Running While Female: Using AI to Track how Twitter Commentary Disadvantages Women in the 2020 U.S. Primaries

Sarah Oates, University of Maryland, College Park, soates@umd.edu
Olya Gurevich, MarvelousAI, olya@marvelous.ai
Chris Walker, MarvelousAI, walker@marvelous.ai
Lucina Di Meco, Global Fellow, The Wilson Center, lucinadimeco@gmail.com

Abstract

While there is conclusive research that female political candidates are treated unfairly by traditional media outlets, the volume and pace of information flow online make it difficult to track the differentiated treatment for female candidates on social media in real time.This paper leverages human coding and natural language processing to cluster tweets into narratives concerned with policy, ideology, character, identity, and electability, focusing on the Democratic candidates in the 2020 U.S. Presidential primary election. We find that female candidates are frequently marginalized and attacked on character and identity issues that are not raised for their male counterparts, echoing the problems found in the traditional media in the framing of female candidates. Our research found a Catch-22 for female candidates, in that they either failed to garner serious attention at all or, if they became a subject of Twitter commentary, were attacked on issues of character and identity that were not raised for their male counterparts. At the same time, women running for president received significantly more negative tweets from right-leaning and non-credible sources than did male candidates. Following the first Democratic debates, the individual differences between male and female candidates became even more pronounced, although at least one female candidate (Elizabeth Warren) seemed to rise above the character attacks by the end of the first debates. We propose that by using artificial intelligence informed by traditional political communication theory, we can much more readily identify and challenge both sexist comments and coverage at scale. We use the concept of narratives by searching for political communication narratives about female candidates that are visible, enduring, resonant, and relevant to particular campaign messages. A real-time measurement system, developed by MarvelousAI, creates a way to allow candidates to identify and push back against sexist framing on social media and take control of their own narratives much more readily.

Suggested keywords:

U.S. elections, campaign, female candidates, social media, bias, Twitter, narratives, artificial intelligence

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Introduction

Political communication research has struggled to keep up with the changing realities of the digital sphere. Much of the earliest discussions tended to be informed by a 'cyber-optimist' perspective, in which the value of instantaneous, low-cost, and many-to-many communication was lauded as a revolutionary tool for democracy. Although studies have demonstrated the crucial role of online communication in empowering citizens in movements ranging from Occupy to the Arab Spring to #Blacklivesmatter, there is also significant evidence to demonstrate how state and corporate interests use the online sphere to disempower or even repress citizens (Vaidhyananthan 2018, Morozov 2011, Deibert et al. 2010). In particular, the online sphere disempowers and represses women and minorities (Barboni 2018). This creates a confusing landscape for citizens and scholars alike that culminated with the results of 2016 U.S. elections. A series of news reports and studies demonstrated the extent to which social media micro-targeting, employed both by U.S. campaigns and foreign actors such as Russia, could challenge traditional campaign communication in the United States.

Reports of Russian interference in the 2016 elections, where for the first time in history a female candidate challenged a male one in the Presidential race, have ignited profound debates about the role of social media in democracy. The race ended with a shocking victory for an outsider candidate who championed the use of social media micro-targeting. Of particular concern are studies that suggest that a fragmented media sphere in the United States, driven particularly by the algorithmic affordances of social media platforms that encourage users to consume information within self-reinforcing filter bubbles, has eroded civic discourse to a point that traditional political institutions such as the mainstream media and Congress struggle to function (Hindman 2008, Benkler et al 2018, Vaidhyananthan 2018, Patterson 2016). This is augmented by evidence that malicious actors, ranging from the Russian government to those who encourage conspiracy theories for profit, have undermined American democracy (Benkler et al. 2018, Hall Jamieson 2018, Starbird 2017).

Against this background, how can political communication researchers create valid and reliable studies that can determine much more precisely the specific role of online communication in informing citizens in a democracy? This study uses election campaigns as a way to consider this issue. Political campaigns create key moments to analyze the relationship between citizens and media messages, as the audience is much more engaged in political news during these periods (Boczkowski and Mitchelstein. 2013). Theoretically, the challenge is that the affordances of the internet combine and obscure what used to be distinctive levels of analysis for study: message production, content, and consumption. In terms of methods, scholars struggle to find ways to harvest, archive, and meaningfully analyze the vast amount of content and activity in the online sphere[1] (for an overview of the challenges, see Jungherr 2016).

This study approaches the challenge by making an analysis in the digital sphere of a well-studied phenomenon in political communication: the way that media messages disadvantage female candidates for office. On the one hand, this provides useful information on a specific element of a campaign, further extending the study of gender-based media messages into the online sphere. At the same time, this study suggests a way of thinking

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[1] Leaving aside the problems of privacy, ethics, and access to material held by internet platforms.

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about the study of the online sphere by encouraging the study of *messages* as opposed to the study of *platforms*. That being said, this particular analysis is conducted on Twitter. While recognizing the limitations of conducting research on a single platform, we are using Twitter to establish the feasibility of employing natural language processing to define and track five specific political campaign narratives in order to compare the discourse surrounding candidates. In this way, we hope to create a valid and reliable technique for operationalizing political discourse as it is deployed on social media platforms and throughout the media ecology (Hoskins and Shchelin 2018) in general. While this has useful implications for research, it also is a promising tool for the candidates themselves as they seek to understand and react to how their campaign narratives are formed and challenged in real time.

For this project, we chose to conceptualize online posts about candidates in five distinctive categories that we thought of as part of important, ongoing political narratives taking place both online and in more traditional venues such as the legacy media:

- Policy: the candidate's stances on particular issues important in the election (e.g. immigration, wealth inequality, healthcare)
- Ideology: the candidate's overall political outlook (e.g. socialist, left-wing, centrist)
- Character: the candidate's personal qualities (authenticity, truthfulness, opportunism)
- Identity: the candidate's belongingness in one or more demographic groups often mentioned in "identity politics" (e.g. gender, race, sexual orientation, age)
- Electability: the candidate's talents at running a campaign or winning an election, particularly against Trump

From monitoring political commentary online over several months through the MarvelousAI system, these five categories emerged as both relevant and having sufficient volume to measure.[2]  Note that these categories are not mutually exclusive, since a particular storyline can be talking about multiple aspects of a candidate (e.g. policy and ideology, or character and identity); however, we found it useful to keep the distinctions.

Narratives: Concept and Operationalization

In conceptualizing narratives as part of political communication, we borrow from Halverston et al. (2011). Halverson et al. define narrative as "a coherent system of interrelated and sequentially organized stories that share a common rhetorical desire to resolve a conflict by establishing audience expectations" (page 14). They call for defining narrative as a "system of stories" (page 7). Miskimmon et al. (2017) define "strategic" narratives as "tools that political actors employ to promote their interests, values, and aspirations for international order by managing expectations and altering the discursive environment" (preface). While we are not concerned here with international narratives, the work by Miskimmon et al. is useful in conceptualizing the difference between the more active nature of narratives versus the more passive idea of frames, which are more commonly used in political communication (Patterson 1993, Iyengar 1991, Scheufele and Tewksbury 2007). In Entman's classic definition of frames in political communication, he wrote that frames "select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or

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[2] In earlier work (Oates and Moe 2016), we found that attempting a deductive method such as by searching for policy mentions was not helpful as volume was very low.

treatment recommendation for the item described" (1993, p. 52). We view the concept of a narrative, with the implied structure of a storyline -- with actors, a genesis, and a suggested resolution -- as more useful for categorizing content that travels through mass and social media during election campaigns.

How do we move beyond a description of narratives to creating a way to measure political campaign narratives that could be considered both valid (it measures what we think it measures) and reliable (others can replicate it)? This is particularly challenging as a political campaign narrative must be broad enough to have cultural significance and resonance, yet precise enough to be articulated with a list of words or a catch phrase (such as "build a wall" or "lock her up"). As an example, in the lead-up to the 2016 elections, Russian operatives and the GOP pushed a narrative of "Crooked Hillary." Multiple stories and conspiracies played into this narrative (Uranium One, private server for emails, Benghazi, etc.), a narrative that was so resonant that some have argued it was a significant factor in swinging a very close election (Benkler et al. 2018, Hall Jamieson 2018).

