

***The Daily Show's* Climate Change Content: Two Decades of Late-Night Science Communication**

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Late-night shows provide important venues for climate change communication, and studies have demonstrated their ability to influence viewer attitudes. This longitudinal study examines climate content featured on one of America's most popular late-night shows, *The Daily Show*, from 2000 to 2021 (including Jon Stewart's and Trevor Noah's tenures as hosts). The quantitative analysis demonstrates that climate content increased significantly in this period, and the qualitative analysis found that the show used framing to define problems and identify responsible political actors. Herein, the thematic emphasis is on Republican presidents Bush and Trump's climate skepticism, specifically their supporters, opponents, and environmental deregulation.

Keywords: climate change communication, comedy, environmental policy, infotainment, science communication

The climate crisis is one of the defining problems of our time, with 19 of the hottest years on record occurring since 2000 (National Aeronautics and Space Administration, 2022). Science communication scholars have studied climate change communication in a plethora of media. In recent decades, the field advanced beyond its initial focus on hard news and traditional media to include alternative and new media and soft news, including late-night shows.² Public-engagement scholars have called for further research into such alternative communication practices, particularly concerning the political dimension of the climate crisis (Carvalho, van Wessel, & Maesele, 2017). This study answers the call by examining how a late-night show, *The Daily Show* (hereafter *TDS*; Katz, 2023), conveys climate change content. Herein, the article focuses on the two most recent iterations of *TDS*: *TDS with Jon Stewart* (O'Neil, 2006) and *TDS with Trevor Noah* (Pennolino, 2017a).

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² This article uses the terms "late-night" and "late-night shows" synonymously, as late-night hosts often turn the adjective "late-night" into a noun to refer to the genre or the shows filling the late-night airtime slot (see for instance, Jammy, 2022, 01:31–01:34).

This study contributes to the literature on late-night science communication by providing the first longitudinal content analysis of *TDS'* (Katz, 2023) climate change content over the course of 21 years (January 2000–December 2021). For this purpose, the article begins with a literature review, split into three sections. First, the article establishes the relevance and impact of late-night shows. Second, the subject of late-night science communication is introduced, identifying the three most relevant studies on *TDS'* science and climate content by Brewer (2013), Feldman (2013a), and the Pew Research Center (2008). The section also outlines the framing theory underlying this article and the three cited articles. Third, the article discusses *TDS'* history, format, viewership, and categorization as a late-night program. This is followed by the methods section outlining the quantitative and qualitative examination of *TDS'* climate change content. Here, the study highlights its contribution to the academic literature on late-night by revising Brewer (2013), Feldman (2013a), and the Pew Research Center's (2008) approach to data collection, updating the keyword search material by shifting from the now defunct episode-tagging system to episode descriptions and including YouTube clips in the search. Finally, the article presents and discusses its findings.

The study observes that not only has *TDS* (Katz, 2023) provided substantive climate change content over the course of 21 years but also that this content has significantly increased in volume over time. The qualitative framing analysis shows that *TDS* used framing to define problems and identify responsible actors, focusing on political personalities. The thematic emphasis is on Republican presidents' climate skepticism, specifically their supporters, opponents, and environmental deregulation. *The Daily Show* actors frame themselves in opposition to these critical political beliefs and thus support the strengthening of the consensus on climate science. These findings and related methodological innovations mark an update and expansion of previous research, providing a more detailed and nuanced perspective on *TDS'* climate discourse, as reflected in the article's conclusion.

The Relevance and Impact of Late-Night Shows

Studies of American late-night shows have demonstrated that late-night programs provide important venues for political and science communication with large audiences, "including viewers who do not follow more traditional news outlets" (Brewer & McKnight, 2015, p. 640). *The Daily Show* (Katz, 2023) presents a critical case study in the genre, as one of America's most popular and longest-running contemporary late-night shows. In addition, the show has also been often credited as the prototype for American political late-night shows of the 21st century (Baym, 2010; Gray, Jones, & Thompson, 2009). Studies of *TDS* found that the show provided substantial coverage of policy issues (Brewer & Marquardt, 2007; Pew Research Center, 2008). A study by Fox, Koloen, and Sahin (2007) confirmed these findings, demonstrating that the late-night program presented approximately as much "substantive" election news as traditional news broadcasts.

Communication researchers have proven that beyond featuring significant amounts of information, late-night shows can not only inform but influence their audience and even effect policy change. According to Chattoo (2017), these shows "exert five common forms of influence: (1) Attracting attention, (2) persuading through emotion, (3) offering a way into complex social issues, (4) breaking down social barriers, and (5) encouraging sharing" (pp. 2–14).

Previous studies provide evidence of all five forms of influence: First, a plethora of studies documents late-night programs' ability to *attract attention* to the issues they discuss, from local ones, such as New York bail reform (Chattoo, 2017) to global ones like climate change (Brewer & McKnight, 2015). Second, late-night shows can *persuade through emotion*, as evident in Skurka, Niederdeppe, and Nabi's (2019) study of "the emotional ingredients" (p. 394) in late-night monologues, which demonstrated their ability to influence the audience's risk perception and behavioral intentions. Third, late-night programs such as *TDS offer a way into complex issues* for audiences that not only provides them with a reference framework to "make sense" of new information but also makes them seek out further information in traditional media (Brewer & Marquardt, 2007; Cao, 2010; Feldman, Leiserowitz, & Maibach, 2011; Feldman & Young, 2008; Xenos & Becker, 2009). Scholars found that audiences were even able to attain political knowledge by consuming late-night shows (Baumgartner & Morris, 2008; Xenos & Becker, 2009). Fourth, late-night shows can *break down social barriers* through their comedic approach, affording individuals the ability to discuss (policy) issues outside the socially accepted norm and question dominant discourses (see Day, 2011; Wild, 2019). Fifth and finally, late-night shows encourage viewer engagement and *sharing*, as exemplified by Baym and Shah's (2011) study of the online circulation of late-night clips.

