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Full-length Research Article

Liking versus commenting on online news: effects of expression affordances on political attitudes

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Abstract

By performing actions such as "liking" a post, commenting on it, or sharing it with others, we are constantly expressing our opinions about ongoing news and public affairs on online media platforms. How do these acts of expression affect our feelings and opinions? We address this question from an "affordance" perspective, focusing on the effects of both the presence of the expression affordance (cue effects) and users' actual engagement with it (action effects). We conducted an online experiment ($N = 368$) on a news website with thumbs-up/down and/or commenting as low-effort and high-effort expression affordances, respectively. Data revealed that the low-effort affordance led to more affective polarization while the high-effort affordance promoted increased interest in deliberation. Merely presenting a commenting cue mitigated affective polarization by increasing perceived interactivity. However, when users engaged the affordance by providing comments, it tended to reinforce pre-existing opinions. These findings have theoretical and practical implications.

Lay Summary

Today's news readers are used to "liking" or commenting on online stories. How do such actions affect them? We conducted a study to see whether showing news readers a comment button or "thumbs up/thumbs down" button on a website made them feel different. We also checked whether leaving a comment or clicking the "thumbs up/thumbs down" button changed their thinking. Results showed that when people saw a comment button, they believed the site to be more interactive. They felt like they had more of a say. It encouraged them to discuss politics. It also made them feel less distant and cold toward people with opposing views. However, when users actually left a comment or clicked a "thumbs up/thumbs down" button, they showed stronger beliefs in their own prior opinions. This led to more extreme attitudes. In this way, features on online sites can have both positive and negative effects. There is a big difference between the effects of seeing the features and acting on them.

Keywords: political expression, technological affordance, TIME theory, attitude extremity, affective polarization, news comments

Public engagement with news is at an all-time high in online media platforms. Among social media news consumers, 58% sometimes or often "like" news stories, and 37% comment on them (Mitchell et al., 2016). Technologies that enable such expression have the potential to provide users unprecedented agency and stimulate wider citizen engagement on social issues, serving as the hidden engine for acquiring knowledge and participating in deliberative communications.

However, lately, a growing number of news websites have started closing the gates for public engagement with news articles (Ellis, 2015; Stroud et al., 2020). Among the main reasons is the concern over the divided public discourse as well as incivility and hate speech shown in online expression. For instance, uncivil comments following science news articles polarized readers' opinions (Anderson et al., 2014) and enhanced media bias perceptions (Anderson et al., 2018). Some have even gone as far as to suggest that the current climate of polarization between the left and the right all across the world is a result of highly partisan commentary and biased information posted by users in a number of online platforms, most especially the news feeds of social media sites and comments sections of news articles (Asker & Dinas, 2017; Barrett et al., 2021).

This tension between the positive potential of expression affordances and negative outcomes in some actual use cases poses a challenging question to news websites, as to whether they should provide readers an opportunity to express themselves on their websites. Will shutting down comments sections in an effort to avoid uncivil exchanges rob the sites of their potential to fulfill basic psychological needs of their readers that might be critical for political discourse in a deliberative democracy?

Unfortunately, the literature does not provide a direct answer to this question. The dominant approach to studying online political expression is survey research (e.g., Bode, 2017; Vaccari et al., 2015), most of which adopts self-reported frequency measures for expression behaviors but does not directly address the role of technology. An "affordance perspective" is thus sorely needed. Affordances refer to action possibilities in the environment (Gibson, 1979), which connects the materiality of the technology and human agency (Evans et al., 2016). However, not all users will notice or act upon the features embedded in a technology. The theory of interactive media effects (TIME; Sundar et al., 2015) posits that the sheer existence of the affordance on an interface can trigger certain perceptual differences (cue effect), quite distinct from the consequences of actually engaging or using the affordances (action effect). Theorizing the effects of expression in online sites from an affordance perspective will help us isolate and understand the role of interactive technology and further deepen our understanding of digital media effects.

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Considering the current climate of political polarization, it is important to investigate the implications of online expression on individuals' political attitudes and perceptions. Polarization results when competing political camps fail to negotiate, reconcile, or persuade each other on issues with divergent viewpoints (Somer & McCoy, 2019, p. 10). This is often accompanied by emotionally charged negative feelings about people on the other side, *aka* affective polarization (Iyengar et al., 2012). Is online expression to blame for this? Does allowing users to "like" or comment shape their political attitudes and perceptions? If so, how? The present study addresses these questions by exploring the psychological effects of technological affordances that allow political expression.

Literature review

Political expression is any communication of a person's political ideas, attitudes, and preferences (Cho et al., 2018), which is an essential element of a deliberative democracy. On digital platforms, such as news websites, users can express their opinions and ideas by posting or reposting content, commenting, liking/disliking (Lane et al., 2019; Vaccari et al. 2015; Weeks et al., 2017), changing profile pictures to show support for a campaign (Gerbaudo, 2015), and utilizing emojis, "memes," or "gifs" (Highfield & Leaver, 2016). These direct and immediate ways to interact with online content (what we call "expression affordances") have led to an explosion of political expression on digital media.

An affordance perspective on political expression effects

According to TIME (Sundar et al., 2015), technological affordances can influence users' perceptions, attitudes, and behaviors via two distinct routes. On the one hand, the *cue* route predicts that the psychological effect is triggered by the affordance "serving as a symbolic representational cue on the interface" (p. 51), triggering a cognitive heuristic or mental shortcut that shapes user perceptions. On the other hand, the *action* route is predicated on the user's active engagement with the affordance.

For example, the sheer presence of certain interactivity features on a political candidate's website is known to increase the candidate's appeal as well as his/her character (sympathetic, trustworthy, sensitive, and caring), even though the content is constant across conditions (Sundar et al., 2003). This is the cue route because the mere presence of the interactivity affordance serves as a cue that triggers the heuristic that interactivity equals openness. Affordances also attract different types of engagement with mediated content, which can, in turn, affect outcomes in an experiential, rather than merely perceptual way. When users actually interact on the site by expressing themselves or communicating with campaign staff, for example, it represents the action route, whereby the active engagement of affordances can imbue in users a *sense of agency* and influence their knowledge, attitudes, and behaviors (Sundar et al., 2015). For instance, Fox et al. (2015) found that participants reported higher levels of hostile sexism toward women after the use of more agentic affordances (i.e., posting tweets incorporating a sexist hashtag) than the use of less agentic affordances (i.e., retweeting posts with the same sexist hashtag). Hence, the nature of actions can also be consequential for users' perceptions and attitudes.

