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When presidential candidates voice party issues, does Twitter listen?

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ABSTRACT
Presidential candidates often speak to their party's issues because parties are thought to have "greater competence on handling" some issues versus others [Petrocik 1996, "Issue Ownership in Presidential Elections, with a 1980 Case Study." *American Journal of Political Science* 40 (3): 825–850, 825]. The present study considers whether Hillary Clinton and Donald Trump tend to use different vocal inflections when talking about their party's issues. Using the audio from the three 2016 presidential debates, we not only find Hillary Clinton and Donald Trump seem to be more emotionally invested in their party's issues, but they use distinct vocal patterns which suggest they "own" some issues more than others. To assess whether viewers responded more positively to these different vocal inflections, we used the valence of 428,185 live-tweets. Ultimately, we found Twitter was net-positive when the candidates raised their vocal pitch while talking about their party's issues. This suggests nonverbal cues are an important component of issue ownership.

Introduction

Presidential candidates often speak to their party's issues because parties are thought to have "greater competence on handling" some issues versus others (Petrocik 1996, 825). However, it is one thing for a Democratic candidate to say, "I support health care" and another thing for a Democratic candidate to say, "I support health care!" Similarly, Republicans who say, "I support our troops!" demonstrate a greater emotional investment than Republicans who say, "I support our troops." Using the audio from the most recent presidential debates, we not only find Hillary Clinton and Donald Trump seem to *emphasize* some of their party's issues more than others, but Twitter also reacts more positively when they display a sincere commitment to the issues owned by their parties. In doing so, we introduce vocal pitch as a way to measure the degree to which presidential candidates are emotionally invested in the issues they are advancing.

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Petrocik, Benoit, and Hansen (2003) argue "sincerity" originates from the genuine "concerns of the party" (602). Ultimately, "sincerity leads to an advantageous strategy" because it helps parties demonstrate their issues are the *most* important (Petrocik 1996, 829). When a candidate says, "I support health care!" voters are more likely to include "health care" in their decision calculus, suggesting "sincerity" helps "increase the salience of issues owned by the candidate's party" (Petrocik, Benoit, and Hansen 2003, 602). Ultimately, we suggest vocal pitch is a useful way to determine whether candidates genuinely care about their party's issues.

Borrowing from the "controllability principle," voters know a candidate's words have been vigorously vetted (Kraut 1978). Less malleable is the way those words are delivered, making nonverbal cues, like changes in vocal pitch, more useful for understanding whether candidates are emotionally invested in their party's issues. Such *emphasis* increases the likelihood voters actively think about those issues which ultimately may benefit those candidates at the ballot box. The present paper uses reactions on Twitter to determine whether this general reaction is net-positive.

Using the valence of 428,185 tweets from the first, second, and third presidential debates, we find vocal pitch likely increases the salience of party issues on the "second screen" – "that is computers, tablets, and mobile devices that enable real-time reactions to the viewing experience" (Shah et al. 2016, 1818). In doing so, we expand the notion of "sincerity" to include nonverbal emotional expressions, such as changes in vocal pitch. When speakers increase their vocal pitch, they demonstrate an emotional commitment to the issue they are advancing. We find such displays are perceived favorably on Twitter, especially when they accompany "owned" issues.

The paper is organized into four sections. It begins with an explanation of why "sincerity" is an important, yet an understudied, component of "issue ownership." We also expand Petrocik's definition of "sincerity" to include a candidate's emotional investment and overall commitment to an issue. We use this discussion to generate two testable hypotheses. The second section describes our audio data and how vocal pitch can be used to determine the degree to which a speaker is "sincere." The third section reports the findings. Additional applications and the contributions of the present study are discussed in the final section.

Vocal pitch and issue ownership

Petrocik, Benoit, and Hansen (2003) argue "sincerity matters because typical Democrats (or Republicans) believe in the concerns of their party" (602). In this way, candidates who are emotionally invested and committed to their party's issues are "sincere." Indeed, a candidate that says, "I support our troops!" demonstrates a greater emotional investment than a candidate

that says, "I support our troops." This study uses vocal inflections (in particular vocal pitch) to differentiate between these types of expressions.

Regardless of whether one is talking about Democrats or Republicans, candidates have a strong incentive to be emotionally invested in their party's issues. Without such commitments, it is difficult to convince voters their "owned" issues are the *most* important. Popkin (1994) puts the argument in this way:

> When voters watch a candidate perform on television, making promises and taking hardline rhetorical positions on issues, they question if there is congruence between avowal and actual feelings-whether the candidate's support for a cause represents a genuine personal commitment or only a campaign tactic … When voters estimate a candidate's preferences, they take account of sincerity-whether the candidate really cares about their concerns. (65)

Since it is difficult for voters to know whether candidate commitments are sincere (or genuine), they must "take shortcuts" (Popkin 1994, 65). We argue vocal pitch is one of these shortcuts.