In the intersection between political communication and computational linguistics, it is particularly important to accept that qualitative research and cultural knowledge are necessary to establish the parameters of a political campaign narrative. The seeds of political campaign narratives often are found in the communicative strategy of candidates and their supporters, i.e. by speeches or statements on websites. More commonly in a fast-moving media environment, narratives often are linked to specific statements, scandals, or even gaffes by candidates. We define four key elements of a significant political narrative for our study, which primarily analyzes the responses to candidate performances in the Democratic debates in the summer of 2019:

1. Visibility: An image, statement, or action of the candidate that is consistent across several influential media outlets.
2. Endurance: The image, statement, or action is a part of news coverage for at least 48 hours.
3. Resonance: The image, statement, or action is remediated (discussed, commented on, retweeted, liked, etc.) via Twitter (as a proxy for social media remediation in general) and a broad range of media outlets. These outlets can range from well-established journalism outlets to more 'fringe' outlets on the Right or Left. This could also be considered story "stickiness" (Xu, 2018).
4. Relevance to the campaign: the political campaign narrative includes one or more of what we have identified as central campaign factors (dimensions): policy, ideology, character, identity, and electability.We identified these elements both through top-down, qualitative determination as well as topic modelling on campaign-related tweets. They can be either in favor of the candidate or against the candidate. We are avoiding the words "negative" and "positive" because they can be confusing and imprecise.

Human knowledge is necessary in defining a political campaign narrative because, as frustrated candidates have discovered, it is very difficult to predict which narratives will achieve all four of these characteristics. In a study of the 2012 debates between Mitt Romney and Barack Obama, very little of Romney's carefully crafted policy statements became campaign narratives (Trevisan et al. 2018). Rather, Romney's statement that he had a

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"binder" full of female candidates for jobs caught the popular imagination and became a widely shared verbal and visual meme on Twitter. The political campaign narrative for "binders full of women" came to represent Romney being out of touch and paternalistic, which resonated with general concerns about Romney's character as an older, white, male Mormon. It sparked coverage and discussion of gender disparity in the workplace across media outlets and the online sphere. Thus, it achieved all four elements of a political campaign narrative: it was visible, it lasted some days in the news cycle, it was broadly remediated, and it was relevant to Romney's policy (as well as his character and identity). Another 2012 debate gaffe from Romney was from his statement that he had nothing against the *Sesame Street* character Big Bird, but that he did not support funding for public television. This also led to a spate of memes, mostly visual, but arguably did not rise to the level of a political campaign narrative because it did not spark broader media coverage of the issue of public media funding (Trevisan et al.). Thus, it was visible and had some resonance, but ultimately did not endure and did not link to an important issue of policy, ideology, character, identity, or electability for Romney.

As noted above, political campaign narratives resist logic, even the often contradictory measures of news logic developed by those who study journalism (Galtung and Ruge 1965, Gans 2004, Harcup and O'Neill 2017). For example, attempts to study how policy issues were articulated and covered for Donald Trump and Hillary Clinton in 2016 were a failure because there was so little coverage or even articulation of policy from Trump (Oates and Moe 2016). What the research did show, however, was that the media constantly re-amplified Trump's political narrative of "build a wall" (Oates and Moe). This inspired us to flip the paradigm: Instead of using classic coding techniques of searching for the mention of particular words, categories, or even frames, we decided to first identify existing political campaign narratives that are visible, enduring, resonant, and relevant. We then use computational linguistics to measure them with more precision. We are particularly interested in established the origin, spread, and possible reaction to a political campaign narrative, in particular in how a candidate might attempt to deflect or change a damaging narrative. In other words, while we have learned that it is very difficult to predict what will become a powerful narrative in a campaign, it is much easier to find powerful narratives and then analyze their components, origin, and trajectory.

This study analyzes the content of messages posted on Twitter as well as ideological slant (measured through media consumption) of those who are posting messages. The content of social media messages is only one strand of a complex communication landscape (Chadwick 2017, Hoskins and Shchelin). We can consider the key levels of analysis as message production, message content, and message consumption (this is an adaptation of theories of media analysis from Oates 2008). All of these elements are an important part of the overall media ecosystem, but they need different theoretical and methodological approaches. In looking at message content, we can illuminate the quantity and quality of messages that exist within the system, making it possible to compare these elements among different candidates. We do not make any assertions or attempts to analyze the effect of these messages on citizens. Rather, we create a description and analysis of the content itself absent the forces that create it or the influence it may have on those who consume it. In this, we are following a long tradition of content analysis in political communication (e.g. Patterson 1993, 2016; Hallin 1986, Johnston and Kaid 2000, Dimitrova and Strömbäck 2005, Entman 2003). We believe that categorizing and measuring the content in this way is a key factor in establishing

the power and influence of social media messages in an election, although we concede there are other factors at work in the media environment, notably on the production and consumption ends of the media equation.

While the initial optimism that the internet could level hierarchies and augment democracy has faded, studies of the actual effect of the internet on electoral politics have remained somewhat fragmented and difficult to replicate. It is a problem both of theory and method. As discussed in the section below, there is convincing evidence that female candidates are at a significant disadvantage in media coverage. Ultimately, the question comes down to whether the digital sphere provides an opportunity to correct the power asymmetry found in traditional electoral communication, in which there is convincing evidence that female candidates are disadvantaged. We find through this project that social media (as measured on Twitter) amplify rather than ameliorate communicative inequalities for female candidates. At the same time, social media can demonstrate the speed and direction of narrative change in fast-moving campaigns such as the Democrat primary for president.

Gendered Differentials in the Online Coverage and Behavior of Male and Female Political Candidates

According to data from the Pew Research Center (2016), about 44 percent of Americans used Twitter, Facebook, and Instagram as sources of information for the 2016 Presidential campaign, with 35 percent of 18-29 years old saying that social media was their primary source of political news. In this context, understanding which role social media is playing, consciously or unconsciously, in the promotion of more gender inclusive and participatory democracy is both urgent and critical. In particular, it is important to understand whether the online space replicates biases that have been observed in the coverage that female politicians receive in traditional media.

Many studies (Kahn and Goldenberg 1991, Kahn 1994, Heflick and Goldenberg 2009, Patterson 2016) have looked at the media coverage female and male candidates receive and most of them have brought to light extensive bias both in quantity and quality. Analyses of U.S. campaigning have consistently found that female candidates suffer from a coverage Catch-22, in that they are either covered less or -- if they manage to garner coverage -- this coverage is significantly more negative than their male counterparts. Stories tend to trivialize them, focusing on their personal traits rather than their issue positions, while the opposite is true for male contenders (Evans and Clark 2015).

Possibly in response to this situation and to circumvent their unfair treatment in the traditional media, female politicians and candidates have turned to social media to build their own narratives and communicate directly with the electorate, in some cases using Twitter on average more than male candidates (Evans et al. 2014). Is social media, however, truly an empowering place for female politicians, or is it replicating some of the same dynamics and biases existing in traditional media? While more research is needed, some patterns emerge from the available studies, pointing to the existence of bias against female candidates in the online space. In addition, research highlights the different use that female politicians and candidates make of social media with respect to their male colleagues, possibly as a result of such bias.

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On the one hand, studies show that female politicians use social media, particularly Twitter, differently from their male counterparts. For example, by analyzing the Twitter activity of all congressional candidates leading up to the 2012 U.S. House elections, Evans and Clark (2015) found that female candidates tend to post fewer personal pictures and statements about themselves than male ones. Instead, they focus on mobilizing their followers around policy issues. They particularly focus on issues that primarily affect women, such as gender-based violence, as well as on issues that historically are perceived as more important to women such as child care, health, and education. Female candidates often ask for action to support their campaigns through donating, volunteering, voting early, etc.