Scholars caution, however, that viewers' attitudes, political orientations, and perceptions of late-night shows impact their reaction to the five forms of influence exerted by late-night shows and the information they try to convey (LaMarre, Landreville, & Beam, 2009; Young, 2013). For instance, Feldman (2013b) finds that viewers who perceived *TDS* (Katz, 2023) as providing information and entertainment (infotainment) retained more information than those watching the show purely for amusement. Similarly, Brewer and McKnight's (2015) study demonstrates that viewers' political orientation had significant impacts on their interpretation of the shows' messages, particularly when presented in an ambiguous manner.

While these examples show that the literature provides ample evidence of the impacts that late-night programs can have on their audiences, fewer studies have examined the content featured on the shows that produces these effects. These studies can be grouped based on the content issue they examine. For instance, several articles study election-related content, with Niven, Lichter, and Amundson (2003) finding that shows particularly focus on sitting presidents and their top opponents. For the purpose of this article, the study focuses on climate change-related content. To provide further context on such science-based late-night content, the following section gives a brief overview of related literature.

Late-Night Science Communication

Communication scholars have long called for further research on scientists and science content featured on late-night shows and the impacts thereof (Baym & Shah, 2011; Brewer, 2013; Feldman et al., 2011). While a vast body of literature is dedicated to studying American late-night shows and *TDS* (Katz, 2023) in particular, the number of studies focusing specifically on *TDS'* climate change content is more narrowly defined. The majority of these works concentrate on audience reactions, with viewers becoming more concerned about climate change and seeking out further information in traditional news after consuming late-night climate change content (e.g., Brewer & McKnight, 2015; Feldman et al., 2011), with only a few studies examining the actual climate change content that audiences are reacting to. The article examines and builds on three such studies on *TDS'* science and climate content—those by Brewer (2013),

Feldman (2013a), and the Pew Research Center (2008). While this section focuses on the insights these studies provide on *TDS'* climate change content and how they shape the present study, the methods section will highlight how this study builds on and further develops the articles' methodological approaches.

Of the three relevant texts outlined in the following, only Feldman (2013a) provides an explicit discussion of framing, citing Entman (1993). However, all three texts can be characterized as using an Entmanian approach to framing. According to Entman (1993), texts frame issues by emphasizing certain aspects, thus (1) defining the problem at hand ("what a causal agent is doing with what costs and benefits"), (2) identifying its cause ("the forces creating the problem"), and (3) making a moral judgment ("evaluate causal agents and their effects"; p. 52). While Entman's (1993) conceptualization of framing includes a fourth aspect, that is, the suggestion of solutions to the given problem, the articles discussed in this section largely refrain from discussing this—a common occurrence, as Entman notes that frames "may not necessarily include all four functions" (p. 52). This article, too, adopts Entman's (1993) framing concept, highlighting its sometimes-implicit presence in the literature and data. With this theoretical backdrop in mind, this section briefly summarizes the three most relevant studies on *TDS'* (Katz, 2023) science and climate content, beginning with (1) Brewer, followed by (2) the Pew Research Center and (3) Feldman.

First, Brewer's (2013) textual analysis examines science content featured on *TDS* (Katz, 2023), including climate change content. According to Brewer (2013), *TDS'* science-related content revolves around five themes: (1) Challenging the politicization or "war on science" perpetuated "particularly by Republicans and religious conservatives" (Brewer, 2013, p. 455); (2) challenging the equal representation of political or religious and scientific consensus, as evident in traditional news' fraught attempts to implement the journalistic standard of balanced reporting on issues such as the climate crisis (climate change denialists vs. scientific consensus on the existence of anthropogenic climate change) or evolution (religious creationist vs. evolutionary biologist); (3) critiquing television news reporting on scientific issues; (4) employing guest interviews to discuss "the interplay between science and the social contexts surrounding it" (Brewer, 2013, p. 455); and (5) reinforcing the "scientific mystique" (social construction of scientific expertise, authority, and purity) produced and perpetuated by social and traditional media (Nelkin, 1995, pp. 14–30). Moreover, Brewer (2013) explicitly calls for the kind of "content analysis of *The Daily Show's* science coverage" that this article provides to "complement" (p. 467) the findings of his textual analysis. Specifically, the author asks for "a more systematic and (given the limitations of the video tagging system used here [in Brewer's article] to select clips) more representative portrait of the same material" (Brewer, 2013, p. 467). This article provides such a systematic review of *TDS* material on climate change and addresses the limitations of the tagging system through a revised sampling approach, as detailed in the methods section.

The second relevant study provides some initial insights into what such a systematic analysis of *TDS'* (Katz, 2023) science content might reveal though it is limited to data from 2007 only. The Pew Research Center's (2008) content analysis made a comparison of how high on the news agenda climate change ranked for *TDS with Jon Stewart* (O'Neil, 2006) with its ranking in traditional news outlets. Measures for the latter were based on the Project on Excellence in Journalism's News Coverage Index, "a study of the news agenda of 48 different outlets . . . [which] consist of both print and broadcast media" (Pew Research Center, 2008, p. 8) with broadcast media measured in minutes of airtime and print recorded in the number of words. The analysis found that *TDS* dedicated twice as much airtime to climate change compared with traditional news

outlets in 2007. This made climate change the fifth most discussed issue on the show—after (1) the presidential election, (2) the Iraq policy, (3) the events in Iraq, (4) fired U.S. attorneys—accounting for 2.6% of its newshole (Pew Research Center, 2008). These results further underline the significance and potential impact of *TDS'* climate change content, thus incentivizing the study thereof. This article builds on the Pew Research Center's mixed method approach, beginning with a quantitative overview of coverage on a given subject, followed by a qualitative contextualization of *TDS* segments identified as containing content on the subject. However, in the case of the Pew Research Center (2008) report, only quantitative information on *TDS'* climate content is provided, while the qualitative analysis focuses on other subjects covered by *TDS*. This article aims to remedy this by including both quantitative and qualitative observations in its systematic examination of *TDS'* climate change content from 2000 through 2021.

