Staying silent and speaking out in online comment sections: The influence of spiral of silence and corrective action in reaction to news

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Abstract

Through the lenses of Spiral of Silence Theory, the Corrective Action Hypothesis, and peer influence research, we conducted an online experiment to identify the influence of varying opinion climates on opinion expression about a news controversy. This study expands the corrective action literature by manipulating the perceived opinion climate and measuring opinion change and subsequent expression. After all participants (*N*=415) read the same news story, they were randomly assigned to one of five opinion climate conditions (supportive, oppositional, mixed, uncertain or polarized) operationalized through user comments following the story. The experiment allowed participants to reply, comment, do both, or not further engage in an attempt to mirror real-world expression behavior. The results suggest that the opinion climate formed by news comments influenced the opinions and comments of participants, providing evidence that those who hold strong opinions are more likely to comment when they perceive the opinion climate to be oppositional rather than supportive to their worldview.

Keywords: news audience, opinion climate, news comment sections, corrective action, spiral of silence, peer influence, experiment, media effects

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As news organizations moved their content online, they offered audiences new opportunities to engage with journalists, editors and other readers through online comment sections. In addition to the purposeful functions that online news comment sections provide (e.g., opinion expression, information sharing, and entertainment), they also play a less obvious role in providing cues to public opinion, as responses from opposing sides are on display.

Scholars, however, have noted a lack of research on whose opinions are represented in comments sections (Stroud, Van Duyn, & Peacock, 2016). Two theories that suggest who expresses their opinion and who stays quiet, Spiral of Silence theory and the Corrective Action hypothesis, seemingly are at odds. The former theory maintains that when controversies arise, audiences will remain silent to avoid social isolation (Noelle-Neumann, 1974), while the latter suggests that controversial issues will inspire people to voice their thoughts to change others' perceptions of public opinion (Davison, 1983). Evidence suggests that audiences are motivated to stay silent or speak up by the strength of their own opinions and how they perceive the opinions of others (Kelman, 1961; Levitan & Verhulst, 2016; Tsfati, Stroud, & Chotiner, 2013), so these theories do not clash directly but, rather, operate under nuanced circumstances.

When individual outcomes of expression choices aggregate in an online comment section, they create a microcosm of public discourse where the opinion climate is in flux. This microcosm of collected opinions can have two sequential effects: First, an audience member uses the comment section to form an impression of public opinion. Next, the audience member, informed and motivated by the perception of public opinion, decides whether to share or suppress a personal opinion. By motivating individuals to either suppress or express their

opinion, the perceived opinion climate can spur either a spiral of silence or a corrective action outcome.

The purpose of this study is to measure how opinion climates created by news comment sections affect personal opinion change and expressive behavior. We do this through the lens of both Spiral of Silence and Corrective Action hypothesis, offering evidence of how these two theories of expression operate in online spaces. In an online experiment, we examined the extent to which audience comments below news stories are processed as cues to the opinion climate. By experimentally varying the opinion climate through online comments, we examine effects of these opinion climate cues on individual opinions and willingness to express them. In the process, the nature of expression was captured by allowing participants the choice of engaging in one of four ways: (1) to start a new comment thread, (2) to respond to another's comment, (3) to do both, or (4) to choose not to comment.

Literature review

News comment sections today operate as forum-like venues analogous to letters to the editor (McCluskey & Hmielowski, 2012). Individuals who participate in the forum set a tone for public opinion, and can influence the tone of future comments (Anderson, Brossard, Scheufele, Xenos & Ladwig, 2014). Around half of online news audience members read article comments, though only 14% post comments regularly (Stroud, Van Duyn, & Peacock, 2016). When only a narrow portion of those who read comments express opinions, they exert a disproportionate influence the nature of the discourse, resulting in an outsized opportunity to shape the perception of public opinion. If the characteristics of the discourse facilitate a spiral of silence or spur corrective expression, audiences may perceive public opinion to be more polarized than it is.

Influence of Opinion Climate on Personal Opinion

Online comment sections allow audiences access to people outside their usual social network. People often talk to others to fully crystalize their opinion (Mutz, 2002; 2006). However, because face-to-face interactions are often limited to people of similar socio-economic and cultural backgrounds (Mutz & Martin, 2001), the resulting discussion may represent a constrained scope of opinions. Homogenous networks construct a reality in which individuals do not encounter diverse opinions, but rather hear their own worldview echoed. Moreover, people tend to refrain from raising controversial issues unless in the presence of like-minded people who will likely approve and encourage to express these opinions (Mutz, 2002; 2006; Sunstein & Hastie, 2015). This tendency follows the logic of Cognitive Dissonance Theory (Festinger, 1957), which assumes that people seek internal consistency, and therefore tend to avoid opposing views. People strive to be accepted by their peers, and maintain harmony in their social networks. They are inclined to socialize with like-minded peers and conform to the perceived dominant opinion, especially in highly cohesive groups (Sunstein, 2009).

Homogenous opinion climates may push audiences toward opinion conformity about a news story. When a news audience was told that an overwhelming majority of peers felt a certain way, members were more likely to align with the majority opinion (Gonzenbach, 1992). In contrast, when audiences had no information about public opinion on the issue, they reported a range of personal opinions (Gonzenbach, 1992). Levitan and Verhulst (2016) found that people who were confronted with a homogeneous set of opinions demonstrated greater conformity compared to people who were confronted with a heterogeneous set of opinions. In another study, participants expressed a conforming opinion contemporaneously in public and again in private weeks later, suggesting that the homogeneous opinion climate had lasting effects (Levitan & Verhulst, 2016).

