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### **Assumptions About Science in Satirical News and Late-Night Comedy**

Lauren Feldman

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*Edited by Kathleen Hall Jamieson, Dan M. Kahan, and Dietram A. Scheufele*

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### **Abstract and Keywords**

Because satirical news programs such as *The Daily Show* and *The Colbert Report* pay substantial attention to science, this chapter considers their significance as sources of science attitudes and information. The first section of the chapter discusses general attributes of satirical news and how these may help foster public attention to, active engagement with, and understanding of science. The chapter then highlights limitations on the capacity of satire to communicate science, including the challenge of conveying the seriousness of certain science issues while using humor, the potential for audience misreading of satiric intention, the inherent divisiveness of satire, and the tension between communication goals and the authenticity of satiric performance. The chapter draws on studies that have explicitly analyzed the role of satirical news programs in a science communication context while also raising important unanswered research questions.

Keywords: satire, science communication, *The Daily Show*, *The Colbert Report*, satirical news

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Over the past decade or so, satirical news programs such as Comedy Central's *The Daily Show* and *The Colbert Report* assumed important positions in our cultural and political landscape. As such, they inspired the interest of media studies, communication, and political science scholars, who have documented the distinctive ways in which these programs interpret and communicate about public affairs (e.g., Baym 2010; Jones 2010; Baym 2005), and the effects they have on audiences' political attitudes, knowledge, and behavior (e.g., Hardy et al. 2014; Feldman 2013b; Hoffman and Young 2011; Baumgartner and Morris 2006). While widely recognized as important sites for political discourse and criticism, satirical news programs recently have been noted for the attention they pay to science. For example, the Project for Excellence in Journalism (2008), in an analysis of news coverage during 2007, found that *The Daily Show with Jon Stewart* devoted a greater percentage of its "news hole" to science, technology, and environmental topics than did the mainstream news media. In 2010, science journalist Dan Vergano, then writing for *USA Today*, asked whether the "Best science on TV [is] Comedy Central's Stewart, [sic] Colbert?" (Vergano 2010). Indeed, both *The Daily Show* and *The Colbert Report* featured satirical news segments about a wide range of science issues, including climate change, evolution, vaccines, space exploration, stem cell research, artificial intelligence, particle physics, and genetics, as well as interviews with scientists, science policymakers, science writers, and science advocates (Feldman et al. 2011). The attention granted to science by *The Daily Show* and *The Colbert Report*, in turn, has spurred several academic studies that have analyzed the assumptions and claims about science that are both implicit and explicit in these programs' coverage (Brewer 2013; Feldman 2013a) and the effects these programs have on viewers' science engagement and attitudes (Brewer and McKnight 2015; Feldman et al. 2011).

(p. 322) Drawing from this research, this chapter considers the significance of satirical news as a form of science communication. Since most lay citizens do not interact directly with science and scientists, media, in general, are understood to play a central role in translating science to the public (Scheufele 2014). Unfortunately, however, the likelihood of broad public engagement with science is minimized by inadequate science coverage in the mainstream news media and scant public attention to the science news that does exist (National Science Board 2014). At the same time, individuals' orientations to science issues are often shaped by their political and cultural values (Kahan et al. 2011); this phenomenon exacerbates rifts in public opinion along partisan and ideological lines, with the views of many Americans at odds with mainstream scientific research on issues such as climate change and evolution (Pew Research Center 2015). Because satirical news differs from traditional news in important ways, a central consideration in this chapter is whether satirical news may help overcome deficiencies in mainstream science coverage and spur public engagement with science while also helping to reduce some of the polarization that surrounds controversial science issues.

The chapter begins with a discussion of satirical humor and considers how general attributes of satirical news programs may help expand public engagement with and understanding of science. This discussion incorporates findings from empirical research that has analyzed both the content of science coverage in *The Daily Show* and *The Colbert*

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*Report* and its effects on audiences. Although few in number, these studies suggest that these programs may offer an important alternative to traditional news coverage of science and can have significant effects on public attention to and attitudes toward science. The second half of the chapter highlights unresolved issues and potential constraints of using satire for science communication, including the challenge of conveying the seriousness of issues such as climate change while using humor, the potential for audience misreading of satiric intention, the inherent divisiveness of satire, and the tension between strategic communication aims and the authenticity of satiric performance. It is important to note that because only a handful of academic studies have explicitly examined the relationship between satirical news and science, this chapter is situated within the larger literature that has explored the intersection of news and entertainment in a political context.