The third notable article by Feldman (2013a) is a content analysis of *TDS with Jon Stewart* (O'Neil, 2006) and *The Colbert Report's* (Stewart, 2005) climate change coverage, which found that the majority of statements on the shows confirmed the existence of global warming. The study demonstrated that the shows most frequently used conflict frames when discussing climate change, with a particular focus on critical commentary regarding "individuals and groups associated with [climate] skepticism" (Feldman, 2013a, pp. 430, 444). Feldman (2013a) further specified that the majority of these individuals and groups were associated with the Republican Party. This finding reiterates the partisan lines along which many scholars outline the American political debate on the climate crisis, with Democrats supportive of climate action and Republicans propagating climate skepticism being characterized as opposite ends of the climate debate (Brewer, 2013). It also supports Brewer's (2013) first two themes, highlighting how *TDS* (Katz, 2023) challenges the politicization of science by Republicans and the news media's equal representation of climate skepticism and scientific consensus on anthropogenic climate change. In addition, it aligns with the focus of late-night shows on the extreme ends of the debate spectrum on contentious topics, such as climate change (Anderson, 2004).

While all three studies (Brewer, 2013; Feldman, 2013a; Pew Research Center, 2008) provide substantial insight into and incentive for further study of *TDS'* (Katz, 2023) climate change content, the research was conducted almost a decade ago. Like most studies of *TDS*, the articles hence fail to include Trevor Noah's tenure at *TDS*. In addition, the public and political discourse on climate has undergone significant shifts since the articles were published. For instance, the Yale Program on Climate Change Communication (YPPCCC) distinguishes between six American publics from alarmed to concerned, cautious, disengaged, doubtful, and dismissive (Leiserowitz et al., 2022). The alarmed public is the most concerned about climate change, most motivated to take action to combat the climate crisis, and holds the highest belief in global warming, while the dismissive holds the lowest belief, is the least concerned, and least motivated to take action (Leiserowitz et al., 2022). Although the YPPCCC's first report found only 18% of the American public was alarmed about climate change in 2009, by 2021, 33% counted among the alarmed (Leiserowitz, Maibach, & Roser-Renouf, 2009; Leiserowitz et al., 2022). This shift in the public understanding of the climate crisis may be indicative of changes in *TDS'* climate change content, highlighting the need for further investigation. The YPPCCC's findings suggest multiple hypotheses for the progression of *TDS'* climate change content, including (1) *TDS* will feature more climate change content as public concern on the matter grows, that is, more climate content on *TDS with Trevor Noah* (Pennolino, 2017a) compared with *TDS with Jon Stewart* (O'Neil, 2006); and (2) considering late-night shows' focus on the extreme ends of political debates (Anderson, 2004), *TDS* climate content will focus on

representations of the extreme ends of the YPCCC audience segmentation (the alarmed and the dismissive). To further contextualize the investigation of these hypotheses, the following section provides a brief overview of *TDS'* history, format, viewership, and genre categorization.

The Daily Show

The Daily Show (Katz, 2023) is a popular American late-night television program specializing in news parody. The show began airing in 1996 with host Craig Kilborn. In 1998, Jon Stewart took over as the host and began the work of reconfiguring the show into the politically focused program it became widely known for. According to *TDS* creators, this process of reconfiguration took until 2000, when "the show really came into its own" (Jammy, 2022, 04:09–04:12), effectively marking the beginning of the contemporary political late-night genre (Baym, 2010; Gray et al., 2009).

The show's format generally adheres to a three-act structure: The episode begins with a monologue featuring the host (Noah/Stewart) sitting at his desk and commenting on current issues and events, mimicking the role of a news anchor on a traditional news broadcast. Next, the host either introduces a field piece featuring one of the show's correspondents or is joined by one of the correspondents at his desk in the studio. Finally, a guest joins the host at his desk for an interview.

The Daily Show (Katz, 2023) has a loyal core viewership though viewer numbers momentarily declined after host Jon Stewart's departure (Molla, Lightner, & Tovar, 2015). At the time, Stewart had established himself as a defining voice in late-night shows while Noah was still unknown to most American viewers (Molla et al., 2015). Nevertheless, Noah soon reached an average television viewership of 1.43 million and an online following of 9 to 10 million followers on YouTube, Twitter, Facebook, and Instagram, respectively, and 4.3 million TikTok followers (as of 2022; Feldman, 2017). Additionally, *TDS'* success and impact can also be measured in the breadth of late-night programs it inspired, from international news parodies that mimic *TDS'* format, such as the Egyptian *Al-Bernameg* (Youssef, 2011), to American shows hosted by former *TDS* correspondents, including *The Colbert Report* (Stewart, 2005).

The Daily Show (Katz, 2023) is a self-described "fake news" show, a label that has been widely accepted by the academic community (Amarasingam, 2010, p. 10; Brewer & Marquardt, 2007, p. 249). Fake news refers to disinformation defined by its author's intentional deception of media industry members and (consequently) the public. While the term has undergone multiple iterations and (re)definitions (see Love, 2007), *TDS'* particular brand of fake news implies that its audience is aware of elements of apparent exaggeration or deception in the program for the sake of entertainment (Baumgartner & Morris, 2008). Baym and Jones (2013) argue that *TDS* "paradoxical[ly gains] power and authority by claiming to be fake" (p. 24) because "it refuses to make claims to authority and authenticity, as opposed to those claims repeatedly asserted . . . by news media" (Baym, 2010, p. 106; Jones, 2010, p. 18).

