EXPRESSION AFFORDANCES OF DIGITAL MEDIA: IMPLICATIONS FOR
POLITICAL KNOWLEDGE, ATTITUDE, AFFECT, AND WILLINGNESS TO
DELIBERATE

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ABSTRACT

From “liking” and commenting to sharing, expressing oneself about ongoing news and public affairs information has become an integral part of online interactive media. How do such acts of expression affect online users? Past research has shown that public self-expression on political issues can shape individuals’ self-concept as well as their political attitudes. But, it is not clear if this is true only for effortfully composed commentary or applies also to low-effort, one-click actions such as thumbs up/down. This dissertation addresses this issue by exploring how psychological effects vary as a function of different expression affordances (e.g., liking vs. commenting) that are currently available in online news media technologies. In particular, based on the theory of interactive media (TIME), it proposes two distinct routes by which an expression affordance may affect individuals’ perceptions, attitudes, and behavioral intentions: on the one hand, the physical presence (absence) of the expression affordance on the media interface may influence user psychology (cue effects); on the other hand, users’ active actions on the affordance may affect their attitudes and behaviors (action effects).

A between-subjects online experiment (N = 368) was conducted in the context of online political news, wherein all participants read identical stories on a news website, but with different expression affordances. Specifically, two aspects of the expression affordance were manipulated, including the effort level of the expression (2: low-effort thumbs up/down vs. high-effort comment), and how it allowed actions (3: cue vs. forced action vs. voluntary action). A control condition with no expression affordances was also included as a base-line comparison.

The data showed that the sheer presence of the commenting affordance cue (vs. control) increased perceived interactivity of the site, which tended to mitigate affective polarization among individuals. In terms of action effects, the results indicated that taking actions on the
expression affordance (vs. being exposed to cues) reinforced pre-existing opinions, supporting the proposed hypothesis. However, counter to expectations, actions (vs. cues) lowered cognitive involvement with the issue featured in the news and diminished users’ hopes for encountering meaningful deliberation.

More importantly, the study revealed that the effort level of the expression affordance made a difference, such that the low-effort affordance (i.e., thumbs up/down) led to more affective polarization than the high-effort affordance (i.e., commenting). Moreover, the commenting affordance (vs. thumbs up/down) allowed users to acquire a stronger sense of agency, which was positively associated with their willingness to deliberate.

This dissertation study offers several theoretical and methodological implications for the study of expression effects and psychological effects of communication technologies, by theorizing and linking affordances of expression with political outcomes at the individual level (political knowledge, affect, attitude, and willingness to deliberate). It also provides practical guidelines for digital platform designers regarding deployment of different opinion-expression affordances in their online public forums.
# TABLE OF CONTENTS

LIST OF TABLES .................................................................................................................. vii

LIST OF FIGURES ................................................................................................................. viii

ACKNOWLEDGEMENTS ......................................................................................................... ix

INTRODUCTION .................................................................................................................... 1

LITERATURE REVIEW .......................................................................................................... 5
  Implications of Online Political Expression ................................................................. 6
  An Affordance Perspective of Political Expression ..................................................... 9
  Effects of Expression Affordances: Cue Route and Action Route ........................... 12

METHOD ................................................................................................................................ 27
  Experimental Conditions ............................................................................................... 27
  Participant Recruitment ................................................................................................. 29
  Participants ...................................................................................................................... 30
  Procedures ...................................................................................................................... 31
  Measures ......................................................................................................................... 33
  Data Analysis Strategy ................................................................................................. 41
  Power Analysis ................................................................................................................. 43

RESULTS .................................................................................................................................. 45
  Manipulation Checks ..................................................................................................... 45
  Randomization Checks ................................................................................................. 46
  News Selection Check .................................................................................................... 46
  Cue Effects ....................................................................................................................... 48
  Action Effects on Issue Knowledge .............................................................................. 51
  Action Effects on Issue Attitude .................................................................................... 59
  Action Effects on Affective Polarization ...................................................................... 60
  Action Effects on Deliberation Willingness/Expectation ............................................ 63
  Effects of Forced Actions versus Voluntary Actions .................................................. 65
  Summary of Findings ...................................................................................................... 70

DISCUSSION ............................................................................................................................. 72
  Cue Effects of Expression Affordances ......................................................................... 72
  Action Effects of Expression Affordances .................................................................... 74
  Effort Effects of Expression Affordances ....................................................................... 80
  Forced Actions vs. Voluntary Actions .......................................................................... 82
Theoretical Implications-------------------------------------------------82
Practical Implications-------------------------------------------------85
Limitations and Future Research------------------------------------------87
Conclusion---------------------------------------------------------------88

REFERENCES---------------------------------------------------------------90

Appendix A. News Stimuli -----------------------------------------------116
Appendix B. News Knowledge Questions----------------------------------124
Appendix C. Means of Variables in Voluntary Action Groups--------------129
Appendix D. Means of Variables across Seven Experimental Conditions---131
Appendix E. Correlation Table--------------------------------------------136
Appendix F. Factor Loadings for the Confirmatory Factor Analysis on Perceived
Interactivity and Sense of Agency----------------------------------------138
LIST OF TABLES

Table 1 Contingency Table of Affordance Manipulation Check ........................................ 45
Table 2 Number of Participants in Different Conditions .................................................. 46
Table 3 Contingency Table of News Selection Check ..................................................... 47
Table 4 Means and Standard Deviations for Different News Issues ............................... 48
Table 5 Estimated Means of Anger as a Function of Cues vs. Control ......................... 49
Table 6 Indirect Effects on Affective Polarization via Perceived Interactivity ................. 51
Table 7 Indirect Effects on Issue Knowledge via Cognitive Involvement ....................... 58
Table 8 Indirect Effects on Affective Polarization via Enthusiasm ............................... 62
Table 9 Estimated Means of Willingness to Deliberate as a Function of Action (vs. Cue) and Effort Level of Expression Affordances ........................................................................ 64
Table 10 Indirect Effects on Willingness to Deliberate via Sense of Agency .................. 64
Table 11 Mean Comparisons of Comment Sentiments ................................................. 67
LIST OF FIGURES