Meeks (2016) also found important differences in how male and female candidates for Senate in 2012 used Twitter. By comparing winning women to winning men, Meeks found that victorious female candidates were likely to be more personalized and interactive than women who lost while the opposite held true for men. The male candidates who won were actually *less* personalized and interactive than the unsuccessful male candidates. In other words, a successful Twitter campaign seemed to hinge on very different tactics for men and women (Meeks), with candidates being rewarded for conforming with gender stereotypical behaviors. These stereotypes frame women as more communicative and personable in their interactions, while men are supposed to be more distant. However, there are two exceptions to this rule and they both reflect some of the biases and challenges women have historically faced in establishing themselves as credible contenders:

1. Winning men were twice as likely to personalize through references to their family and personal photos. Restraint on the part of female politicians when it comes to discussing their family life is logical given that research shows that while stories about their families generally humanize and ultimately benefit male politicians, they negatively impact women. This is particularly true for female candidates with young children, as it can raise questions on their ability to juggle family and profession, as well as discouraging people from taking their candidacies seriously (Murray 2010). In this context, it's not surprising that female politicians would choose to expose less of their personal lives online -- a fear not generally shared by male candidates.

2. Winning men were more likely to personalize through personal photos, particularly "candid" photos, than winning women, who were in turn more likely to engage with their followers through replies and retweets. The reticence of female candidates to show "candid" pictures of themselves is a response to the fact that female politicians have traditionally been subject to a higher level of public scrutiny and criticism than men with respect to their private and public persona. Female candidates' age, sartorial style, physical appearance, marital status, as well as the absence or presence of children have often represented a liability and a source of criticism or trivialization (Maggio 2014, Kittilson and Fridkin 2008, Bystrom and Kaid 2002, Ross 2003). As Hillary Clinton, the first woman to win the presidential nomination of a major political party in America, put it: "It's not easy to be a woman in politics. That's an understatement. It can be excruciating, humiliating. The moment a woman steps forward and says: 'I'm running for office,' it begins: the analysis of her face, her body, her voice, her demeanor; the diminishment of her stature, her ideas, her accomplishments, her integrity. It can be unbelievably cruel" (Clinton 2017, p. 116).

On the other hand, female candidates will receive a different type of attention than their male counterparts on Twitter, regardless of the choices they make about self-presentation. While arguably the digital space offers an opportunity for female politicians to try to own their

narrative, doing so is extremely difficult for them. In an analysis of the 2014 U.S. midterm elections, McGregor and Mourão (2016) found that female candidates "may experience increased attention on Twitter, being more "central and replied to when they run against men," but they may have less direct influence on the rhetoric of the conversation about them," as they are faced with "uneven and gendered terrain" on the online network space.

The online space also has significant downsides as it puts women at risk of being targets of online gender-based violence, threats, and harassment. A recent study of Britain and the United States found that 778 women politicians and journalists in these countries were abused on Twitter every 30 seconds, with 1.1 million abusive and problematic tweets sent against them (Amnesty International, 2018). Although Twitter is not a friendly place for many, women are asymmetrically targeted online.

All in all, without minimizing the empowering impact that some female politicians internationally have reported finding in the online space (Di Meco 2019), it's fair to say that social media is far from being a gender-equal arena for political campaigns. Instead, social media replicates many of the same biases and threats female politicians face on the campaign trail, sometimes serving as a sounding board for the most misogynistic and harassing behaviors. It remains to be studied if and how female candidates are managing to strategically adapt and respond to this environment. With this research, we hope to give candidates (women and men) tools to understand more easily and quickly how their narratives are being amplified and discussed in the online sphere.

Methods

This paper uses the MarvelousAI StoryArc, a narrative tracking product for online news and social media. StoryArc is currently focused on tracking 2020 US Presidential candidates, but the same techniques can be applied to a variety of topics (such as wide-ranging political issues, foreign disinformation, corporate reputations and brands, etc.). StoryArc was designed and coded by two of the authors (Gurevich and Walker). At the core of StoryArc is an iterative active-learning loop: similar content is automatically collected into groups, humans analyze the groups in order to define political narratives, and the human labels are used to refine the quality of the automatic identification of these narratives in later content, as well as discovery of previously unlabelled groupings.

To launch the StoryArc process, Marveous.ai first actively constructs data sets known as *corpora*. Each corpus is a combination of *query terms* (e.g. names of all 2020 presidential candidates) and *data sources* (e.g. mainstream online news, social media, known propaganda outlets etc.). For this research project, we used the Twitter application programming interface (API) with desired search terms, running the query to fetch the data every few minutes. For high-volume queries on peak days (e.g. leading candidates on the day of a debate), we are rate-limited and may get a sample of between 50 to 100 percent of the total volume. For online news and commentary sites (e.g. CNN, Fox News, NYTimes, reddit, 4chan), we collect headlines and search snippets for the desired query terms via Google Alerts. The alerts can be generic over all search results, or site-specific (e.g. 'site:cnn.com "elizabeth warren"'). Results are collected every few hours. For the analysis presented in this paper, we primarily relied on Twitter data.

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Thematic Clusters

We employ an unsupervised text clustering approach to detect groups of related documents (e.g. tweets) inside a particular corpus and topic (for a similar approach, see Demszky et al. 2019). The clustering approach proceeds as follows:

- Represent each frequent word in the corpus as a multi-dimensional vector that reflects that word's distributional properties in the corpus. We use [GloVe](#)-style vector embeddings that are trained on the set of tweets we've collected for all candidates over the course of a few weeks.
- Represent each document (e.g. tweet) in the corpus as a vector in the same embedding space as the individual words. We use a geometric averaging method for computing sentence embeddings, as described in Arora et al. 2016.
- Find groups of similar documents using bottom-up hierarchical clustering with hand-tuned thresholds.
- For each cluster, compute the centroid (using vector representations of the tweets comprising the cluster) and find the individual words whose embeddings are closest to that centroid. We use these words as a cluster label for easier human interpretation, e.g.

| Description | Candidate | Date | Count |
|---|---|---|---|
| ['walmart', 'shareholder', 'starvation', 'wage'] | bernie sanders | 2019-06-11 | 8520 |

Thematic clustering for each 2020 candidate is performed daily on the preceding week of Twitter data.

Detecting Narratives

We believe that most news stories in the political landscape serve to reinforce one or more particular *narratives* about the topic (intentionally or unintentionally). Since it is not feasible to examine each individual news story manually, we use the thematic clusters, as defined above, to enable the discovery of political campaign narratives. Each cluster is associated with one or more underlying narratives. While thematic clusters are transitory and often pertain to a particular news event or big story happening over a few days or a week, narratives are broader and run over longer periods of time. Moreover, the words describing a relevant narrative may not be explicitly present in a particular cluster. As discussed in the section on defining narratives above, we look for for four key elements to define the presence of a campaign narrative: visibility, endurance, resonance, and relevance.

We take the view that narratives are often known ahead of time and reflect the goals of particular state, political organization, or individual actors hoping to influence public debate. Thus, we rely on human experts to define an initial set of narratives, based on their familiarity with the subject area and on examination of the unsupervised thematic clusters. Then, as news about a topic evolves over time, that expert may refine or add narratives to keep up. In addition, the expert-in-the-loop narrative labelling generates training data for supervised automatic detection of the known narratives in future tweets.

So far we have manually defined narratives for the top nine Democratic Presidential candidates. Each narrative has the following elements:

- **Description**, i.e. "Amy Klobuchar has an anger management problem."
- **Stance**, i.e. support, attack, or neutral. Note that the same narrative description may carry different stance for different audiences (e.g. "Elizabeth Warren will eliminate private insurance" may be supported by a left-leaning audience and feared/attacked by a right-leaning audience). In such cases, we create two separate narratives with opposing stances.
- **Type**, i.e. what the narrative is about. We have defined the followeing key narrative types for this project (see definitions above):
  - Policy
  - Ideology
  - Character
  - Identity
  - Electability
- **Label**, a representative shorthand that makes it easy to label the narrative in the tool, e.g. "angry."