## The Promise of Satirical News Programs for Engaging the Public with Science

*The Daily Show* rose to prominence when Jon Stewart took over as host in 1999; over the course of sixteen years, Stewart transformed the comedy program into a venue for incisive political and media criticism and penetrating interviews with policymakers, activists, business leaders, celebrities, and other public figures. When Stewart left the show in August 2015, a common refrain among media commentators was how “important and influential” Stewart’s voice had become within the public sphere, particularly in helping his viewers make sense of such events as the 9/11 terrorist attacks, the Iraq war, and the 2008 financial collapse (Remnick 2015; Schwartz 2015; vanden Heuvel 2015). *The Colbert Report*, a spin-off of *The Daily Show*, was conceived in 2005 and was hosted by former *Daily Show* correspondent Stephen Colbert. In the persona of a conservative talk show host, Colbert used parody and irony to critique right-wing media and politics, as well as broader themes within the political culture (Baym 2010). While these two programs, as exemplars of contemporary political satire, have generated substantial interest from academics, neither exists today in its original formation. *The Daily Show* is now anchored by South African comedian Trevor Noah, and *The Colbert Report* concluded at the end of 2014; Colbert currently hosts *The Late Show* on CBS, a more popular-oriented comedy program. Both shows, however, left an enduring legacy that established satirical news as an integral component of the modern media landscape. That genre continues to grow and evolve, as evidenced by newer programs such as *Last Week Tonight with John Oliver*, which debuted on HBO in spring 2014, and *The Nightly Show with Larry Wilmore*, which until late 2016 aired during *The Colbert Report*’s former time slot on Comedy Central. *Last Week Tonight* is a weekly show that uses a satirical platform to delve deeply into public affairs subjects; Wilmore’s show was structured around panel discussions about current issues. Both have covered science topics.

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While these programs differ in important ways, in their common deployment of comedy and satire they share several attributes that speak to the capacity of this genre to interest and influence audiences in the domain of science. Satire is “artful political critique” (Caufield 2008, 4), in that it exposes not only the wrongdoing but also the ridiculousness of powerful institutions and individuals by using entertainment and play to engage the audience (Gray et al. 2009; Fletcher 1987). As such, several (p. 323) scholars have argued that satirical news programs such as *The Daily Show* and *The Colbert Report* function as an alternative model for journalism (Young 2008a; Baym 2005). This is, in part, because of what Baym refers to as “discursive integration”—the way in which these programs put the discourses of news and entertainment in complementary rather than competitive arrangements. Comedy attracts the audience and supplies the shows’ initial appeal but also, according to Baym, “provides the method for engaging in serious political criticism” (273).

Satire, at its core, is an aggressive form; it uses humor to level attack and judgment upon a particular target, often in an effort to challenge traditional power structures (Test 1991). In coverage of science on *The Daily Show* and *The Colbert Report*, these targets tended to be the positions toward science held by conservatives and Republicans. Based on a qualitative analysis of *The Daily Show*’s science coverage, Brewer (2013) observed that the program castigated specific Republicans for waging a “war on science” while also satirically undermining Republican efforts to politicize, manipulate, and disparage science and scientific research. Feldman (2013a) similarly found that the most frequent targets of climate change-related humor on *The Daily Show* were conservative and Republican politicians; nearly half of all climate change segments focused on this group. Colbert also concentrated on the rhetoric and actions of conservatives and Republicans in more than a quarter of climate change-related segments, making this category his second most frequent satirical target, following climate skepticism in general. Through such satirical critiques, these programs actively deconstructed controversial claims about science that had been used by strategic actors to undermine public certainty about climate change (Dunlap and McCright 2011) and which were often accepted as fact by viewers of conservative media (Feldman et al. 2014).

