



Narrowing the Gap: Gender and Mobilization in Net Neutrality Advocacy

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In 2015, the Federal Communications Commission moved to regulate the Internet under Title II of the Communications Act of 1934, handing net neutrality advocates a major victory. This followed years of impassioned advocacy by a wide range of ideological actors. This study examines several factors that influenced the gender gap in one prominent type of net neutrality activism: messages submitted to the commission during the first of two official comment periods in 2014. Our computational analysis of more than 800,000 such comments identifies and profiles 11 distinct advocacy campaigns that together accounted for nearly 60% of commenters. We find that progressive campaigns attracted relatively high proportions of female commenters, whereas conservative and tech-focused campaigns overwhelmingly elicited responses from men.

Keywords: gender gap, Federal Communications Commission, data science, computational, feminism, Internet

Few issues directly affect how Americans use the Internet more than network neutrality. The core norm of net neutrality can be summarized briefly: All Internet traffic should be treated equally by Internet service providers (ISPs) regardless of origin or content (Wu, 2003). This implies that moneyed interests should not be able to pay ISPs for faster access to end users. Net neutrality has been an active telecommunications policy issue since at least 2003, and supporters won a major victory in 2015 when the Federal Communications Commission (FCC) proposed to regulate the Internet as a telecommunication

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service under Title II of the Communications Act of 1934. This decision is not the final word on net neutrality, however, as it is likely to be challenged in court by companies that would benefit from its absence (Kastrenakes, 2015).

Pro-neutrality activism may have played a substantial role in swaying the FCC toward protecting net neutrality (Faris, Roberts, Etling, Othman, & Benkler, 2015), on which it equivocated throughout much of 2014. A diverse array of public advocacy actions and events preceded the FCC's 2015 decision, including a number of organized calls to submit public comments to the FCC during two official comment periods in 2014. The FCC received more than 3.7 million comments during these two periods, and the available evidence suggests that the majority of those received during the first period supported net neutrality (Lannon & Pendleton, 2014). Public opinion polls showed that large majorities of Americans who understood the concept of net neutrality supported it (Center for Political Communication, 2014; Moore, 2014).

Because net neutrality directly affects the vast majority of Americans, we were particularly interested in the diversity of the individuals who directly lobbied the FCC. Like many federal agencies, the FCC regularly solicits public comment to help ensure that its policies are fair and reflect the interests of society as a whole. A diverse public comment pool would enable the FCC to consider the views of a wide variety of Americans. As feminist authors have long argued, net neutrality is especially important for women in general and feminists in particular. Fortuitously, the structure of the FCC's public commenting system allows us to examine several factors that may have influenced the comment pool's gender gap. Our results offer a theoretically, methodologically, and practically valuable object lesson in what motivates men and women to speak out on issues of importance to them.

Net Neutrality Advocacy

For the better part of the past two decades, policymakers, communication scholars, and technology companies have debated how to regulate the Internet. With a few minor exceptions, the U.S. Internet has been net-neutral for its entire history, in spite of occasional anti-net-neutrality overtures from telecom companies (see e.g., O'Connell, 2005). Yet, media policy experts and concerned citizens have known for years that net neutrality is not guaranteed. Indeed, the issue has provoked a vigorous public debate among a host of parties on both sides. These interests have attempted to sway the FCC to regulate the Internet either as a neutral medium or as one subject to the profit motives of the small number of companies that control Internet access.

On May 15, 2014, the FCC published a regulatory proposal titled "Protecting and Promoting the Open Internet." Despite being nominally intended to preserve "openness," it was interpreted by some as a threat to net neutrality because it did not specifically ban Internet "fast lanes" (Robertson, 2014). But as our results show, others believed the proposal would result in a "government takeover" of the Internet because of its (noncommittal) discussions of common carriage and Title II. Thus, both the pro- and anti-net-neutrality movements viewed the proposal as an urgent opportunity to press their respective cases. One of the primary ways they did so was by submitting opinions and recommendations directly to the FCC, which solicited such comments in the proposal.

Although most net neutrality scholarship has focused on its legal and/or technical dimensions (e.g., Cheng, Bandyopadhyay, & Guo, 2010; Crowcroft, 2007; Economides, 2008; Nuechterlein, 2009), a handful of communication studies have addressed net neutrality activism directly. Some are stridently activist in tone, emphasizing the role of net neutrality in facilitating a range of long-standing progressive political goals (Ross-Brown, 2015; Shade, 2008). A separate branch explores how media outlets and advocates from across the ideological gamut have framed and argued for their positions (Harpham, 2010; Löblich, in press; Powell & Cooper, 2011; Stiegler & Sprumont, 2013). These studies emphasize the strong role of advocacy organizations in focusing public attention and directing public action. Some such organizations are longtime media reform advocates, some view net neutrality as a critical component of social justice, some believe it is essential to preserve online liberty, and some simply oppose federal regulations on principle (Faris et al., 2015; Löblich, in press). These groups, which originate in both the private and nonprofit sectors, demonstrate the wide range of interests with a stake in the FCC's eventual decision. At least one study argues based on the volume and timing of online news sharing that the pro-neutrality camp decisively influenced that decision (Faris et al., 2015).

One of the most unorthodox net neutrality advocates was John Oliver, host of the political comedy television show *Last Week Tonight With John Oliver*. As an alumnus of *The Daily Show*, Oliver addresses news and politics in a similar albeit more in-depth (and more overtly left-of-center) format. On his June 1, 2014, broadcast—only the fourth episode yet aired at that point—Oliver discussed net neutrality extensively in a 13-minute segment. Using humor, metaphor, and pop-culture references, he explained what net neutrality is and argued forcefully for its preservation. At the end of the segment, Oliver encouraged viewers to log on to the FCC website and urge the agency to protect net neutrality, which resulted in a deluge of Web traffic that temporarily disabled the site (Faris et al., 2015; Lannon & Pendleton, 2014).

Oliver's entry into the ranks of net neutrality advocates is especially interesting given the audience demographics of political comedy programming, which overlap substantially with the segment of Americans who know most about net neutrality. Millennials make up a disproportionate share of the political comedy audience and strongly prefer entertaining news content (43% of *The Colbert Report's* regular audience and 39% of *The Daily Show's* were under 30 years of age in 2012; yet, just 23% of the American public was between the ages of 18 and 29 years at the time; Pew Research Center, 2012). In addition, political comedy viewers are disproportionately male, politically progressive, and highly educated, with the largest share possessing a college degree (Gottfried, Matsa, & Barthel, 2015).