Yet, some scholars have contested the show's categorization as fake news, arguing that *TDS* (Katz, 2023), in fact, presents a "new model of journalism" (Baym, 2010; Young, 2008, pp. 242–243) instead, with some claiming that Americans view the show as an alternative source of political news (Sotos, 2007). Moreover, Jacobs and Wild (2013) found evidence of newspapers of record treating *TDS* as "just another

official source" (p. 71). Nevertheless, the show's creators have long disputed its categorization as journalism, arguing that viewers would have difficulties understanding the show if they were not already following the news (Baym & Jones, 2013; Pew Research Center, 2008). In recent years, however, Noah has embraced the categorization of the show as a news source though stressing the comedic intent of *TDS*, stating, "I'm not trying to create a straight-up news show" (Noah et al., 2019, 44:37–44:40).

The Daily Show's (Katz, 2023) conveyance of news is framed by the traditional joke structure, which begins with a setup providing relevant background information in the form of a news story, followed by the punch line, which subverts viewers' expectations, producing the desired humorous effect. Here, the punch line provides the joker's interpretation of the source material (the setup) and in the case of political late-night shows such as *TDS*, often offers political commentary. In some cases, political late-night shows not only combine the argument and punch line but present the news headline/setup and argument separately, followed by a joke that reinforces the argument. While conveying news in the setup, effectively fulfilling a journalistic function, the host's interpretation of the news provided in conjunction with the punch line often fails to adhere to journalistic conventions of balance and neutrality for the sake of comedic effect (Day, 2011). To this effect, some have categorized the show as a "satirical program" though Knight (2004) and Skurka et al. (2019) have pointed out that satire is really a "frame of mind that mimics other genres rather than a unique genre unto itself" (Skurka et al., 2019, p. 396). Consequently, this article has adopted the umbrella term "late-night" to describe the show, as it is frequently used by late-night hosts (see Jammy, 2022, 01:31–01:34).

Scholars (Baym, 2010) and hosts of late-night suggest that though *TDS* (Katz, 2023) monitors the news, the show's creators "feel no obligation to follow the news cycle" (Doctoroff, 2008, para. 152). While featuring popular news stories, the show often also highlights issues "the general public might not have been familiar" (Brewer & Marquardt, 2007, p. 260) with, particularly those originating from the realm of science (Nelkin, 1995, pp. 66–68; Pew Research Center, 2008). This reinforces the finding that *TDS* presents an important venue for science and climate change communication (Brewer, 2013; Feldman, 2013a; Feldman et al., 2011). To analyze the kind of climate content that the show communicates to its audience, the following section discusses the methods used to examine it.

Methods

This study analyzes the climate change content on *TDS* (Katz, 2023) from January 2000 to December 2021. While Jon Stewart took over as host of the show two years before the beginning of the sampled time frame, it took until 2000 for Stewart's team to reconfigure *TDS* into the format it is known for today (Jammy, 2022). Focusing on the years 2000 through 2021, the study examines *TDS'* from season four, episode 76, to season 27, episode 42. Herein, *TDS with Jon Stewart* (O'Neil, 2006) makes up seasons four to 20, and seasons 21 to 27 relate to *TDS with Trevor Noah* (Pennolino, 2017a).

This section first outlines the two-step content analysis used to examine these episodes; this is followed by a more detailed exploration of the analytical steps: First, the study identifies which episodes of *TDS* (Katz, 2023) contain climate change content through a keyword analysis of *Daily Show* episode descriptions and YouTube clips. Second, the study conducts a more in-depth analysis of the segments

identified as containing climate change content by reviewing each *Daily Show* broadcast to identify the dominant themes and frames used by actors to shape *TDS'* discourse on climate.

This methodological approach thus builds on the blueprint of the three analyses of *TDS'* (Katz, 2023) science and climate change content by Brewer (2013), Feldman (2013a), and the Pew Research Center (2008). While the Pew Research Center (2008) study simply reviewed all *TDS* episodes in a year, this study focuses on a 21-year time frame and hence sought to narrow down the number of relevant episodes to be analyzed in a detailed qualitative thematic and framing analysis. To do so, it adapted Brewer's (2013) and Feldman's (2013a) approach of identifying relevant episodes via a quasi-quantitative content analysis of episode descriptions.

However, it became necessary to adapt and update some aspects of this methodological approach. Instead of identifying *TDS'* (Katz, 2023) climate change content via episode description analysis, Brewer (2013) and Feldman (2013a) relied on the tagging (keyword) system on the Comedy Central website. Unfortunately, the show retired its practice of "tagging" the content of videos with the departure of Jon Stewart as its host in 2015. Since this study also includes Noah's tenure (2015–2022), the method was adapted to analyze episode descriptions instead of episode tags.

Brewer (2013) and Feldman (2013a) remarked that their findings were limited due to their reliance on tags, or in this case, episode descriptions, provided on the Comedy Central website. To address this shortcoming, the study cross-referenced the results from the episode description analysis with a keyword search of the show's YouTube channels using the same search terms. Once the clips were identified based on this keyword search, they were reviewed to confirm they featured climate change content. The study followed Brewer's (2013) and Feldman's (2013a) tradition of coding by individual segments rather than episodes. Through this process, it was found that *TDS with Jon Stewart* (O'Neil, 2006) featured climate change content on 66 occasions, while *TDS with Trevor Noah* (Pennolino, 2017a) did so 76 times.

In the second round of analysis, the study performed a twofold examination of the identified segment clips. These clips varied in duration between approximately three and 12 minutes. First, the segments were coded based on whether they directly discussed climate change, meaning that an actor in the clip had to explicitly mention "climate change" (or a related term, e.g., "climate crisis" or "global warming") or whether the segment only indirectly (implicitly) referenced the climate crisis (e.g., mentioning it offhandedly or as one of multiple contributors to an environmental disaster). Direct (explicit) discussions of climate change were treated as dominant factors, meaning that if a segment included both direct and indirect references to climate change, it would be coded as "direct."