Figure 1 Proposed Model of Expression Affordances Effects.......................................................... 26
Figure 2 Thumbs up/down Cue vs. Action .................................................................................... 28
Figure 3 Comment Cue vs. Action ................................................................................................. 28
Figure 4 Action (vs. Cue) x Effort Level interaction on Attitude-inconsistent Knowledge ........ 56
Figure 5 Action (vs. Cue) x Effort Level Interaction on Knowledge Difference ....................... 57
Figure 6 Action (vs. Cue) x Effort Level Interaction on Enthusiasm ........................................ 61
Figure 7 Voluntary (vs. Forced) Action x Effort Level Interaction on Affective Polarization .... 69
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INTRODUCTION

Should online news welcome user reactions? An intuitive answer might be, why not? A few years ago, supporters for participatory journalism claimed that news stories without user comments “are becoming rare and starting to look awkward, even suspicious” (Reich, 2011, p. 97). Indeed, public engagement with news seems to have become the new normal. For example, among social media news consumers, 58% of them sometimes or often “like” news stories and 37% of them comment on news stories (Mitchell, Gottfried, Barthel, & Shearer, 2016). Thus, user engagement, such as comments, shares, and likes, is closely monitored and strategically analyzed, becoming a new battleground for online news outlets.

However, recently, a growing number of news websites have started closing the gates for public engagement with news articles (Ellis, 2015). In fact, if you check the websites of some major news media such as CNN (https://www.cnn.com/), USA Today (https://www.usatoday.com/), or Huffington Post (https://www.huffpost.com/), you will find no user reactions to news stories. In contrast, Yahoo News (https://news.yahoo.com/), Fox News (https://www.foxnews.com/), and the Washington Post (https://www.washingtonpost.com/) offer their readers facilities for commenting directly on news articles and viewing others’ reactions. The difference between their decisions highlights the complexity of question, as it can be considered from different angles.

For news consumers, a defining feature of digital media is the ubiquity of action possibilities for them, allowing them to serve as the source, editor, commenter, or the broadcaster of the information, quite akin to the gatekeeping role undertaken by media professionals in news
organizations. This has the potential to provide them unprecedented agency (Sundar, 2008). In other words, instead of being “passive audience” receiving information, they are “active users” expressing themselves on digital media (Sundar & Limperos, 2013). For instance, emerging media platforms provide users several ways of responding to the political information to which they are exposed and expressing their opinions, such as liking, upvoting/downvoting, commenting, and reposting. Therefore, allowing user reactions to news stories helps fulfill their need for agentic expressions. More generally, technologies that enable expression may stimulate wider citizen engagement on social issues, which may serve as the hidden engine for knowledge acquisition and participation in deliberative communications.

On the other hand, online discourse often features controversial topics and shows deep divides between different sides. It may also contain incivility, hate speech and trolling (Frischlich, Boberg, & Quandt, 2019). Therefore, greater expression online may push citizens further away from opportunities to learn facts and understand each other. For example, uncivil comments following online news articles about scientific issues polarized readers’ opinions (Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2014) and enhanced media bias perceptions (Anderson, Yeo, Brossard, Scheufele & Xenos, 2018). This tension thus poses a challenging question to news websites, as to whether they should provide readers the access to features such as commenting on their websites. It is therefore necessary to investigate the effect of expression to figure out if there is a way to reconcile the tension between the importance of citizen engagement and the potential damage caused by divisive political expression.

Theory and research suggest that actively expressing oneself entails significant psychological effects. According to Sundar (2008), a strong sense of agency, “the feeling of
having a competent, confident and assertive voice” (Stavrositu & Sundar, 2012, p.371), arises when users can communicate their opinions, feelings, and identities to others, which can influence users’ perceptions, attitudes, and behaviors. The theory of expression effects (Pingree, 2007) also points out that the process of expressing oneself can strongly affect message senders’ self-perception and opinion change. Another line of research specifically focuses on how expressing different emotions affect the writer him/herself (Pennebaker, 1997; Smyth, 1998). Therefore, on digital media, users’ actions to respond to different political information and express themselves can have positive implications for their knowledge, attitudes, emotions, and behaviors.

While a fair amount of research on political expression via digital media has been conducted (e.g., Bode, 2017; Vaccari et al., 2015; Yamamoto, Kushin, & Dalisay, 2015; Yu, 2016), most of it uses a survey approach that adopts self-reported, aggregated measures for expression behaviors, which fails to address the role of technology itself. A technology affordance perspective is thus lacking and sorely needed. Affordances refer to action possibilities in the environment (Gibson, 1979). Studying communication technology from an affordance perspective connects the materiality of the technology and human agency (Evans, Pearce, Vitak, & Treem, 2016). As indicated in the Theory of Interactive Media Effects (TIME) (Sundar, Jia, Waddell, & Huang, 2015), the sheer existence of the affordance can trigger certain perceptual differences (cue effect), aside from the consequences of actually engaging or using the affordances (action effect). Furthermore, not all affordances are created equal. Of the affordances that enable expression, some cost more cognitive effort (e.g., commenting), whereas others are more light weight (e.g., “liking”). Thus, theorizing the effect of expression from an affordance
perspective helps single out the role of interactive technology and further deepen our understanding of digital media effects on the current climate of political polarization.

The present dissertation study explores the implications of different news media affordances that enable expression in the political realm. Specifically, the study attempts to establish the theoretical linkage between affordances that allow expression and a user’s political knowledge, attitude, affect, as well as willingness to deliberate. In addition, the current study investigates and compares the effects of different types of expression affordances, specifically, a less effortful expression such as a one-click “thumbs up/thumbs down” and a more effortful expression such as commenting.