This demographic looks much like net neutrality's issue public. A YouGov poll taken less than a month before Oliver's net neutrality segment first aired revealed that those who knew the term *net neutrality* were disproportionately White, male, college educated, and high income (Moore, 2014; also see Center for Political Communication, 2014). This may help explain why Oliver was able to motivate such a massive response: Many in his audience likely had already heard about the issue and were thus predisposed to be mobilized.

Gender, Feminism, and Online Political Participation

In addition to research on net neutrality activism, three strands of scholarship on feminist/gendered activism and online political participation inform this study. The first examines feminist counterpublics (Fraser, 1990; Travers, 2003) in online contexts. Many of these studies analyze cases in which feminists used online tools to pursue political and social goals effectively (e.g., Finnigan & Ross, 2013; Keller, 2012; Puente, 2011; Schuster, 2013; Shaw, 2014). This research is generally optimistic about the prospects of Internet-enabled feminist activism, even given the prevalence of misogynistic harassment online (Herring & Stoerger, 2013; Marwick & Miller, 2014; Shaw, 2014). Most of the use cases analyzed specifically addressed women's issues—gendered media criticism, violence against women, women's roles in various religions, and so on—as opposed to issues such as net neutrality in which the role of gender is not as obvious.

Making explicit the connections between net neutrality and feminism is the core project of the second strand of feminist literature undergirding our work. Both academic and nonacademic feminists have argued that net neutrality is a particularly, even disproportionately, significant concern for feminists (Free Press, 2014; Mirk, 2014; Shade, 2011; Shaw, 2014; Wood, 2008). These authors are nearly unanimous in their support of strong net neutrality rules (for a dissenting view, see Tate, 2013). For example, Shade (2011) points out that “[feminists’] ability to organize and mobilize effectively depends upon use of social media tools free from censorship” (pp. 126–127). Outside the academy, the media policy advocacy organization Free Press (2014) echoes a similar sentiment: “Women have used the open Internet to talk back to the mainstream media and create their own spaces online” (para. 4). Net neutrality is framed here as an essential element of the digital foundations upon which feminists have so productively plied their trade. Strong net neutrality regulations are therefore necessary to ensure that the Internet will continue to serve feminists well.

The dominant position among both academic and nonacademic feminists seems to be that net neutrality affects women at least as much as, if not more than, men. Considered in isolation, this might be taken to imply that men and women engage in net neutrality activism on a roughly equal basis. However, evidence from our third strand of feminist literature casts doubt on this possibility. A number of studies have detected gender gaps in various forms of political participation wherein women participate at substantially lower levels than men. These gaps persist in both offline contexts (Costantini, 1990; Mohai, 1992; Verba, Burns, & Schlozman, 1997) and online (Harp & Tremayne, 2006; Herring & Stoerger, 2013; Stromer-Galley & Wichowski, 2011). Not all studies specify how such gaps differ across issues, but those that do find disparities across a range of issues (Chaney, Alvarez, & Nagler, 1998; Costantini, 1990; Mohai, 1992; Schlozman, Burns, Verba, & Donahue, 1995). Men and women also differ in terms of how they engage: Men participate more in political parties, protests, and formal public deliberations, whereas women are more likely to participate privately in such actions as boycotting and political consumerism (Burns, Schlozman, & Verba, 2001; Coffé & Bolzendahl, 2010; Karpowitz, Mendelberg, & Shaker, 2012; Stolle, Hooghe, & Micheletti, 2005).

Several factors underlie these disparities. Burns et al. (2001) explain how male advantages in education, the workplace, and religious institutions translate into greater rates of political participation. Coffé and Bolzendahl (2010) blame the gap on men's greater levels of political interest and efficacy, which are likely linked to the broader structural factors that Burns et al. discuss. In a study of gender differences in public deliberations, Karpowitz et al. (2012) found that specific changes to the ground rules of debate caused the gender participation gap to disappear. In something of a departure from these studies, we examined other potential influences on the gender gap in political participation. Following from our discussion in the previous section, we are interested in the extent to which men and women respond differently to calls to speak out on net neutrality issued by various advocacy organizations. Our results help fulfill the field's long-standing normative goal of understanding of how such gender gaps can be bridged. The gendered participation gap is especially relevant to the issue of net neutrality in light of the latter's importance to online feminist counterpublics.

First, in accordance with prior research, we predict an overall gender gap favoring men in political expression about net neutrality. Given the many studies that have detected gender gaps on other issues, it would be very surprising not to see one here. Second, we expect that the political ideologies of the advocates of net neutrality activism would influence the gender gap in political expression on the issue. Women have long skewed progressive in their political attitudes as compared with men, especially on issues of social equality (Eagly, Diekmann, Johannesen-Schmidt, & Koenig, 2004). Consequently, we expect that calls to action from progressive advocacy groups would appeal more to women than would such calls from conservatives. Third, we expect that technology policy advocates would appeal primarily to men. Technology-focused calls to participate on an issue most often framed in technical terms (Stiegler & Sprumont, 2013) are likely to exhibit the same male dominance for which the tech industry has long been notorious (Dyer-Witheford & de Peuter, 2006; Frenkel, 1990; Hicks, 2013). Fourth, consistent with the preceding discussion, we expect that the issue's portrayal through a political comedy lens would be associated with a widening of the gender gap. Fifth, we investigated how the gender gap changed during moments of high attention. Online attention to news and public policy issues tends to be event-driven, and the FCC's net neutrality proposal was no exception. Periods of high attention tend to alter the patterns of information exchange and communication that prevail at less active times in unexpected ways (Freelon & Karpf, 2015; Lin, Keegan, Margolin, & Lazer, 2014).

The following hypotheses and research questions summarize these empirical goals more formally:

H1: Men will post a majority of the FCC comments about net neutrality.

RQ1: Which advocacy campaigns will encourage citizens to post comments?

H2: Comments originating from technology-focused advocacy campaigns will manifest a wider gender gap than those from non-tech campaigns.