Conversely, heterogeneous opinion climates can decrease confidence in personal opinions and lead to ambivalence (Mutz, 2002). Huckfeldt, Mendez and Osborn (2004) found that people in "undecided" discussion groups indicated less conviction regarding for whom to vote in an upcoming presidential election compared to those who faced an overwhelmingly supportive or oppositional discussion group. Further, the authors found that heterogeneous opinion climates led to less personal opinion polarization compared to homogenous opinion climates (Huckfeldt, Mendez, & Osborn, 2004).

Strength of Personal Opinion and Opinion Change

Involvement with an issue is key when attempting to predict how likely audiences are to adjust their own beliefs and attitudes. Partisans are not likely to change their opinions when confronted with oppositional arguments, and this is especially true for those who hold strong opinions (Taber, Cann, & Kucova, 2009). In fact, studies provide evidence that messages designed to correct beliefs among partisans may trigger a backfire effect (Gaines, Kuklinski, Quirk, Peyton, & Verkuilen, 2007; Nyhan & Reifler, 2010). In contrast, centrists are more susceptible to group preferences and are more likely to conform to the perceived opinion climate (Mutz, 1992), especially when the group is highly unified and homogeneous (Mutz, 2002).

Online Comments Influence Personal Opinions

Evidence suggests that many opinion climate mechanisms that influence personal opinion operate in offline domains function similarly online (Lee, 2012). Price and Cappella (2002) found that online discussions moved personal opinions in the direction of the majority opinion when controlling for initial opinion. Lee (2012) demonstrated that hostility of online comments can change audience's perception of the article itself, as audience members who saw comments opposing their personal opinion rated the article as biased even though the content was neutral.

This research suggested that audiences were conflating the opinions of those who commented with the opinions of the news organization and as a result, exhibited a hostile media effect (HME; Lee, 2012). This form of selective processing may explain why partisans perceive news coverage regarding issues of personal value as biased against them (Giner-Sorolla & Chaiken, 1994; Gunther, 2014).

Depersonalization of online comments, compared to offline conversations, appears to promote consensus among the public's perceptions, evaluations, and attitudes (Lee, 2006; Walther, DeAndrea, Kim, & Anthony, 2010). Lee (2006) argued the depersonalization of online comments meant that audiences were more likely to see similarities between themselves and other commenters, and therefore were more likely to be influenced by online comments than interpersonal comments. In contrast to face-to-face interactions, online platforms offer an arena to express and to encounter a diversity of opinions at greater frequency and ease of access (Brundidge, 2010; Chaffee, Saphir, Graf, Sandvig, & Hahn, 2001; Kim, 2011).

Opinion Climate and Willingness to Stay Silent

Exposure to news comment sections may additionally influence expression effects: Perceptions of the opinion climate may also motivate individuals to express or self-censor their own personal opinions, as individuals tend to refrain from expressing personal opinions when they believe that the audience will oppose or disagree with them (Hayes, Glynn, & Shanahan, 2005). Noelle-Neumann's Spiral of Silence Theory (1974) suggests that willingness to express an opinion is affected by assessments of opinion climate via an instinctive "quasi-statistical sense" of opinion trends gleaned from mass media. Over time, those who identify themselves with the minority position are less likely to speak up due to fear of social isolation and possible

sanctions inflicted by the majority group, leading to suppression of the minority opinion (Katz, 1981; Noelle-Neumann, 1974).

The spiral of silence and opinion conformity do have exceptions. Shamir (1997) used a panel study design to better assess the dynamic nature of opinion climates. He found opinion consensus as a weaker predictor of expression than other factors, such as political involvement and demographics. Additionally, a meta-analysis of spiral of silence studies suggests that the relationship is not robust (Glynn, Hayes, & Shanahan, 1997). The weak or absent correlation between perception of opinion climate and willingness to express could be the result of other individual-level factors (Hayes, Glynn, & Shanahan, 2005), as some people speak out regardless of the opinion climate (Noelle-Neumann, 1974). Certain individuals seem immune to the pressure to conform to the group (Moy & Scheufele, 2000; Noelle-Neumann, 1993) and do not hesitate to express unpopular views (Matthes, Morrison, & Schemer, 2010).

Attitude certainty, meaning the extent to which a person feels confident in their opinions (Krosnick & Petty, 1995), seems to be a key predictor of those who will express a minority opinion (Glynn & McLeod, 1984; Lasorsa, 1991). Matthes, Morrison and Schemer (2010) indicated that after controlling for attitude certainty, evidence supporting the spiral of silence theory was not observed. Those who remain silent, it appears, are those with less confidence in their opinions and those who have moderate opinions.

Correcting the Opinion Climate

Conversely, partisans and highly involved individuals tend to express opinions publicly, while moderate opinions remain relatively silent (Kelman, 1961; Levitan & Verhulst, 2016; Tsfati, Stroud, & Chotiner, 2013). When the strong and polarized opinions are those that get voiced and shared, audiences consequently perceive public opinion as far more polarized and

hostile than it is in reality. Opinion expression motivated by, rather than inhibited by, perceptions of a hostile public opinion may be explained by theories of presumed-influence, specifically corrective action (Gunther, 2014; Mutz, 1989; Rojas, 2010; Willnat, 1996). The corrective action hypothesis suggests that those who hold strong opinions are motivated to express their views publicly when encountering incongruent information to correct the perception of public opinion and educate others (Davison, 1983). Corrective action may be tied to a motivation spurred by HME. Survey and experimental research suggest that the degree of perceived bias in the news affects perceptions of public opinion about the issue (Eveland & Shah, 2003; Gunther & Christen, 1999; Gunther, Christen, Liebhart, & Chia, 2001). When people perceive news to be biased against them, they are concerned that the public may be swayed in that direction. Because of this fear, those who feel that media is biased against them are motivated to take action to correct the public opinion by speaking up even when their opinion is in the minority (Rojas, 2010).