This dissertation is organized as follows: first, it reviews relevant research and proposes hypotheses; second, it describes an experiment designed to test the research questions and hypotheses; third, it reports results of data analyses; finally, it discusses theoretical and practical implications based on interpretation of the results.
Political expression is any communication of a person’s political ideas, attitudes, and preferences (Cho, Ahmed, Keum, Choi, & Lee, 2016). Being able to express one’s opinion about news and politics is an essential element of a deliberative democracy (Delli Carpini, Cook, & Jacobs, 2004; Scheufele & Eveland Jr, 2001). With the advancement of communication technologies, individuals can express their opinions in much easier, more direct, and more immediate ways to react to the information they encounter online. And this interactive feature is available on a number of platforms, including social media, discussion forums, and news websites. For instance, news consumers today do not have to write letters to editors to express their opinions; instead, they can comment on the news immediately and directly on the website (McCluskey & Hmielowski, 2012). Even when we are watching traditional media such as television, it is possible now to concurrently express our thoughts on social media, a phenomenon called second screening (Gil de Zúñiga, Garcia-Perdomo, & McGregor, 2015; Gil de Zúñiga, & Liu, 2017).

This is perhaps one of the most salient changes brought about by digital media compared with traditional media, the realization of which can take on different forms. On digital platforms, users can express their opinions and ideas by posting or reposting content, commenting, liking/disliking (Lane et al., 2019; Vaccari et al. 2015; Weeks, Ardèvol-Abreu, & Gil de Zúñiga, 2017), changing profile pictures to show support for a campaign (Chapman & Coffé, 2016; Gerbaudo, 2015), and utilizing newer types of content such as emojis, “memes” or “gifs” (Highfield & Leaver, 2016). These communicative behaviors are not restricted to interpersonal communication or discussion with specific partners. They include public expressions of one’s
beliefs, attitudes, and emotions. This has led to an explosion of political expression on digital media, a phenomenon that has attracted attention from many scholars.

Implications of Online Political Expression

In line with past research that often associates discussion/expression with democratic outcomes, much of the research shows the positive effects of political expression, such that more frequent political expression activities on social media are associated with increased online and offline political participation (Gil de Zúñiga, Molyneux, & Zheng, 2014; Valenzuela, 2013; Yamamoto et al., 2015). Even those “low cost” online expressive behaviors (e.g., one click “liking”) can lead to more offline political participation (Bode, 2017; Vaccari et al., 2015). However, it is also found that this effect can be moderated by prior attitudes of the individual, such that if a person holds an unfavorable attitude about President Trump, then expressing on social media while watching news about Trump could lead to political disengagement (McGregor & Mourão, 2017).

From a media-effects perspective, expressions can generate influences on message receivers, considering that digital media afford users the ability to make their political expression visible to others to various degrees (Treem & Leonardi, 2013). For instance, research has shown that news readers’ opinions could be swayed by the comments under social media posts, especially when the comments were negative (Winter, Brückner, & Krämer, 2015) or uncivil (Anderson et al., 2014; Gervais, 2015). The sheer number of comments or metrics about the volume of expression (e.g., number of likes, shares, comments), may trigger the “bandwagon heuristic”, such that “if other people like this, then it should be good” (Sundar, 2008). In various contexts, including politics, scholars have documented a salient effect of these bandwagon cues.
(e.g. Knobloch-Westerwick, Sharma, Hansen, & Alter, 2005; Lee & Sundar, 2013; Messing & Westwood, 2014; Sundar, Oeldorf-Hirsch, & Xu, 2008; Xu, 2013).

Being able to speak out and being heard by others also entails psychological implications for message senders. Scholars have called them expression effects, focusing on “a more psychological and intrapersonal account of what happens to people when they express themselves” (Shah, 2016, p.13) and highlighting the bidirectional nature of the social influence process (Pingree, 2007). According to Pingree (2007), during the cognitive process of expressing, two distinct stages will produce two different effects: composition effect and release effect. Before or during the release of the message to others, wherein the sender spends mental effort and resources in organizing his or her ideas, the composition effect may occur. Pingree argued that prior attitudes will be reconstructed, and new ideas may emerge at this stage. Yoo et al. (2017) showed that social media political expression promoted the user’s effortful thinking and elaboration of the issue topic, which was particularly salient if the expression was motivated by an intent to persuade. Following which, message release effect occurs when the sender perceives the message being received by others. The message then may become part of the self-concept of the sender, and a public commitment about one’s stand or viewpoint, potentially changing the self-perception, attitude and behaviors of the sender. This has also been supported by studies in social media contexts, such that using social media affordances to express one’s political opinions yielded a more positive political self-perception of users, including higher interest, stronger efficacy, and perceiving themselves as active participants in politics (Lane et al., 2019).
The expression processes and effects on message senders may also have an emotional component. In studies of online political expression, scholars have often focused more on rational deliberation and less on the role of emotion in political behavior. However, as indicated by affective intelligence theory, different types of emotions are aroused when people encounter various political figures, news, and events (Marcus, MacKuen, & Neuman, 2011). Moreover, individuals have the need to share their emotions to others (Rimé, 2009). Therefore, online political expression usually contains a fair amount of emotionally charged content. For instance, researchers found many tweets expressing condolences and sadness about mass shootings in the discourse on gun control (Zhang et al., 2019). For political/moral issues, emotional words can facilitate the diffusion of a message in online space, showing the power of emotional expression in the political realm (Brady, Wills, Jost, Tucker, & van Bavel, 2017). From an intrapersonal perspective, expressing emotions has long been recognized to have psychological effects on message composers, such that writing about one’s emotional experience can be a therapeutic process (Pennebaker, 1997). In this regard, political expression on digital platforms may also serve the function of emotion release for the message sender.

In sum, political expression on digital platforms may have important implications for message senders, both cognitively and affectively. However, thus far, these effects of online political expression have been primarily studied as outcomes of user behaviors, such as how often they express, while the role of communication technologies, i.e., what media interfaces essentially provide to users, is largely overlooked. To overcome this issue, recent communication technology research has adopted an affordance perspective to understand the implications of digital media. By considering affordances of technologies, we can better understand the ways in
which users actively interact with these features, as well as how different physical features of
media play roles in communication processes and are related to communication outcomes.
Therefore, this study intends to study the effect of online political expression from the
perspective of affordances of communication technologies, which will be detailed next.