H3: Comments originating from conservative advocacy campaigns will manifest a wider gender gap than those from non-conservative campaigns.

H4: Comments originating from progressive advocacy campaigns will manifest a narrower gender gap than those from non-progressive campaigns.

H5: Comments posted immediately after John Oliver's net neutrality broadcast will manifest a wider gender gap than comments posted at other times.

RQ2: How will spikes in FCC comment activity affect the gender gap?

Method

This study analyzed public comments submitted electronically to the FCC regarding its 2014 net neutrality proposal. Many U.S. federal agencies, including the FCC, are required by the Administrative Procedure Act of 1946 to solicit public comments on proposed regulations. The purpose of federal rulemaking comment procedures is to give the public opportunities to inform regulators of the possible consequences of their decisions. It is ideal for agencies to receive input from as diverse a group of Americans as possible so that "rule writers can weigh competing interests carefully and craft consensus around acceptable alternatives" (Regulations.gov, n.d., para. 7). If the FCC's comment procedure is intended to solicit views from all parties affected by its proposed policies, it should ideally hear from as many women as men.

The FCC held two open comment periods for its 2014 proposal. This study analyzed only the first period, which lasted from February 19, 2014, to July 15, 2014; this original deadline was extended until July 18, 2014. All comments submitted via the FCC's online comment system and the e-mail address openinternet@fcc.gov were publicly viewable. The FCC bundled all comments from the first period into six XML files, which it posted to its website. These files contained a total of 446,719 distinct data entries. Some of these entries represented individual comments, while others were collections of comments posted as single entries by advocacy campaigns. This study's third and fourth authors created and publicly posted a derivative data set in which they disaggregated all fields containing multiple comments so that each comment occupied its own separate entry.¹ Their efforts revealed that 801,781 individual comments had been posted to the FCC's website instead of 446,719. This study analyzed this derivative data set instead of the FCC's because it more faithfully represented the available body of citizen commentary.

Each comment field contained a series of metadata, including the commenter's name, zip code, the date the comment was posted, and the full text of the comment. Most commenters entered a first and last name, although some entered obvious pseudonyms such as "Concerned Citizen" or "Anonymous." As our primary interest was in gender gaps, we wanted to ensure that our results would not be distorted by highly active users, of which there were several. At the same time, we wanted to account for the possibility that distinct users might share very common first name/surname combinations. With these two concerns in mind, we constructed an identifier for each comment consisting of whatever was entered in the "name" field followed by the zip code. Whenever two or more comments appeared with identical full

¹ This data set is available at <http://sunlightfoundation.com/blog/2014/09/02/what-can-we-learn-from-800000-public-comments-on-the-fccs-net-neutrality-plan/>.

name/zip code combinations, we removed all but the first comment. This procedure yielded 718,592 unique users, a 10.4% reduction from the original comment count.

The fact that most users identified themselves with a full name allowed us to construct a lexicon-based gender-guessing algorithm based on the open-source Genderator module for the Python programming language (Muller, 2012). Genderator uses a lexicon of 61,846 gender-labeled first names to assign the corresponding gender label whenever a given text string is entered into it. Whenever a string not present in the name lexicon is entered, Genderator returns a value of "unknown."

Genderator's built-in lexicon is extensive but required some modification. For example, it considers the strings "Kyle," "Mike," and "The" to be female names. To remedy these and similar idiosyncrasies, we entered all first names in the data set into Genderator and then manually inspected the 300 most frequently occurring names categorized as male, female, and unknown (i.e., 900 in total). This allowed us to edit Genderator's name lexicon so that it could properly classify the most popular names it had initially misclassified. We used our modified Genderator lexicon to classify the genders of all users in the data set.

A substantial minority of users entered e-mail addresses into the "name" field. For these and other non-name text strings, we directed Genderator to determine the longest name of four or more characters that could be detected when scanning from the start of the string.² For the fictional e-mail address thomaswheeler2016@fcc.gov, our script would have extracted the name "Thomas" and coded it as male. Strings that did not begin with discernible names of at least four characters in length were coded as unknown. Our finalized algorithm provided conclusive gender guesses for 84.1% of all unique users ($n = 604,459$), coding the remaining 15.9% ($n = 114,133$) as unknown.

To identify the advocacy campaigns that exhorted citizens to submit comments, we took advantage of the fact that many of them provided boilerplate text that citizens could modify at their discretion. We algorithmically clustered comments with substantial portions of identical text by applying a dimensionality-reduction technique called latent semantic indexing (Deerwester, Dumais, Landauer, Furnas, & Harshman, 1990) to a sparse document-by-term matrix created from the data. Latent semantic indexing essentially performs recursive principal components analysis to naively describe latent structure in collections of text documents based on patterns of term co-occurrence. The process creates three matrices: a diagonal matrix that describes the relative weights of 200 "topics" found in the corpus, a term-by-topic matrix, and a document-by-topic (transposed) matrix. These three matrices, when multiplied together, re-create the original document-by-term matrix. The "topics" are groups of words that frequently co-occur within comments; we chose to generate 200 because this number produced interpretable topics, whereas higher and lower numbers did not.³

² We chose these parameters because searching for three-character names and starting at positions other than the beginning of the string produced too many false positives.

³ See Bradford (2008) for an extended discussion of the considerations involved in choosing the number of dimensions to use in latent semantic indexing.

Using the document-by-topic matrix, we produced clusters via iterative k -means clustering, which splits the total document space into smaller collections of documents of decreasing variance. Beginning with $k = 5$ in the first iteration, we then proceeded to each cluster and repeated the k -means clustering process with $k = 5$. If the decrease in variance (using the parent cluster's variance as baseline) was greater than a threshold of 0.1 within at least two of those clusters, we accepted the new division and proceeded with k -means clustering within each cluster. If not, we backed off to $k = 4$, and again tested for variance decreases. If clustering with $k = 2$ still produced an insufficient drop in variance, we concluded that that particular cluster was not to be split.

This process yielded 758 numerically-labeled clusters. By searching for evidence of organizational sponsorship within the largest, lowest-variance clusters and, when that failed, entering snippets of their respective texts into a search engine, we identified a total of 11 distinct campaigns (not counting John Oliver) that together accounted for 58.7% of all unique users. Nine were in favor of net neutrality, with two opposed. We should emphasize that the fact that our algorithm could not classify a particular message as part of an advocacy campaign does not necessarily imply that it was independently posted.