Generally, when people assess a speaker's sincerity they often follow one of two rules. The ulterior motive rule argues, "one should discount an actor's behavior as a reflection of his or her true nature to the extent the behavior furthers the actor's short-term self-interests" (Kraut 1978, 381). The controllability rule argues, "one should believe most in those aspects of a person's performance that the person is least able to deliberately and consciously control" (Kraut 1978, 381). On the campaign trail, it is easy for candidates to say one thing and do another, meaning it is assumed that they always have an ulterior electoral motive when they speak. Given that, the controllability rule may be of greater use when determining whether a candidate actually cares about their party's issues.

At its most basic level, this rule assumes "if one cannot control it, one cannot fake it" (Kraut 1978, 381). Since features like "verbal content, speech rate and fluency, most body movements, and the large easy-to-see facial expressions, are all more susceptible to deliberate control," speech topic and the choice of words are likely weighed less by voters when assessing a speaker's emotional investment (Ekman et al. 1991, 134). Changes in vocal pitch, on the other hand, typically lie beyond the control of the individual, especially in "deceptions which involve emotion" (Ekman et al. 1991, 133). Thus, not only are vocal inflections less "controllable," but those watching presidential debates likely place greater weight on these nonverbal cues when assessing whether candidates are emotionally invested in the issues they are advancing.

Emotional investments ultimately help candidates mobilize voters. First, "there is ample evidence to suggest that charismatic leaders tend to exhibit more aroused behaviors than do non-charismatic leaders" (Erez et al. 2008,

606). Although there are a variety of nonverbal cues associated with emotional arousal, "the most consistent association reported in the literature is between arousal and vocal pitch, such that higher levels of arousal have been linked to higher-pitched vocal samples" (Mauss and Robinson 2009, 222). This suggests candidates who raise the tone of their voice when speaking about their party's issues are likely to be viewed more favorably than those who do not.

Second, candidates can transfer their emotional state to voters. This phenomenon – called emotional contagion – is the "tendency to automatically mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person, and consequently, to converge emotionally" (Hatfield, Cacioppo, and Rapson 1992, 153–154). On the campaign trail, successful candidates are able to speak at rally after rally with an enthusiasm that actually energizes the audience. We expect a similar contagion effect when candidates raise the tone of their voice during presidential debates, ultimately causing a net-positive reaction.

We use live-tweets from the first, second, and third presidential debates to determine whether viewers react positively when presidential candidates *emphasize* their party's issues. Although Twitter is generally of interest to political scientists, live-tweeting of presidential debates has been mostly studied by communication scholars (e.g. Hawthorne, Houston, and McKinney 2013). For example, Shah et al. (2015) examined the extent to which verbal, tonal, and visual elements influenced the live-tweeting of the first presidential debate between Mitt Romney and Barack Obama. Ultimately, they found "candidates' nonverbal communication mattered mightily in terms of the volume and valence of expression on "Twitter" (242). These results were later replicated by Shah et al. (2016) using the first and third presidential debate.

The present study adds to this literature by examining the interaction between party issues and candidate tone. For example, Shah et al. (2016) argue "the nonverbal behavior of candidates is consequential in driving social media responses, rivaling what candidates actually say during debates," but they do not test whether there is an interactive effect (1837). More specifically, they coded rhetorical functions, like whether candidates made attack or contrast statements, but they did not code whether Obama or Romney was talking about one of their party's issues. Similarly, "tone" is defined as either anger or happiness which is different than candidates demonstrating an emotional investment by raising the tone of their voice. By considering the interaction between what candidates say and how they say it, the present study not only expands our understanding of "second screening" (e.g. Gil de Zúñiga, Garcia-Perdomo, and McGregor 2015), but we also expand the notion of "sincerity" to include candidates' emotional investment in their party's issues.

Theoretical expectations

Although previous scholars have noted the importance of issue ownership, less attention has been paid to Petrocik's notion of "sincerity." To help better understand this portion of Petrocik's theory, we have developed several testable hypotheses.

> *Hypothesis 1:* Hillary Clinton and Donald Trump will be more emotionally activated when talking about their party's issues.

Party's "own" certain issues because they have developed a reputation for being able to effectively "handle" those issues. In other words, Democrat's "own" social welfare because they genuinely care about programs like Social Security. Similarly, Republican's "own" issues like tax reform because they are committed to reducing the size of government. This should generally make Democrats and Republicans more emotionally invested in their party's issues. We expect to find the same with respect to Hillary Clinton and Donald Trump.