Online Expression

In addition to the opinion climate cues embedded in online comment sections, the size of the audience, or perceived size of audience, may also influence the decision to express unpopular opinions. More specifically, due to the mass visibility of news media, the commentary on digital platforms may bear greater consequences than opinions expressed interpersonally. The prominence and placement of a news article can lead people to perceive it as more, or less, influential (Tal-Or, Tsfati, & Gunther, 2009). Comments on forums often generate presumed media influence since audience members draw inferences about the effects that user generated messages may bear on other readers, then they aggregate that into the inference on the story's content (Gunther & Storey, 2003). Audience members tend to alter their behaviors based on the

assumption that others will be affected by the media. Ho and McLeod (2008) found that expression effects were similar in online and offline contexts, but the fear of isolation was stronger offline.

Reconciling Spiral of Silence and Corrective Action

Taken together, these studies suggest that in online environments where public opinion is relatively uniform and cohesive, ambivalent audiences will tend to conform to the opinion of the majority. Further, they suggest those with moderate or less crystalized opinions will be less likely to express their opinions when they are in the minority. Conversely, the corrective action literature suggests those with strong opinions will be less likely to adjust their opinions and more likely to speak up when they are in the minority. To test how opinion climates influence spiral of silence or corrective action, we propose an experiment.

In corrective action and HME studies using survey data, personal opinions and the perception of public opinion are measured simultaneously. Attempts to examine the influence of public opinion cues call for the use of experiments, which are complicated by the fact that people hold relevant opinions before exposure to the messages containing cues (Gunther & Schmitt, 2004). While strong preexisting opinions are no doubt less malleable to experimental manipulations, we can examine experimental effects by focusing on an issue that readers have less experience with, and manipulating the opinion climate in the comments section of a news article. In this way, we can test Spiral of Silence and corrective action in a controlled process that accounts for time order. Scholars have criticized experimental approaches to studying spiral of silence because isolated conditions cannot capture the cumulative nature of discussing current events to understand public opinion climates (Gonzenbach, 1992). Yet, controlled conditions

have produced evidence of both spiral of silence (Gonzenbach, 1992) and corrective action (Yun, Park & Lee, 2016).

H1. Comment sections that represent homogenous opinion climates will change personal opinion more than heterogeneous or ambivalent opinion climates.

H2. Comment sections that represent homogeneous opinion climates will move personal opinions in the direction of the majority opinion.

Further, the above research suggests that the degree of opinion change will be dependent upon the extremity of the initial opinion. Specifically:

H3. Comment sections will have greater influence on personal opinion of those who are undecided relative to those who hold strong opinions.

RQ1. How will the varying opinion climate represented in a comment section affect the change of personal opinion of audiences?

As the studies cited above demonstrate, perceptions of opinion climate influence whether people express their opinions or suppress them based on strength of personal opinion. We predict Spiral of Silence theory could be applied to media contexts outside of traditional journalism and in modern contexts such as online news comment sections when the audience is presumed to be large enough to influence others. Thus, by manipulating the comments to create different impressions of the opinion climate, we posit an interaction between personal opinion and the likelihood of expressing an opinion.

H4. Audience members with moderate opinions are more likely to comment on a news story when they perceive their opinion to be in the majority compared to when they are part of the minority opinion.

H5a. Audience members with strong opinions are more likely to comment on a news issue when opinion climate of the comment section is oppositional to their opinion than when the comment section is supportive of their personal opinion.

H5b. Audience members with strong opinions are more likely to comment on a news story when the opinion climate of the comments section is oppositional to their opinion than when the comment section represents mixed or undecided opinions.

RQ2. How will varying the opinion climate through the comments section affect the likelihood of audience comments?

Method

Participants

Participants for this study were recruited from a large Midwestern university. The students were given extra credit in a course for participating in the study. Excluding three participants who withdrew from the study during the debriefing process, 415 people completed the study. The majority of participants identified as female (69 %); white (89%); and the average age was 20. We conducted a power analysis for a medium-sized effect (ηp^2=.2) where the goal was to get .85 power. Analysis suggested we should aim for 68 people per condition where there were 5 conditions (N=340).

Procedure

This study used a 5-condition between-subjects experimental design that manipulated the opinion climate of a news comment section to test the above hypotheses. Participants in this study were told they were going to give their opinions on an online news application under development as a type of "beta test." Participants began by answering questions about their media use and attitudes toward media. Then, all participants were introduced to the news

application by reading a mock news story. The 14-paragraph news story, which appeared within the context of the news app as if it was written by those associated with the app, described a (fictitious) proposed state law that would require post-secondary students who receive financial aid to submit to random drug testing. This topic was chosen for the article because of relevance to the participant population, while at the same time, it is unlikely that the participants have formed long-held prior opinions on the issue since the proposed law was fictitious. The story was written in traditional news style to give a balanced perspective between those who proposed the new law and those who opposed it.