Effects of expression affordances: cue route

In the present context of studying expression affordances on digital platforms, what is the cue effect? First, the presence of expression affordances signals the extent to which the system allows user input, which may trigger the *activity heuristic* among users, such that the medium is a "departure from the passivity" of traditional mass communications and is capable of receiving user input (Sundar, 2008, p. 85). Simply seeing the presence of a commenting function on a news webpage (vs. a news webpage without such a function) can potentially enhance a user's perceived interactivity of the site, especially the two-way communication dimension of the concept of interactivity (Liu & Shrum, 2002). Therefore, we propose:

> H1: Online users will perceive a higher level of interactivity in the presence (compared to absence) of expression affordances on an interface.

In addition, higher interactivity of the system may trigger favorable affective responses to the site as well as its content. As shown in previous studies with political campaign websites, a high level of interactivity can hold out the promise of dialogue and conversational discourse, and provide candidates an emotional advantage for winning over voters, due to a "halo effect," i.e., positive perceptions of the website will bleed over and enhance positive evaluations of the candidate (Lee & Shin, 2012; Sundar et al., 2003; Van Noort et al., 2016). Of note, the positive interactivity effect could be dependent on the characteristics of the user. For instance, political cynics are less likely to show positive responses to highly interactive political websites (Kruikemeier et al., 2016). Users with socialization or entertainment purposes are more likely to obtain gratifications from interactive features of news websites than information seekers (Yoo, 2011). But, overall, there is a net positive effect of website interactivity on enjoyment and satisfaction across a variety of contexts, according to a recent meta-analysis (Yang & Shen, 2018). Therefore, highly interactive sites with more expression affordances are likely to generate more positive emotions.

> H2: Being exposed to the presence (vs. absence) of expression affordances on digital media will (a) increase positive emotion (e.g., enthusiasm) and (b) reduce negative emotion (e.g., anger), (c) by perceiving a higher level of interactivity.

Emotions and affective polarization

Emotions introduced by interactivity in political media may have implications for affective polarization, which refers to the fact that partisans increasingly dislike those who are politically opposed to them, attributing negative characteristics to them, and generally showing a larger social and psychological distance (Iyengar et al., 2012; Iyengar et al., 2019). Research has shown the critical mediating role of *emotions in* connecting information exposure and affective polarization. When facing political events, issues, figures, and communications, individuals are likely to experience different emotional responses, which may further influence their judgments and behaviors (MacKuen et al., 2010; Marcus et al., 2000). For example, in the political context, anger depresses information

seeking, encourages knowledge distortion, and leads to close-mindedness and entrenched attitudes (MacKuen et al., 2010; Weeks, 2015; Wollebæk et al., 2019). According to appraisal tendency theory (Lerner & Keltner, 2000), when certain emotions are aroused, individuals' judgment and decision-making processes can be biased until the emotion-eliciting conflict is resolved. Even incidental emotions can carry over their effects to subsequent judgments on unrelated topics and objects. Based on this line of reasoning, anger induced by controversial political information may motivate individuals to rate the other side even more negatively and defend their ingroup members, which increases affective polarization (Lu & Lee, 2019). By contrast, enthusiasm signals that the person's goal is met (Marcus et al., 2000). Thus, enthusiastic partisans may be more willing to accept differences and the opposing party. Therefore, we propose:

> H3: Being exposed to the presence (vs. absence) of expression affordances on digital media will (a) reduce affective polarization, by way of (b) reduced anger, and (c) increased enthusiasm.

Effects of expression affordances: action route

Political expression on digital media can trigger a consistency motivation, which is likely to increase attitude extremity. From an intrapersonal perspective, expressing one's thoughts and opinions about political issues is a matter of asserting one's identity via technological affordances (Sundar et al., 2015), which may shift users' focus from the media content to their own views (Sude et al., 2021) and trigger a motivation to maintain consistency in that identity. As suggested by Festinger (1957), dissonance motivates individuals to adjust their attitudes or beliefs to decrease the discomfort they are experiencing. Hence, resistance to influence is a common psychological strategy to protect one's ego and maintain cognitive consistency.

From an interpersonal point of view, political expressions on digital media are often displayed to certain groups of audiences with varying degrees of publicness. The higher the publicness of expression, the higher the likelihood of the person adhering to his/her expressed opinion to maintain a consistent public image (Cialdini & Goldstein, 2004; Schienker et al., 1994). Previous research has demonstrated that political expression on social media could motivate users to strategically manage their self-presentation and change their self-perception accordingly (Lane et al., 2019). When individuals actively express their political opinions online, they will be more motivated to pursue a consistent belief system and consequently demonstrate an entrenched view, as has been observed in previous research (Cho et al., 2018). Therefore, we propose the following hypothesis:

> H4: The use of expression affordances on digital media will have a positive effect on attitude extremity.

Action effects on affective polarization

Aside from potential reinforcement of attitudes, expressive actions can influence emotional reactions. As Pingree (2007) notes, cathartic release is a possible subdimension of expression effects, potentially resulting in a lower level of negative affect. Sharing emotional experiences, especially negative ones, can often help individuals achieve emotional recovery or emotional relief (Pennebaker, 1997; Zech & Rimé, 2005). From this perspective, political expression can be perceived as an emotion-relieving process that helps individuals reduce negative emotions toward opposing viewpoints. Negative emotions, as argued in the cue-effects section, are likely to be sources of affective polarization. Therefore, if the technology does not provide users an opportunity to express their feelings, the suppressed affect may enhance outgroup resentment. Past research on intergroup politics supports the idea that successfully regulating negative emotions (e.g., anger) by cognitive reappraisal could effectively ameliorate intergroup conflicts and foster reconciliation (Halperin et al., 2013). Based on this rationale, we propose the following hypothesis:

> H5: The use of expression affordances on digital media will have (a) a negative effect on affective polarization, (b) by way of reduced negative emotion (e.g., anger).

Action effects on willingness to deliberate

Another positive effect of action is the increase in user agency. The enhanced agency generated by political expression will likely stimulate a desire for deliberation. Deliberative communication requires that individuals provide compelling reasons for their own stance, listen and show respect for different perspectives, and engage in conversation with others (Burkhalter et al., 2002). Willingness to participate in such conversations shows one's enthusiasm to reason for their beliefs and tolerance of conflicting viewpoints.

In the context of communication, sense of agency is about "the feeling of having a competent, confident and assertive voice" through repeatedly expressing oneself and being validated by message receivers (Stavrositu & Sundar, 2012, p. 371). Expressing opinions and thoughts can help users gain a psychological advantage, i.e., sense of agency, of being the source of information (Li & Sundar, 2022; Stavrositu & Sundar, 2012). Additionally, the task of choosing and making expressions consistent with one's identity requires a certain level of capacity and efficacy (Muhlberger, 2005). By expressing online, users can potentially be equipped with the necessary skills and confidence for voicing ideas and opinions. Thus, the assertiveness and confidence derived from a heightened sense of agency are expected to increase their willingness to communicate with others:

> H6: The use of expression affordances on digital media will (a) have a positive effect on willingness to deliberate, (b) by way of increased sense of agency.