> *Hypothesis 2:* When candidates become emotionally activated (as indicated by their increased vocal pitch) when talking about their party's issues, those live-tweeting the presidential debates will tend to respond more positively.

When candidates are emotionally engaged, not only do they seem more charismatic, but they also transfer their enthusiasm to those who are watching via emotional contagion. Whether it is President Obama saying "Fired up! Ready to go!" or Donald Trump saying, "Lock her up!" the most successful candidates are those who can raise the salience of their party's issues in the mind of voters. Thus, when either Hillary Clinton or Donald Trump *emphasize* their party's issues during the presidential debates, we expect those live-tweeting the debates will respond more positively.

Description of audio, video, and Twitter data

We downloaded videos of each debate from NBC News.[1] The audio was extracted using *ffmpeg* and clips where candidates were talking by themselves were segmented using *Audacity*. Similar to Dietrich, Enos, Sen (Forthcoming), *Praat* was used to extract the vocal pitch. This popular audio analysis program estimates the fundamental frequency (or vocal pitch) by dividing the autocorrelation of a windowed signal by the autocorrelation of the window itself.

[1]The url for the first debate is: https://www.youtube.com/watch?v=855Am6ovK7s&t=4s. The url for the second debate is: https://www.youtube.com/watch?v=FRlI2SQ0Ueg&t=1s. The url for the third debate is: https://www.youtube.com/watch?v=smkyorC5qwc&t=1s. The videos are also included in the Supplemental Information.

For each debate, the vocal pitch was normalized to standard deviations above or below each candidate's baseline. For example, the vocal pitch from Hillary Clinton's first debate audio clips was standardized using her average vocal pitch from the first debate. We repeated this process for the first, second, and third debates. We also did the same for Donald Trump. Ultimately, this is very similar to the approach used by Dietrich, Enos, Sen (Forthcoming), and helps account for inherent gender differences and other issues, such as recording differences, specific to each debate. More details and a working example of how we standardized vocal pitch is provided in the Supplemental Information.[2]

We used Twitter's Streaming API to obtain tweets that were posted during each debate. Unlike Twitter's Search API, the Streaming API pushes a random sample of tweets in real-time based on a set of criteria the user provides, such as keywords, usernames, locations, etc. For this study, we used the official presidential debate hashtag (#debates) to limit the tweets we obtained to those that specifically referenced the presidential debates. Although there were several other informal hashtags, we used the official hashtag because it was not only the most prevalent, but it also was formally endorsed by both campaigns and each broadcasting network.

For the first, second, and third presidential debate broadcasts we collected 159,772, 59,739, and 226,257 tweets, respectively. Of these, we only used English language tweets – which constituted 96.06 percent of our initial data. This brought our final count to 428,185 tweets with the majority of those tweets coming from the first and third debates. While we are generally interested in all tweets, we ultimately excluded re-tweets from our analyses after we examined a random sample. In that sample, the re-tweets covered a variety of topics, several of which were not related to the debates.

Unlike @replies and hashtags, "there is no universally agreed-upon syntax for retweeting" (boyd, Golder, and Lotan 2010, 3). For example, users often alter the message when retweeting or they add their own commentary. Re-tweets can also reference the content of other media or paraphrase what is said in others' tweets. "As a result, the text and meaning of messages often change as they are retweeted and the inconsistent syntax makes it difficult to track the spread of retweets" (3). This is precisely what we found in our data.

Moreover, people re-tweet for a number of reasons, many of which are not actually based on the content of the tweet. For example, some users viewed retweeting as an "an act of friendship, loyalty, or homage," whereas others used re-tweets "to either gain followers or reciprocity for more visible participants" (boyd, Golder, and Lotan 2010, 5). Regardless, a "retweet" does not

[2]We also estimated models in Tables S8 and S9 where the baseline measures used to standardized the vocal pitch of the *i*th clip does not include the *i*th clip in the calculation of the mean and standard deviation. The correlation between this standardized variable and the one used in Tables 1 and 2 is 0.99 and the results in Tables S8 and S9 are essentially identical.

automatically imply an endorsement which is why we felt comfortable excluding them when conducting our analyses.

The "positive" and "negative" emotional words categories from the Linguistic Inquiry and Word Count (LIWC) dictionary were used to determine whether a tweet was generally positive or negative. In total, LIWC includes 407 "positive" words and their extensions. For example, words like "agreeable" and "benevolent" are included in this category. LIWC also provides 500 "negative" words and their extensions. Words like "agitated" and "bitter" are all included in this category. Although we cannot provide a full list of the words included in each category, we include all the tweets we collected as well as the number of positive and negative words in the Supplemental Information.