Participants were then randomly assigned to one of five opinion climate conditions: supportive, oppositional, mixed moderate, mixed polarized and uncertain. The opinion climate was shown in two steps that were designed to show the matching opinion climates: First, participants were shown results of a reputed poll of other readers about the issue. The opinion climates were represented by corresponding percentages of votes for the opinion category (or categories in the case of a mixed opinion climate). Second, they were shown six comments and told they were from other readers of the story. The text of the comments was enhanced by a graphic icon showing a red, green or yellow foam finger pointing up, down or to the right. The bar chart of opinion polling and the graphic of the comments matched to show evidence of the same opinion climate.

These manipulations were created to simulate five opinion climate conditions, two of which represented homogenous opinion climates. *Supportive* (*N*=69) These comments were supportive of the proposed drug testing law. They included “I am a rock star student because I don’t smoke. Drugs are a distraction;” and “When students accept taxpayer money, they give up their right to privacy.” *Oppositional* (*N*=85) In this condition, the comments were constructed to

present the same type of arguments as the supportive, but with the valence changed to be opposed to the proposal. These comments included "I smoke weed. So what? I still get all As;" and "This violates the privacy of all students – what's next? Students are not going to stand for this."

The three other conditions represented non-homogenous opinion climates. These were *Mixed Moderate* (*N*=73). This climate condition was constructed from three comments from the supportive condition and three comments from the oppositional condition. *Mixed Polarized* (*N*=100). This climate condition was constructed from the mixed moderate, but the language was changed to make the positions more dramatic and polarized. For example, "Natural selection. Idiots who smoke weed shouldn't get an education and shouldn't get good jobs;" and "If you don't support this, you're an idiot. Oust the freeloaders." And *Uncertain.* (*N*=88). This climate condition was constructed to show no valence in the opinions. Instead, the comments asked questions (e.g., "What do you think of this?") or took a middle position about the issue (e.g., "I can see the pros and cons of this"). See *Appendix A.*

At this point, participants were told they had four choices: They could choose any of the following: 1) reply to one of the comments they saw or 2) start a new comment thread or 3) both reply and start a new thread or 4) do nothing to further engage with the news comment section. Based on their choice, the participants were guided through the commenting process. Those who chose not to further engage with the comment section were guided to the next portion of the survey.

Then, personal opinion about the issue was collected for a second time. After viewing the stimulus information about the opinion climate and being given a change to contribute a comment, participants were asked to report their opinion about the issue in the same way as the

first opinion question. At the end of the survey, demographic information was collected and participants were debriefed about the deception used in the experiment.

The procedure for this experiment was designed to mock a beta test of a soon-to-the-market mobile news application, and participants were asked to give their honest answers. This type of design was chosen because it creates a plausible reason for the survey without revealing to participants they are part of an experiment until the debriefing.

Variable Construction

Personal opinion. The opinion of the participant about the news issue was collected at two time points. Time 1 (*M*=2.4, *SD*=1.29) immediately after reading the news story. It was captured on a 5-point scale where 1 was "definitely oppose the bill" and 5 was "definitely support the bill." For time 2 (*M*=2.36, *SD*=1.28) data were collected after participants had seen the poll results and the comments posted in response to the news story. The scale and format of the question was parallel to the Time 1 item.

Change in personal opinion. Change in personal opinion was calculated as the difference between Time 2 and Time 1 (*M*=-0.03, *SD*=.61). The resulting variable ranged from 3 to -3, where positive scores indicate a move toward supporting the bill, a negative score indicate a move toward opposing the bill. A score of zero indicates there was no change in expression of personal opinion. Ten percent of the participants changed their opinion on the news issue between Time 1 and Time 2.

Strength of personal opinion. Strength of personal opinion (*M*=2.25, *SD*=0.68) was calculated using the Time 1 personal opinion variable that ranged from 1 (definitely oppose) to 5 (definitely support). However, here we wanted to account for the strength of the opinion rather than the valence of the opinion. We folded the Time 1 personal opinion so that those with strong

opinions (definitely oppose and definitely support) would be in the same group, while those with moderate opinions (probably oppose and probably support) would be in the same group. The resulting scale included 0 (no opinion; *N*=57), 1 (moderate opinion; *N*=197) and 2 (strong opinion; *N*=161).

Engagement. Engagement (*M*=0.47, *SD*=.62) was measured as an ordinal variable that counted the number of times the participant engaged with the news comment section. The participants could engage zero times (*N*=250), once through either a comment or a reply (*N*=137), or two times through both a comment and a reply (*N*=28).

Results

To check that the opinion climate conditions were perceived as intended, participants answered several manipulation check questions. The first asked participants how they perceived the opinion climate of the comment section. For each condition, the most common answer was the correct answer: 71% correct in the supportive condition; 75% correct in the mixed moderate condition; 88% correct in the mixed polarized condition; 47% correct in the uncertain condition; and 84% correct in the oppositional condition. A Chi-square showed a significant association between the assigned condition and the perception of the opinion climate based on the comments, $X^2(12, N=415)=528.8$, $p<.001$.

Next, participants reported how they perceived public opinion based on the polling results. Again, the most common answer was the correct one: 86% correct in the supportive condition; 74% correct in the mixed moderate condition; 88% correct in the mixed polarized condition; 56% correct in the uncertain condition; and 86% correct in the oppositional condition. A Chi-square showed a significant association between the assigned condition and the perception of the opinion climate based on polling results, $X^2(12, N=415)=655.1$, $p<.001$.