Armed with the initial set of narratives, human experts go through a regular annotation process, whereby they tag new clusters with one or more narratives. When appropriate, they may edit or create new narratives. We are actively working on automatic narrative tagging to reduce the amount of time humans spend annotating.

Bias and Credibility Ratings

We also use network analysis to identify the bias and credibility ratings of Twitter users, which allows us to gauge the nature of the audience commenting on specific candidates on Twitter. The Media Bias Fact Check project uses a team of journalists to evaluate major English-language online news sites in terms of their political bias (left - centrist - right) and "commitment to facts" (credibility; factual - mixed - questionable). The ratings are done by professional journalists and are based on the behavior of a site as a whole, rather than on a per-article basis. Using ratings for news sites, we infer the bias and credibility scores for the link behavior of Twitter users in our corpus. We translate these ratings into a two-dimensional scale:

- X-axis: Bias, ranging from -5.0 (far left) to 5.0 (far right)
- Y-axis: Credibility, ranging from 5 (very credible) to -5 (fake news)

The screenshot below represents the link behavior of users participating in discussion of the 2020 primaries for the week prior to June 11, 2019.

**Bias and Credibility Distribution (-1.0948, 1.6991)**
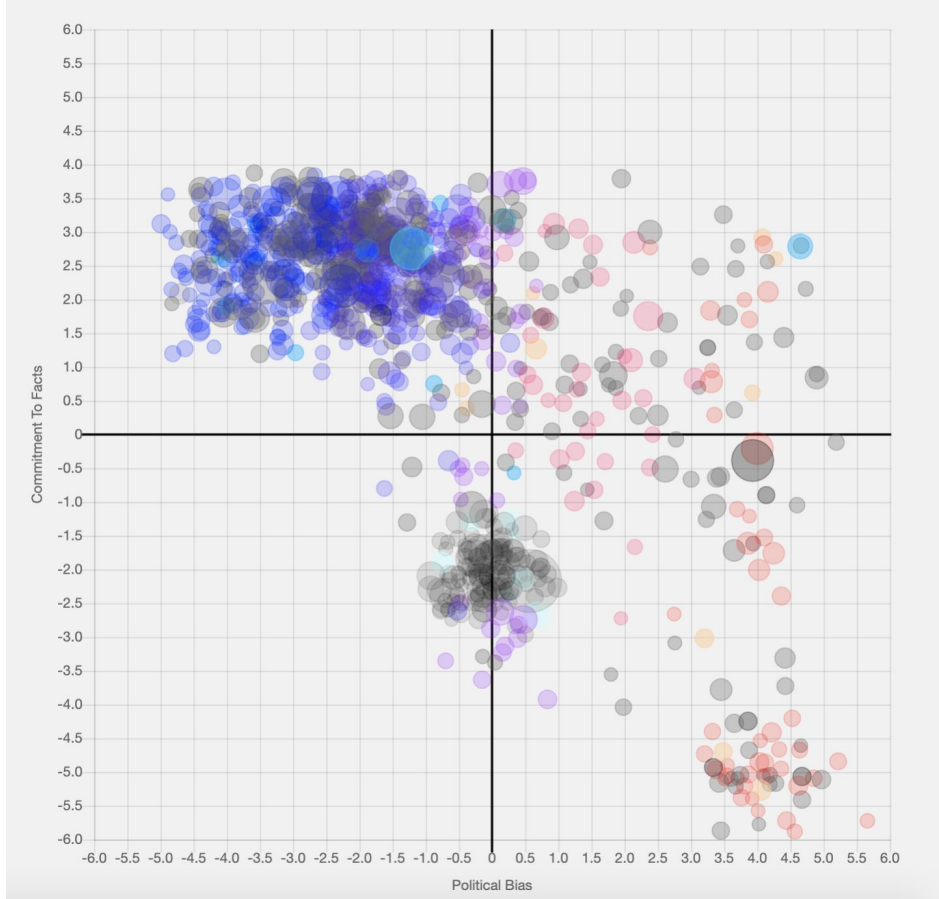


Each dot on the graph represents a Twitter account that tweeted about the topic; the size of the dot represents the number of tweets from that account. The color coding works as follows:

- Verified account
- Account with left-of-center media links
- Account with right-of-center media links
- Account with centrist media links
- Account with right-wing extremist signifiers (emoji, hashtags)
- Suspicious account (based on date of creation, long strings of numbers in user name, etc.)

We observe that in discussions on any given day or candidate, the tweets are distributed across the left-to-right political spectrum. There is typically a lot more discussion left-of-center, which makes sense since we are tracking the Democratic primaries. However, on the credibility spectrum only the right-of-center area dips into fake news territory. This is a known asymmetry in the US news landscape, as Benkler et al. (2018) explore.

The MarvelousAI tool allows us to observe the bias and credibility distributions in overall discussion for a particular time period or in a particular thematic cluster or narrative, as defined above. We can therefore distinguish between narratives that are prevalent among the left, among the right, or mixed with representatives of both sides. The latter clusters tend to be the most interesting.

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In the following section, we describe the results of applying MarvelousAI technology to the analysis of 2020 primaries on Twitter. We were specifically interested in any systematic differences in how female and male candidates are talked about on the platform.

Findings

We examined Twitter conversations about six leading candidates (three male and three female): Joe Biden, Bernie Sanders, Pete Buttigieg, Elizabeth Warren, Kamala Harris, and Amy Klobuchar. We looked at two scenarios: conversations surrounding each candidate's official campaign launch (between January and April 2019, depending on the candidate), and conversations following the first 2019 Democratic debate on June 26th and 27th.

For each candidate, we collected tweets for a week following their official campaign kickoff. A campaign launch is typically an opportunity for a candidate to dominate the news cycle and often is their best shot at defining themselves to the public. Thus, the volume and content of tweets in this time period may be predictive of later news coverage of the candidates. The chart below indicates average daily volume of tweets, along with the dates on which we pulled the data. The overall volume of tweets was comparable across candidates, peaking at around 40,000 to 50,000 per day, so female candidates received roughly as much Twitter attention as male ones in the week after their campaign launch, and Kamala Harris even significantly more than the rest.

Campaign Launch: Tweets per day
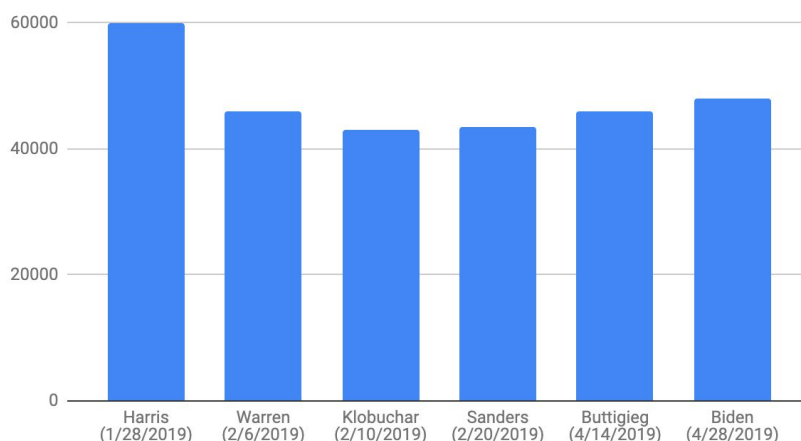


A common observation is that female politicians receive less coverage in media compared to male colleagues. This is not borne out in our Twitter data, which would seem like a good sign for women. However, drilling down into the nature of the conversation revealed significant differences, both in terms of *what is being said* (i.e. thematic clusters and narratives) and *who is talking* about the candidates (i.e. political bias and credibility of the tweeters). In other words, attention on Twitter isn't necessarily good for a candidate.