We ultimately determined whether a tweet was "positive" or "negative" by simply comparing the percentage of words within each category. For example, if 10 percent of a tweet's words were positive and 5 percent of a tweet's words were negative, then we would say the tweet was generally more "positive." Similarly, if 5 percent of a tweet's words were negative and 2 percent of a tweet's words were positive, then we would say overall the tweet was more "negative." In the Supplemental Information, we also provide raw counts of the positive and negative tweets for each candidate.

We used the Google Speech Recognition API to extract what was said in each audio clip. Using keyword searches, we then identified whether either candidate was talking about any of the twelve topic categories outlined by Petrocik, Benoit, and Hansen (2003). According to these authors, Democrats are said to "own" the following issues: "Civil Liberties," "Civil Rights," "Social Welfare/Spending," "Social Class and Group Relations," "Women," and "Organized Labor." Conversely, Republicans are said to "own" the following issues: "Civil and Social Order," "Defense and Spending Policy," and "Big Government." Petrocik, Benoit, and Hansen (2003) also identified several "performance issues" which are not necessarily "owned" by either party, but can benefit one party depending on the current political climate. For these issues, we said Republicans had an advantage on "Foreign Relations" and "Government Functioning," whereas Democrats had an advantage on the "Economy." Given that Donald Trump also campaigned on the economy, we include additional analyses in the Supplemental Information in which we say the economy is "owned" by Republicans. The results remained the same when this was done. Topic descriptions and keywords are also included in the Supplemental Information.

Results

Candidates are more emotionally activated when talking about their party's issues

Previous literature has shown that vocal pitch is highly correlated with "emotional activation" due to the vocal cords naturally tightening in response

to an internal or external stimulus (Bachorowski and Owren 2003). Occurring largely below conscious awareness, we argue these physiological changes take place when candidates are emotionally invested in the issues they are advancing. Given that, we expect both candidates will raise their vocal pitch when talking about their party's issues, but some issues will generate a greater increase.

Figure 1 plots each candidates' vocal pitch when talking about Democratic Issues. It is readily apparent Hillary Clinton is more emotionally invested in her party's issues. We found the greatest difference when both candidates were talking about "Civil Liberties." Here, Hillary Clinton spoke 0.58 standard deviations *above* her baseline, whereas her opponent spoke 0.64 standard deviations *below* his baseline. Although this difference was only statistically significant at the .10-level ($t = 1.91$, df = 10, $p < .09$), when all the Democratic issues were combined into a single variable a more statistically meaningful difference was found. This variable can be found on the far right of Figure 1. When Hillary Clinton was speaking about any Democratic issue her vocal pitch was 0.20 standard deviations *above* her baseline, whereas Donald Trump spoke 0.33 standard deviations *below* his baseline when talking about these same issues. Not only is this difference statistically significant at

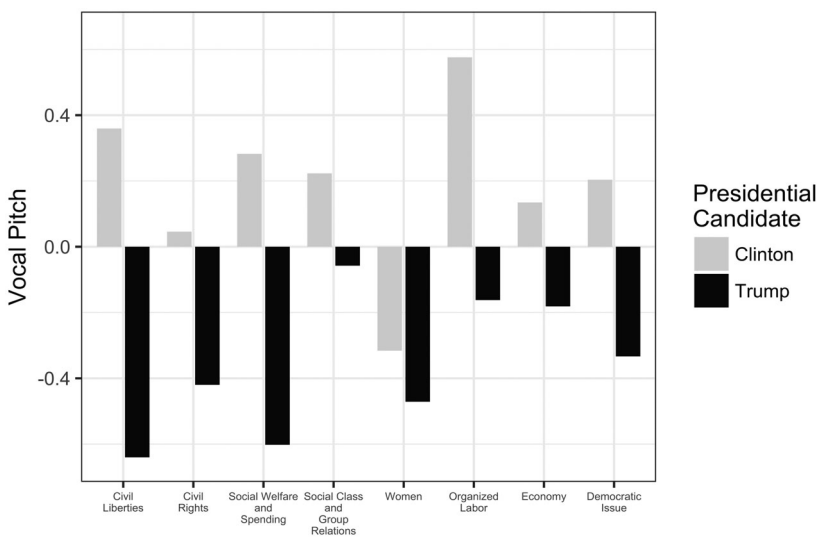

Figure 1. The candidate's vocal pitch when discussing Democratic issues.

Note: The vocal pitch of Hillary Clinton and Donald Trump are represented by grey and black bars, respectively. The y-axis is the mean vocal pitch (standardized) when a candidate mentions a given topic. For example, when discussing Civil Liberties, the grey bar is greater than zero, whereas the black bar is not. This implies Hillary Clinton was more emotionally activated when talking about Civil Liberties as compared to Donald Trump. A full list of the topics and keywords used for each topic can be found in the Supplemental Information.