Finally, to check the participants' perception of the extremity of the opinion climate, participants were asked to rate the reasonableness of the comments. Of those assigned to the mixed polarized condition, 46% rated the comments as somewhat unreasonable or extremely unreasonable while 18% of those assigned to the mixed moderate condition did the same. Of those assigned to the mixed moderate condition, 70% rated the comments as somewhat reasonable or extremely reasonable while 35% of participants assigned the mixed polarized condition did the same. A Chi-square suggested a significant association between the assigned condition and the perception that the comments were reasonable, $X^2(16, N=415)=55.94$, $p<.001$.

Homogeneous and Heterogeneous Opinion Climates

H1 posited that those who read homogenous opinions would change their opinion on a news issue more than those who read comments expressing mixed or uncertain opinions. To test H1, a one-way ANOVA was used to test the change in personal opinion in the two homogenous opinion conditions compared with the three non-homogenous opinion conditions. There was a significant difference in the change in opinion between those in the homogenous opinion conditions (M=-0.12, SD=0.63) and those in the non-homogenous opinion conditions (M=0.02, SD=0.59), $F(1, 142)=5.25$, p=0.002. Thus, we found support for H1, suggesting those in homogenous opinion conditions changed their opinion on the news issue more than those in non-homogenous opinion conditions did.

H2 posited that those who read news comments in opposition to a news issue will move their personal opinion to be more oppositional to the issue compared to those who read comments in support of a news issue. To test H2, a repeated measures ANOVA was used where Time 1 and Time 2 were compared within subjects and opinion climate condition was compared between subjects. There is a significant interaction between the change in personal opinion and

the opinion climate condition, $F(4, 409)=4.40$, $p=.002$. Means testing showed that participants in the supportive opinion climate condition increased their personal opinion of the news issue between Time 1 ($M=2.63$, $SE=.15$) and Time 2 ($M=2.68$, $SE=.15$). Participants in the oppositional opinion climates decreased their personal opinion on the news issue between Time 1 ($M=2.38$, $SE=.14$) and Time 2 ($M=2.13$, $SE=.14$). This difference was significant, $MD=.40$, $SE=.20$, $p=.048$ suggesting support for H2.

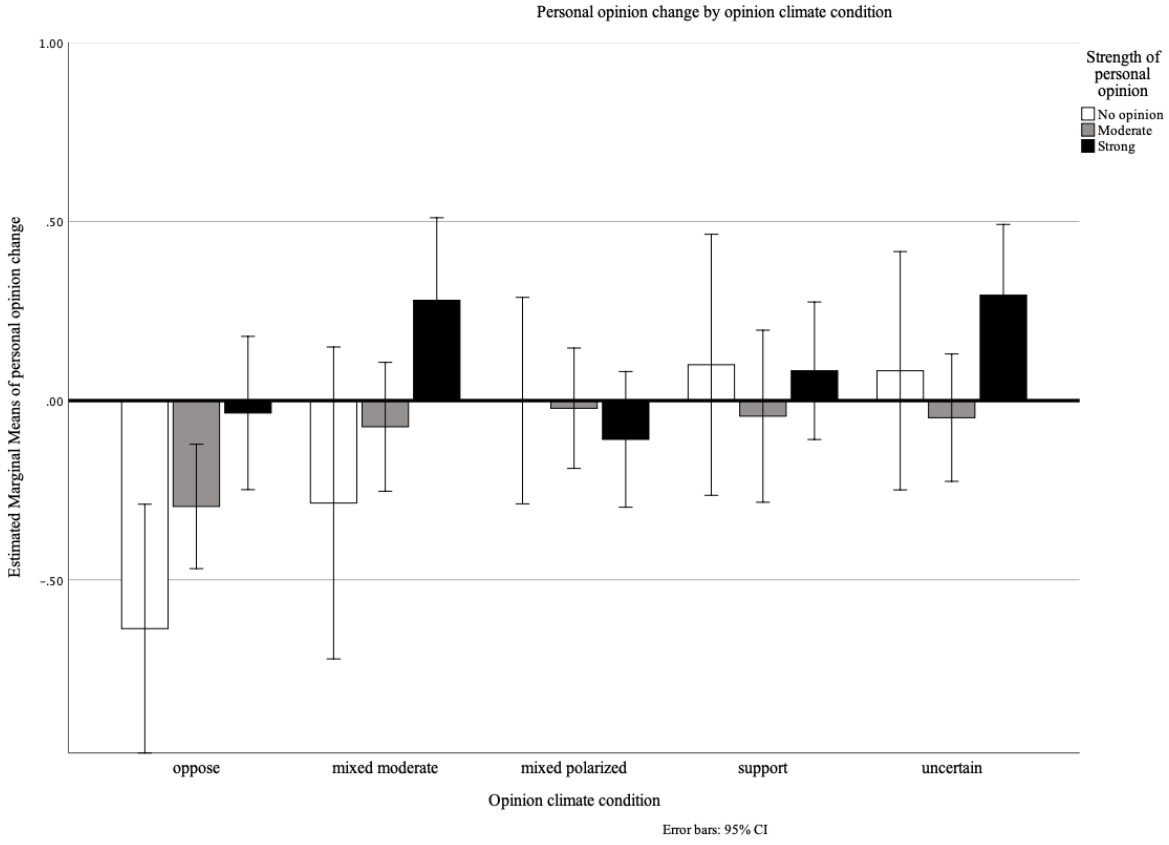

Figure 1. Change in personal opinion about the issue after reading peer comments.

Personal opinion after reading the story only interacted with the opinion climate of the

comments, so that those with ambivalent opinions changed their opinion more than those with moderate or strong opinions.