**An Affordance Perspective of Political Expression**

Affordances, being action possibilities, invite behaviors but exist independent of
behavioral intention and related outcomes (Withagen, de Poel, Araújo, & Pepping, 2012). The
core idea is that the material aspect of technology can enable or constrain certain actions. At the
same time, affordances are also relational, being imbued with different meanings by different
individuals (Hutchby, 2001). For example, social media provide users with an affordance to
connect with others, which is distinct from the goal or the need of the users such as “need to be
connected”, and is distinct from the outcome of the action such as “being connected with others”
(Majchrzak & Markus, 2012). Studies of communication technologies are increasingly adopting
and examining the concept of affordance (Evans et al., 2016).

Different forms of political expression on digital media represent the abundance of action
possibilities that enable self-expression, which are named expression affordances in this study.
For instance, posting, commenting, liking/disliking functions on the user interface invite and
allow user actions. Related to political expression, there are at least two types of expression
affordances that often utilized by individuals. First, user generated content (UGC) represents the
product of a vital expression affordance of modern media, which is content creation, also called
*content sharing* (Karahanna, Xu, S., Xu, Y., & Zhang, 2018; Kietzmann, Hermkens, McCarthy,
& Silvestre, 2011) or *broadcasting* (Mesgari & Faraj, 2012), or *posting* (Oeldorf-Hirsch &
Sundar, 2015). Conceptually, it refers to the action possibility that users create/alter content and disseminate the content to other users in a network. Second, digital media technologies also provide users with another action possibility of reacting to other users’ presence, profiles, content, and activities. It is categorized as content *curation* affordance, considering that it allows users to select, organize, and recommend existing content (Sundar, Oh, Bellur, Jia, & Kim, 2012; Sundar et al., 2015). Scholars also call it “*metavoicing*” affordance, given that users are adding metaknowledge based on existing content (Majchrzak, Faraj, Kane, & Azad, 2013). Unlike content creation that enable users to initiate the process of production and dissemination, curation/metavoicing is more focused on reacting to the original content from the perspective of the audience. Typical examples include the “liking” and commenting buttons on Facebook and Twitter, or the upvote/downvote function of Reddit. By responding to other users’ profiles or stories, users are acting as the source of information to express their attitudes and opinions. In sum, as main vehicles for self-expression, content creation and curation/metavoicing technologies expand the ways in which individuals engage in political expression and conversations, thus promoting overall political participation (Gil de Zúñiga et al., 2014; Östman, 2012).

These expression affordances fall into the broader category of *agency affordances*, defined by Sundar (2008). Agency is derived from the concept that humans can serve as independent agents of their own motivations and actions (Bandura, 1989). In the context of media studies, Sundar (2008) characterized the agency affordances of communication technologies based on the notion of “self as source.” For example, individual users are afforded the ability to engage in customization by dictating the design of certain aspects of the interface,
such as how it should look and how it should function. Users also have the opportunity to express their thoughts to a sizable audience using social media. Among them, expression affordances align perfectly with the essence of agency affordance, i.e., every user becoming the source of information. From a cultural perspective, user agency is greatly enhanced when average people can be active participants rather than passive recipients of media content (Van Dijck, 2009).

Furthermore, according to the theory of interactive media effects (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), which is associated with the physical presence of the action possibility. On the other hand, the action route is generated by user’s active engagement with the affordance. For example, the presence (vs. absence) of a commenting button on a news website may trigger certain heuristics (i.e., mental shortcuts) of users, without users necessarily taking actions, which is the cue route. When users make use of the commenting button, the action effect is triggered. This framework helps capture the effect of affordances regarding both the materiality of the technology and agency of the user.

Different affordances can lead to different heuristics and different types of engagement with mediated content, which in turn affect outcomes. For agency affordances, via the cue route, they are said to generate different levels of interaction and control heuristics, such that users perceive themselves having more control and the system being more interactive. For instance, a moderate level of interactivity (vs. low/high interactivity) of a political candidate’s website
increased the candidate’s appeal as well as his/her character (sympathetic, trustworthy, sensitive, and caring), even though the content was constant across conditions (Sundar, Kalyanaraman, & Brown, 2003). Via the action route, the active engagement of agency affordances can imbue users with a sense of agency, which can further influence individuals’ knowledge, attitudes, and behaviors (Sundar et al., 2015). For instance, Fox, Cruz, and Lee (2015) examined effects of affordances with different levels of “sourceness” (writing tweets vs. retweeting tweets) in the context of sexual harassment and found that participants reported higher levels of reported hostile sexism after the use of more agentic affordance (i.e., writing tweets incorporating a sexist hashtag) than the use of less agentic affordance (i.e., sharing tweets with the same sexist hashtag). Hence, by delineating the differential effects of affordance-based cues and actions, TIME provides a useful theoretical framework to understand how affordances of media technologies affect knowledge, attitudes, affect, and behaviors.

**Effects of Expression Affordances: Cue Route and Action Route**

Political expression via digital media affordances can entail significant effects on the individuals who express along all dimensions--cognitive, affective, and conative. Specifically, when engaging in communications of political issues, it is often expected that individuals can reach a consensus on the objective fact and take different viewpoints into consideration. However, what often occurs is that they obtain distorted knowledge, more extreme attitude, negative affect toward the other side, and less openness to disagreement (e.g. Bail et al., 2018; Gastil, et al., 2017; Hart & Nisbet, 2012; Levendusky, & Malhotra, 2016; Lu & Lee, 2018; Porter & Schumann, 2018; Tabet & Lodge, 2006). Does political expression via digital media play a role in this process? If so, how? Considering the premise of expression effects and a
technology affordance perspective, this study seeks to understand how political expression on digital media influences political judgement, affect and behaviors, as well as the underlying psychological mechanisms.

**Cue effects.** As proposed by TIME, even without user action, the sheer presence/absence of the affordance on the interface can trigger different perceptions about the platform as well as the content conveyed (cue effect). For instance, a product presentation website utilizing a scrolling (vs. clicking) feature increased the perceived vividness of the content and perceived coolness of the technological gadget, which generated a more enjoyable experience that led to more positive attitudes toward the product (“a positive halo effect”). And this cue effect is independent of user’s actual use of the website (Wang & Sundar, 2017).