To ensure intercoder reliability based on Cohen's kappa, a random data subset comprising 36 segments (25% of the total number of climate-related segments analyzed in the study) was independently coded by the author and a trained PhD student. The intercoder reliability test found near-perfect agreement between the coders with a Cohen's kappa of 0.82 (1 implying perfect agreement, and any value above 0.81 is considered almost-perfect agreement), indicating 91.7% agreement between the two coders (Warrens, 2015).

Second, the study performed an inductive qualitative content analysis based on Krippendorff's (2008) guidelines, which have been used in previous studies of *TDS'* (Katz, 2023) climate change content (see Feldman, 2013a, 2013b). Herein, frames are considered instances of problem definition, including identifying causes and perpetrators (Entman, 1993). Based on Krippendorff's (2008) approach, the material was first reviewed and detailed notes were taken, which were in turn categorized based on themes and frames. Through this process, the study identified multiple thematic and framing patterns in *TDS'* climate change content, outlined in the next section.

Results and Discussion

The following section presents a brief overview of *TDS'* (Katz, 2023) climate change content from 2000 through 2021. Since the data examined for this overview were not randomly sampled but purposefully selected to illustrate *TDS'* climate change content, inferential statistics would not prove useful in comparing content (see Feldman, 2013a). This section thus only includes percentages and frequencies regarding *TDS'* climate change content and the direct or indirect discussion styles featured therein. The following section discusses the segments and actors through which *TDS* featured its climate content. The final section highlights dominant frames and themes in *TDS'* climate content, drawing on examples to illustrate the latter.

Overview of *TDS'* Climate Change Content

Among the 142 climate-related segments, 66 were featured on *TDS with Jon Stewart* (O'Neil, 2006) and 76 on *TDS with Trevor Noah* (Pennolino, 2017a). This means that Noah's *Daily Show* included an average of 11 climate-related segments per year from September 2015 to December 2021, while *TDS with Jon Stewart* averaged four climate-related segments per year between January 2000 and August 2015. This confirms the assumption that *TDS with Trevor Noah* would include more climate content than *TDS with Jon Stewart*, as hypothesized based on the increase in public concern regarding climate change observed by the YPCCC (Leiserowitz et al., 2009, 2022). *The Daily Show* (Katz, 2023) thus featured an overall average of 6.8 climate-related segments per year between 2000 and 2021. This finding is supported by Feldman's (2013a) tagging-based study of *TDS'* climate change content, which found that Stewart's *Daily Show* averaged six segments per year between October 2005 and April 2012. Additionally, the results reaffirm studies by Brewer (2013) and the Pew Research Center (2008), which demonstrated that *TDS* featured substantive amounts of science-related content.

Figure 1 shows the number of climate-related segments each year (2000–2021). The figure distinguishes between segments in which actors explicitly discuss climate change ("direct") and those in which the issue is merely implicitly referenced ("indirect"). While 85.5% of *TDS with Trevor Noah's* (Pennolino, 2017a) climate change content explicitly addressed climate change, only 68% of *TDS with Jon Stewart's* (O'Neil, 2006) climate segments did so. Consequently, Noah's tenure with *TDS* not only featured more climate change content compared with *TDS with Jon Stewart*, but it also incorporated more "direct" climate change references in the show. This finding is particularly notable, considering Noah had been the show's host for only half as long as Stewart was in the examined time frame. This trend aligns with growing public awareness and concern about

the climate crisis (cf. Leiserowitz et al., 2009, 2022). It supports the article's argument for the need to examine Noah's tenure further and highlights its contribution to the literature.

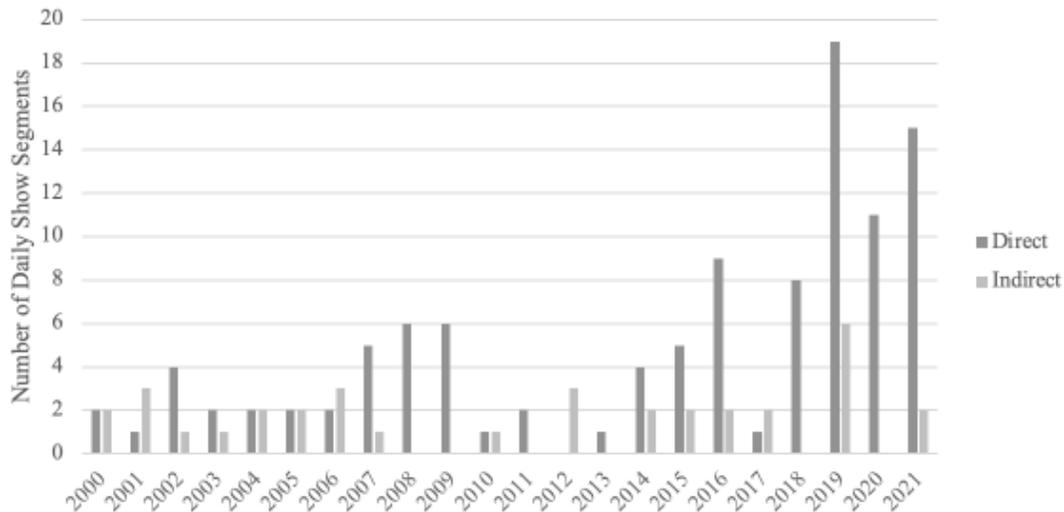


Figure 1. TDS' direct and indirect climate change content, January 2000–December 2021.

