: Revisioning archival photographs in *the Civil War*. *Western Journal of Communication, 60*, 397-414.

Lupton, D. (2015). *Digital sociology*. London: Routledge.

Mayer-Schönberger, V., & Cukier, K. (2013). *Big data: A revolution that will transform how we live, work, and think.* Boston, MA: Houghton Mifflin Harcourt.

McCandless, D. (2010). *The beauty of data visualization.* Retrieved from http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization

McLuhan, M. (1964). *Understanding media: The extensions of man*. New York, NY: Mentor: New American Library.

McQuarrie, E. F., & Mick, D. G. (1996). Figures of rhetoric in advertising language. *Journal of Consumer Research, 22,* 424-437.

McVeigh, K. (2017, 8 February). Hans Rosling, statistician and development champion, dies aged 68. *The Guardian*. Retrieved from https://www.theguardian.com/global-development/2017/feb/07/hans-rosling-obituary

Medhurst, M. J., & DeSousa, M. A. (1981). Political cartoons as rhetorical form: A taxonomy of graphic discourse. *Communication Monographs, 48*, 197-237.

Neher, D., & Heidewald, J. (2015). *Business curriculum practices survey 2015: Placing skills and curriculum in context*. Paper presented at the 80th Annual International Conference of the Association for Business Communication, Seattle, WA.

Ott, B. L. (2016). The age of Twitter: Donald J. Trump and the politics of debasement. *Critical Studies in Mass Communication,* 34(2017), 59-68.

Pariser, E. (2012). *The filter bubble*. New York: Penguin Press.

Porter, J. E. (2009). Recovering delivery for digital rhetoric. *Computers and Composition, 26*, 207-224.

Postman, N. (1985). *Amusing ourselves to death: Public discourse in the age of show business*. New York: Viking.

Prigogine, I. (1997). *The end of certainty: Time, chaos and the new laws of nature*. New York: Simon & Schuster.

Reber, A. S. (1993). *Implicit learning and tacit knowledge*. New York: Oxford University Press.

Reeves, J., & Stoneman, E. (2014). Heidegger and the aesthetics of rhetoric. *Philosophy and Rhetoric, 47*(2).

Richards, N. M., & King, J. H. (2013). Three paradoxes of big data. *Stanford Law Review Online 66,* 41-46.

Rosling, H. (n.d). Don't panic- how to end poverty in 15 years. *Subtitles (SRT & ASS) for Movies, Documentaries, +.* Retrieved from http://subsaga.com/bbc/documentaries/factual/this-world/don-t-panic-how-to-end-poverty-in-15-years.srt

Salvo, M. J. (2012). Visual rhetoric and big data: Design of future communication. *Communication Design Quarterly, 1*(1), 37-40.

Sayers, J. (2012). The thing about networks, or big data rhetoric. Retrieved from http://www.digitalrhetoriccollaborative.org/2012/06/21/networks/

Senge, P. M. (1994). *The fifth discipline: The art and practice of the learning organization*. New York: Doubleday.

Shwom, B. L., & Keller, K. P. (2003). The great man has spoken. Now what do I do? A response to Edward R. Tufte's *The cognitive style of PowerPoint*. *Communication Insights, 1,* 1-16.

Slayden, D. and R. K. Whillock, Eds. (1999). Soundbite culture: The death of discourse in a wired world. Thousand Oaks, Sage.

Sorapure, M. (2010). Information visualization, web 2.0, and the teaching of writing. *Computers and Composition, 27*, 59-70.

Spinuzzi, C. (2003). *Tracing genres through organisations: A sociocultural approach to information design*: Cambridge, MA: MIT.

Stephens, S. H., DeLorme, D. E., & Hagan, S. C. (2015). Evaluating the utility and communicative effectiveness of an interactive sea-level rise viewer through stakeholder engagement. *Journal of Business and Technical Communication, 29*(3), 314-343.

The success story of Tableau software. (2017). Retrieved from https://intellipaat.com/blog/success-story-tableau-software/

Sun, R. (2001). *Duality of the mind: A bottom-up approach toward cognition*. London: Psychology Press.

Surowiecki, J. (2004). *The wisdom of crowds*. New York: Doubleday.

TED Conferences, LLC. (n.d.). Hans Rosling at Ted2006: The best stats you've ever seen. Retrieved from https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen

Toth, C. (2013). Revisiting a genre. *Business and Professional Communication Quarterly, 76*(4), 446-457.

Tufte, E. R. (1983). *The visual display of quantitative information*. Cheshire, CT: Graphics Press.

Tufte, E. R. (1997). *Visual explanations: Images and quantities, evidence and narrative*. Cheshire, CT: Graphics Press.

Tufte, E. R. (2003). *The cognitive style of PowerPoint*. Chesire, CT: Graphics Press.

Viégas, F., & Wattenberg, M. (2007). Artistic data visualization: Beyond visual analytics. In D. Schuler (Ed.), *Online communities and social comput* (pp. 182-191). Berlin: Springer-Verlag.

Vogel, D. R., Dickson, G. W., & Lehman, J. A. (1986). *Persuasion and the role of visual presentation support: The UM/3M study*. Management Information Systems Research Center Working Paper Series, (MISRC-WP-86-11). Minneapolis, MN.

Winans, J., & Hudson, H. H. (1931). *A first course in public speaking*. New York: D. Appleton-Century.

Winsor, D. A. (1988). Communication failures contributing to the Challenger accident: An example for technical communicators. *IEEE Transactions on Professional Communication, 31*(3), 101-107.

Wolfram, S. (2002). *A new kind of science*. Champaign, IL: Wolfram Media.

DALE CYPHERT is an Associate Professor of Management at the University of Northern Iowa, where she currently directs the MBA Program. Her theoretical work frames rhetorical communities as complex adaptive systems, and research applications involve normative adaptations to communication technologies and the material feedback mechanisms of sustainable rhetorical communities.