Let's take a look at the content of the conversations about the candidates. We examined the top thematic clusters in each candidate's coverage and annotated them with the human-inferred narratives, as discussed in the Methods section above. Below is a summary of

the most voluminous narratives exemplified by these clusters, along with narrative type and stance.

| Candidate | Narrative | Example thematic clusters | Narrative type | Stance |
|---|---|---|---|---|
| Warren | Elizabeth Warren is dishonest | Lied about being Native American<br>Apologized for DNA result fiasco | character | attack |
| Harris | Kamala Harris is not authentic | Both parents were immigrants (not a real American)<br>Was a prosecutor (not truly black) | identity | attack |
| Klobuchar | Amy Klobuchar is too unstable to lead | Was mean to her staff on multiple occasions | character | attack |
| Biden | People used to think Joe Biden was creepy | Accusations of inappropriate touching make Biden non-electable | electability | attack |
| Sanders | Bernie Sanders is a credible candidate | He has good policy proposals<br>He almost won in 2016 | policy | support |
| Buttigieg | Pete Buttigieg is running a good campaign | He has clever retorts to Mike Pence | electability | support |

To summarize, narratives for all three female candidates have to do with their character or identity, and are overwhelmingly negative. Top narratives for Sanders and Buttigieg are positive and non-personal.

Once we have defined the dominant campaign narratives on Twitter, we turn to examining who is engaged in conversations about the candidates and their narratives. As described above, MarvelousAI can analyze the link behavior of users to infer political leanings. The graphs below show the right/left and credible/non-credible distribution of discussions for each of the six candidates.

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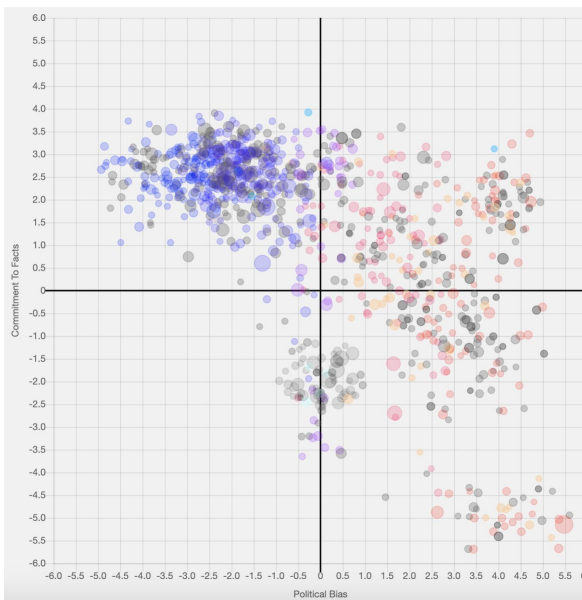Bias and Credibility distributions for launch events
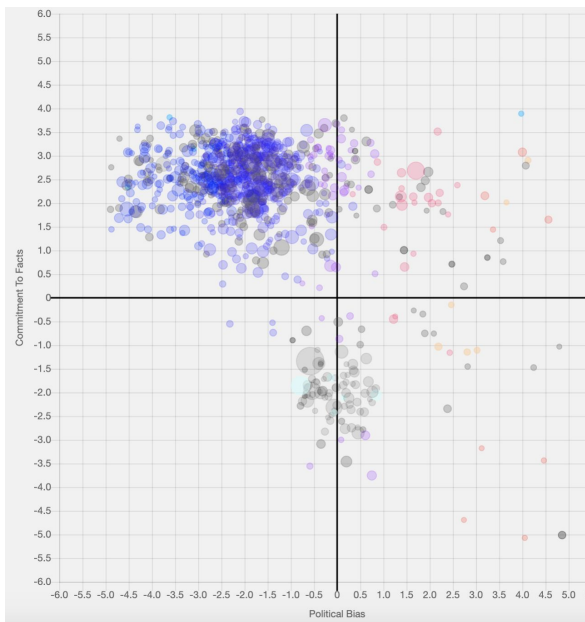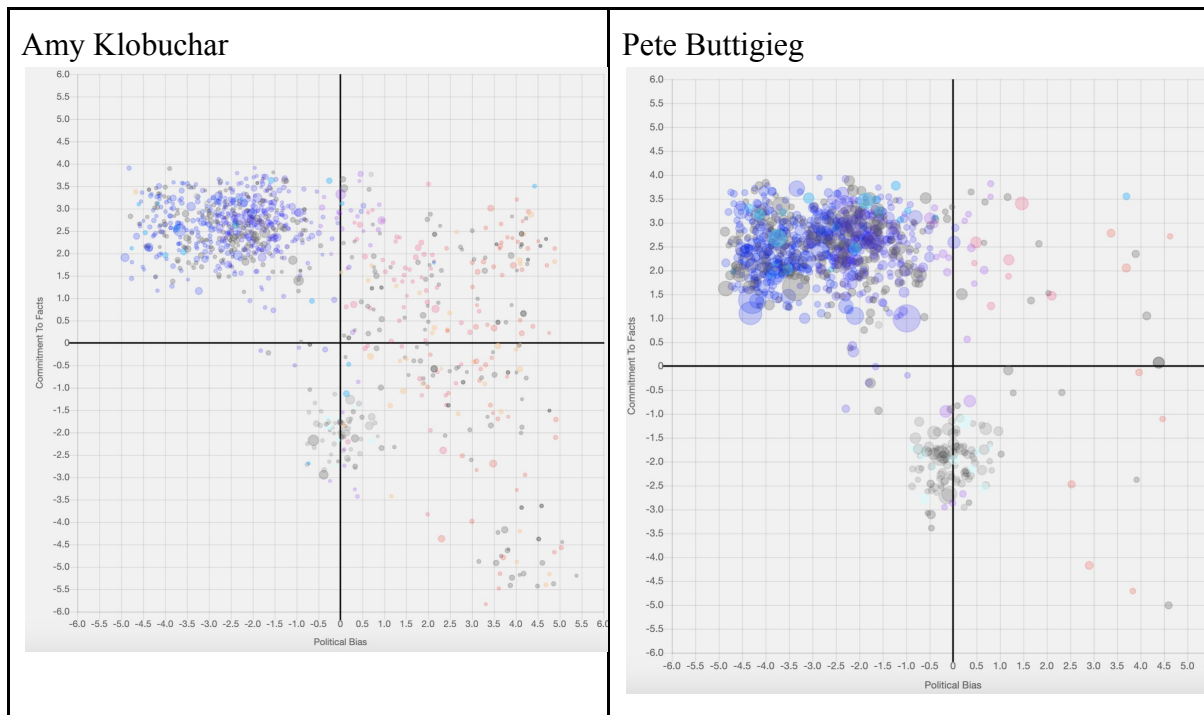


Elizabeth Warren

Joe Biden
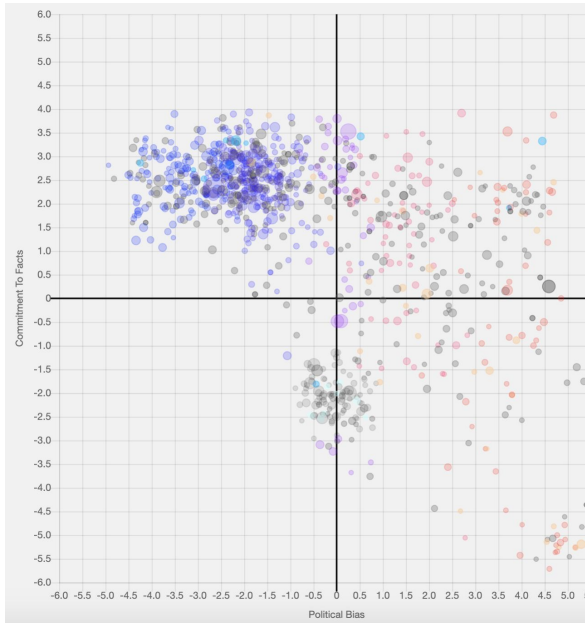
Kamala Harris

Bernie Sanders

Amy Klobuchar — Pete Buttigieg

It is clear that in the time periods examined, Twitter conversation about female presidential candidates was more heavily skewed both towards the political right as well toward the less credible quadrants of the spectrum. To illustrate this difference more clearly, the chart below shows the average bias and credibility scores for each candidate (male candidates in blue, female candidates in red). These are computed from the distribution graphs above.