Results

H1 predicted that the majority of comments would be posted by men. Of the 604,459 users our lexicon identified as either male or female, almost two thirds (63.8%, $n = 385,669$) were male. This number accounts for 53.7% of all comments, so even if all those coded as unknown turned out to be female, men would still hold a slight majority. Figure 1 plots the respective volumes of male and female comments over time, showing that each gender's contributions rose and fell at the same times.

RQ1 inquired about the major advocacy campaigns that asked citizens to send comments to the FCC. Our clustering process identified 11 different campaigns, each of which we briefly describe here in descending order of size:

- *CREDO Action (114,926 users)*: This campaign was the largest of all those we identified, accounting for 14.7% of all comments in the Sunlight data set. CREDO Action is the activist branch of the CREDO Mobile wireless provider, which funds a wide range of progressive causes. Its form letter condemned "the proposed rules that would allow Internet service providers to divide the Internet into fast lanes for wealthy corporations and slow lanes for the rest of us."
- *Battle for the Net (98,728 users)*: This is a coalition campaign co-created by four progressive media and/or technology policy organizations: Fight for the Future, Demand Progress, Free Press, and Engine Advocacy. Its form letter characterized net neutrality as "the First Amendment of the Internet" and emphasized the damage a non-neutral Internet would cause new businesses. As of this writing, Battle for the Net is still actively defending net neutrality against its opponents.
- *Daily Kos (95,713 users)*: Daily Kos is a progressive blog and discussion forum that began operations in 2002. Like CREDO Action, it coordinates many campaigns that advocate for a range of political causes. Daily Kos ran at least nine separate net neutrality campaigns during the first

FCC comment period, each with its own distinct form letter. These campaigns were linked by their identical introductory and concluding texts, as well as the fact that the different form letters all made similar substantive points.

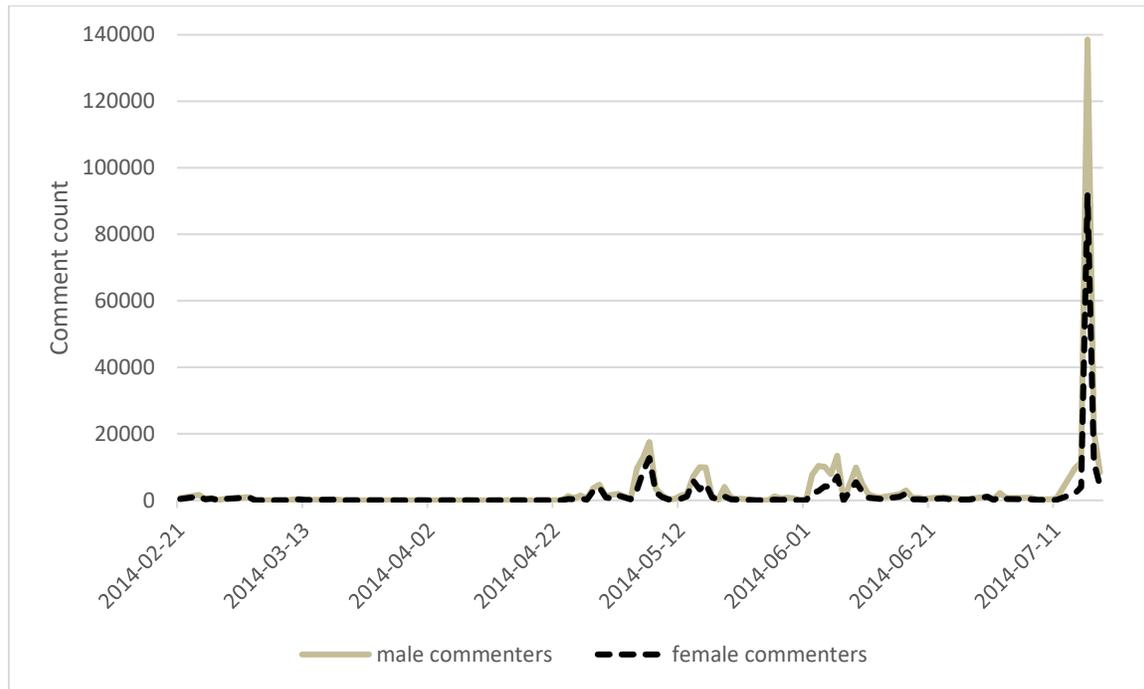


Figure 1. Volumes of comments by men and women over time.

- Electronic Frontier Foundation (79,409 users)*: Founded in 1990, the Electronic Frontier Foundation is one of the oldest digital rights organizations in the United States. Its campaign encouraged users to personalize their comments with the phrase "Net neutrality. . . is important to me because . . ." Many users took this opportunity to add personal testimony about net neutrality's impact on their lives.
- American Commitment (11,610 users)*: American Commitment is a conservative nonprofit group that advocates accordingly. It is on record as being staunchly anti-neutrality, but that position is difficult to discern from its form letter, which was written extremely vaguely. The letter did not include the phrase *net neutrality* at all, but instead decried "the FCC's crippling new regulations that would put federal bureaucrats in charge of Internet freedom." At no point did the letter describe the details of these proposed regulations. The FCC's 2014 proposal did not endorse a specific regulatory scheme, which raises the question of whether the letter's signatories understood exactly what they were signing. But regardless of the letter's content, American Commitment's explicit opposition to net neutrality makes its intentions unmistakable.