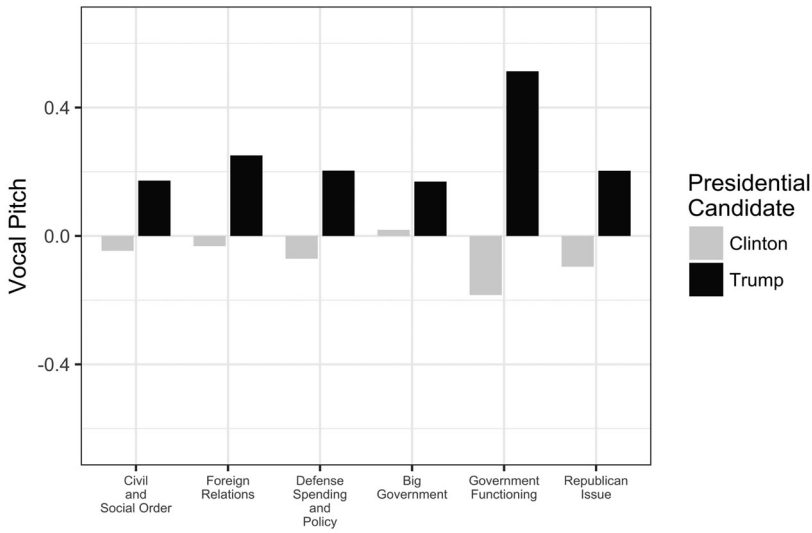

Figure 2. The candidate's vocal pitch when discussing Republican issues.

Note: The vocal pitch of Hillary Clinton and Donald Trump are represented by grey and black bars, respectively. The y-axis is the mean vocal pitch (standardized) when a candidate mentions a given topic. For example, when discussing Foreign Relations, the grey bar is less than zero, whereas the black bar is greater than zero. This implies Hillary Clinton was less emotionally activated when talking about Foreign Relations as compared to Donald Trump. A full list of the topics and keywords used for each topic can be found in the Supplemental Information.

the .05-level ($t = 3.00$, df = 93, $p < .05$), but it demonstrates Hillary Clinton seems to be more emotionally invested in her party's issues.

We created the same plot for Republican issues. This can be found in Figure 2. Similar to his opponent, Donald Trump is more emotionally activated when talking about his party's issues. We found the greatest difference when both candidates were talking about "Government Functioning." Here, Donald Trump spoke 0.51 standard deviations *above* his baseline, whereas his opponent spoke 0.18 standard deviations *below* her baseline. Although this difference is not statistically significant at the .05-level ($t = 1.36$, df = 12, $p > .05$), a greater difference is found when we combined all Republican issues. This variable can be found on the far right of Figure 2. When Donald Trump was speaking about any Republican issue his vocal pitch was 0.20 standard deviations *above* his baseline, whereas Hillary Clinton spoke 0.10 standard deviations *below* her baseline. Although larger, this difference is still not statistically significant at the .05-level ($t = 1.51$, df = 91, $p > .05$), suggesting Donald Trump is less emotionally invested in his party's issues as compared to his opponent.

The main test of our first hypothesis can be found in Table 1. In these models, we only consider audio clips that are at least 30 seconds long. We found these clips contained the vast majority of topic discussions and gave

Table 1. Hillary Clinton and Donald Trump are more emotionally activated when speaking about their party's issues.

(a) Hillary Clinton			(b) Donald Trump		
	(1)	(2)		(3)	(4)
Constant	0.300***	0.796***	Constant	0.196	0.957***
	(0.132)	(0.211)		(0.146)	(0.248)
Democratic	−0.676***	−0.427***	Republican	−0.283	−0.222
Issue	(0.209)	(0.212)	Issue	(0.207)	(0.194)
Hillary	−0.543**	−0.388	Donald	−0.435*	−0.530**
Clinton	(0.243)	(0.235)	Trump	(0.244)	(0.212)
Clip		−0.003	Clip		−0.004**
Duration		(0.002)	Duration		(0.002)
Responding		−0.575***	Responding		−0.601**
		(0.146)			(0.146)
% Positive Words −		−1.975	% Positive Words −		−2.308*
% Negative Words		(1.366)	% Negative Words		(1.382)
Second		0.020	Second		−0.030
Debate		(0.171)	Debate		(0.171)
Third		0.028	Third		0.058
Debate		(0.169)	Debate		(0.168)
Democratic Issue ×	1.070***	0.871***	Republican Issue ×	0.719***	0.697***
Hillary Clinton	(0.314)	(0.306)	Donald Trump	(0.299)	(0.276)
N	138	138	N	138	138
Adjusted R^2	0.070	0.181	Adjusted R^2	0.021	0.173