Average Bias / Credibility of Launch Coverage
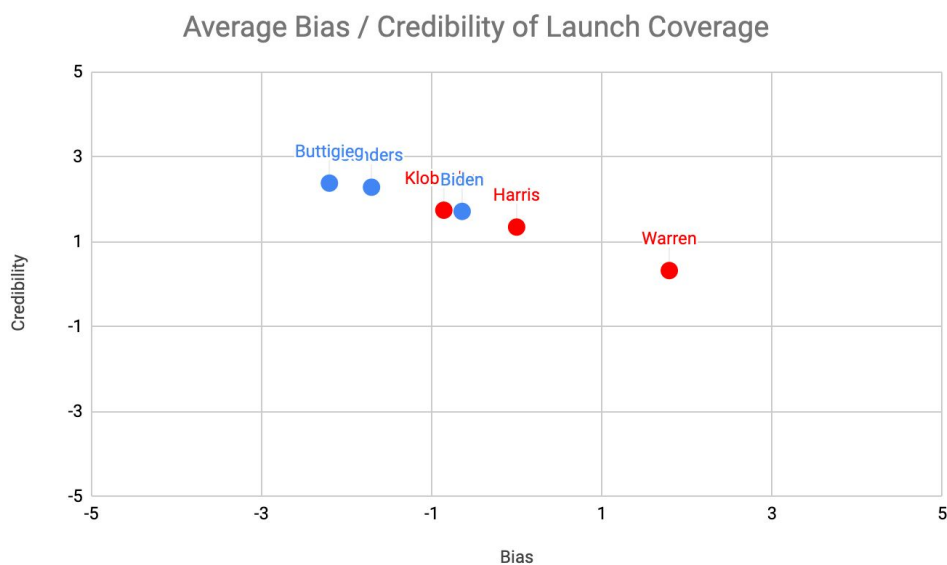
The positions of the candidates are essentially along a diagonal line, from left/credible to right/non-credible. How far each candidate is along this line corresponds directly to that candidate's standing in the polls (more popular candidates get more right-wing/fake coverage), but with an added penalty for female candidates. In fact, the "gender penalty" seems to be much greater than the penalty for poll ranking.

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The bias against female (and other minority) leadership among the American conservative electorate is well-documented, so it is not surprising that misogynistic remarks are more common in the right side of the political spectrum. It's worth asking, however, how much the prevalence of right-wing and/or fake accounts impacts the overall discourse about each candidate? We found that there was almost no change in major narratives when we excluded the right-wing users, i.e. the same themes dominate conversations on both sides of the political aisle. So we cannot dismiss the more damaging narratives about female candidates as an artefact of bias toward rightwing politics or non-credible news usage.

Although women don't hold exclusive rights to such character attack narratives (cf. Joe Biden), they are disproportionately affected by them. What's worse, these narratives aren't restricted to the trolling parts of the discourse space; they are front and center among the mainstream users. In fact, we analyzed one week's worth of coverage of all the candidates (regardless of their campaign events) earlier this year and found a very similar asymmetry. [3]

Post-Debate Coverage

The political news landscape changes rapidly, so we repeated our examination of gender and campaign narratives at a later point in the campaign. Following the first Democratic debates on June 26 and 27, 2019, we analyzed Twitter conversations about the same six candidates.[4] Unlike in the campaign launch coverage, there were clear tiers in the volume of mentions, as the graph below demonstrates.



Tweet mentions in week following debates
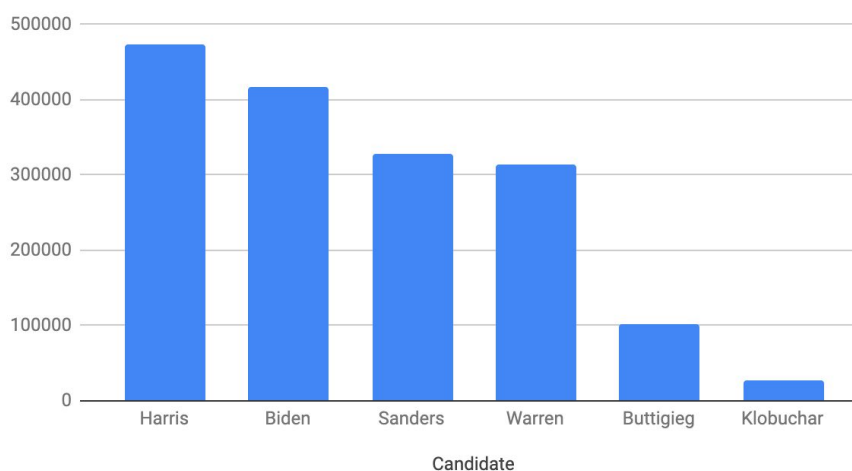
Harris dominated the discussion, with close to 500K mentions in the week following the debates, followed by Biden[5]. Sanders and Warren were in the second tier, with Buttigieg and Klobuchar far behind.

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[3] https://marvelous.ai/2019/02/28/gender-and-race-in-the-2020-primaries-no-the-playing-field-isnt-level/

[4] Part of this analysis was reported on by Aleszu Bajak at StoryBench, http://www.storybench.org/quantifying-the-twitter-attacks-on-kamala-harris-during-and-following-the-democratic-debates/

[5] The precise number of tweets is likely affected by rate-limiting during the highest-volume days for the most-mentioned candidates, but the relative volumes across candidates are still valid.

For comparison, we also collected mainstream news stories mentioning the six candidates. The chart below shows the number of stories on the day following the debates.

**Mainstream News Stories on 6/28**
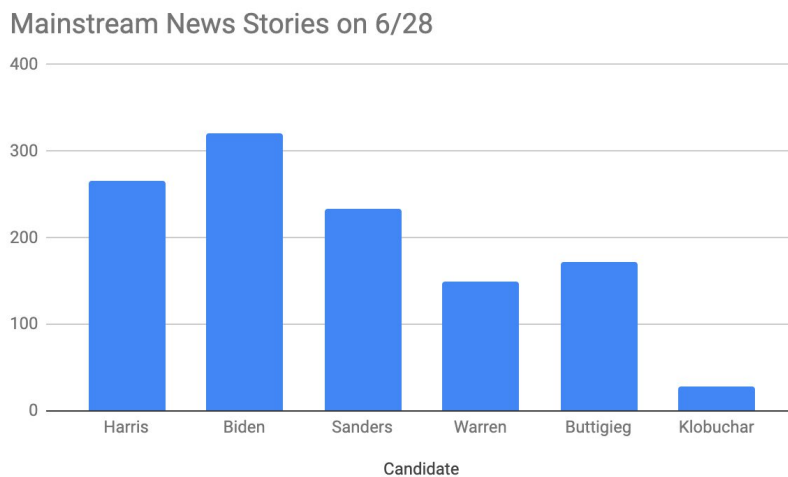


In mainstream media, women received significantly less coverage than men, when compared to each candidate's volume of Twitter mentions. Does this mean that Twitter is a friendlier medium for female candidates? Let's take a look at the content and political orientation of the Twitter chatter.

The following graph shows the average bias and credibility for each candidate during this time period. Compared to the launch coverage, the debate discussion was more heavily centered in the left-of-center, credible audience and the contrasts between the individual candidates were less obvious. Individual candidates' average scores relative to each other were similar to campaign coverage, with one noticeable exception: conversation about Elizabeth Warren moved squarely into the left-of-center quadrant. The analysis below delves into the specifics and possible explanations.