Low-effort and high-effort expression affordances

While expression, in general, can have positive effects, it is not clear if the nature of—and effort involved in—expression matters. Compared with commenting or posting, the simple action of liking or upvoting/downvoting is not associated with elaborate political thought and may indeed involve much less mental effort. For users, however, these actions are not entirely meaningless. Scholars conceptualize these lightweight acts of communication as paralinguistic digital affordances (PDAs) that "facilitate communication and interaction without specific language associated with their messages" and serve an expressive function (Hayes et al., 2016, p. 173).

That said, the magnitude of psychological effects of such "low-effort" political expression is likely to be smaller than those of high-effort expression actions, since the level of cognitive effort is much lower (Kim & Yang, 2017). For example, commenting on political content is associated with deeper cognitive elaboration of content than "liking," leading to greater political learning (Kim et al., 2021). Low-effort activities are also lower in their levels of publicness because comments and posts are more visible on the interface and therefore, they are likely to be noticed by a larger group of audience members than one-click "likes," which are often displayed as aggregated numbers (Aldous et al., 2019). Therefore, less self-presentation concerns will be triggered by low-effort actions, resulting in weaker expression effects. Lane et al. (2019) found that on Facebook, liking was not a predictor of the political self-presentation motive, whereas posting and sharing were positively associated with it. From the perspective of affect, the use of high-effort expression affordances such as commenting may be able to regulate users' negative affect to a greater extent by allowing them to express it more explicitly, thus resulting in a stronger cathartic effect and lower affective polarization. As a result, the implications of low-cost political expression on cognition and affect may be limited. Thus, we propose:

> H7: Compared to high-effort political expression (e.g., commenting), low-effort online political expression (e.g., liking, upvoting/downvoting) will result in (a) more negative affect, (b) more affective polarization, (c) less attitude extremity, and (d) less willingness to deliberate.

Method

To test these hypotheses, an online experiment was conducted using a 3 (Affordances: Cue vs. Forced Action vs. Voluntary Action) × 2 (Effort Level: Thumbs up/down vs. Comment) + 1 (No Affordances) between-subjects experimental design. The main task for participants was reading a news story on a news website, with the presence of expression affordance varied across conditions. The study was approved by the university's institutional review board.

We created a fictitious news website called "News Insider" that "aggregates news from diverse, credible sources" with different expression affordances, as described below and shown in Figure 1.

Effort level manipulation

In the low-effort conditions, participants were offered the thumbs up/thumbs down option to interact with a news story they read on News Insider. The high-effort expression affordance was operationalized in the form of a commenting function. In the control condition, participants did not have any expression affordances.

Cue vs. action manipulation

Participants assigned to the *cue conditions* were provided a screenshot of the News Insider website, so while they were able to see the presence of the affordance, they were not able to act on it. In comparison, participants in the *forced action conditions* were required to interact with the news story by clicking on the buttons. However, instructing them to take action may lack ecological validity because it does not capture the volitional nature of actions typically undertaken by online users. As Stroud et al. (2019) note, forced exposure leads to effects that are different from those of selective exposure. Therefore, another set of conditions—*voluntary action conditions*—were created, wherein participants were told to feel free to interact with the news by clicking on the buttons.

Participant recruitment

Participants were recruited from Amazon's Mechanical Turk (MTurk). It is consistently shown that MTurk subjects are more liberal and tend to lean Democratic than national

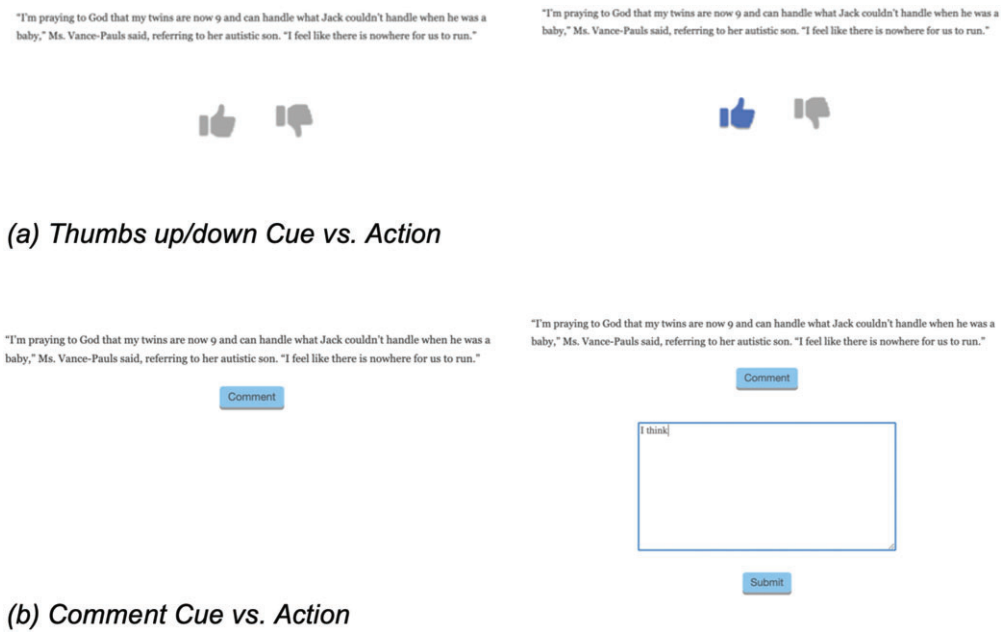

Figure 1. Low-effort vs. high-effort expression affordances.

representative samples (Huff & Tingley, 2015). To address this potential imbalance in sampling, two study links were created: one was used to recruit Democrats and those leaning Democratic, and the other was used to recruit Republicans and those leaning Republican. Given that partisans are of interest in this study, moderates/independents were excluded from the study using a screening question. Participants who successfully completed the questionnaire were paid $1 U.S. In total, 452 participants completed their questionnaires (232 Democrats/Leaning Democrats, 220 Republicans/Leaning Republicans). Thirty-eight IP addresses produced duplicate responses to the questionnaire and were thus removed from the dataset.