Similarly, because satirical news shows are primarily entertainment programs, they are not constrained by norms of objectivity and related journalistic conventions (Young 2008a). As such, they are able to assert “truths” and offer critical perspectives that may be missing from mainstream news sources. *The Daily Show*, for example, has been credited with effectively using satire to both question the motives behind the Bush administration’s decision to invade Iraq following 9/11 and critique the news media for its complicity in endorsing the government’s agenda (Bennett 2007; Baym 2005). At the same time, satirical news programs can eschew the false balance that often pervades traditional news coverage of nonconsensus views of science in particular. Whereas traditional news coverage of debates over issues such as climate change, evolution, and vaccine safety has been criticized for employing a he-said/she-said approach that parrots talking points from each side rather than evaluating the merits of these claims (Boykoff 2008; Clarke 2008; Mooney and Nisbet 2005), Brewer (2013) and Feldman (2013)

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observed that *The Daily Show* and *The Colbert Report* sided with the scientific consensus on these issues. For example, according to Brewer's analysis, *The Daily Show* framed the evolution side as correct and the intelligent design side as wrong when covering the controversy over teaching these topics in public schools. Similarly, the show presented the reality of climate change as a settled matter, highlighted the mainstream scientific consensus on climate change, and mocked or challenged climate skeptics. Consistent with this interpretation, Feldman found that 70% of segments dealing with climate change on *The Daily Show* and 64% on *The Colbert Report* explicitly asserted the existence of global warming.

Satirical news programs also have more latitude in terms of the issues they feature and the depth with which they cover them. For example, an issue such as global warming—because of its incremental, abstract, and complex nature—is largely incompatible with traditional news values (Revkin 2007). As a result, while global warming often failed to garner sustained attention from the mainstream news media (Boykoff et al. 2015), it was covered relatively prominently by *The Daily Show* (Project for Excellence in Journalism 2008). Likewise, whereas the average television news package is 142 seconds (Pew Research Center 2013), Jon Stewart often covered a single issue for up to 8 minutes (Baym 2005), and John Oliver's so-called "long rants" on relatively esoteric public affairs topics run for 10 to 20 minutes (Paskin 2014). Thus satirical news may be able to characterize the complexity and levels of certainty or uncertainty surrounding scientific research in ways that are not possible in the brief snapshots characteristic of traditional television news. Indeed, in May 2016, John Oliver devoted a 20-minute segment to critiquing how news outlets often obscure the nuances of scientific research by presenting decontextualized and oversimplified conclusions in ways that ultimately conflate science with entertainment.

As mentioned earlier, *The Daily Show* and *The Colbert Report* often included interviews with a (p. 324) diverse range of public figures, including members of the science community; this departs from traditional late-night comedy programs on network TV, such as *The Tonight Show*, whose guests disproportionately hail from the entertainment world. Baym (2005) has argued that Jon Stewart, in particular, provided a forum for the deliberative discussion of public issues by engaging his interview guests through civil exchange, complex argument, and the goal of mutual understanding. Brewer (2013) similarly characterized *The Daily Show*'s science-related interviews as a space to discuss science and society by providing "varied and competing perspectives on how science and other elements of broader society reflect, shape, and sometimes clash with one another" (462). For example, he cited interviews that considered topics such as the ethics of exporting American ideas about science and medicine abroad and the tension between science and religion (of note, Larry Wilmore also explored the latter topic in a 2015 panel on his show). Feldman (2013) analyzed the frames used to discuss climate change in *The Daily Show* and *The Colbert Report*'s interview and noninterview segments. On both shows, the dominant frame was a conflict one that portrayed climate change in the context of political strategy and power struggles among elites. This was likely because this frame was prevalent in traditional news coverage of climate change (Hart and

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Feldman 2014), and both shows depended on existing news coverage for their material. However, on both programs, but particularly on *The Colbert Report*, the interview segments often shifted the frame of reference away from political conflict, emphasizing the environmental, economic, public health, and moral dimensions of climate change more frequently than in noninterview segments. Given the integral role of religious, political, cultural, moral, and social values in scientific decision-making (Scheufele 2013), these interview discussions could be important to public understanding of and reflection upon science and how it connects to broader societal considerations.

Satirical news programs also use what Jones (2010, 34–35) calls “common sense” narrative that appeals to the human instinct for storytelling and puts issues in terms that are accessible and easily understood. For example, over the course of almost a year in 2011, Stephen Colbert walked his audience through the complexities of campaign finance by actually creating his own super PAC and 501c4 on the show. As Hardy et al. (2014) demonstrated, viewing *The Colbert Report*, more so than any mainstream news outlet, was associated with higher knowledge of campaign finance regulation, arguably due to the narrative thread Colbert created. Colbert constructed this narrative over many months, but a compelling narrative also can be developed within a single segment, as John Oliver demonstrates on *Last Week Tonight*. In his “long rants,” Oliver engages viewers with a complex, dense topic such as net neutrality or the prison system by offering a complete narrative: here’s the issue, here’s why it matters, and here’s what you can do about it (Ross 2014). He also uses humorous analogies that help clarify complex ideas and reveal simple truths. For example, in his segment on net neutrality, he suggested that having former industry lobbyist Tom Wheeler head the FCC is like hiring a dingo to watch your baby. In one of the show’s science-related segments, Oliver held “a statistically accurate” climate change “debate,” which featured ninety-seven climate scientists who believe in global warming and three who do not.