Applying this to the present context, what is the cue effect of expression affordances on digital platforms? First, the presence of expression affordances signals the extent to which the system allows for 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). Essentially, expression affordances represent a higher level of interactivity of the system. To explain it further, seeing 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; Song & Zinkhan, 2008). Therefore, the study proposes:

**H1:** Participants will perceive a higher level of interactivity in the presence (compared to absence) of expression affordance on an interface.
In the context of political communication, a higher interactivity of the system may trigger favorable affective responses to the site as well as its content. As shown in previous studies on political campaign websites, a high level of interactivity can provide candidates an emotional advantage for winning over voters (Sundar et al., 2003; Lee & Shin, 2012; Van Noort, Vliegenthart, & Kruikemeier, 2016). A meta-analysis also showed the positive effect of website interactivity on enjoyment and satisfaction across different contexts (Yang & Shen, 2018).

Regarding political issue discussion, a high level of perceived interactivity, which is introduced by the presence of expression affordances, may indicate a possibility for dialogic and conversational discourses, while the site can seem overly assertive when it has only a low level of interactivity. 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 reduce negative emotion (e.g., anger) (H2a) and increase positive emotion (e.g., enthusiasm) (H2b), by way of perceiving a higher level of interactivity (H2c).

**Emotions and Affective Polarization.** Reduced negative emotions introduced by perceived interactivity may further influence affective polarization. Not only does political polarization refer to the ideological aspect, i.e., whether more people hold extreme views rather than being moderates (Fiorina & Abrams, 2008; Fiorina, Abrams, & Pope, 2005) or the significant trend of Democrats moving to the left and Republicans moving to the right (Abramowitz & Saunders, 2008), but also the affective aspect, whereby partisans increasingly dislike each other and associate opponents with negative characteristics, showing a larger social and psychological distance (Iyengar, Sood, & Lelkes, 2012). Furthermore, there is ample
evidence that affective polarization is rising in the United States (Iyengar, Lelkes, Levendusky, Malhotra, & Westwood, 2019), which can be accounted for by the intergroup nature of partisanship politics, such that the presence of party cues can exert strong effects on partisans’ reactions and behaviors (Iyengar & Westwood, 2015). In other words, people hate each other merely because they belong to different groups, not because they hold different opinions.

Research has shown the critical mediating role of emotions connecting information exposure and affective polarization. Emotions are intense, short-lived mental states directed at external stimuli (Nabi, 1999). When facing political events, issues, figures and communications, individuals are likely to experience different emotional responses, which may further influence their judgements and behaviors. For example, affective intelligence theory proposes that in the political context, enthusiasm/pride is most likely to arise under conditions of victory and determination, anger/aversion is associated with failure, threats, or cross-cutting interactions, while anxiety increases when individuals experience unfamiliarity and uncertainty (MacKuen, Wolak, Keele, & Marcus, 2010; Marcus, MacKuen, & Neuman, 2011; Marcus, Neuman, & MacKuen, 2000). These emotional responses can be triggered and enhanced with the increasing salience of the partisanship identity (Huddy et al., 2015).

Emotional responses can influence political judgements and perceptions. According to appraisal tendency theory (Lerner & Keltner, 2000), when certain emotions are aroused, individuals’ judgement and decision-making processes can be biased until the emotion-eliciting conflict is resolved. Even incidental emotions can carry over their effects to subsequent judgements on unrelated topics and objects. For example, anger depresses information seeking, encourages knowledge distortion, and leads to close-mindedness and entrenched attitude,
whereas anxiety and fear trigger information seeking and lowers the resistance to new information (MacKuen et al., 2010; Marcus, Sullivan, Theiss-Morse, & Stevens, 2005; Valentino, Hutchings, Banks, & Davis, 2008; Weeks, 2015; Wollebæk, Karlsen, Steen-Johnsen, & Enjolras, 2019). Based on this line of reasoning, anger induced by controversial political information, may motivate individuals to rate the other side even more negative and defend their ingroup members, whereas enthusiasm signals that the person’s goal is met (Markus et al., 2000), thus enthusiastic partisans may be more willing to accept differences and the opposing party. As shown in recent studies, negative emotions such as anger and fear toward the other side increased affective polarization (Lu & Lee, 2019). On the flipside, a reduction in negative emotions is likely to temper affective polarization. Based on this rationale, this study proposes:

H3: Being exposed to the presence (vs. absence) of expression affordances on digital media will reduce affective polarization (H3a), by way of reduced negative emotion (e.g., anger) (H3b) and increased positive emotion (e.g., enthusiasm) (H3c).

Action effects on issue knowledge. For political expression and conversations, it is generally desirable that participants are well informed (Delli Carpini, & Keeter, 1996; Kim, Scheufele, Shanahan, & Choi, 2011). To what extent individuals learn from information such as news is likely to be driven by their cognitive elaboration of the issue, which is applicable to both offline and online information environments. A high involvement with an issue drives more attention and more effortful, systematic processing of relevant information regarding the issue (Petty & Cacioppo, 1984), which in turn increases knowledge acquisition (Eveland, 2002; Eveland & Dunwoody, 2002; Shah, Cho, Eveland Jr, & Kwak, 2005).
Providing users with expression affordances can potentially enhance cognitive involvement with the information conveyed on the interface. Sundar (2008) argues that when users become the source of information, such as when they are allowed to customize the interface, the action can lead to perceived involvement with the interface, thus increasing the cognitive engagement with information delivered by the interface. This proposition was supported by empirical research related to web portals (e.g., Kalyanaraman & Sundar, 2006) and blogging sites (e.g., Sundar, et al., 2012).

In addition, active use of expression affordances involves more effortful thinking, which is named “composition effect” (Pingree, 2007). Specifically, when individuals go through the process of composing an expressive message, they often spend more cognitive effort in understanding the issue and organizing their thoughts. This explains why, in educational settings, allowing students to express their thoughts can enhance learning outcomes (Sfard & Kieran, 2001; Wilson, Pollock, & Hamann, 2007). Nekmat (2012) found that individuals who had expressed their personal messages in an online website learned more than those who had not in the context of drunk driving, because of higher cognitive elaboration. In a similar vein, Oeldorf-Hirsch and Sundar (2015) revealed that Facebook users who shared a news story reported a higher level of elaboration on the shared content than those who only read the story, which led to significantly more involvement. Therefore, allowing individuals to express their thoughts and opinions has the promise of increasing their knowledge acquisition via an increase in cognitive elaboration. Thus, this study proposes:

H4: The use of expression affordances on digital media will have a positive effect on issue knowledge.
H5: The relationship between the use of expression affordances and issue knowledge will be mediated by the level of cognitive elaboration.