Note: In all models, the unit of analysis is a given clip and the data were subsetted to only include clips 30-seconds or longer in which either Hillary Clinton or Donald Trump was talking by themselves. In the panel labeled "Hillary Clinton," we include a dummy variable for whether Hillary Clinton was speaking. In the panel labeled, "Donald Trump," we include a dummy variable for whether Donald Trump was speaking. We also include dummy variables for whether a candidate was talking about a Democratic or Republican issue. The dependent variable is each candidate's (standardized) vocal pitch. Please refer to the Supplemental Information for additional model specification and a list of all the variables. All coefficients are estimated using ordinary least squares. Levels of significance are reported as follows: $^*p < .10$; $^{**}p < .05$; $^{***}p < .01$. Standard errors are reported in parentheses.

those live-tweeting the debates enough time to react.[3] The dependent variable is the candidates' vocal pitch scaled to standard deviations above and below their respective baselines. To capture whether Hillary Clinton talked at a higher vocal pitch when discussing Democratic issues, we created a dummy variable which equals 1 when she is talking and 0 when Donald Trump is talking. This variable (see *Hillary Clinton*) was interacted with another dummy variable which equals 1 when either candidate is talking about a Democratic issue and 0 otherwise (see *Democratic Issue*). This interaction helps determine whether Hillary Clinton uniquely raised her vocal pitch when talking about Democratic issues or whether both candidates were generally more emotionally activated when talking about her party's issues.

Similar variables were created for Donald Trump. More specifically, to capture whether he talked at a higher vocal pitch when discussing Republican

[3]In the Supplemental Information, we include additional specifications where audio clips are subsetted using 1, 5, and 10 seconds. The results are the same in each of these instances.

issues, we created a dummy variable which equals 1 when he is talking and 0 when Hillary Clinton is talking. This variable (see *Donald Trump*) was interacted with another dummy variable which equals 1 when either candidate is talking about a Republican issue and 0 otherwise (see *Republican Issue*). We expect this interaction (see *Republican Issue* × *Donald Trump*) to be positive and statistically significant, suggesting Donald Trump is more emotionally activated when talking about Republican Issues as compared to Hillary Clinton. We expect to find the same result for Hillary Clinton (see *Democratic Issue* × *Hillary Clinton*), meaning she is more emotionally activated when talking about Democratic issues as compared to her opponent.

In Panel A, we find strong evidence that Hillary Clinton tends to speak at a higher vocal pitch when discussing Democratic issues. Beginning with Model 1, when Hillary Clinton is speaking about a Democratic issue her predicted vocal pitch is 0.15 standard deviations *above* her baseline. Not only is this significantly higher than her opponent's predicted vocal pitch (−0.38), but her vocal pitch is significantly lower when she is talking about something that is not "owned" by her party. Here, when *Democratic Issue* is set to 0, Hillary Clinton's predicted vocal pitch is 0.24 standard deviations *below* her baseline. This implies not only is Hillary Clinton more excited to talk about Democratic issues, but she also seems to be unexcited to talk about anything that is not one of her party's issues.

This result holds when additional controls are included in Model 2. Here, we include four controls. To control for the varied length in our audio clips we included *Clip Duration*, which is the length (in seconds) of each audio clip. Since candidates also likely respond differently to the moderator, we included a dummy variable (*Responding*) for whether Hillary Clinton or Donald Trump was responding to each other. Dummy variables for each debate were included for similar reasons. While the first and third debates were somewhat similar, the second debate was a town hall, so we included dummy variables (e.g. *Second Debate*) to isolate this and other differences between the debates.

Of these control variables, the difference in the percentage of positive and negative words (as defined by LIWC) is the most important. Even when this variable is included in our models, the main and interactive effects of the vocal pitch are statistically significant and still in the predicted direction (see Model 2). In the first debate, when Hillary Clinton is speaking about a Democratic issue her predicted vocal pitch is 0.06 standard deviations *above* her baseline, holding all other variables constant at their mean and modal values. In the second and third debates, her predicted vocal pitch rises to 0.08 and 0.09 standard deviations *above* her baseline, respectively. Conversely, when *Democratic Issue* is set to 0 her predicted vocal pitch is 0.38 0.36, and 0.36 standard deviations *below* her baseline in the first, second, and third presidential debates, respectively. This provides strong

evidence that Hillary Clinton was more emotionally invested when talking about Democratic issues.