Our data also points to an interaction between opinion about the news issue at time 1 (prior to reading the comments) and opinion climate condition on change in personal opinion. While there is a main effect of the condition, in a manner that those who viewed oppositional opinion climates reacted more negatively to the news story than those who saw supportive comments. This effect interacted with the strength of initial personal opinion.

Personal Opinion

H3 predicted those who had a strong opinion about the issue would be less affected by the opinion climate compared to those who were ambivalent about the issue. To test this hypothesis, we used a two-way ANOVA to test the effects of personal opinion strength and opinion climate. A significant interaction effect was found between the change of opinion and opinion climate condition, $F(8, 399)=2.42$, $p=.015$, $\eta p^2=.046$. Post-hoc tests with Bonferroni correction show a significant difference in opinion change between those who were ambivalent and those with moderate opinions ($MD= .276$, $SE=.084$), $p=.003$, and a significant difference in opinion change between those who were ambivalent and those with strong opinions ($MD=.33$, $SE=.86$), $p<.001$. When this interaction was included in the model, the main effect of opinion climate was not significant. This suggests that the personal opinion of the participant after reading the news story interacted with the opinion climate condition of the news comments to affect final personal opinion. Overall, the model significantly predicted the change in opinion, $F(14, 399)=2.39$, $p=.003$, $\eta p^2=.077$. See *Table 1*. These results support the hypothesis that strength of personal opinion interacts with the opinion climate to influence the magnitude of opinion change. Those with ambivalent opinions about the news issue changed their opinion to a

larger degree after reading the news comment section than those who had moderate or polarized opinions. H3 was supported. [*See Figure 1*].

H4 posited that readers with moderate opinions are less likely to comment on a news story when their opinion is in opposition to the majority of the opinion expressed in a news comment section than when it agrees with the majority. To test H4, participants with moderate opinions (probably support/probably oppose) were selected (*N*=67). Then a two-way ANOVA was used to compare the number of times the participant engaged with the comment section in the supportive and oppositional opinion climate conditions. The overall model was not significant $F(3, 63)=1.18$, $p=.362$. The interaction effect also was not significant $F(1,63)=0.268$, $p=.600$. Thus, H4 is not supported.

H5 predicted that readers with strong opinions are more likely to engage on a news issue their opinion is in opposition to the majority of the opinion climate than when it agrees with the majority. To test H5, an ANOVA was used to test for an interaction between the opinion climate and Time 1 personal opinion on the count of expressive behaviors. The results indicate a main effect of initial personal opinion on the expression behavior, $F(4, 390)=4.87$, $p=.001$. (See Table 2.) See Figure 2 for presentation of expressive behaviors by condition and initial personal opinion on the issue. Further, post-hoc means testing with Bonferroni suggest that those who definitely oppose or definitely support the news issue at Time 1 had higher expressive behavior counts than those who had moderate opinions or no opinion (see *Table 3)*. These results suggest that when those who have a strong opinion on a news story encounter a comment section, they commented or replied more times than when they encountered a news comment section that supported their opinion. H5 was supported. Furthermore, Those who had initial strong opinions

about the news issue were more likely to express their opinion. There is no significant interaction with the opinion climate condition.