The discursive structure of satiric news can make complicated topics, like science, more understandable and engaging to audiences. This may attract audiences who otherwise would not pay attention to such topics. Indeed, Baum (2003) found that exposure to entertainment-oriented, or soft, news programs increased public attention to foreign policy, particularly among apolitical audiences, because these programs often piggy-back politics on entertainment, thereby increasing the benefits and decreasing the cognitive costs of engagement. Fusing politics with popular culture provides a social incentive to pay attention; politics becomes “water-cooler worthy.” At the same time, attaching politics to information people already are motivated to attend to and packaging it in a way that makes politics more cognitively accessible reduce the investment required from audiences. Feldman et al. (2011) explored whether a similar process increased viewers’ attention to science and the environment. Using cross-sectional analysis of national survey data from 2008, they found that viewing *The Daily Show* and *The Colbert Report* was positively associated with attention to science and technology news, environmental news, and information about global warming. Moreover, these benefits accrued

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disproportionately to those with lower levels of formal education—the very people for whom following science would bear the greatest cognitive costs. In other words, satirical news may help equalize traditional educational gaps in science news attention and knowledge (Tichenor et al. 1970).

(p. 325) Satirical news is unique in other ways, which also have implications for its effects on audiences. One of the defining characteristics of satire is its playfulness (Test 1991). Unlike news, which presents information as something to learn or consume, satire encourages audiences “to play with politics, to examine it, test it, and question it” (Gray et al. 2009, 11). Thus satire can help promote active audience engagement and critical reflection, along with an experience of pleasure (Jones 2010). Given *The Daily Show’s* satiric analysis of how politicians, particularly conservatives, distort scientific evidence, Brewer (2013, 466) asked whether this could encourage viewers to critically evaluate these actors’ speech and actions, which, in turn, might lead viewers to more actively seek truth about science, in general, outside the viewing context of the show. Further, as Day (2011) has argued, satire can serve an identity- and community-building function among those who are in on the joke. By signaling the presence of like-minded others, satire creates a sense of shared understanding and common experience that can empower and mobilize the audience. Similarly, Young et al. (2014, 1113), in considering the influence of Colbert’s super PAC segments, argued that his biggest impact may have been “through the construction of a politically resonant, satirical popular culture experience.” In other words, as a result of its playfulness, satire may encourage audience members to develop an emotional connection with its subject matter and with one another. Likewise, satiric treatments of science issues may facilitate a sense of connection to and engagement with science and scientists. In Brewer’s (2013) analysis of *The Daily Show*, he characterized the program’s science coverage as reifying a “scientific mystique” (see Nelkin 1995) by portraying scientists as all-knowing and heroic and science itself as a superior but separate culture. In light of its critical stance toward most other social institutions, this trend is unusual for *The Daily Show*. Ultimately, as Brewer argues, such glorification may help create favorable public perceptions of the scientific community but at the same time prevent *critical* public engagement with science and distance citizens from the process of science. These contrasting ideas about audience effects should be tested empirically in future research.

In part because of satire’s communal function, there is evidence that satirists can inspire citizens to take action. More than 200,000 people turned out for Stewart and Colbert’s “Rally to Restore Sanity” on the National Mall in 2010 (Montopoli 2010), and, more recently, John Oliver has been credited for causing a spike in public comments in response to the FCC’s net neutrality decision (Williams and Shelton 2014). Further, because Comedy Central makes embeddable clips of its programs available on its website (clips from *Last Week Tonight with John Oliver* are likewise available on YouTube), the shows’ content can be shared and repurposed by regular citizens and activists and used both rhetorically and as a mobilization tool. When, for example, Baym and Shah (2011)

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analyzed the digital flow of ten environmental clips from *The Daily Show* and *The Colbert Report* through multitiered online issue networks, they found that environmental activists used the clips to help express and circulate their dominant concerns and preferred solutions, to connect with allies, and as a resource for collective action.