Participants

After removing participants who did not pass the manipulation check (see "Results" section), the final dataset contained 368 partisans, with 189 (leaning) Democrats and 179 (leaning) Republicans. They were between the ages of 18 and 76 ($M = 39.65$, $SD = 13.86$). One hundred and eighty-eight participants identified themselves as female (50.76%), and 177 participants as male (48.48%). The majority of participants (79.3%) identified themselves as White/Caucasian, followed by 9.0% Black/African American, 4.9% Hispanic/Latino, 3.3% Asian/Pacific Islander, 1.9% mixed races, 0.5% others, 0.3% Middle Eastern, and 0.3% Native American. More than half of the participants (56.5%) reported having a bachelor's degree or higher.

Procedures

Pre-exposure

After consenting to participate in the study, participants' pre-existing attitudes about 12 different political issues were collected. These questions were "padded" with several covariates to reduce sensitization.

Interaction with news stories

Participants were then instructed to choose one news story that interests them the most but have not read before, from among four story headlines. These four news stories dealt with four different political issues—gun control, recreational marijuana legalization, mandatory vaccinations, and carbon emission tax. The four topics were chosen based on a pretest with 72 participants recruited from MTurk, such that Democrats and Republicans show significantly different attitudes on these issues and they both deemed these issues as equally important. After choosing the article to read, participants were then randomly assigned to one of the seven experimental conditions, where different agency affordances were made available along with the article they chose to read. The four news stories had been published by major news outlets (see Supplementary Materials), but were modified by us to ensure that facts and opinions supporting both sides are included, so that participants had access to both attitude-consistent and attitude-inconsistent information. In addition, to ensure that the amount of information was about the same, the length of the four articles was kept between 750 and 800 words.

To ensure that participants paid attention to the news content, they were able to proceed only after they spent at least 20 seconds on the site. The webpage recorded participants' actions on the site. Participants then answered a post-exposure questionnaire.

Measures

Attention check

Participants were asked to identify the affordance they saw on the website by choosing from three different options, including a figure of the thumbs up/down, a figure of the comment button, and "none of the above."

Perceived interactivity

This variable was measured using four items combining previous scales, including "this website facilitates two-way communication," "the website enables conversation," "the website gives me the opportunity to talk back" (Liu, 2003; McMillan & Hwang, 2002), and "the website is interactive" (Kalyanaraman & Sundar, 2006; $M = 3.92$, $SD = 1.69$, $\alpha = .93$).

Emotional reactions

Participants' emotional reactions to the news were assessed using a 5-point response scale ranging from "0 = none of this feeling" to "4 = a great deal of this feeling" (Dillard & Peck, 2001). The scales and their corresponding items were as follows: *anger* (irritated, angry, and annoyed; $M = 1.32$, $SD = 1.20$, $\alpha = .89$) and *enthusiasm* (happy, cheerful, and elated; $M = 1.28$, $SD = 1.14$, $\alpha = .87$).

Sense of agency

Perceived sense of agency was evaluated via six items. Sample items include "the website allows me to have control over my own voice" and "the website makes me feel I have a distinct voice" (Oeldorf-Hirsch & Sundar, 2015; $M = 3.92$, $SD = 1.57$, $\alpha = .92$).

Pre-exposure and post-exposure issue attitude

Participants were asked to indicate their attitude on the issue they read in the news story using a 7-point scale ranging from 1(strongly oppose) to 7(strongly support). Please see Table 1 for all attitude means by issue topic and party identification.

Attitude extremity was measured by calculating the distance of their issue attitudes from the midpoint (4) ($M_{pre} = 2.18$, $SD_{pre} = 1.01$; $M_{post} = 2.22$, $SD_{post} = .97$).

Willingness to deliberate

Participants were asked the question that if they had the chance to participate in a deliberation session about the issue they read, how interested would they be in doing so, from 1= "Not at all interested" to 7 = "Extremely interested" (Neblo et al., 2010; $M = 4.52$, $SD = 1.77$).

Affective polarization

In line with Iyengar et al. (2012), a thermometer scale ranging from 0 to 100 was used to measure affect toward Republicans/Democrats (0 = a feeling of "cold" toward the group, 100 = a feeling of "warm"). The score given to the party of the participant was ingroup warmth ($M = 75.08$, $SD = 21.05$), and the score given to the opposing party was outgroup warmth ($M = 29.14$, $SD = 25.09$). Affective polarization is the arithmetic difference between ingroup warmth and outgroup warmth ($M = 45.94$, $SD = 34.33$).

Table 1. Means of issue attitudes

Issue topic	Party	Pre-exposure attitude		Post-exposure attitude	
		M	SD	M	SD
Carbon tax	Democrats	6.10	1.20	5.88	1.40
	Republicans	4.22	2.13	4.65	2.04
Gun control	Democrats	6.31	1.51	6.37	1.29
	Republicans	2.23	1.70	2.55	1.87
Marijuana legalization	Democrats	6.45	1.08	6.61	0.73
	Republicans	5.57	1.55	5.93	1.22
Mandatory vaccination	Democrats	5.69	1.87	5.72	1.89
	Republicans	4.57	2.04	5.01	2.02

Behavioral measures

Web-log data were collected to measure the behaviors of each participant, specifically the use of expression affordances, including the content of their comments ($n = 71$).

Covariates

The following covariates were measured prior to participants' exposure to the news, and were all on a 7-point scale: partisanship, ranging from 1 (strong Democrat) to 7 (strong Republican; $M = 3.86$, $SD = 2.21$), perceived importance of the chosen issue ($M = 5.54$, $SD = 1.59$), online political expression (Cho et al., 2018; $\alpha = .90$ $M = 3.58$, $SD = 1.69$), and political interest ($M = 5.58$, $SD = 1.27$). In addition, political awareness of participants was measured by an index consisting of six multiple-choice knowledge questions about U.S. politics (Clifford & Jerit, 2016; Delli Carpini & Keeter, 1996). Correct answers were then summed into an index ($M = 4.04$, $SD = 1.54$). Participants were also asked to provide their gender, age, ethnicity/race, level of education, and income.

Data analysis strategy

Because of the unbalanced study design ($3 \times 2 + 1$), an omnibus one-way analysis will not be able to show the interaction effects. Therefore, to probe the effects of interest, the data were analyzed by performing certain specific comparisons between conditions, in line with our hypotheses (see Figure 2). All comparisons had adequate statistical power.

Results

Attention and manipulation checks

Twenty eight participants who answered the attention check question incorrectly were removed from the dataset. In addition, 18 participants in the forced action conditions who did not perform any action were removed from the analysis. The final sample retained for analysis consisted of 368 participants.

Randomization checks

There were no significant differences in gender (χ^2 (18) = 13.50, $p = .76$) or ethnicity (χ^2 (42) = 51.29, $p = .15$) between the seven conditions. A one-way Analysis of Variance (ANOVA) showed no significant differences in educational attainment [F (6, 360) = 1.17, $p = .32$] or income [F (6, 360) = 1.30, $p = .26$]. However, there was a significant difference in terms of age, $F(6, 360) = 2.38$, $p = .03$. Therefore, age was included as a control variable in all our analyses.