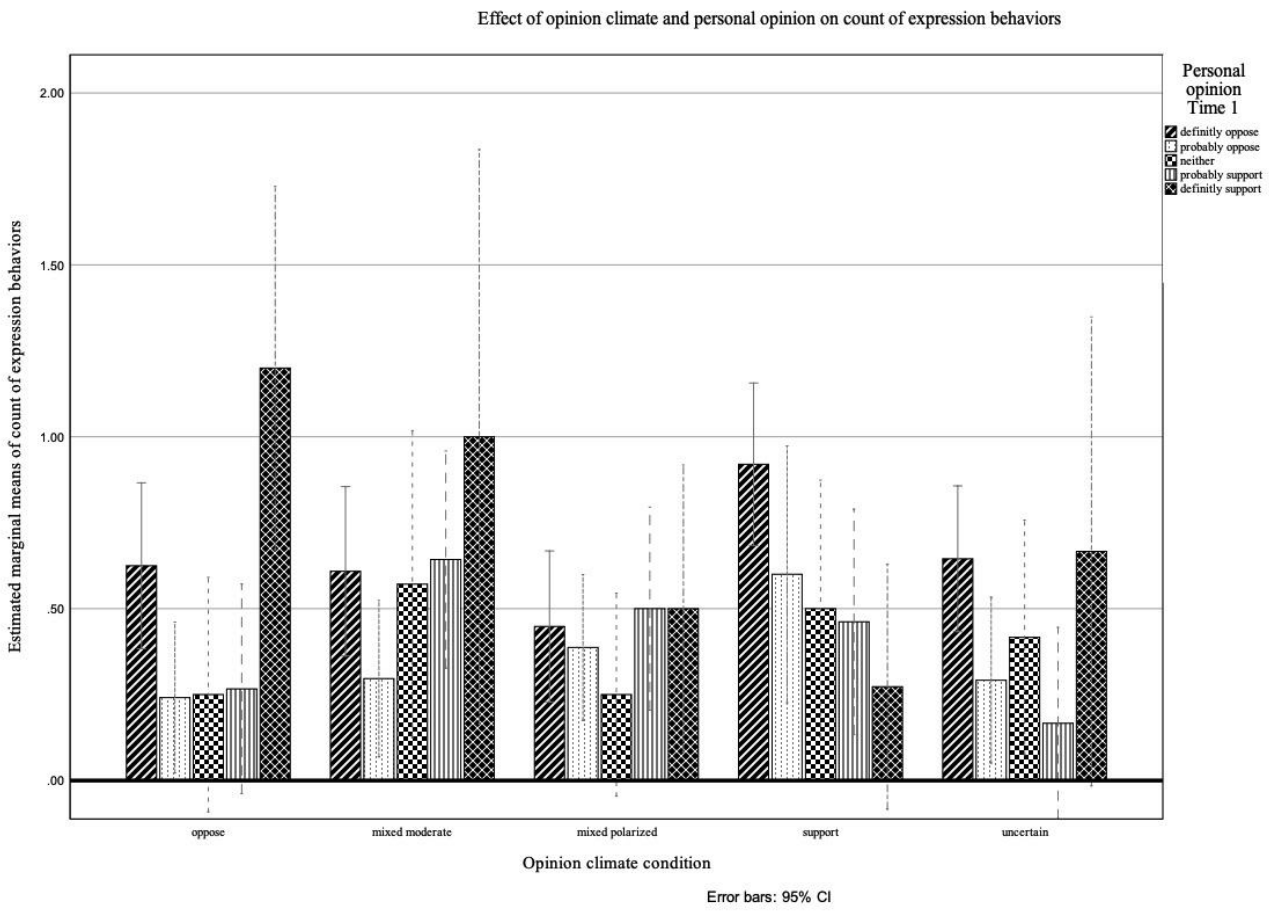

Figure 2. Count of expressive behaviors by condition and initial personal opinion on the news issue. Those who had initial extreme strong opinions about the news issue were more likely to express their opinion. There is no significant interaction with the opinion climate condition.

Discussion

This experiment examined the manner in which opinion climate, as indicated by the composition of the comment section following a news story about a public policy issue, affected readers' opinion about the issue. Furthermore, it measured the extent to which these factors influenced subsequent expressive engagement. By using a fictitious news issue and manipulating

both poll results and the comment section composition, this study manipulated the opinion climate surrounding an issue. In the process, this study disentangled the effects of news content and comment content by exposing participants to the news story and its attendant comments separately, while measuring opinion at each step. Guided by one theory that suggests audiences will suppress their opinion out of fear of being in the minority (Noelle-Neumann, 1974) and another that suggests that audiences will express their opinion to correct the public perception (Davison, 1983), we sought to clarify the conditions under which each will operate to predict expression in online news comments sections.

To reconcile these two theories, this study employed controlled opinion climates and a fairly direct behavioral measures of opinion expression in response to the news story. The results suggest news comments are posted by audiences with strong opinions to correct the perception of public opinion when the opinion climate is in opposition to their opinion. When respondents with strong predispositions encountered a news comment section that expressed an incongruent opinion to theirs, they were more likely to engage with the comment section than those who encountered comments that supported their own opinion. While spiral of silence (Davison, 1983; Noelle-Neumann, 1974) may suggest that those with moderate opinions would engage more in opinion climates that agree with them than oppose, this study found no evidence to support that assumption.

This study measured actual expression behavior by giving participants a choice to do nothing, to reply to a comment, and to start a new discussion thread. In our sample, 40% of the participants chose to engage with the news comment section. We should note that we chose a controversial issue for the stimulus story that was designed to be salient to the participants. This, perhaps, resulted in a much higher engagement rate than surveys have shown for general

audiences (Stroud, Van Duyn, & Peacock, 2016). Interestingly, even though the news story covered issues that participants may likely have prior opinions about, such as financial aid, privacy, and public policy on drugs, this study found that 10% of participants changed their opinion about the news issue based on a sample of opinions they were presented with in our stimulus manipulations. These results are in line with studies that demonstrate the influence of online commentary on perceptions of public opinion (Gunther, 2014; Lee, 2012).

Though the effects of news comment sections had in the past been studied in relation to HME or measuring attitudes toward the news story's credibility (Searles, Spencer, & Duru, 2018; Tenenboim, Chen, & Lu, 2019), this study found comment sections can also move personal opinions on the news issue itself. The results here suggest the homogenous opinion climates that are largely supportive or largely oppositional influence opinions more than mixed climates. The influence is generally in the corresponding direction of the comments. Further, the results indicate an interaction between the opinion climate of the comments and the personal opinion of the reader such that those who had moderate opinions changed their opinion more than those who had strong opinions in the homogeneous opinion climates.

This study found that those with centrist opinions on the news issues in question were influenced by homogeneous comment sections in the corresponding direction. It also found that those with strong opinions are more likely to comment in response to comment sections that oppose their opinion, and less likely to comment when the opinion climate was in their favor. This, in combination with the fact that people with centrist opinions are less likely to comment at all, suggests that news comment sections will be filled with polarized opinions while moderate opinions go unheard. This may distort the perceptions of the opinion climate leading people to perceive that the public is more polarized than reality (Abramowitz & Saunders, 2008). But

considering these processes may result in a mixture of opinions from both sides – even if those opinions are polarized – opinion change from the resulting comment sections may be muted.

Here, under conditions where the perception of public opinion climate was manipulated, the Corrective Action Hypothesis correctly predicted that those with strong opinions would speak up more frequently when their opinion was in the minority. This provides evidence of the time order of the expression effect: First, after forming their own opinion, audiences surveil public opinion. When it is in opposition to their opinion, they speak up. These findings complement cross-sectional surveys, but additionally disentangles the influences of the news story from the comments. Further, we manipulated the opinion climate and saw differing behaviors among those with strong opinions. This suggests that it is the opinion climate that motivates expression among those with strong opinions, not merely that those with strong opinions perceive the same opinion climate to be different than those with moderate opinions.