**Action effects on attitude-consistent and attitude-inconsistent knowledge.** While individuals may show a high level of issue knowledge, it is important to distinguish between *attitude-consistent* and *attitude-inconsistent* knowledge. Theoretically, a well-reasoned opinion requires considering alternative facts and arguments (Gastil & Black, 2007). But, in reality, a person may be very aware of facts and arguments that support their own positions, yet fail to recognize facts that are consistent with the preference of the other side. Specifically, individuals in different political camps may learn different aspects of the facts, thus holding divergent empirical beliefs. For instance, during the Hong Kong protests in 2019, the pro-government group and the pro-democracy side had little consensus about the basic facts of the event, such as who the participant is, how the protest looks like, or what the goal of the movement is, due to the consumption of slanted media coverage (Hong, 2019). These beliefs may further serve as bases of their issue stances.

Moreover, when encountering new information, individuals are more likely to believe in the empirical evidence that is consistent with their prior attitudes and values—a “knowledge distortion” process that directly impacts their voting decision (Gastil, Reedy, & Wells, 2017; Wells, Reedy, Gastil, & Lee, 2009). As a result, even if they are provided two-sided arguments, they are likely to show a higher level of knowledge consistent with their pre-existing opinions compared with attitude-inconsistent knowledge. This poses great challenges for dialogue and negotiation when people are not in agreement with each other regarding the facts of the case. Therefore, understanding what people on different sides know about the issue, specifically
whether they hold biased knowledge is important. However, the process governing the effects of the use of expression affordances, especially on this knowledge difference, is less clear. As discussed above, engaging in self-expression may enhance effortful information processing by individuals. The key question is, will that increased amount of cognitive engagement also promote more attitude-consistent knowledge (vs. attitude-inconsistent knowledge)?

Previous theories and empirical evidence have pointed to the likelihood that higher cognitive involvement is often associated with more biased information processing, which can lead to a heightened level of difference between attitude-consistent and -inconsistent knowledge. It is argued that when presented with information consistent with prior beliefs, people tend to accept the validity of the information without much thinking, in contrast to displaying more effortful processing and counterarguing with preference-inconsistent information (Ditto & Lopez, 1992).

In addition, individuals with higher levels of cognitive reflection are most likely to display motivated reasoning (Kahan, 2013), leading to biased information processing. Motivated reasoning theory posits that when the goal to reach a directional conclusion outweighs the goal to achieve an accurate understanding of an issue, people are likely to spend more time consuming attitudinally consistent information, rate opposing arguments less compelling than congruent arguments, contesting and counterarguing with dissonant information, and decreasing the weight given to dissonant arguments while increasing the relative importance of attitude-consistent information (“attribute weighting”) (Kahan, 2013; Kunda, 1990; Redlawsk, 2002; Taber & Lodge, 2006). Through these different levels of biased information processing, more involved
individuals tend to develop more knowledge consistent (vs. inconsistent) with their prior attitudes. Therefore, this study proposes:

H6: The use of expression affordances on digital media will promote more attitude-consistent knowledge than attitude-inconsistent knowledge (H6a), by way of increased cognitive elaboration (H6b).

**Action effects on issue attitude.** Attitude is usually defined as a dispositional response to an object in a positive or a negative manner (Eagly & Chaiken, 1993; Fishbein & Ajzen, 1974). When a person’s issue attitude (also called “issue positions” or “policy preferences”) moves to more extreme positions on the spectrum, it is an indicator of forming a stronger attitude and a more entrenched resistance to change (Abelson, 1995). Moreover, attitude extremity is directly related to voting decisions and has been extensively studied across different issue topics such as abortion, gun control, sexual minority rights, health care, tax reform, climate change, immigration policy, and presidential candidate favorability (e.g., Abramowitz & Saunders, 2008; Evans, 2003; Lindell et al, 2017; Warner & McKinney, 2013; Wojcieszak, 2011).

Political expression on digital media can trigger a consistency motivation, which is likely to increase individuals’ attitude extremity. From an intrapersonal perspective, expressing one’s thoughts and opinions about political issues is a manner of asserting one’s identity via technological affordances (Sundar et al., 2012), which may trigger a motivation to maintain the consistency of that identity. As suggested by Festinger (1957), dissonance can be triggered by cognitive inconsistency, which motivates individuals to adjust their attitudes or beliefs to decrease the discomfort they are experiencing. Being challenged, persuaded, or proved inaccurate or wrong can possibly pose threats to an individual’s self-perception and increase
cognitive dissonance. Hence, resistance to influence, if not radicalization, can be deemed as a way 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. And the higher the publicness of the expression, the higher the likelihood of the person adhering to his/her expressed opinion to maintain a consistent public image (Schienker, Dlugolecki, & Doherty, 1994; Cialdini, & Goldstein, 2004). 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). Therefore, when individuals actively express their political opinions on social media, they will be more motivated to pursue a consistent belief system and to process counter-attitudinal information defensively. This can potentially reinforce their preexisting opinions, which has been observed in previous research (Cho et al., 2018). Therefore, this study poses the following hypothesis:

H7: The use of expression affordances on digital media will have a positive effect on attitude extremity.

**Action effects on affective polarization.** While different cognitive mechanisms have been more frequently discussed, it is worth noting that emotions are also key components of the political expression experience. Therefore, aside from the potential reinforcement on attitudes, expression actions may exert influence on emotional reactions. As discussed in Pingree (2007), cathartic release is a possible subdimension of expression effects, which can possibly result in a lower level of negative affect. Having emotional experiences, especially negative ones, can often help people achieve emotional recovery or emotional relief, such that the memory related to the
event would lose a significant part of its emotional baggage (Zech & Rimé, 2005), leading to
decked to increased long-term emotional health (Pennebaker, 1997). In this sense, political expression can
be perceived as an emotion relieving process that helps individuals reduce negative emotions
towards opposing viewpoints. Negative emotions, as argued in the cue effect section, are likely
to be sources of affective polarization. Therefore, if the technology does not provide users with
the opportunity to express their feelings, the suppressed affect may enhance outgroup hatred.
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, Porat, Tamir, & Gross, 2013). Based on this rationale, this
study proposes the following hypotheses:

H8: The use of expression affordances on digital media will have a negative effect on
affective polarization.