Finally, some evidence indicates that, because it disrupts message counterarguing, humor can be persuasive (Young 2008b; Nabi et al. 2007). Often, traditional persuasive messages are ineffective because audiences scrutinize and counterargue their main premises (Petty and Cacioppo 1986); by overcoming these tendencies, humor can facilitate persuasion. Humor reduces counterarguing in one of two ways—either by diverting the cognitive resources that would otherwise be used to counterargue to instead process the humor (Young 2008b) or through message discounting, whereby audiences deem a comedic message as irrelevant to their attitudes and thus do not deploy counterarguing strategies (Nabi et al. 2007). Several studies have linked exposure to satirical news programs to attitudes about political issues and actors (e.g., Hardy et al. 2014; Baumgartner and Morris 2006), although the evidence for satirical news' persuasive effects in political contexts is fairly weak and highly conditional on message, contextual, and audience factors (e.g., Boukes et al. 2015; LaMarre et al. 2014; LaMarre and Walther 2013; Holbert et al. 2011; Nabi et al. 2007). Still, it is possible that scientific claims made on satirical news programs can influence viewers' attitudes and perceptions. Only one study has explored this possibility. Brewer and McKnight (2013) conducted an experiment that compared the effects of segments from *The Daily Show* and *The Colbert Report* that satirized climate skepticism and affirmed the reality of climate change with a control video that was unrelated to climate change. They found that participants' certainty that global warming is happening was significantly higher in each of the two satirical news (p. 326) conditions than in the control, although the effect sizes were small; moreover, these effects did not vary according to individuals' political predispositions.

This literature review suggests that, in the political domain at least, satirical humor can provide a corrective to mainstream news coverage, help promote active audience engagement, serve a community-building function and as a tool for activism, and, in some cases, act as a vehicle for persuasion. Research explicitly examining the relationship between satirical news and science has found that *The Daily Show* and *The Colbert Report*, in particular, may offer critical alternatives to traditional news coverage of science, help promote public attention to science and environmental news, and shift public attitudes toward controversial issues, such as climate change, in a direction that is more consistent with evidence from mainstream scientific research. These results are certainly suggestive of satire's promise as a tool for engaging the public with science—assuming, of course, that the satirist is supportive of science in the way that Stewart and Colbert have been—but they derive from a small set of studies. Many of the potential effects reviewed here have yet to be adequately addressed by current research in the context of science communication, including satirical news's ability to foster an emotional connection to science and scientists; its role in encouraging critical thinking about scientific issues, institutions, and processes; and its influence on science-related behavior and activism. In addition, following from existing research, there are several potential



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constraints on satire's effectiveness as a source of science communication. These limitations raise important questions for future research and are taken up in the next section.

## Unresolved Issues and Potential Limitations of Using Satire for Science Communication

The use of humor can make it challenging to convey the seriousness of issues such as climate change, particularly when the humor is focused on the issue itself. Feldman (2013) found, for example, that on *The Daily Show* and *The Colbert Report*, more than a third of segments covering climate change included explicit statements that trivialized the consequences or importance of the topic, portrayed the issue as easily solvable, or treated it as a positive phenomenon. Although these statements were generally meant ironically or sarcastically, their explicit message challenged mainstream scientific views regarding the severity of climate change (slightly less than a third of segments explicitly *affirmed* the severity of climate change). Importantly, prior research has shown that viewers' attitudes may follow more directly from satirists' explicit messages than their implicit ones (Baumgartner and Morris 2008). More generally, experimental research from the area of health communication found that, in a sitcom, the use of issue-related humor, but not the use of humor overall, decreased the perceived seriousness of the issue and resulted in a boomerang effect among viewers (Moyer-Guse et al. 2011). As Bore and Reid (2014) noted, satire often creates distance between the audience and subject matter that must be overcome in order to encourage people to care about the issue. Although this remains a testable proposition, the most effective humor about science thus may not be directly about the issue. For example, on *Last Week Tonight*, John Oliver often does not make jokes about the issue per se; the show's humor is derived from Oliver's own reaction to either the media coverage or the response of politicians to the matter rather than to the issue itself. Another strategy for establishing serious intent is incorporating clearly demarcated moments of sincerity within the satire (Bore and Reid 2014), as Jon Stewart did on various occasions throughout his tenure as host of *The Daily Show* and at the end of his 2010 "Rally to Restore Sanity."