Variations in climate content should be contextualized with respect to other news events, such as natural disasters or presidential elections. For instance, with the peak in climate change content in 2019, featuring 19 explicit (direct) and six implicit (indirect) discussions of climate change on the show, observers may assume a continuation of this trend in light of the YPCCC's findings on the increasingly alarmed public's concern about climate change (Leiserowitz et al., 2022). However, soon after, the COVID-19 pandemic started dominating the news, meaning that the show's continued discussion of the climate crisis, though not at pre-pandemic levels, remained comparatively robust.

Similarly, when *TDS'* (Katz, 2023) climate content experienced a low in the early 2010s, the environmental newshole was dominated by man-made and natural disasters, including but not limited to the Halliburton oil spill, Hurricane Sandy, and Hurricane Katrina. A closer examination of episode descriptions confirms that much of the science and news discussed on *TDS* during these years was dominated by the environmental and human disaster responses and clean-up efforts directed by the Obama administration. This explains why the newshole in the early 2010s was too saturated to accommodate notable climate change coverage or policies. The 2012 presidential election further added to the suppression of these issues on the political and news agenda. Correspondingly, the 2017 dip in *TDS'* climate-related content can be attributed to the aftermath of the 2016 election, which rocked both traditional news and late-night shows, with many commenting on shows' apparent fixation on President Trump that took up content space traditionally reserved for other subjects, including climate.

Segment Distribution

The Daily Show's (Katz, 2023) climate change content was prominently featured in the host segment (59.2%), while the correspondent (21.8%) and guest (19%) segments both conveyed climate change content to a lesser degree. Though many of the climate-related host segments follow the type of event-driven news reporting expected in this category, hosts Noah and Stewart also appear to intentionally raise the issue of climate change at times when the mainstream news stories on which the segment is based do not make such an explicit connection. Examples of this can be found in *TDS'* coverage of the preparedness and relief efforts for Hurricanes Irma and Harvey, with the show's host wondering, "How many once-in-a-lifetime events is it going to take in our lifetime for everyone to admit that maybe man-made climate change is real?" (Pennolino, 2017d, 00:23–00:31). Bringing up the subject of climate change in superficially unrelated news stories, such as hurricane relief, thus underscores the crisis' urgency. This sentiment is captured on *TDS with Trevor Noah* (Pennolino, 2017a), with its host stating, "The actual end of the world is climate change. And it may not be the news of the day but technically climate change is the news of every day" (Pennolino, 2017a, 00:04–00:12).

This discussion of climate change at times when it is not prominently featured in the big news stories of the day becomes even more apparent in the less news-driven guest segments and the, at times, quirky correspondent segments that cover topics "the general public might not have been familiar" (Brewer & Marquardt, 2007, pp. 259–260) with, from Bigfoot to the "everyday impact of global warming" (Pennolino, 2017c, para. 1). The two segments presented similar amounts of climate change content, with 27 climate-related guest segments and 31 related correspondent segments. This segment distribution of climate change content is virtually identical to that identified in Feldman's (2013a) study, which distinguished between interview- (guest) and non-interview (host, correspondent) segments, finding that 20% of the guest segments discussed climate change.

The former vice president, filmmaker, and environmental activist Al Gore was the most frequently featured guest in climate change content. Gore appeared in a total of five guest segments, three of which were on *TDS with Jon Stewart* (O'Neil, 2006) and two on *TDS with Trevor Noah* (Pennolino, 2017a). Guests predominantly addressed climate change directly, with only one of 27 climate-related guest segments referencing climate change indirectly (implicitly). Though to a lesser extent, the correspondent segment also predominantly discussed the climate crisis directly, with less than a third of correspondent segments referencing the issue indirectly. This finding is in line with Feldman's (2013a) results identifying that guests who talk about global warming on the show ("global warming activists, environmental policy makers, scientists, and science writers"; p. 445) are often actively advocating and shaping the conversation on the matter. Though to a lesser extent, the correspondent segment also predominantly discussed the climate crisis directly, with less than a third of correspondent segments referencing the issue indirectly. The segment-based difference in direct and indirect modes of address may be due to the segment norms, with the more direct host and guest segment often focusing on hard news items, such as policies, protests, or political summits, while the less direct correspondent segment is more attuned to soft news.

Correspondents in climate-related segments made the case for more climate-friendly lifestyle options with a wide variety of field segments and in-studio appearances covering topics from plant-based diets to protest culture. While he became a correspondent only at the beginning of Noah's tenure in 2015, Ronny Chieng was the most active correspondent in the show's discussion of climate change, starring in

eight of 31 climate-related correspondent segments. Chieng often covered the technology beat, reporting on the newest gadgets and inventions, from artificial intelligence software used in the legal system to toilets generating drinking water. Unsurprisingly, Chieng's climate-correspondent segments thus often focused on technological solutions to the crisis, such as ultraviolet shields blocking out sun rays and floating cities adapted to rising sea levels. By focusing on potential solutions, Chieng's climate segments provided rare examples of *TDS'* (Katz, 2023) frames of climate change, including all four functions of framing (problem definition, problem diagnosis, moral judgment, and solution suggestion; Entman, 1993). The following section further discusses *TDS'* framing of the climate crisis.

Thematic and Framing Patterns

Overall, the qualitative content analysis focused on identifying prominent frames and themes in *TDS'* (Katz, 2023) climate content. This section begins with a brief overview of the (1) framing and (2) thematic analysis, followed by examples of how the two intersect. The discussion predominantly focuses on *TDS'* direct (explicit) climate content, featured more frequently on the show between 2000 and 2021.

The study's framing analysis found that *TDS* (Katz, 2023) predominantly relied on the first three functions of framing (Entman, 1993), defining the climate-related problem (typically of a political nature, e.g., President Trump's 2017 withdrawal from the Paris Agreement), identifying the causes and responsible political actors (e.g., climate skepticism in the Trump administration), and making a moral judgment (critiquing the Trump administration for undermining an international climate agreement). While the fourth framing function (solution suggestions) occasionally appears, most frequently in correspondent segments, problem definition and the identification of underlying causes and responsibilities in the political sector were prioritized.