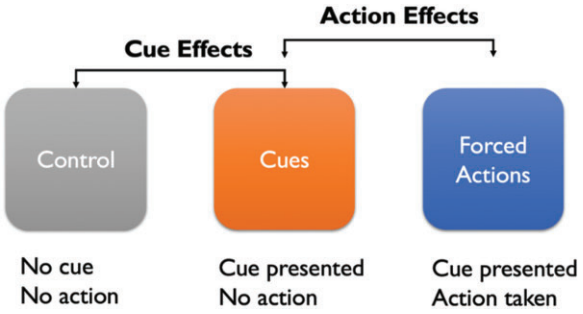

Figure 2. Separate condition comparisons that show cue effects and action effects.

Cue effects

To test H1–H3, the two cue conditions, i.e., thumbs up/down cue condition ($n = 48$) and comment cue condition ($n = 58$), were compared to the control group ($n = 53$) on perceived interactivity, emotions, and affective polarization. A series of one-way analyses of covariance (ANCOVAs) was conducted, with participants' age, prior attitudes, online political expression habits, political interest, political awareness, partisanship, prior-exposure issue attitudes, and perceived issue importance as covariates. In addition, participants' selection of different news issues (gun control, recreational marijuana legalization, mandatory vaccinations, and carbon emission tax) was entered as a control variable, since no interaction effects were found between news issue and the manipulated independent variables (cue vs. action and effort level) on any of the outcome variables.

Perceived interactivity

The analysis revealed a significant main effect of expression affordance cue on perceived interactivity, F (2, 145) = 51.53, $p < .001$, partial $\eta^2 = .42$, supporting H1. According to pairwise contrasts, participants who saw the comment cue perceived the website to be much more interactive ($M = 5.45$, $SE = .19$) than participants who were assigned to the thumbs up/down cue condition ($M = 3.29$, $SE = .20$; $p < .01$) and control condition ($M = 2.88$, $SE = .19$; $p < .01$), but the latter two, while in the expected direction, did not differ significantly from each other ($p = .43$).

Emotional reactions

Data showed that the cue effect of expression affordance on participants' *enthusiasm* was not significant, F (2, 145) = 1.66, $p = .19$, partial $\eta^2 = .02$. Nor was it significant on their

feelings of *anger*, F (2, 145) = 2.07, p = .13, *partial* η^2 = .03 (see Table 2 for means). H2a and H2b were thus not supported.

Affective polarization

Expression affordance cues showed a significant effect on affective polarization, F (2, 145) = 3.50, p = .03, partial η^2 = .05. Planned pairwise contrasts revealed that participants in the control condition were significantly higher in affective polarization (M = 52.27, SE = 4.30) than those who were assigned to the comment cue condition (M = 36.31, SE = 4.10), p = .01, but not significantly higher than participants in the thumbs up/down cue condition (M = 45.70, SE = 4.44), p = .40. H3a was partially supported. When using *ingroup party warmth* and *outgroup party warmth* as dependent variables separately, results showed that expression affordance cues had a significant effect on outgroup party warmth, F(2, 145) = 3.60, p = .03, partial η^2 = .05, but not ingroup warmth, F(2, 145) = .42, p = .66, partial η^2 = .01. Specifically, participants in the high-effort (comment) cue condition rated the outgroup party "warmer" (M = 36.93, SE = 3.12) than those who were in the control condition (M = 24.59, SE = 3.28), but did not differ from participants in the low-effort (thumbs-up/down) cue condition (M = 29.79, SE = 3.38).

Mediation analyses

A series of mediation analyses was conducted to test the proposed mediation effect (H2c), with the experimental condition (low-effort cue condition vs. high-effort cue condition vs. control group) being the categorical independent variable using indicator coding, perceived interactivity being the mediator, emotions (enthusiasm and anger) and affective polarization being the dependent variables, and previously listed covariates.

Model 4 of PROCESS Macro (Hayes, 2012) was employed with 5,000 bootstrap samples. There were no significant indirect effects of expression affordance cue on emotional reactions (anger or enthusiasm) via perceived interactivity. Thus, H2c was not supported. Instead, results revealed that the comment cue elicited a higher level of perceived interactivity of the website than the control condition, with perceived interactivity being negatively associated with affective polarization (Table 3).

Action effects on issue attitude

To analyze the proposed action effect of expression affordances, which is the effect generated by taking actions (vs. being exposed to cues), participants who were forced to take actions were compared with participants in the cue conditions. This decision was based on the fact that (a) the forced action conditions permit causal inferences about the effects of action because the decision to act is not self-selected by participants but randomly assigned; (b) the forced action conditions provided more complete data (i.e., all participants acted on the affordances) than the voluntary action conditions; and (c) there were no significant differences between forced and voluntary action conditions (as reported in our next section) that would hinder testing of our hypotheses.

H4 predicted that participants would show more extreme attitudes after they expressed themselves. Another two-way ANCOVA was conducted, with action (vs. cue) and effort level being independent variables along with their interaction term and post-exposure attitude extremity serving as the dependent variable. Participants' *pre-exposure attitude extremity* was controlled along with other covariates. A significant main effect of action (vs. cue) on post-exposure attitude extremity was discovered, F (1, 189) = 6, p = .02, partial η^2 = .03. In line with H4, participants who took actions demonstrated more extreme post-exposure attitudes (M = 2.33, SE = .07) than participants who only saw expression affordance cues (M = 2.08, SE = .07). No main effect for effort level of expression or interaction effect was found. H7c was thus not supported.

Table 2. Estimated means of anger and enthusiasm as a function of cues vs. control

Experimental conditions	Anger		Enthusiasm	
	M	SE	M	SE
Control	1.07	0.16	1.26	0.16
Low-effort Cue	1.49	0.27	1.64	0.17
High-effort Cue	1.46	0.15	1.36	0.15

Note: Anger and enthusiasm were evaluated on a 0–4 scale.

Table 3. Indirect effects on affective polarization via perceived interactivity

Comparisons	Relative indirect effect bootstrap estimate	95% Confidence intervals	
		LLCI	ULCI
Thumbs up/down—control comparison	−1.92(1.49)	−5.42	0.27
Comment—control comparison	−10.66(4.77)	−20.26	−1.26

Notes: Standardized estimates (beta) are included in parentheses. Indirect effect confidence intervals apply to unstandardized estimates.