A related concern arises from the possibility that audiences will misread satiric intention. Feldman's (2013) analysis of climate change coverage on *The Colbert Report* found that there was a mismatch between Colbert's explicit and implicit messaging: Although he outwardly called climate change a "hoax" or "myth," he did so ironically, in order to critique the rhetoric of climate skeptics. Brewer and McKnight's (2013) experimental study found that this ambiguity made it more difficult for politically conservative viewers to accurately discern Colbert's views toward climate change relative to liberals; perceptions of the host's beliefs on climate change, in turn, predicted individuals' own beliefs about the reality of climate change. This is consistent with earlier studies, which found that Colbert's use of irony can result in some audience members, particularly conservatives, taking him at face value (LaMarre et al. 2009; Baumgartner and Morris 2008). Such responses may be a result of biased processing, with individuals reading what they want to read onto ambiguous stimuli as a way to protect their own social identity and self-image (Kunda 1990). Thus conservatives who tend not to believe in

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climate change are motivated to see Colbert as agreeing with them. If the use of ironic satire makes it more (p. 327) difficult for certain audiences to discern the true message behind a satiric claim, this raises questions about satire's capacity to do more than preach to the choir: Can satire actually change attitudes and correct misinformation among those who are predisposed to disagree with the comedian's intended message? Although Johnson et al. (2010) found that active audiences can get the underlying message of a satiric video even if they miss the joke, the ambiguity of satirical humor has proven an obstacle to social change in other contexts (Vidmar and Rokeach 1974).

Satiric humor is also inherently socially divisive. By definition, it is aggressive and judgmental; its focus is on identifying an enemy and pointing out its absurdity or hypocrisy. Thus while satire can be community- and identity-building within groups, it also can be polarizing (Day 2011). For example, *The Daily Show* and *The Colbert Report's* climate change-related humor often derogated conservatives and Republicans who do not accept climate science (Brewer 2013; Feldman 2013). Similarly, John Oliver's "statistically representative" climate debate mentioned earlier demeaned people who do not recognize the scientific consensus on climate change. Despite humor's tendency to reduce counterarguing and facilitate persuasion, messages that show contempt for people—for example for those who believe that global warming is not real—may elicit motivated reasoning and defensive processing within that group. Indeed, several studies have found that humor is seen as less entertaining or funny when it degrades one's in-group or is incongruent with one's opinion preferences (Boukes et al. 2015; Becker 2014). At the same time, derisive humor can normalize prejudice toward social groups targeted by the humor (Ford et al. 2008). And Stroud and Muddiman (2013) found that a satirical news website, relative to a serious one, discouraged people from reading counterattitudinal articles and, in turn, reduced their tolerance for partisans with opposing views. Overall, what often gets attacked in satiric treatments of science are particular viewpoints or institutional positions toward science issues (e.g., denial of climate science, belief in a link between vaccines and autism), and this can be alienating rather than persuasive to the side under attack. Simultaneously, such humor may reinforce solidarity among those who agree with the comedian's message but make them more resentful toward those on the other side.

This begs the question of whether there are other targets of science satire that may be less divisive. For example, Corner (2015) suggested that satiric jokes about climate change can be about "any of the dozens of subjects—family disputes over energy bills, travel and tourism, or changing consumer habits—that are directly impacted by climate change." Further, satirical news programs do not only cover inherently polarizing issues like climate change. Colbert, for instance, used satire to lament the end of the US space shuttle program, perhaps helping to persuade audiences of the value of space exploration. He also mocked the pharmaceutical industry in a recurring segment, "Cheating Death with Dr. Stephen T. Colbert, D.F.A.," in which he would introduce a real medical problem and then offer a solution sponsored by the fictitious and exploitative

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Prescott Pharmaceuticals; the remedy typically involved horrendous and often absurd side effects. Although the influence of these segments has not been studied, they may have encouraged audiences—regardless of political orientation—to be less trusting of the pharmaceutical industry as well as of medical science more generally.

To the extent that satirical news programs can persuade viewers to shift their views about science issues (Brewer and McKnight 2015), we do not know how these effects compare to the effects of popular science media, such as PBS's *NOVA* or 21st Century Fox's 2014 remake of *Cosmos*, which, like *The Daily Show* and *The Colbert Report*, tend to support the scientific consensus on controversial issues. On one hand, satirical news may reach audiences who are not predisposed to science and thus do not pay attention to science-oriented media (Feldman et al. 2011; Nisbet and Scheufele 2009), but it may be that satire as a messaging strategy is no different in its effectiveness when compared to other forms of mediated science communication. Experimental comparisons of the effects of satiric and nonsatiric presentations of science are needed.