Similar to his opponent, Donald Trump is also more emotionally invested in his party's issues. Beginning with Model 3, when Donald Trump is speaking about a Republican issue his predicted vocal pitch is 0.20 standard deviations *above* his baseline. Not only is this significantly higher than his opponent's predicted vocal pitch (−0.09), but his vocal pitch is significantly lower when he is talking about something that is not "owned" by his party. Here, when *Republican Issue* is set to 0, Donald Trump's predicted vocal pitch is 0.24 standard deviations *below* his baseline. This again implies not only is Donald Trump more excited to talk about his party's issues, but he seems to be unexcited to talk about anything else.

In Model 4, these results hold when we include additional controls. In the first debate, when Donald Trump is speaking about a Republican issue his predicted vocal pitch is 0.03 standard deviations *above* his baseline, holding all other variables constant at their mean and modal values. In the second and third debates, his predicted vocal pitch first falls to 0.01 and then rises to 0.09 standard deviations *above* his baseline, respectively. Conversely, when *Republican Issue* is set to 0 his predicted vocal pitch is 0.44, 0.47, and 0.39 standard deviations *below* his baseline in the first, second, and third debates, respectively. This again provides strong evidence that Donald Trump was more emotionally invested in his party's issues.

Twitter reacts positively when candidates demonstrate they are emotionally invested in their party's issues

We have shown Hillary Clinton and Donald Trump are generally more activated when talking about their party's issues, even though both candidates seem to *emphasize* some issues more than others. For example, Hillary Clinton is more activated when talking about "Civil Liberties" as compared to the "Economy." Conversely, Donald Trump is more activated when talking about the "Economy" as compared to "Civil Liberties." This is consistent with both candidates being genuinely concerned about their party's issues, even though the effect seems to be more pronounced for Hillary Clinton. Ultimately, this provides strong support for our first hypothesis.

We now turn to whether those live-tweeting the debates responded more positively to these emotional displays. For example, when Hillary Clinton raises her vocal pitch when talking about health care is there a net-positive reaction on Twitter? Charismatic leaders tend to be more emotionally expressive. Similarly, a candidate's emotional state can often transfer to those watching the debate, ultimately producing a more favorable response. Regardless of the mechanism, we expect both candidates will be viewed more positively when they display an emotional investment in their party's issues because

Table 2. Hillary Clinton and Donald Trump are evalutated more positively when they are emotionally activated while speaking about their party's issues.

(a) Hillary Clinton			(b) Donald Trump		
	(1)	(2)		(3)	(4)
Constant	1.914***	1.576***	Constant	2.162***	2.608***
	(0.273)	(0.276)		(0.215)	(0.315)
Vocal	−0.274	−0.385*	Vocal	0.240	0.127
Pitch	(0.303)	(0.199)	Pitch	(0.253)	(0.232)
Democratic	0.527*	−0.060	Republican	0.029	0.182
Issue	(0.315)	(0.205)	Issue	(0.267)	(0.231)
Clip		0.010***	Clip		−0.004
Duration		(0.003)	Duration		(0.003)
Responding		−0.220	Responding		−0.060
		(0.191)			(0.250)
% Positive words −		−1.122	% Positive words −		−2.246
% Negative words		(1.727)	% Negative words		(1.954)
Second		−1.302***	Second		−0.824***
Debate		(0.212)	Debate		(0.255)
Third		0.986***	Third		0.684**
Debate		(0.196)	Debate		(0.268)
Vocal pitch ×	0.270	0.690***	Vocal Pitch ×	−0.007	−0.081
Democratic issue	(0.360)	(0.228)	Republican Issue	(0.299)	(0.259)
N	64	64	*N*	64	64
Adjusted R^2	0.002	0.659	Adjusted R^2	0.005	0.347

Note: In all models, the unit of analysis is a given clip and the data were subsetted to only include clips in which Hillary Clinton and Donald Trump were talking by themselves. We also only include clips that were at least 30 seconds long. The dependent variable is the number of positive tweets per second minus the number of negative tweets per second. Please refer to the Supplemental Information for additional model specifications and a list of all the variables. All coefficients are estimated using ordinary least squares. Levels of significance are reported as follows: $^{*}p < .10$; $^{**}p < .05$; $^{***}p < .01$. Standard errors are reported in parentheses.

their party's issues are more likely to be salient in the mind of those who are live-tweeting the debates.

In Table 2 we test this hypothesis using the number of positive tweets minus the negative tweets. Similar to a viewer response dial, our dependent variable will return a positive value when Twitter is more positive than negative. To help interpret the results, we only consider instances where Hillary Clinton was speaking by herself in Models 1 and 2. When this is done, we find Twitter generally responded more positively when Hillary Clinton *emphasized* her party's issues. More specifically, in Model 1 when the vocal pitch is set to its maximum (2.34) there are 2.34 more positive than negative tweets when Hillary Clinton is talking about a Democratic issue. This number drops to 1.27 when she is talking about something else (*Democratic Issue* = 0), suggesting when she is emotionally invested in Democratic issues those watching respond more positively.