H9: The relationship between the use of expression affordances and affective polarization
will be mediated by negative emotion (e.g., anger).

**Action effects on willingness to deliberate.** Polarization can also be characterized as a
behavioral tendency to avoid deliberation. Deliberation, as a type of communication, requires
that participants can reason for their own stance on the issue in a compelling way, listen and
show respect to different perspectives, and engage in the conversation (Burkhalter, Gastil, &
Kelshaw, 2002). On the one hand, supporters for deliberation see such practice as a way to
encourage a more informed, democratic decision-making process and mitigate conflicts as it
allows a better understanding of alternative perspectives (Fishkin & Luskin, 2005; Gutmann &
Thompson, 1996). On the other hand, there are certain critiques around deliberation regarding its
quality, cost efficiency, and true benefits (e.g., Sanders, 1997; Sunstein, 2009). Despite the controversy around the content and consequences of deliberation, willingness to participate in such conversations to some extent shows individuals’ openness to dialogue and tolerance of conflicting viewpoints; on the contrary, an anti-deliberative behavioral intention is perhaps a sign of indifference or large social distance among different camps, stymieing the public discourse. Therefore, knowing individuals’ willingness to deliberate can reveal the extent to which polarization manifests at a behavioral level.

The enhanced agency generated by political expression will possibly stimulate the willingness of individuals to participate in deliberations. In psychology, sense of agency is generally defined as the human consciousness of being the author of one’s own actions and external consequences (Haggard & Tsakiris, 2009). 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 viewers (Stavrositu & Sundar, 2012, p.371). Expressing opinions and thoughts can help users gain a psychological advantage, i.e., the sense of agency, of being the source of information. For example, female bloggers who wrote about social and political issues felt having greater control over their expressions and believing more in the distinctiveness of their voice (Stavrositu & Sundar, 2012). In addition, to choose and make expressions consistent with one’s identity is a task that requires a certain level of capacity and efficacy (Muhlberger, 2005). By expressing to a group of audience members, users can potentially be equipped with necessary skills and confidence for voicing ideas and opinions congruent with their political identities. In line with this thought, the assertiveness and confidence derived from the sense of agency, which is the notion that users perceive themselves
having their say in the information environment, are expected to increase their willingness to communicate with others. Thus, this study proposes:

H10: The use of expression affordances on digital media will have a positive effect on willingness to deliberate.

H11: The relationship between the use of expression affordances and willingness to deliberate will be mediated by sense of agency.

**Low-effort and high-effort expression affordances.** Although all the hypotheses referred to expression affordances generally, not all expression affordances are the same. Compared with commenting or posting, the action of liking or upvoting/downvoting on social media may cost much less mental effort and not associated with elaborated thought in political expression. Critics claim that these actions are inherently low-quality participation (Shulman, 2009) and have little, if not negative, real-world impact (Morozov, 2009). However, for individual users, these actions are not always meaningless. Scholars conceptualized these lightweight acts of communication as paralinguistic digital affordances (PDAs), which “facilitate communication and interaction without specific language associated with their messages” (Hayes, Carr, & Wohn, 2016, p.173). PDAs are oftentimes seen as showing an evaluation of the content, serving an expressive function (Hayes et al., 2016). In political communication, scholars have also demonstrated that these easy and low-threshold political activities do not distract individuals from more effortful political participation; instead, they are highly positively correlated (Bode, 2017; Vaccari et al., 2015).

Nevertheless, the magnitude of psychological effects gained from low-cost political expression is possibly smaller than high cost expression actions, since the level of ego-
involvement and cognitive processing are much lower when using low-effort affordances. These activities also differ in their levels of publicness, such that commenting, or posting, is likely to be seen by a larger group of audience members than one-click “liking”. Lane et al. (2019) found that on Facebook, liking was not a predictor of the political self-presentation motivation, whereas posting and sharing were positively associated with self-presentation motivation. As a result, the implications of low-cost political expression on political polarization can be smaller:

H12: Low-effort online political expression (e.g., liking, upvoting/downvoting) will produce lower levels of psychological effects than high-effort political expression (e.g., commenting), resulting in smaller effects on a) knowledge acquisition/distortion, b) attitude extremity, c) negative affect, and d) willingness to deliberate.

Overall, built upon TIME, this study proposes to examine the influences of expression affordances by disambiguating the cue effect and the action effect, as summarized in Figure 1:
Figure 1 Proposed Model of Expression Affordances Effects
METHOD

To test these hypotheses, an experiment was conducted using a 3 (Affordances: Cue vs. Forced Action vs. Voluntary Action) x 2 (Effort Level: Thumbs up/down vs. Comment) + 1 (No Affordances) between-subjects experimental design. The main task for participants was reading a piece of news story on a news website, with the expression affordance varied according to random assignment. Participants then completed a post-exposure questionnaire. The study was approved by the institutional review board at the Pennsylvania State University.

Experimental Conditions

We created a fictitious news website called “News Insider” that “aggregates news from diverse, credible sources” with different expression affordances, as described below.

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 the 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 condition were told that they were provided a screenshot of the News Insider website and they were able to see the presence of the affordance but not act upon it. In comparison, to test the proposed action effect and the causal relationship, participants in the forced action conditions were required to interact with the news story by clicking on the thumbs up/down or comment button, depending on the condition. And they were able to act on the buttons (see Figure 2 and 3 for the comparison between cues and actions). However, it is worth noting that this action effect could have limited ecological validity because participants were forced to do so and their actions might not
represent what they would normally do when reading a news story online. Therefore, another set of conditions – voluntary action conditions (low-effort and high-effort expression affordances) were created. In the voluntary action conditions, participants were told to feel free to interact with the news by clicking on the buttons. And if they chose to click, they were able to act on the buttons. Including these conditions helped preserve the voluntary nature of users’ actions and mimicked real-life settings.