Action effects on affective polarization

H5 predicted that participants would show a lower level of affective polarization because of their reduced negative emotions and increased positive emotions. ANCOVA results indicated that there was a significant action (vs. cue) effect on participants' *enthusiasm*, F (1, 189) = 4.93, p = .03, partial η^2 = .03. However, contrary to the hypothesis, enthusiasm was significantly higher in the cue condition (M = 1.50 SE = .10) compared to the action condition (M = 1.17, SE = .11). No significant action (vs. cue) effect was found on participants' feeling of *anger*, F (1, 189) = 1.24, p = .27, *partial* η^2 = .01. No main effects of effort level or interaction effects were discovered. Thus, H7a was rejected.

Affective polarization

Contrary to H5a, participants in the action conditions showed a higher level of affective polarization (M = 47.43, SE = 3.06) than participants in the cue conditions (M = 40.27, SE = 3.16), but the difference was not significant, F (1, 189) = 2.51, p = .11, partial η^2 = .01. By contrast, the main effect of effort level on affective polarization was significant, F (1, 189) = 5.04, p = .03, partial η^2 = .03, with those in the low-effort condition reporting a higher level of affective polarization (M = 48.69, SE = 3.08) than those in the high-effort condition (M = 39.01, SE = 2.99). H7b was supported.

No two-way interaction between action (vs. cue) and effort level was found on affective polarization.

Participants' ratings of ingroup warmth and outgroup warmth were analyzed separately. Results revealed that neither action (vs. cue) nor effort level had an effect on ingroup warmth evaluations. But participants who took actions rated outgroup less warmly ($M = 27.15$, $SE = 2.50$) than those who were exposed to cues ($M = 34.18$, $SE = 2.42$), $F(1, 189) = 3.86$, $p = .05$, partial $\eta^2 = .02$. The effort level also had a significant effect on ratings of outgroup warmth, such that participants who were assigned to the high-effort affordance conditions showed higher outgroup warmth ($M = 34.22$, $SE = 2.37$) than those in the low-effort affordance conditions ($M = 27.11$, $SE = 2.44$), $F(1, 189) = 4.35$, $p = .04$, partial $\eta^2 = .02$.

Mediation analysis

A mediation analysis was conducted to test whether enthusiasm was the underlying mechanism. Model 8 of PROCESS Macro was employed with 5,000 bootstrap samples. Results showed no significant mediation effects (see Table 4). H5b was thus rejected.

Action effects on deliberation willingness/expectation

To examine H6, ANCOVAs were conducted, with action (vs. cue) and effort level as the independent variables.

Sense of agency

Action (vs. cue; $M_{action} = 4.03$, $SE_{action} = .13$, $M_{cue} = 4.25$, $SE_{cue} = .13$) did not have a main effect on sense of agency, $F(1, 189) = 1.36$, $p = .25$, partial $\eta^2 = .01$. However, participants in the high-effort condition reported a greater sense of agency ($M = 4.89$, $SE = .13$) than participants in the low-effort condition ($M = 3.39$, $SE = .14$), $F(1, 189) = 66.31$, $p < .01$, partial $\eta^2 = .26$.

Willingness to deliberate

Results indicated no main effect of action (vs. cue) on participants' willingness to deliberate, $F(1, 189) = .38$, $p = .54$, partial $\eta^2 = .00$. Effort level also had no main effect on willingness to deliberate, $F(1, 189) = 1.14$, $p = .29$, partial $\eta^2 = .01$. The interaction effect between the action (vs. cue) and effort level was also not significant (see Table 5 for estimated means). H6a and H7d were rejected.

Mediation analysis

Mediation analyses showed a significant mediation pattern: Compared with participants who saw or used a low-effort affordance, those who were assigned to the high-effort condition felt a stronger sense of agency, which was positively associated with their willingness to deliberate (see Table 6).

Table 4. Indirect effects on affective polarization via enthusiasm

Comparisons	Relative indirect effect bootstrap estimate	95% Confidence intervals	
		LLCI	ULCI
Low-effort—action vs. cue	1.99(1.85)	−1.08	6.31
High-effort—action vs. cue	0.16(0.78)	−1.18	2.09

Notes: Standardized estimates (beta) are included in parentheses. Indirect effect confidence intervals apply to unstandardized estimates.

Effects of forced actions versus voluntary actions

Descriptive results

In the low-effort voluntary action group, a total of 42 participants (75%) took actions (thumbs up or down) voluntarily. Additionally, in the high-effort voluntary action conditions, 23 participants (42.59%) posted comments. Participants in this group were more likely to identify themselves as male (χ^2 (1, $N = 71$) = 6.65, $p = .01$) and more likely to have frequent online political expressions ($M = 4.07$, $SD = 1.65$) than the forced commenting group ($M = 3.16$, $SD = 1.51$), $t(69) = -2.31$, $p = .03$. No other individual differences were found.

Comment analysis

We analyzed the comments generated by participants in both forced action group and the voluntary action group (see Appendix for detailed methods). Comments written by participants in the forced action condition were slightly lengthier ($M = 39.92$, $SD = 32.47$) than comments written by participants in the free action group ($M = 26.22$, $SD = 27.90$), but the difference is not significant, $t(69) = 1.74$, $p = .09$. In addition, a Chi-square test showed no significant differences on comment categories between these two conditions, χ^2 (3, $N = 71$) = 1.79, $p = .73$. Sentiment analysis showed that comments in these two conditions did not differ significantly in their negative, neutral, or positive sentiment scores. Overall, comments showed a very low level of incivility ($M = .03$, $SD = .07$). A Mann-Whitney U Test indicated that no incivility difference was found between comments posted by participants in the voluntary action condition ($M = .06$, $SD = .11$) and those by participants in the forced action condition ($M = .02$, $SD = .03$), $U = 467$, $p = .23$.

To explore whether the forced nature of actions in the experiment changed any of the action effects compared with voluntary actions, the forced action conditions were compared to the two voluntary action groups using ANCOVAs. Voluntary (vs. Forced) action and effort level were entered as independent variables, and all measured outcome variables were entered as dependent variables one by one, with covariates in place.

Table 5. Estimated means of willingness to deliberate as a function of action (vs. cue) and effort level of expression affordances

Effort level of expression affordances	Cue		Action	
	M	SE	M	SE
Low effort	4.76	0.25	4.23	0.24
High effort	4.64	0.22	4.86	0.25

Table 6. Indirect effects on willingness to deliberate via sense of agency

Comparisons	Relative indirect effect bootstrap estimate	95% Confidence intervals	
		LLCI	ULCI
Cue—high-effort vs. low-effort	0.36(0.16)	0.05	0.70
Action—high-effort vs. low-effort	0.37(0.17)	0.06	0.73

Notes: Standardized estimates (beta) are included in parentheses. Indirect effect confidence intervals apply to unstandardized estimates.