**Average Bias / Credibility Post-Debate**
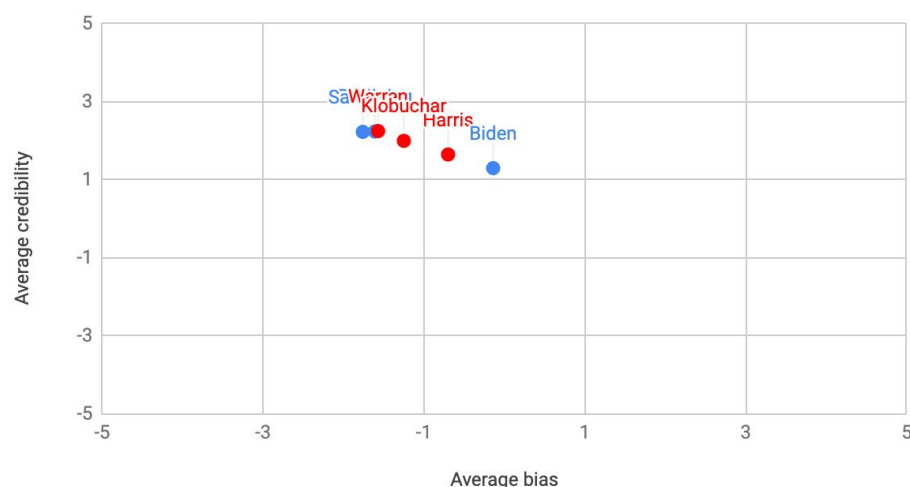


To get a deeper understanding of the conversations, we used our clustering technique and hand-annotated all clusters in the week post-debates with narrative labels. In order to see clear patterns, we grouped the narratives into the following categories:

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- **Personal: Attack**: attack-style narratives about the candidate's character or identity. E.g. "Kamala Harris is a sellout who cannot be trusted".



**icewater**
@camsterrr

kamala Harris literally pulled the race card on Biden like she didn't lock up so many black men.... that was so calculated lol

7:48 AM · Jun 28, 2019 · Twitter for iPhone

**25** Retweets  **145** Likes



**Ali Alexander**
@ali

Kamala Harris's Ancestors Also Owned Slaves

You're welcome.

> Kamala Harris's Ancestors Also Owned Slaves
> Sen. Kamala Harris (D., Calif.) is the descendant of an Irishman who owned a slave plantation in Jamaica, accordi...
> 🔗 freebeacon.com

6:26 PM · Jul 9, 2019 · Twitter for iPhone

**96** Retweets  **198** Likes

- **Personal: Support**: supporting narratives about the candidate's character or identity. E.g. "Pete Buttigieg is authentic and sincere."

**zheinpathos — Ace4Pete**
@zheinpathos

Pete represents a new patriotism, a patriotism of the future…
that gains its strength by uniting trans people, black people,
white people, gay people, poor people, immigrants, Muslims,
Christians, and atheists under the banner of America.
bleedingheartland.com/2019/04/17/why…

**Why I'm switching from Elizabeth Warren to Pete Buttigieg**
Bleeding Heartland welcomes guest posts about the Iowa caucuses,
including candidate endorsements. Please read these guidelines
bleedingheartland.com

♡ 66   6:55 PM - Jul 1, 2019                                        ⓘ

- **Policy: Attack**: attack-style narratives about a candidate's policy or ideology, e.g. "Bernie Sanders is a socialist (and will destroy America)".



- **Policy: Support**: supporting narratives about policy or ideology. E.g. "Elizabeth Warren has a plan for everything."

- **Electability: Attack**: attack-style narratives about whether a candidate can win. E.g. "Bernie Sanders is too old/white/male to compete in 2020 against diverse field".

**Joy Reid** ✔
@JoyAnnReid

RT @JoyAnnReid: Even more clear evidence that the "not Biden" vote is consolidating, and not around Bernie Sanders as many pundits presumed...

> **Sahil Kapur** ✔ @sahilkapur · Jul 1
> Post-debate CNN poll: 2020 Democrats
>
> 6/28-30 (change from 5/28-31)
>
> Biden 22% (-10)
> Harris 17% (+9)
> Warren 15% (+8)
> Sanders 14% (-4)
> Buttigieg 4% (-1)
> Booker 3% (-)
> O'Rourke 3% (-2)
> Klobuchar 2% (-)
> Castro 1% (-1)
> de Blasio 1% (+1)
> Gabbard 1% (-)
> Yang 1% (-)
> [everyone else <1%]
> Show this thread

- **Electability: Support**: supporting narratives about whether a candidate can win. E.g. "Joe Biden is the front-runner".



The Root ✔
@TheRoot

Atlanta Mayor Keisha Lance Bottoms has endorsed Joe Biden for president.

"For me, it was most important that we have a president who doesn't have to walk in the door and figure out where the light switch is."trib.al/KRou7vG
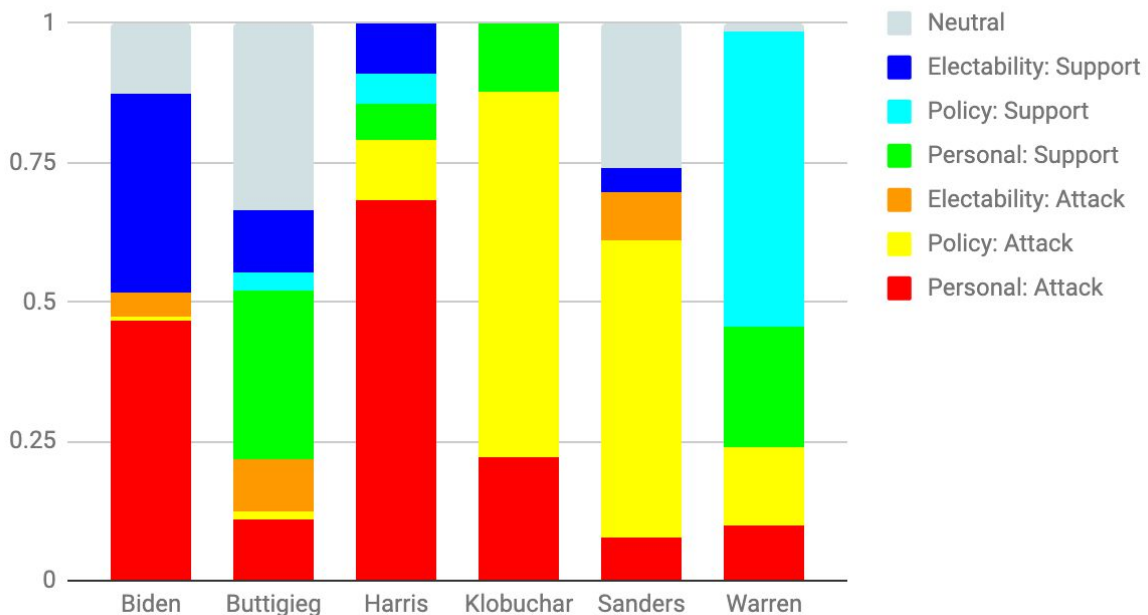
♡ 40   8:30 PM - Jun 30, 2019

The graph below shows the distribution of these narrative types for each of the six candidates. The attack-style narratives are in warm colors at the bottom of the bars, and the support-style narratives are in cool colors at the top.

## Narrative Types In Post-Debate Coverage



The clearest observation is that each candidate is facing a unique narrative landscape, in a way that does not allow easy generalizations along gender or any other demographic lines. The debates were the first time when all candidates were on stage together, connecting more intimately with each other and with the American public. This brought their individual behaviors into more focus than any preconceived stereotypes.

The most striking contrast in the post-debate period is between Elizabeth Warren and Kamala Harris. Earlier in the campaign, our research showed that both candidates were the subject of multiple character and identity-based attacks, receiving more attention from the right-wing/non-credible parts of the political spectrum than most other candidates in the race. After the June debate, conversations about Harris remained in that part of the political space, and top narratives were all various flavors of character attacks:

- Kamala Harris is a liar and a fraud.



✨James✨
@RN_JB7

The Two Faces of Kamala Harris. Nah, I think she has more than 2: Racist, Great Divider, Big Liar, Hypocrite, Mediocre, Powermoger, Female Obama, Lover and Protector of Illegals and Lawbreakers like Jussie Smollett, and you can add yours to the list.