- *The Nation (9,470 users)*: The long-running progressive magazine's pro-neutrality campaign is similar to the other progressive campaigns, emphasizing the detrimental impact of non-neutrality on "every day [sic] Internet users." Its form letter incorrectly claimed that "the Federal Communications Commission is planning on implementing rule changes that would allow *Internet service providers* [emphasis added] to pay for special, faster lanes to deliver their content," but in fact it is content providers who would be able to pay ISPs for traffic priority under "fast lane" proposals. This error underscores how net neutrality's nuances can confound even those who are highly engaged on the issue.
- *Free Press (5,052 users)*: Although its concerns as a progressive media policy nonprofit are not limited to the Internet, Free Press has long advocated for net neutrality. Its form letter highlighted the "widespread discrimination online" that a non-neutral Internet would permit.
- *Avaaz (4,555 users)*: As an international progressive advocacy network, Avaaz's FCC activism was only one prong of a global pro-neutrality campaign. Like the Electronic Frontier Foundation's, its letter encouraged supporters to "write your own message of support for Net Neutrality here." Its concluding boilerplate marked each message "as part of an Avaaz campaign to stop the corporate Internet takeover."
- *Reddit/r/technology (975 users)*: Billing itself as the "front page of the Internet," this popular collaborative news forum has courted controversy with its tolerance of offensive speech. A thread posted to the r/technology subreddit in May 2014 included a succinct pro-neutrality statement that the author encouraged readers to forward to the FCC. The statement declared "opposition to any proposal that allows specific ISPs or content providers to selectively adjust Internet bandwidth or throughput, based on any criteria."
- *Stop Net Regulation (924 users)*: This is a project of the Center for Individual Freedom, a conservative advocacy group. Its letter denounced the proposed "federal government micromanaging [of] the Internet" and asked FCC Chairman Thomas Wheeler to "stop any and all efforts by the FCC to reclassify broadband Internet under Title II of the Communications Act."
- *Badass Digest (347 users)*: The former Badass Digest (now known as Birth.Movies.Death) is a website devoted to news and previews of action and science fiction films. Similar to the Reddit campaign, Badass Digest asked its readers to forward a brief pro-neutrality message to the FCC. The message asked the FCC to ensure that the Internet remains "a level playing field for all content."

The remaining 41.3% of unique users ($n = 296,883$) posted comments that were not algorithmically associated with any campaign. This does not necessarily mean that they were posted independently, only that our methods could not classify them.

Hypotheses 2 through 4 predicted which kinds of campaigns would manifest larger and narrower gender gaps. H5 required a slightly different method because it involved John Oliver, who did not offer his viewers a form letter. Figure 2 displays the proportions of female users of all users identified as male or female by campaign, revealing stark differences between different types of campaigns. The campaigns with the five highest proportions of female users were all progressive, supporting H4. The tech policy campaign with the highest female proportion was Battle for the Net, wherein women composed 34.8% of the comment pool. Similarly, the two conservative campaigns, American Commitment and Stop Net Regulation, were only 34.2% and 29.7% female, respectively. But it was the male-oriented sites Badass Digest and Reddit that showed the widest gender gaps of all the campaigns (15.2% and 14.3% female, respectively). Thus, H2 and H3 were supported as well.

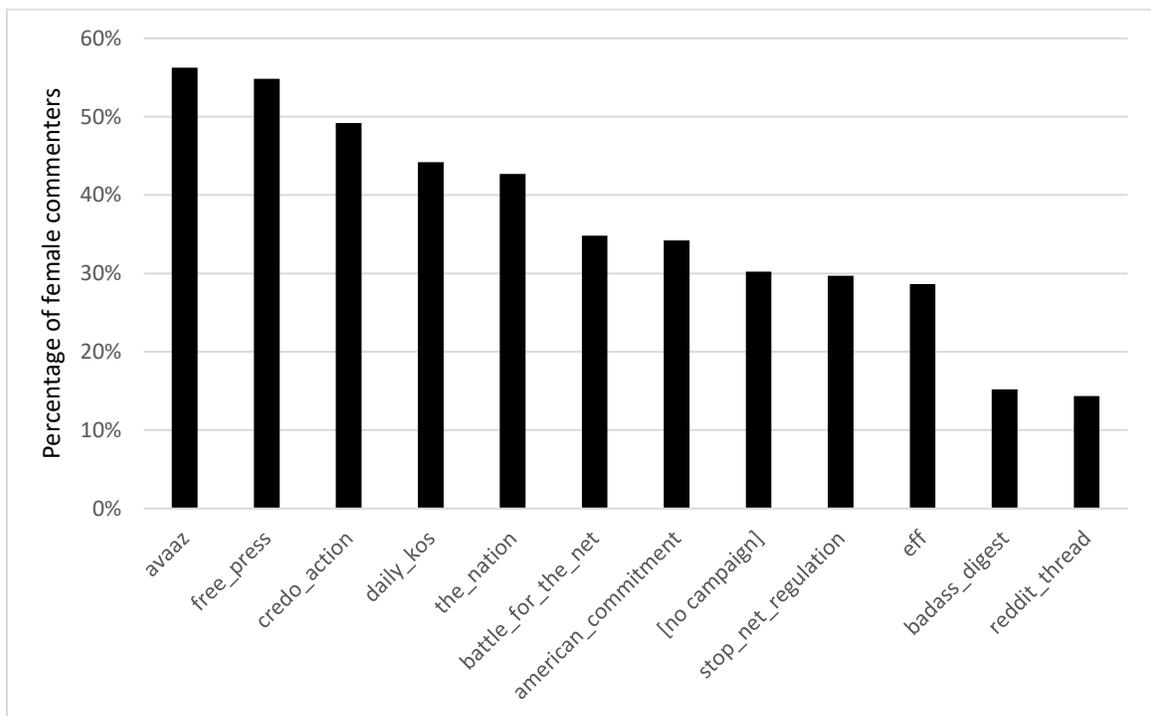


Figure 2. Percentages of female commenters in net neutrality advocacy campaigns.
EFF = Electronic Frontier Foundation.

We subjected these conclusions to a more rigorous test by computing four logistic regression models to predict gender. In all models, "female" was coded as 1 and "male" as 0 in the outcome variable. The first three models included only one theoretically relevant predictor each, and the fourth included all predictors along with two covariates: message length and number of days until the end of the comment period. The three main predictors represented the campaigns we considered to be tech-oriented (Battle

for the Net, Electronic Frontier Foundation, and Reddit), progressive (Avaaz, CREDO, Daily Kos, Free Press, and The Nation), and conservative (American Commitment and Stop Net Regulation). Badass Digest was omitted because it did not fit into any of those categories and because of its very small size.