A significant interaction effect between voluntary (vs. forced) action and effort level was found on affective polarization, F (1, 140) = 5.48, $p = .02$, partial η^2 = .04 (see Figure 3). Post hoc comparisons showed that participants who voluntarily left a comment reported a higher level of affective polarization than participants who were forced to comment ($p = .04$), whereas there was no difference between those who voluntarily clicked the "thumbs up/down" and those who were forced to take this low-effort action ($p = .34$). When examining ingroup party warmth vs. outgroup party warmth separately, data showed that voluntary commenters revealed a higher level of ingroup party warmth ($M = 83.78$, $SD = 14.52$) than forced commenters ($M = 73.08$, $SD = 19.24$), F (1, 61) = 5.48, $p = .048$, partial η^2 = .06. No significant main effect of voluntary (vs. forced) action or interaction effects were found on any of the other mediators or dependent variables.

Comparisons between cue effects and voluntary no-action effects

Participants who voluntarily performed no actions were compared with participants who were exposed to cues (low-effort: $n = 48$, high-effort: $n = 58$) using ANCOVAs. Results showed no significant differences between these two groups (see Supplementary Materials for all means).

Table 7 provides a summary of the findings.

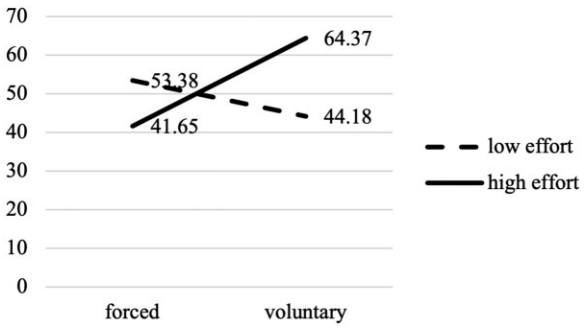

Figure 3. Voluntary (vs. forced) action × effort level interaction on affective polarization (estimated means).

Discussion

By using an experimental approach, our study is able to show causation between online expression affordances and political attitudes of partisans. As predicted by TIME, cues provided by expression affordances influence political outcomes differently than actions facilitated by them. In addition, the effects of low-effort expressions, such as a one-click "thumbs up/down" button, are different from those of high-effort expressions, such as composing and posting a comment. These findings advance our theoretical understanding of the role played by the affordances of digital media on online political expression, and have practical implications for interface designers of news sites and other online forums for public affairs information.

Cue effects of expression affordances

Online political expression has been mostly conceptualized as the frequency of media use in prior research (Lane et al., 2019; Vaccari et al. 2015; Weeks et al., 2017), but this study has demonstrated that the nature of use is key, that materiality of the technology matters in shaping how individuals express themselves and are affected by it. The results indicate a positive effect of the presence (vs. absence) of expression affordance cues. Specifically, participants who were exposed to a low-effort expression affordance (thumbs up/down) were more likely to feel enthusiastic about the news than those who were in the control condition. Furthermore, merely being exposed to the availability of high-effort expression (comment cue) reduced their affective polarization, mediated by perceived site interactivity (H1 and H3). These findings support the proposed idea that the presence of a commenting affordance signals an openness to dialogue for partisans, which helps mitigate their negative feelings toward outgroup members. Without a commenting affordance, partisans may feel helpless in reaching out to the other side, thus leaving them with less outgroup warmth. Overall, our findings suggest that the positive role of the interactivity cue and its related "activity heuristic" proposed in TIME can carry over from the interface to relevant groups involved.

The proposed relationship between emotions (i.e., enthusiasm and anger) and affective polarization (H2) was not supported, contradicting previous findings (e.g., Lu & Lee, 2019; McLaughlin et al., 2020). One possible explanation is that in

Table 7. Results at a glance

Dependent Variable	Control vs. cue	Cue vs. action	Forced vs. voluntary action
Affect (enthusiasm and anger)	Not sig.	Cues lead to higher enthusiasm than actions.	Not sig.
Affective polarization	Comment (vs. control) reduced affective polarization via increased perceived interactivity.	Independent of cue vs. action, low-effort expression affordances elicited a higher level of affective polarization than high-effort affordances.	Voluntary commentors showed higher affective polarization than forced commentors. No difference between voluntary one-clickers and forced one-clickers.
Attitude extremity	N/A	Taking actions (vs. seeing cues) increased post-exposure attitude extremity.	Not sig.
Willingness to deliberate	N/A	Independent of cue vs. action, high-effort affordance elicited a higher level of sense of agency than low-effort affordance, which is associated with higher willingness to deliberate.	Not sig.

this study, emotions were measured as responses to reading a news article rather than toward any specific ingroup or outgroup member, thus being less relevant to subsequent feelings toward different parties.

Action effects of expression affordances

Issue attitude

By singling out the effects of user action, results were largely consistent with our hypothesis (H4) that taking actions would serve to reinforce partisan users' prior attitudes. In examining the actual comments, it is clear that study participants took this opportunity to express their opinions about the issue, showing motivated reasoning (Kunda, 1990). This further lends support to the proposed psychological process of expression effects: The composition process allows individuals to organize their ideas and ultimately produce more consistent thoughts (Pingree, 2007; Zaller, 1992). Additionally, the publicity associated with online expression may motivate users to adhere to their expressions during the message release stage. Active public expression is a way for users to highlight and insert their identities in the online space (Sundar et al., 2015). This kind of self-presentation makes individuals feel obligated to behave in a consistent manner (Gonzales & Hancock, 2008). Overall, the effect of expressive actions on attitude extremity appears to be particularly robust given that participants in this study simply performed a one-time expressive behavior.

However, this finding contradicts the positive effect of "self-as-a-source" on content attitudes proposed in TIME (Sundar et al., 2015), echoing Sude et al. (2021) who discovered that individuals tend to be self-focused when expressing themselves. Allowing users to be the source does not necessarily make them more susceptible to persuasion, thus prompting us to consider boundary conditions. When the conferral of source status is independent of any specific content, such as website customization (Kang & Sundar, 2016), users are likely to be persuaded by content that they encounter. However, when users attain "sourceness" because of expression affordances, i.e., by directly commenting on content and even counterarguing, their pre-existing beliefs are more likely to be enhanced and thereby dictate their perceptions and attitudes.

Affective polarization

Contrary to the expected catharsis effect of self-expression (H5), taking actions did not reduce affective polarization. If anything, data suggest that expressive actions may have served to reinforce the effect of participants' initial positions on affective polarization. For partisans who expressed their issue opinions (vs. issue-irrelevant opinions) in their comments, they also evaluated their ingroup party members more warmly. This implies that when individuals express their support or opposition to the policy preference of a certain group, their initial feelings towards the group get confirmed. But results should also be interpreted with caution as participants may act differently in real-life settings when facing different audiences.