The Two Faces of Kamala Harris
Kamala Harris has matched every one of her progressive achievements with conservative ones.
🔗 jacobinmag.com

- Kamala Harris will protect criminals and dangerous foreigners before she protects "real Americans."



Blaise Pascal 🖖 ★★★
@donaldpirl

Kamala Harris Promises Opportunities, but Outsources U.S. Jobs to Indian Graduates

Kamala Harris Promises Opportunities, but Outsources U.S. Jobs to Indian G...
Sen. Kamala Harris is declaring herself the supporter of working families — but she is the lead Democratic sponsor on legislation which offers green car...
🔗 truepundit.com

6:04 PM · Jul 3, 2019 · Buffer

24

- Kamala Harris is a sellout who cannot be trusted.

**Lakota Man**
@LakotaMan1

"Kamala Harris is no friend to American Indians. As California's attorney general Kamala Harris has been fighting to invalidate Indian Trust Lands."

Kamala Harris is a menace to the Native American community.



**Kamala Harris is no friend of American Indians**
I've tried to bring this up in comments about Kamala Harris in other diaries and have been attacked and said I was just trying to smear Harris. I'm calling …
🔗 m.dailykos.com

11:15 AM · Jun 28, 2019 · Twitter for iPhone

- Kamala Harris is not authentically black.

**Arthur Schwartz** ✔
@ArthurSchwartz

Kamala Harris's Ancestors Owned Slaves, Her Father Says

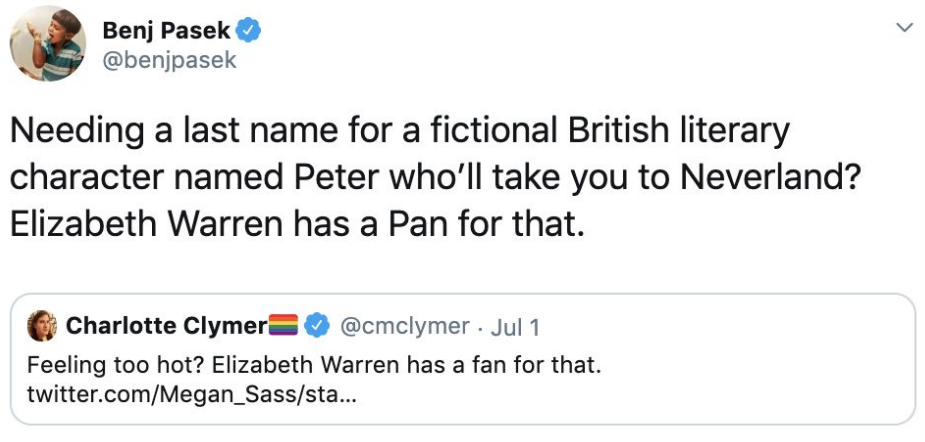**Kamala Harris's Ancestors Also Owned Slaves**
Sen. Kamala Harris (D., Calif.) is the descendant of an Irishman who owned a slave plantation in Jamaica, accordi…
🔗 freebeacon.com

1:51 PM · Jul 9, 2019 · Twitter for iPhone

25

By contrast, Elizabeth Warren mentions showed a groundswell of support, much of it playful/ meme-like variations of "Warren has a plan for that." The top Warren narratives were as follows:

- Elizabeth Warren has clear policy proposals.



**Benj Pasek** ✔
@benjpasek

Needing a last name for a fictional British literary character named Peter who'll take you to Neverland? Elizabeth Warren has a Pan for that.

> 🏳️‍🌈 **Charlotte Clymer** 🏳️‍🌈 ✔ @cmclymer · Jul 1
> Feeling too hot? Elizabeth Warren has a fan for that.
> twitter.com/Megan_Sass/sta...

- Elizabeth Warren is considerate and polite.



**Blair**
@blairbraney

RT @blairbraney: Elizabeth Warren uses exact change at the grocery store and has it prepared upon checkout. She's meal planned so knows exa...

> 🏳️‍🌈 **Amanda Deibert** 🏳️‍🌈 ✔ @amandadeibert · Jun 26
> Elizabeth Warren already has her wallet out when it's time to pay. She's never gonna hold everyone up. twitter.com/MerrillBarr/st...
> Show this thread

What is responsible for the dramatic change in narratives for Warren? The optimistic explanation is that it's due to Sen. Warren's relentless focus on policy specifics and staying on message through a multitude of campaign appearances leading into the debates. She ignored personal attacks (on Twitter as well as in public appearances) and instead captured the news cycle through consistent release of policy proposals, town-hall appearances, and personal connections with a multitude of voters. The right-wing trolls on Twitter are still there, but organic support for Warren overwhelms the conversation. Harris, in the meantime, has struggled to define her specific policy proposals, leaving a vacuum to be filled by the character attacks. A more nefarious explanation is that Harris's success is hampered by many factors unrelated to her gender: her race, her past as a prosecutor (which seems at odds with her race or her liberal positions), her quick career rise, or her being viewed as more dangerous by the GOP.

Conclusions and Future Work

Combining political science theory and natural language processing tools, we have analyzed social media discourse for 2020 Democratic presidential hopefuls at two critical points in the early campaign: when they announced their bids for office and after the first debates. We set out to establish if narratives about female candidates on social media, representedin this paper by Twitter, echo the problems female candidates face in the traditional media of being either ignored or attacked on character issues that are not raised for their male counterparts.

Our analysis showed that much of the time, the discussion of female candidates on Twitter echoes the issues found in the coverage of female candidates over many decades in the American press. On Twitter, discussions of female candidates tend to consist of character or identity-focussed attack narratives.These narratives can translate into increased Twitter volume for a particular candidate, but this volume does not tend to be supportive. Thus, it would be misguided to use overall volume of tweets to extrapolate a measure of the candidate's popularity.

Another observation is that female candidates receive more attention on Twitter from right-leaning, less credible parts of the political spectrum than male candidates. Our current technology does not yet allow us to say whether these narratives emerge in the extremist fringes and make their way to the middle, or if the narratives already exist in the mainstream and the fringe fans the flames. This will be a focus of near-term future research. In either case, personal attacks, as well as attempts to defend against them, leave less discourse space for positive or policy-related discussions of female candidates. Overall, we found very little mention of policy on Twitter, which was not surprising given previous studies.

We found some exceptions to the pattern of 'quantity but not quality' for women on Twitter, particularly in Elizabeth Warren's more recent surge in organic Twitter support. Both this evident support for Warren in a place where female candidates get little positive reinforcement as well as the changes between announcing a bid for office and the post-debate discussion demonstrate that social media is a very dynamic campaign communication environment. We also plan to expand our research to chart the flow of political campaign narratives in the mainstream media (as opposed to on Twitter, although as much of the discussion includes links to mainstream media it is accounted for to a degree). We also know that despite challenges of access it is important to include a much broader part of the social media world than Twitter (especially Facebook, but also sites such as 4chan and Instagram), even though Twitter is particularly well attuned to political debates in the United States.

Although we are still refining our use of narrative, we found it to be a useful tool for this research. We also want to continue to develop how we can automate some parts of the analytical process, particularly the tagging of narratives in social media. However, we remain committed to a "cyborg" approach in which human analysis is a key part of establishing both narratives and the shifts in narratives. While machine learning can be incredibly useful at further defining, tagging, and tracing narratives as they move through dynamic media environments, it is impossible to follow the strange and amazing world of U.S. presidential campaigns without human attention and reaction to candidate statements, personalities, events, gaffes, etc. That being said, we believe that the MarvelousAI StoryArc is useful in dealing with speed and accuracy the understanding how key campaign messages form and

spread in our media systems (and hence through the collective mind of the voters). With this knowledge, both candidates and voters can be much more aware of the role of emotion and manipulation in navigating the electoral landscape. They can know who is saying what about them and when. Potentially, they can understand, embrace, deflect, or challenge resonant narratives as they arise in the U.S. media ecosystem. Ultimately, that ability and agency can empower political candidates in a way that could serve democracy well.

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