Table 1 reveals inconclusive results for tech and conservative campaigns: the odds ratios for each change direction from a lower to a higher likelihood of femaleness when covariates are added. But the odds ratios for progressive campaigns are much more robust: In both Models 3 and 4, progressive commenters are around twice as likely to be female as are non-progressive commenters. These results lend additional support to H4.

Table 1. Logistic Regression Models Predicting Commenter Femaleness.

Predictor	Model 1		Model 2		Model 3		Model 4	
	Odds ratio	95% CI						
Tech campaign	0.775	[0.766, 0.785]	-	-	-	-	1.305	[1.278, 1.331]
Conservative campaign	-	-	0.901	[0.866, 0.937]	-	-	1.298	[1.246, 1.353]
Progressive campaign	-	-	-	-	1.997	[1.975, 2.020]	2.230	[2.199, 2.261]
Message length	-	-	-	-	-	-	1.000	[1.000, 1.000]
<i>N</i> days remaining	-	-	-	-	-	-	0.999	[0.999, 0.999]
(Intercept)	0.607	[0.603, 0.610]	0.569	[0.566, 0.572]	0.450	[0.447, 0.453]	0.534	[0.525, 0.543]
Pseudo <i>R</i> ²	.002		.000		.0188		.0203	

Before analyzing John Oliver's impact on the gender balance, Figure 3 merits a brief mention. It displays the proportions of each campaign's users that were identified as male or female, providing a measure of confidence for the preceding analysis. The greater the proportion of names classified, the more confident we can be in our conclusions about gender balance. Figure 3 shows that our methods identified the genders of the vast majority of commenters in each campaign. For Daily Kos, which scored the lowest proportion, we were able to identify the genders of nearly three quarters of participants.

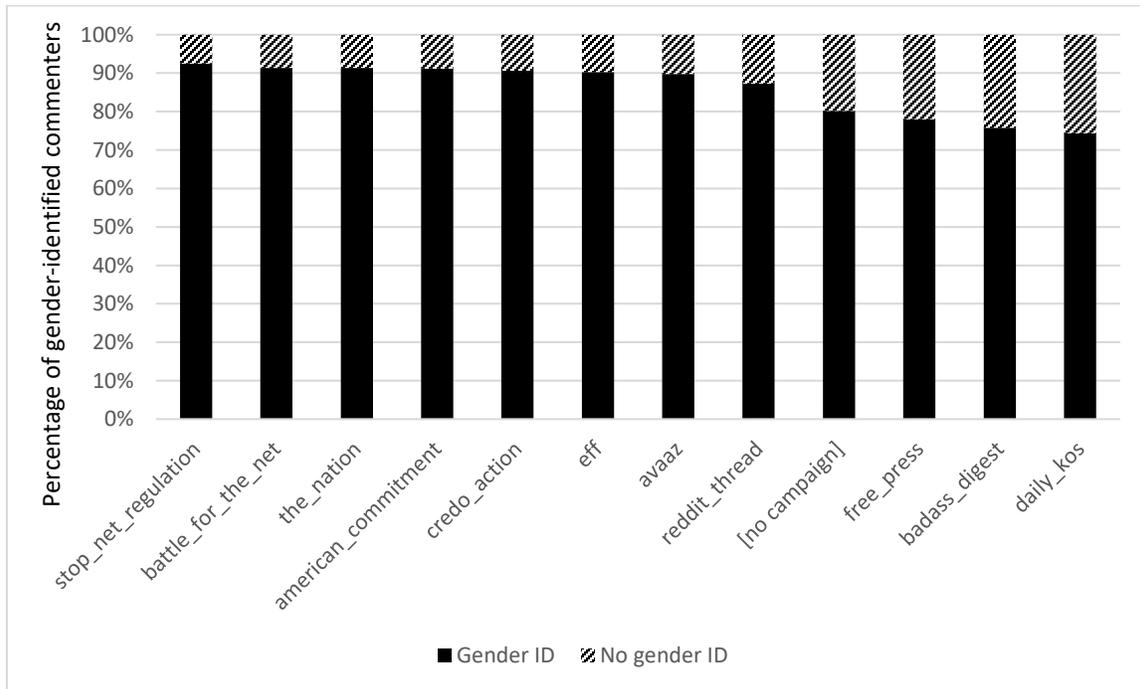


Figure 3. Percentages of gender-identified commenters in net neutrality advocacy campaigns. EFF = Electronic Frontier Foundation.

Because John Oliver did not provide boilerplate text for his viewers to send to the FCC, it was not possible to estimate which comments were directly inspired by his broadcast. Accordingly, our evidence for his impact on the volume and gender balance of the comments is not quite as strong as for the campaigns, but it is suggestive nevertheless. Figure 4, a graph of the respective proportions of male and female commenters over time, displays this evidence. We aggregated these proportions by week to better reveal longitudinal trends; each point represents the gender gap for the preceding seven days.

As Figure 1 suggests, Figure 4 masks massive differences in the volume of comments from week to week. In particular, the four proportions between March 28 and April 17 are probably meaningless because the highest combined male/female weekly comment count for those weeks was only 40. Before that period, the gender gap reached its narrowest point in the entire data set (46.7% female). In contrast, the gender gap had widened substantially by the weeks immediately preceding Oliver's June 1 broadcast. It hit its nadir, 18.8% female, the week before the episode aired. The three weeks after that saw a gradual doubling of the proportion of female commenters, from 18.8% to 36.6% for the week ending June 20. After that, whatever "Oliver effect" for gender there may have been wore off, as the chart shows some minor fluctuation in its final weeks. H5 is therefore not supported because the Oliver episode preceded a substantial narrowing, rather than the expected widening, of the gender gap.