Another outstanding question is what happens beyond *The Daily Show with Jon Stewart* and *The Colbert Report*. On Colbert's new *Late Show*, which airs on network television and is thus more vulnerable to market pressures, he may not have as much freedom to cover complex science topics. However, in an encouraging sign, his early interviewees included astrophysicist Neil De Grasse Tyson, with whom he had a deep discussion about space; Ernest Moniz, Secretary of Energy under President Obama, nuclear physicist, and former MIT professor; and Elon Musk, CEO of the electric car maker Tesla and of the aerospace manufacturer and space transport services company SpaceX. It also remains (p. 328) to be seen whether Trevor Noah, Stewart's replacement on *The Daily Show*, will give science the same attention as his predecessor. Overall, it is important to know whether satire can effectively engage the public with science in alternative contexts such as other late-night comedy shows, films, sitcoms, or online videos. Of course, such examples exist—the popular sitcom *Big Bang Theory* comes to mind most readily—but they have yet to be studied systematically (although see Bore and Reid [2014] for an evaluation of a satiric Canadian stage play designed to promote public engagement with climate science). Moreover, it is worth noting that *The Daily Show* and *The Colbert Report* both directed their satire in a way that was generally supportive of consensus science on controversial issues; comedy and satire also could be used to engage audiences in the opposite direction.

Finally, it is important to highlight the tension between strategic science communication goals and the authenticity of satiric performance (Day 2011). Hosts, writers, and producers of satiric news programs likely operate on the basis of their own values and interests, mining news content for humor, and not necessarily intending to inform or persuade. Deploying satirical news strategically in order to deliberately persuade or activate audiences may undermine the perceived authenticity of the satire and in the process undercut the resonance of the message with audiences (Young et al. 2014; Holbert et al. 2011). At the same time, it is important to keep in mind that comedians are not scientists or journalists and thus easily can misrepresent science. To what extent

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should they be or can they be held accountable for getting the science right? Williams and Delli Carpini (2011) asked a similar question with regard to satirical news and politics, ultimately arguing for the need to subject satirical news to the same scrutiny as other more “serious” media.

In conclusion, there is some evidence that satirical news programs can animate and illuminate science issues for the general public in ways that traditional news and even science media do not while also empowering and activating those who are sympathetic to the comedians’ intended message. On the other hand, satire may not reach enough people or provide sustained and serious enough coverage of science to ameliorate the public’s relative inattention to science news and their apathy toward and/or misinformation about critical science issues. Nor is satirical news, given its aggressive stance, likely to quell motivated reasoning and reduce the political and cultural polarization evident on many science issues. Still, these premises are ripe for further investigation.

Despite a rich literature on satirical news’ effects in political contexts, we cannot necessarily assume that past findings will translate to a science communication context. Science and politics, although closely connected, are epistemologically different. Science is supported by a systematic way of knowing; although it is an imperfect and inherently human process, it has mechanisms for self-correction including peer review, replication, and retractions. Thus satiric arguments about science may resonate differently than claims about politics. Ultimately, additional research is needed, particularly qualitative and quantitative analyses that examine how satiric portrayals of science influence audience knowledge, affect, attitudes, and behavior. While research in the context of climate change remains valuable, it also is important for researchers to study the content and effects of satirical news coverage of other science issues that may be less politicized or less familiar to audiences. Currently, there are few conclusive findings outside the topic of climate change. Finally, although panel discussions about the value of comedy for science have featured writers from satirical news programs (e.g., Health, Hollywood & Society 2014), researchers should attempt to systematically study the production of these programs in order to uncover the assumptions about science and science communication, if any, that inform their coverage of science.

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### **Lauren Feldman**

Lauren Feldman (Ph.D., University of Pennsylvania, 2008) is an Assistant Professor in the School of Communication and Information at Rutgers, The State University of New Jersey. Her research focuses on political communication and media effects, with an emphasis on how less traditional sources of political information, such as late-night comedy and opinionated cable news programs, shape citizens' engagement with and understanding of politics. Her work on media perceptions and effects has been published in numerous edited volumes and peer-reviewed journals, including

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