The qualitative framing analysis found that *TDS'* (Katz, 2023) less frequent *indirect* (implicit) discussion of climate change almost exclusively featured environmental frames, meaning that the climate crisis was overwhelmingly "discussed in terms of its environmental impacts, such as death or danger to plant and animal species, increase in severe weather events, sea level rise or flooding" (Feldman, 2013a, p. 438). However, *TDS'* more frequent *direct* (explicit) climate change content predominantly featured politically charged frames, including conflict, public accountability, and morality frames. In her framing analysis, Feldman (2013a) similarly found that *The Colbert Report* (Stewart, 2005) and *TDS with Jon Stewart* (O'Neil, 2006) employed conflict frames most frequently. The author (Feldman, 2013a) attributed the frames to late-night shows' focus on political controversy (Anderson, 2004), cautioning that some "audiences may not 'get' the show's criticism of climate skepticism and political inaction" (Feldman, 2013a, pp. 445–446) due to the ambiguity with which the hosts communicated the issue. However, in light of *TDS'* increasingly explicit discussion of climate observed in this article, such ambiguity or misunderstandings appear unlikely today.

The political focus of *TDS'* (Katz, 2023) climate content was also reflected in the qualitative thematic analysis. Herein, the study found that *TDS* stayed true to its character as a *political* late-night show, with climate change content often focusing on political actors and events. Evidence of this includes former vice president Al Gore being the most frequently featured guest in *TDS'* climate content. Prior research supports this finding, with scholars noting its alignment "with Stewart's reputation for holding politicians accountable for their actions and words" (Brewer & Marquardt, 2007; Day, 2011; Feldman, 2013a, p. 466). While most

studies on *TDS* have focused on *TDS with Jon Stewart* (e.g., Baym & Shah, 2011; Fox et al., 2007; O'Neil, 2006; Young, 2013), this article confirmed that the trend also applies to Noah's *TDS* tenure.

Within this concentration on political actors, the article found that *TDS'* (Katz, 2023) climate content particularly focused on Republican presidents' climate skepticism. For instance, in his 2006 guest appearance on *TDS with Jon Stewart* (O'Neil, 2006), Al Gore addressed "President Bush . . . [and] his administration" (O'Neil, 2006, 01:50–01:56) when discussing his concerns about the climate crisis. This confirms Brewer's (2013) finding that *TDS'* science content "revolves around the efforts of a conservative movement to challenge an emerging scientific consensus that humans have contributed to global warming" (p. 458) though the scientific consensus on anthropogenic climate change can be called emergent no more (see Consensus Project, 2022). Other scholars have similarly confirmed *TDS'* emphasis on Republican climate skepticism (Feldman, 2013a) and late-night shows' general focus on and criticism of Republican politicians and political actions (Anderson, 2004; Day, 2011). Late-night shows' focus on sitting presidents and their opponents has also been demonstrated in election-themed research (Niven et al., 2003).

To put this Republican presidential thematic focus into context, a keyword search of *TDS* (Katz, 2023) episode descriptions shows an even starker difference in *TDS'* framing of climate content in relation to Democratic and Republican presidents. The description analysis showed that Democratic presidents' (Obama, Clinton, Biden) climate politics were not mentioned at all (zero) in episode descriptions relating to *TDS'* climate change content. Republican presidents' climate politics, on the other hand, proved defining motives in *TDS'* climate discourse. *The Daily Show* episode descriptions framed climate content with reference to George Bush nine times, accounting for 24.3% of climate change content during Bush's eight years in office (2001–2009), and Donald Trump 13 times, equating to 27.7% of climate content during his four years as president (2017–2021).

On closer examination of this thematic focus, the study identified three distinct subthemes in *TDS'* (Katz, 2023) discussion of climate change with reference to Republican presidents Bush and Trump's skepticism: Supporters, opponents, and environmental deregulation. This emphasis on the extreme ends of political debate, be that supporters versus opponents or climate skepticism overall, speaks to the hypothesis that *TDS'* climate content focuses on representations of the extreme ends of the YPCCC audience segmentation (the alarmed and the dismissive; Leiserowitz et al., 2022). This assumption is supported by previous research on late-night shows' focus on the extremes and margins of political debates (Anderson, 2004; Feldman, 2013a). The remainder of this section combines the thematic and framing analysis findings to illustrate these subthemes using the example of Trump's 2017 withdrawal from the Paris Agreement, beginning with subtheme (1) supporters, followed by (2) opponents and finally (3) deregulation.

First, *TDS* (Katz, 2023) positions climate change in relation to Republican presidents' climate skepticism by focusing on the presidents' supporters. This includes instances in which presidents are perceived as catering to, fulfilling, or failing promises to their supporters. *TDS* actors challenge the underlying economic reasoning supposedly motivating Bush, Trump, and their supporters in their climate skepticism and antienvironmental policies, specifically focusing on the Republican attachment to the fossil fuel industry. For instance, following Trump's withdrawal from the Paris Agreement, Noah explained,

In his mind, this decision [to take the US out of the Paris Agreement] basically fulfilled his promise [to his supporters] to bring back old-school industrial jobs, you know, like cement and steel, and coal. And here's the thing, we all want people to have jobs, but the numbers have shown that green energy is where the work is gonna be. . . . And you know what? I think this had less to do with jobs and America's economy, and more to do with how Trump thinks this makes him look to the rest of the world. (Pennolino, 2017b, 03:14–03:51)

In this host segment, Noah thus frames the president's antienvironmental actions as primarily motivated by Trump's ego rather than concern for his supporters' economic security.