It is likely that there may be instances in which stories on contested issues could have a preponderance of comments from those on one side of an issue; this may become particularly likely given the trend toward growth in partisan news media. Such publications tend to attract partisan audiences and may foster more homogeneous comments sections. In some cases, partisan websites link to mainstream news stories, potentially driving a disproportionate share of readers with strong views to the story. Those select people could dominate a comment section with like-minded comments. A person with moderate views encountering such a comment thread could be influenced to shift his or her opinion in a direction in line with the comments. Social context cues serve as guidelines for behavioral norms. If certain contexts lack social cues, which often is the case for mediated communication, then people tend to rely on heuristic cues if available. If uncertain about platforms leaning ideology, or that of other users, they may refrain

from expressing opinion altogether. Perhaps in the conditions of ambiguous and mixed opinions, there were no concrete cues as to the appropriate behavior.

Further, these findings are a testimony for the importance of offering venues for public opinion expression on professional reliable news platforms, and perhaps even moderate these platforms. Combined with a growing body of research on detrimental effects of comment sections (Anderson et al., 2014; Coe, Kenski, & Rains, 2014; Rowe, 2015; Searles, Spencer, & Duru, 2018; Tenenboim, Chen, & Lu, 2019), those who host comment sections must consider the cost to their reputation and business to allow disproportionally polarized comments to live on their website.

Limitations and Future Research

While this experimental study advanced methodology in several ways and transferred media theories to new contexts, there are some limitations that should be addressed. First, this study used a sample of undergraduate students. As mentioned, students may be more likely to engage with comment sections or be more influenced by peer opinions than the general population. A replication of this study with a representative sample of the general population is warranted to see whether the effects remain consistent. It should however be noted that media effects causal processes operate consistently in student and non-student samples (Druckman & Kam, 2011; Nyhan & Reifler, 2010).

Second, the particular news story used in this study was designed to be relevant and controversial to the specific demographics of the participants. The level of engagement with the comment section and the number of people who changed their opinion may be different had we selected a less-controversial news story or a one less relevant to participants' lives. Additionally, the prompts asking the participants how they wanted to respond likely artificially increased the

number of participants who chose to comment. Because of this, the frequency of commenting seen in this experiment is not generalizable to all news stories. The motivations that lead to expression decisions are less pronounced in less personally relevant issue contexts, and without the additional prompting. Instead, we focus on the differences between groups as meaningful. Thus, future studies should try to replicate these findings using observational data or within different issue contexts, especially as one of the key factors identified in this study is opinion strength.

Third, for internal validity, this study used the same scale to measure personal opinion on this issue in Time 1 and Time 2. Thus, we were unable to capture change in opinion expression – or entrenchment of opinion – among those who were already on the ends of the scale. Future work could employ measures more sensitive to changes among those with strong opinions. Future research might want to differentiate between the well-correlated certainty and strength of opinion (Shrum, 1999) so that scholars can determine which of the two is driving the actions of those individuals who speak out in an oppositional opinion climate. Studies have shown that online, computer-mediated setting reduces individuals' fear of isolation, which increases individuals' willingness to express their opinions (Ho & McLeod, 2008; Schulz & Roessler, 2012). In this contemporary online app environment, where people had no prior connection to the community of commenters, the fear of isolation may have rendered so low that other factors drove processes of commenting to express an opinion. In an ideally functioning democracy, citizens make well-informed decisions based on a diversity of opinions. Based on this definition, a key factor is exposure to a diverse scope of arguments, such as the exposure facilitated in online commentary. The results of this study demonstrate how perceived public opinion can

enhance or inhibit the democratic participation in these online discussions, and how that may result in a less visible variety of opinions on news issues.

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Tables

Table 1

Interaction effect of strength of personal opinion and opinion climate condition on change in personal opinion

	SS	*df*	*MS*	*F*	*p*
Corrected model	9.56	14	.683	2.39	.003
Intercept	30.06	1	30.06	104.97	<.001
Strength of personal opinion	4.351	2	2.18	7.6	.001
Opinion climate condition	1.27	4	.32	1.11	.351
Interaction term	5.55	8	.69	2.42	.015
Corrected total	123 83	413			

R2=.077 Adjusted R2=.045

Table 2

Effect of strength of personal opinion on count of opinion expression

	SS	*df*	*MS*	*F*	*p*
Corrected model	18.47	24	.77	2.13	.002
Intercept	65.03	1	65.03	180.15	<.001
Strength of personal opinion	7.04	4	1.76	4.87	.001
Opinion climate condition	1.37	4	.034	.095	.435
Interaction term	8.91	16	.56	1.54	.082
Corrected total	159.24	414			

R2=.116 Adjusted R2=.062

Table 3.

Mean differences between expression behavior counts of those with strong opinions and those with moderate opinions of no opinion with Bonferroni correction.

		MD	***SE***	***p***
Definitely oppose	probably oppose	.31*	0.08	<0.001
	no opinion	.28*	0.10	0.04
	probably support	.25*	0.09	0.042
	definitely support	0.06	0.12	1.00

Note. *p<.05

Results suggest that those who definitely opposed the news issue were more likely to express an opinion than those who probably opposed the issue, probably supported the issue or had no opinion about the issue. There was no significant difference in the count of expressive behaviors between those who definitely opposed the issue and those who definitely supported the issue.