Effort effects of expression affordances

High-effort and low-effort affordances can influence user psychology differently by providing different levels of interactivity and user agency. First, users are more likely to obtain a strong sense of agency by seeing or using a commenting feature than seeing or acting on the thumbs up/down button. This suggests that one-click actions may not be able to imbue users with a strong sense of being the source; more effortful actions, such as commenting, are needed. Furthermore, the sense of agency elicited by the high-effort affordance is positively associated with willingness to deliberate, supporting H6. This result is striking as it implies that the sense of "sourceness" originating from highly interactive online media tools may enhance a person's sense of civic responsibility.

In addition, the thumbs up/down cue and actions elicited a higher level of affective polarization, specifically less outgroup party warmth, than commenting cues or actions (H7b). One possible explanation is that the format of the thumbs up/down feature leaves no room for middle ground but forces individuals to take sides. In this regard, commenting affordance represents a higher level of interactivity that enables dialogues between different sides, which may mitigate perceived polarization and reduce affective polarization. Future research in more natural settings would be needed to replicate the finding and test such mechanisms.

Forced actions vs. voluntary actions

Voluntary expression and forced expression did not produce meaningfully different outcomes except for the comment effect on affective polarization. It merits noting that participants who voluntarily acted (or not) were not randomly assigned to that condition. As a consequence, the effects of their action cannot be causally attributed to the affordance. However, the similarity in effects between these two conditions suggests that the ecological invalidity of forced expression does not undermine the findings.

Implications

Our research provides important theoretical implications for understanding online expression effects from a technological affordance perspective. Our data demonstrate two distinct routes (cue route and action route) by which an affordance can influence users, involving the roles of both physical materiality of the technology and human agency. The cue effects are not always in the same direction as the action effects, as evidenced by our finding that while the presence of a comment cue on the interface can serve to mitigate affective polarization, the actual use of it can increase it by involving theoretical mechanisms related to sense of agency, identity maintenance, motivated reasoning, cognitive consistency, and attitude extremity. Our study has thus highlighted the attitude rehearsal aspect of online political expression (Mercier & Landemore, 2012). It is also the first attempt to study the relationship between daily online expressive behaviors and willingness to engage in deliberative communications, extending the effect of agency affordance proposed in TIME (Sundar et al., 2015) to a political context. By adopting an experimental approach, it complements correlational research on political effects of online expression by showing causal relationships between specific technological affordances and critical political outcomes.

Our research also has practical implications for affording user reactions to news content on digital media. First, it is important to show willingness to hear from readers. As evidenced in this study, the absence of expression affordances for controversial political topics can make users more affectively polarized. But the solution is not to employ low-effort features such as "thumbs up/down," as they too can serve to

intensify affective polarization by providing simple binary choices. Instead, the presence of a high-effort feature such as a commenting may reduce feelings of polarization and enhance public interest in civic deliberation. However, the minority of users who voluntarily engage with such features tend to show more extreme attitudes and affective polarization in their comments. Therefore, the implementation of such features ought to be strategic in that they should appear prominently on the interface to convey openness to user comments and provide a higher sense of agency to users, but also include robust moderation mechanisms to keep polarized user commentary in check.

Limitations and future research

Several limitations of the current study have to be kept in mind while interpreting our results. The current design is limited to interaction with news on a fictitious website, which may be different from a natural news consumption setting or a social media setting where many other cues and affordances are co-present and can have their own effects on reader judgments and perceptions. Participants may not encounter or choose to read our news stimuli in a real-life setting, as the chosen stories were limited in their diversity of geolocations. Also, our study excluded nonpartisans. It would be valuable for future studies to explore how expression affordances affect politically moderate individuals, in terms of both their political opinions and willingness to deliberate. In addition, participants in this experiment only read the news and used the affordance once. It is unclear whether the expression effects will be strengthened or weakened with repeated use. Future research should explore how the use of expression affordances over time and repeated exposure to the same issue affect political outcomes.

This study may not be able to provide a simple answer to the question whether offering expression affordances to users is beneficial or not. This is because it delineates the complex ways by which the tools of online media influence political cognitions and attitudes. As such, it lays the groundwork for further research on how different designs of technological affordances might alter individuals' perceptions and facilitate democratic outcomes such as enlightened opinion, reduced hatred, and civil discourse.

Supplementary material

Supplementary material is available online at *Journal of Computer-Mediated Communication*.

Data availability

The data underlying this article will be shared upon reasonable request to the corresponding author.

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Appendix: Comment analysis method

Comment length was analyzed using computer software.

Two independent coders were trained to code *comment category*. First, they identified whether the comment is interpretable and relevant. Irrelevant thoughts were those not associated with the news or issue or not interpretable (code = 0). For example, "great" was coded as uninterpretable/irrelevant given that it was incomplete and unclear what the participants meant. Relevant thoughts were further categorized into three categories (1 = comment relevant to the news content or delivery but not the issue, e.g., "this is a well-written article"; 2 = comment relevant to the issue and showing opinions, e.g., "I oppose all gun-control laws"; 3 = comment relevant to the issue but not expressing opinions, e.g., "This is a contentious issue"). Twenty-five percent of the comments were randomly selected to perform a reliability test, showing good intercoder reliability (Krippendorf's α=.83).

Comment sentiment was analyzed using the NLTK library (https://www.nltk.org) with Python 3.6, which is a leading open-source toolkit for language processing and has been used to analyze sentiment of user comments. The algorithm evaluated the comment by comparing its language with existing affective word dictionaries, and then produced ratings on three dimensions—negative sentiment, neutral sentiment, and positive sentiment. The total of the scores on these three dimensions is 1. For example, a comment receiving a score of 0.25 on negative sentiment, 0.75 on neutral sentiment, and 0 on positive sentiment indicates a slightly negative comment. Overall, comments collected in this study were largely neutral ($M_{positive}$ = .15, $SD_{positive}$ = .17; $M_{neutral}$ = .73, $SD_{neutral}$ = .18; $M_{negative}$ = .12, $SD_{negative}$ = .15).

Comment incivility was measured using the ratio of "bad words" used in the comment. The list of "bad words" was compiled by Luis von Ahn of Carnegie Mellon University (https://www.cs.cmu.edu/~biglou/resources/bad-words.txt). It is a comprehensive lexicon of 1,374 offensive words, including swear/profane words (e.g., f*ck, b*tch), negative words (e.g., die, hell) and others (e.g., enemy, drug). Using Python 3.6, the number of such "bad words" in each comment was computed. The total number of bad words was then divided by the length of the comment, constructing an index of comment incivility.