Second, *TDS* (Katz, 2023) thematizes climate change in relation to Republican presidents' climate skepticism by highlighting opposition and public resistance to the latter. *The Daily Show* discusses both national and international public resistance to the presidents' environmental deregulation policies, climate change being a global issue. Both Stewart and Noah contrast reporting on Bush and Trump's failure to address the climate crisis (or even acknowledge its existence) with protests held by those opposing the presidents' environmental policies (or lack thereof). In the case of Trump's withdrawal from the Paris Agreement, *TDS* emphasizes two forms of public resistance: (1) public protests, such as the *People's Climate March* and (2) legislative acts of dissent, as highlighted in the following. Host Noah portrays these opposing parties (Trump vs. public/political opponents) through the lens of a conflict frame, stating, "It turns out that when it comes to climate change, the [United] States are not exactly united" (Pennolino, 2017b, 03:09–03:17), referring to 10 states whose Democratic legislators countered Trump's withdrawal from the Paris Agreement by signing climate commitments of their own. Noah continues, "You can't blame these ten states for taking climate change seriously, I mean [. . .] they would be the first to be hit . . . if sea levels continue to rise, they will be the first to go" (Pennolino, 2017b, 03:58–04:08). In this and other examples, *TDS* actors position themselves on the side of resistance defined in opposition to the Republican president's stance.

Third, *TDS* (Katz, 2023) situates climate change in relation to Republican presidents' climate skepticism by discussing the respective administration's environmental deregulation efforts. In the case of Trump's withdrawal from the Paris Agreement, Noah offered a rebuke to Trump's reasoning for his actions. For instance, regarding Trump's claim that other world leaders were supposedly ridiculing the United States for intentionally placing limitations on and thus harming its economy due to climate change mitigation measures, Noah responded,

No one was laughing at you, Donald. I mean, well, not for this. . . . The other countries were cheering because it was a chance to save Mother Earth, not screw Uncle Sam . . . I don't know where Trump got this paranoid idea, you know, like the world was going: "Haha, look at this idiot, joining us to save the planet and the children, hahaha, dumbass." (Pennolino, 2017b, 04:28–04:57)

Here, Noah positions himself, and thus *TDS* (Katz, 2023), in opposition to the Republican president's actions, demonstrating semantic authority in appealing to the audience's common sense, encouraging viewers to question Trump's interpretation of the Paris Agreement's effects on the international perception of the United States.

Conclusion

The principal aim of this study was to provide a systematic overview of *TDS'* (Katz, 2023) climate change content from January 2000 to December 2021 to foster a better understanding of how frequently, and in what ways, the late-night show featured climate change content. The article thus provides the first longitudinal study of *TDS'* climate change content over the course of 21 years, updating and expanding both methods and findings on *TDS'* climate discourse. The analysis focused on direct and indirect mentions of climate change by *TDS* actors as well as identifying thematic and framing patterns in the show's climate content.

The motivations for this analysis were twofold: First, existing studies on *TDS'* (Katz, 2023) climate content were outdated. As such, these studies failed to account for recent trends in climate discourse, most notably the overall rise in public concern about the climate crisis (Leiserowitz et al., 2009, 2022). In addition, by virtue of being almost a decade old, previous literature on the subject exclusively focused on *TDS with Jon Stewart* (O'Neil, 2006), begging the question of whether Noah's tenure at the helm of *TDS* would follow a similar trajectory, considering the shift in public opinion on climate change. As hypothesized, the study found that *TDS'* climate change content significantly increased in volume over time, with *TDS* featuring an average of 11 climate-related segments per year during Noah's first seven years in the news (parody) anchor chair, while *TDS with Jon Stewart* only averaged four climate-related segments per year in his 15 years as *TDS* host. Although a comparison of the show's hosts remains fraught since Noah and Stewart's respective tenure at *TDS* is anchored in a specific socio-political context, the study nonetheless noted a considerable increase in climate change content during Noah's time at the helm of *TDS*. With Noah leaving the show in December 2022, future research could examine whether and how the next *TDS* host approaches the subject of climate change and how this might impact viewer perceptions.

Second, the analysis of themes and frames was motivated by previous research on *TDS* (Anderson, 2004; Katz, 2023) and its climate content (Feldman, 2013a), finding that *Daily Show* coverage tends to focus on the extreme ends of the climate discourse, suggesting that *TDS'* climate content between 2000 and 2021 would focus on the opposite ends of the YPCCC audience segmentation (the alarmed and the dismissive; Leiserowitz et al., 2022). The findings confirmed this hypothesis, identifying a thematic focus on Republican climate skepticism and a further focus on the extreme ends of the political debate in the subthemes therein (supporters vs. opponents). Previous studies cautioned that viewers may interpret late-night content in line with their political beliefs due to the source material's ambiguity, for example, viewers dismissive of climate change could interpret *TDS'* content as affirming climate skepticism (Brewer & McKnight, 2015; Feldman, 2013b; LaMarre et al., 2009; Young, 2013). However, the study demonstrated that the majority of *TDS'* climate content addressed the issue directly, with the show's actors (hosts, correspondents, and guests) often positioning themselves in opposition to the frequently discussed Republican presidents Bush and Trump's climate politics. *The Daily Show's* climate change content hence centered around political personalities, and in doing so, it framed critical political beliefs about climate change and supported the strengthening of the consensus on scientific evidence of the climate crisis.

In summary, the article thus provides a more nuanced analysis of *TDS'* (Katz, 2023) climate change content in the years 2000 to 2021 compared with previous studies, building on and updating their

methodological approaches and findings. Due to format restrictions, the article was unable to explore the role of Democratic politicians in *TDS'* climate discourse further, focusing on the dominant role of Republican politicians instead. The article encourages future studies toward a more comprehensive examination of Democratic climate politics on *TDS*.

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