Not only does this result hold in Model 2, but there is a more pronounced relationship when additional controls are included. To help interpret the results, we plotted predicted values in Figure 3. In the first debate, when Hillary Clinton spoke one standard deviation above her baseline about a Democratic issue there were 2.14 more positive than negative tweets. This

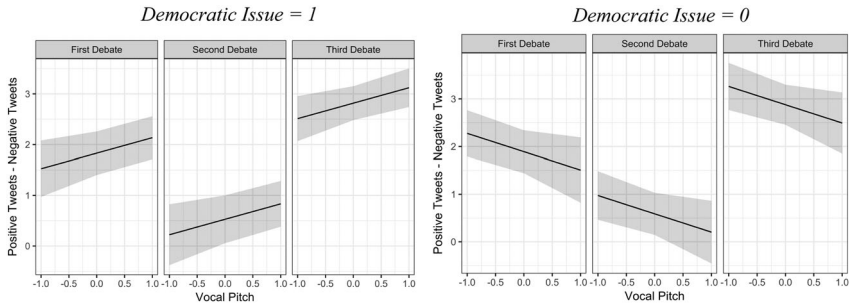

Figure 3. Predicted valence of twitter response as Hillary Clinton's vocal pitch increases when discussing democratic issues. *Democratic Issue = 1. Democratic Issue = 0.*
Note: Predicted values derived from Table 2, Model 2. The *y*-axis is the predicted number of positive tweets minus the predicted number of negative tweets as vocal pitch ranges from one standard deviation below (−1) and one standard deviation above (1) Hillary Clinton's baseline. In the first panel, *Democratic Issue* is set to 1. In the second panel, *Democratic Issue* is set to 0. All other variables are held constant at their mean and modal values.

number drops to 1.51 when she spoke about something that was not "owned" by her party. We found essentially the same results in the second and third debates where there were 0.83 and 3.12 more positive than negative tweets when Hillary Clinton spoke one standard deviation above her baseline about a Democratic issue. These numbers dropped to 0.20 and 2.49 when she spoke about something that was not one of her party's issues, suggesting Twitter responded more positively when she *emphasized* her party's issues.

Although the direction of the relationship is the same when predicted values are calculated, we found essentially no difference between the number of positive and negative tweets when Donald Trump spoke about his party's issues. For example, in Model 3, when vocal pitch is set to its maximum (2.34) there were 2.74 more positive than negative tweets when Donald Trump spoke about a Republican issue. This number only drops to 2.72 when he spoke about something else (*Republican Issue* = 0), suggesting Twitter responded more positively when he *emphasized* his party's issues, but the difference was slight. In the Supplemental Information, we also plot the predicted values of Model 4 while vocal pitch is allowed to vary from one standard deviation *below* to one standard deviation *above* Donald Trump's baseline. Again, the plots look remarkably similar, yielding only partial support for our second hypothesis.

Discussion

According to Petrocik (1996), "sincerity" is a prerequisite for issue ownership. Candidates who genuinely care about their party's issues are better able to

convince voters that their issues are the *most* important. Although there are a number of ways for candidates to demonstrate they are emotionally invested in their party's issues, voters are more likely to pay attention to cues that are less malleable – like changes in their vocal pitch. This is what we found on Twitter. Not only were Hillary Clinton and Donald Trump more likely to raise their vocal pitch when advancing their party's issues, but those live-tweeting the debates tended to respond more positively.

These findings make two important contributions to the study of issue ownership. First, we empirically test the importance of "sincerity." Petrocik argues on several occasions that (a) parties are not only genuinely concerned about the issues they "own," but (b) it is in their interest to demonstrate they care. We not only show Hillary Clinton and Donald Trump were more emotionally activated when they talked about their party's issues, but there was a net-positive reaction on Twitter. Both findings are consistent with "sincerity" being an "advantageous strategy" (Petrocik 1996, 829).

Second, we also expand the notion of issue ownership to include nonverbal behavior. Regardless of whether one is talking about presidential debates, floor speeches, or oral arguments, what is said is more than the words on the page. We show nonverbal behavior, like vocal inflections, are at least as important, if not more important, than their verbal counterparts, especially when it comes to assessing whether a speaker is emotionally invested in the issues they are advancing. Indeed, saying "I support health care!" is not the same thing as saying, "I support health care." Although more research is needed to fully understand the importance of nonverbal cues, the present study is an important step in the right direction.

Disclosure statement

No potential conflict of interest was reported by the authors.

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