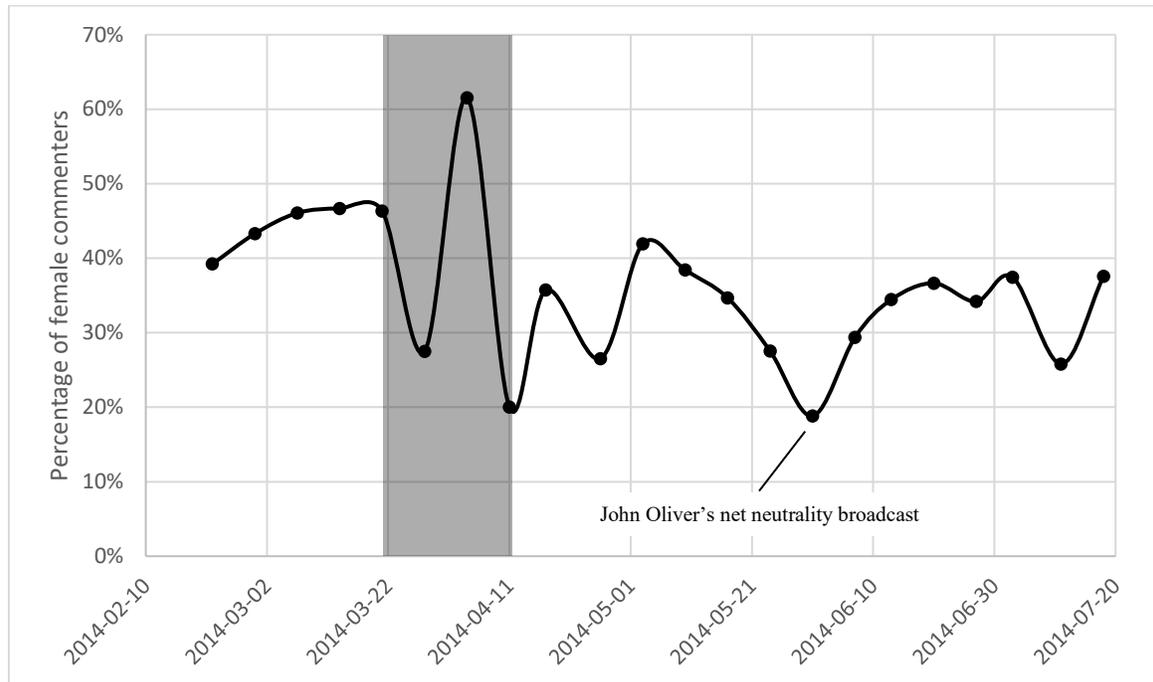


Figure 4. Percentages of male and female commenters over time. Note: A total of 40 or fewer gender-labeled comments were posted per week during the shaded period.

Finally, we turn to RQ2, the question of how spikes in attention affected the gender gap. To answer it, we estimated a multiple regression model that attempted to predict the gender gap based on the total number of posts per day. The other covariates for this model were number of days until the end of the comment period, number of posts by men, and number of posts by women. The model revealed no relationship between the gender gap and posts per day (see Figure 5).

Discussion

This study contributes to our understanding of net neutrality activism and of gender gaps in online political participation. It is already well known that net neutrality attracts activists from across the political spectrum, but our examination of the identities and messages of the major letter-writing campaigns adds important nuance to existing accounts. Consistent with previous research, we reveal net neutrality to be a highly partisan issue. The progressive campaigns were concerned primarily with a non-neutral Internet's detrimental effects on minority voices. The three tech campaigns framed their pitches similarly, with the largest noting net neutrality's importance for new businesses. In contrast, conservatives viewed net neutrality as a burdensome regulatory regime that would stifle innovation. Interestingly, both sides insinuated that pernicious changes to the Internet's functionality were immediately afoot, but some of this was clearly for rhetorical effect.

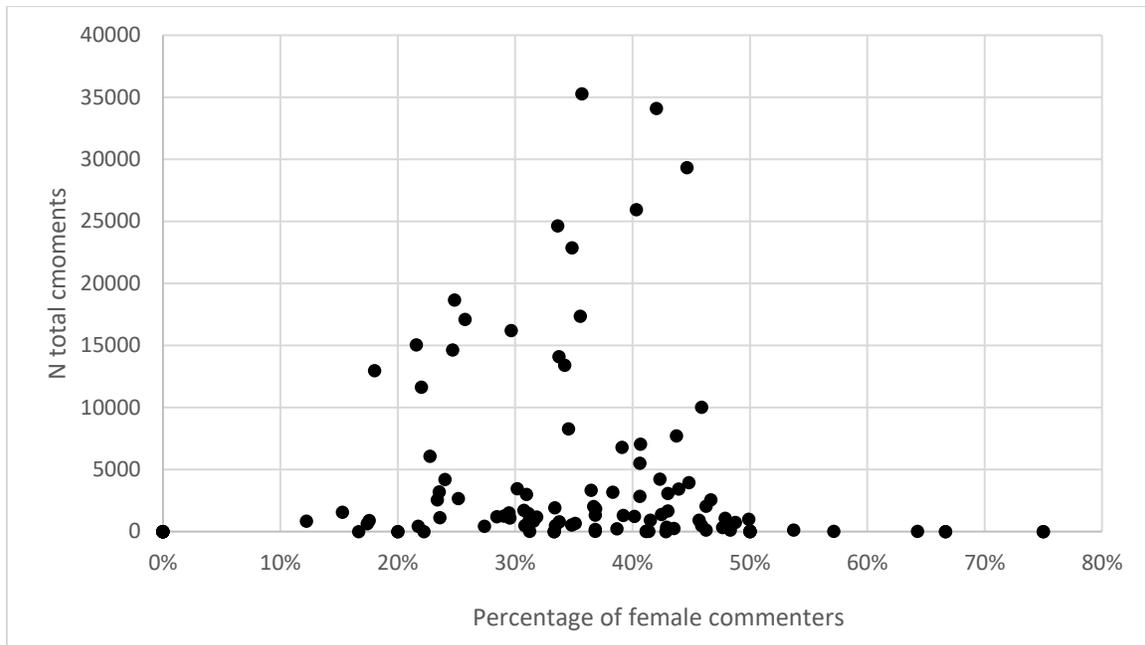


Figure 5. Total comments as a function of percentage of female commenters.

The 11 advocacy groups whose messages accounted for well over half the comments' unique users differed sharply in their respective gender gaps. Although the comments as a whole reflected a significant gender gap, campaign-specific gaps were smallest among those sponsored by progressives. Tech-oriented and conservative campaigns were dominated to similar degrees by men. If we consider Oliver as a progressive campaign, it dovetails neatly with this narrative. Taken together, the evidence suggests that men and women may rely disproportionately on different types of organizations to signal to them that this issue warrants their time and attention. This is a critical aspect of the advocacy process: to the extent that a political demand's legitimacy derives from the representativeness of the citizens who express it, demographic diversity matters. For net neutrality, whose absence would disproportionately harm marginalized interests, the voices of diverse citizens are particularly essential.

Our findings also speak directly to scholarship on feminist activism online. The fact that women were overwhelmingly pro-neutrality is consistent with the feminist case for net neutrality, although assessing the latter's causal role would be difficult. Future researchers interested in probing this question could examine the text of women's comments directly to ascertain how often they cite gender-specific reasons for supporting net neutrality. It is also interesting that feminist advocacy organizations did not emerge in our data as prominent drivers of this specific type of political participation. This is despite the facts that feminist organizations such as Women, Action, and the Media publicly encouraged women to send comments to the FCC (Women, Action, and the Media, 2014) and that many key leaders in the pro-neutrality movement were women (Ammori, 2015). It is possible that the comments prompted by such

organizations and individuals were prevalent but somehow not detectable via our methods. The progressive groups we did detect advanced the feminist goal of closing gender gaps in political participation largely without emphasizing net neutrality's gender-specific implications. The apparent effortlessness of the gender near-parity within progressive campaigns represents a success from any perspective that considers gender gaps problematic.

The Oliver segment's role in narrowing the gender gap was unexpected, as survey research indicates that political comedy audiences are predominantly male. Yet, notwithstanding this demographic reality, several alternative explanations are possible. Given how inhospitable the tech world can be for women, the political comedy audience may be more balanced by comparison, or Oliver's specific audience may differ demographically from those of *The Daily Show* and *The Late Show with Stephen Colbert*. At this point, little if any research exists on how *Last Week Tonight* differs from others of its genre, but its home on premium cable network HBO may be a factor.

Because Oliver is not a traditional advocate for net neutrality action, it is remarkable that his segment could motivate such a massive show of citizen concern. But how common will such effects turn out to be? Although prior research has linked political comedy to political participation (Becker, 2013; Moy, Xenos, Hussain, & Valdivia, 2012), some might view Oliver's net neutrality episode as the exception that proves the rule, as other episodes have failed to inspire similar levels of engagement. Still, it is worth considering some of the factors that may have led to the segment's success: its humor and general "stickiness" (Jenkins, Ford, & Green, 2013), viewers' perception of the issue's relevance to their lives (Pinkleton & Austin, 2001), the relatively low level of effort required of the requested action (DiMaggio, Hargittai, Neuman, & Robinson, 2001), and the perceived likelihood that the action would make some difference (Hoffman & Thomson, 2009; Vecchione & Caprara, 2009). Follow-up studies should consider what roles these and other potentially relevant factors might play in successful and unsuccessful mediated calls to actions.

These findings may generalize to other issues. Net neutrality is similar to climate change, stem cell research, and other technically complex issues in that citizens are highly reliant on journalists and other political elites to explain to them how to think about it (Becker, Dalrymple, Brossard, Scheufele, & Gunther, 2010; Nisbet & Becker, 2014). For example, Battle for the Net called net neutrality "the First Amendment of the Internet," while Texas senator Ted Cruz dubbed it "Obamacare for the Internet" in late 2014. For relatively new issues on the public agenda such as this, the mediated struggle to generate frames that will resonate with specific issue publics takes on much more urgency than for more established issues. In such cases, nimble advocacy groups can seize the first-mover advantage in shaping public perceptions. And, in turn, we should expect such frames to mobilize men and women to different degrees.

This study makes several important methodological contributions as well. We have demonstrated the value of applying lexicon analysis to the task of gender classification in studies of gender gaps in political participation. Although gender classification is a well-known application of automated text analysis (e.g., Alowibdi, Buy, & Yu, 2013; Vasilescu, Capiluppi, & Serebrenik, 2014), its value for studies of computer-mediated communication depends on the extent to which real names are required or

encouraged. For services such as Twitter and Instagram in which many users choose pseudonyms, it may be difficult or impossible to infer the genders of a sufficient proportion of users. But for situations such as public participation in federal rulemaking in which there is a strong norm of real name usage, we have shown that lexicon analysis applies broadly enough to provide high levels of confidence in gender balance estimates. Also, the use of unsupervised text classification techniques to identify advocacy campaigns is likely to be useful for other online politics cases that involve the submission of form letters of unknown provenance. The fact that such letters often include much of the original boilerplate text makes them highly amenable to such methods. Future applications could include analyzing gendered participation gaps in rulemaking solicitations by other government agencies, social media memes, and e-mail chain letters.

Like all studies, this one has several limitations that should be acknowledged. One minor concern is that the 15.9% of users whose genders we could not identify may have differed in systematic ways from those we could identify. However, these differences would need to be quite stark to alter our findings appreciably. The threat of online misogyny may have prompted some women not to reveal their gender, but given that the FCC's commenting platform does not allow direct replies to comments, this is probably a less pressing concern than it would be in most social media environments. Also, our data do not include comments from the FCC's second rulemaking solicitation, which was dominated by citizens mobilized by American Commitment (Pendleton & Lannon, 2014). We chose to analyze the first comment period because its greater diversity and general agreement with the FCC's final decision held correspondingly higher theoretical value. Third, we had no way to measure how many comments our methods may have omitted from the correct clusters, or how many campaigns may have been present but unclassifiable by our methods. We openly grant that some organized activity may simply lie beyond the limits of our ability to detect them, but we are confident that the clusters we detected represented the political interests we attributed to them. Finally, our conclusions should be interpreted in light of the standard limitations of textual analysis. Other methods such as interviews or participant observation can certainly make valuable contributions to the study of gender-based participation gaps, but as we hope our results and discussion make clear, so can analyzing user-generated text.

Ultimately, this research points to the importance of studying not only the volume but also the diversity (gender and otherwise) of online activism. The algorithmic methods now gaining in popularity and rigor throughout the field of communication afford us the ability to do so at previously unimaginable scales. For example, the methods we implemented here could be used to explore whether women are more likely to alter the boilerplate messages provided by advocacy groups, which could in turn extend our understanding of the gender gap beyond mere participation counts. Future political participation research might also seek to analyze gender in combination with other identity dimensions such as race, age, sexual orientation, and religion, pending the availability of appropriate metadata.

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