**Figure 2** Thumbs up/down Cue vs. Action

**Figure 3** Comment Cue vs. Action
Participant Recruitment

Participants were recruited from Amazon’s Mechanical Turk (MTurk), which is an online platform for recruiting individuals to perform tasks for compensation. According to previous research, MTurk participants are more representative of the general population than convenience samples and are not all that different from nationally stratified samples (Berinsky, Huber, & Lenz, 2012; Huff & Tingley, 2015). In addition, they respond to interactive experiments in a similar manner as participants in the physical lab (Thomas & Clifford, 2017). Therefore, this study used MTurk to recruit participants.

However, it is consistently shown that MTurk subjects are more liberal and leaning Democrat than national representative samples, especially for older adults (Berinsky et al., 2012; Huff & Tingley, 2015). To address this potential imbalance in sampling, two study links were created: one was used to recruit Democrats and those leaning toward Democrats, and the other was used to recruit Republicans and those leaning Republicans. Given that partisans are of interest in this study, moderates/independents were excluded from the study.

To be eligible for the study, individuals had to be at least 18 years of age. In addition, two screening questions were used at the beginning of the questionnaire. The first question asked participants whether they were U.S. citizens and those who answered “no” to this question would be automatically prevented from participating. The second question asked about participants’ party identification using a 7-point scale (1 = Strong Democrat; 7 = Strong Republican). In the questionnaire that recruited Democrats/Leaning Democrats, participants who answered with a score higher or equal than 4 would be automatically skipped to the end, whereas participants with a score lower or equal than 4 would be skipped to the end in the questionnaire that recruited
Republicans/Leaning Republicans. Participants who successfully completed the questionnaire were paid 1 dollar each for their participation as the incentive. The analysis showed that the average time taken to complete the study was approximately 15 minutes.

In total, 452 participants completed their questionnaires (232 Democrats/Leaning Democrats, 220 Republicans/Leaning Republicans). To avoid repeated participation, participants’ IP addresses were checked to see if multiple responses came from a single IP address. Thirty-eight IP addresses produced two responses to the questionnaire. They were removed from the dataset, resulting in a sample of 414 participants (209 Democrats/Leaning Democrats, 205 Republicans/Leaning Republicans).

**Participants**

After removing participants who did pass the manipulation check (see Results section), the final dataset contained 368 individuals, including 189 (leaning) Democrats and 179 (leaning) Republicans. They were between ages 18 and 76 ($M = 39.65, SD = 13.86$). 188 participants identified as female (50.76%), 177 participants identified as male (48.48%), 1 participant identified as non-binary or gender nonconforming, and 2 participants preferred not to disclose. The majority of participants (79.3%) identified 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. In terms of education, more than half of the participants (56.5%) reported having a bachelor’s degree or higher. In addition, the median of the annual household income was between $50,000 to $59,999.
Procedures

Participants were told that researchers would like to study how individuals in the US interact with online political information.

Pre-exposure. After consenting to participate in the study, they were first asked to answer a series of questions about themselves. Next, their pre-existing attitudes about twelve different political issues were collected. These questions were “padded” with several covariates to avoid sensitization, including perceived issue importance, online political expression habit, political interests, and political awareness.

Interaction with news stories. Participants were then provided a brief introduction to the “News Insider” website. Then they were instructed to choose one story that interests them the most and they have not read before, from among four news stories “aggregated on this site during the past few months”. This selective exposure procedure was introduced to increase the ecological validity of the study, mimicking participants’ behaviors in a real-life environment.

These four news stories dealt with four different political issues, including gun control, recreational marijuana legalization, mandatory vaccinations, and carbon emission tax. The four issue topics were chosen based on a pretest with seventy-two participants recruited from MTurk, where participants were asked to indicate their perceived importance and their attitudes about twelve controversial political issues that are of both scientific and moral value¹. Three criteria were used to decide which issues to include in the main study: 1) the mean of perceived issue

¹ The twelve pretested issues were: universal health care, minimum wage, gun control, mandatory vaccinations, allow abortion in all circumstances or not, free college education, government monitor communications from individuals, tax carbon emissions, illegal immigrants, legalize recreational use of marijuana, the use of nuclear power as a source of energy, and gene editing to reduce a child’s risk of disease
importance should be higher than 4 on a 1-7 point scale; 2) Democrats and Republicans show significant differently issue attitudes; 3) There is no significant difference in perceived issue importance between Democrats and Republicans. Only the chosen four issues met all the criteria.

The four news stories were modified versions of articles that had been published by major news media (see Appendix A), which were all policy-oriented. The goal of modification was to make sure that more facts were included, thus the news story was more likely to provide new information to readers and increase the likelihood that readers update their knowledge. Two-sided facts and opinions were presented, thus participants had access to both attitude-consistent and attitude-inconsistent information. In addition, to ensure that the amount of information was generally equivalent, lengths of the four articles were kept between 750 words and 800 words.

After choosing the article to read, participants were then randomly assigned to one of the seven experimental conditions, where different agency affordances were set up. To ensure that participants paid attention to the news content, the timer function of Qualtrics was used such that they were able to proceed only after they spent at least 20 seconds on the site. The webpage recorded participants’ actions on the site, including whether they acted upon any of the expression affordances, which one they used, and if they left comments, what they expressed.

**Post-exposure.** Participants then completed a post-exposure questionnaire, which included the following measures, in order of appearance: manipulation check, perceived interactivity, emotions, cognitive elaboration, perceived knowledge gain, issue knowledge, sense of agency, issue attitude, willingness to participate in deliberations, deliberation expectation, and affective polarization. Finally, participants received a secret code to show their completion of the study and they were thanked for their participation.
Measures

**Manipulation 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. Three items focused on the two-way communication dimension of website interactivity (Liu, 2003; McMillan & Hwang, 2002), including, “this website facilitates two-way communication,” “the website gives me the opportunity to talk back,” “the website enables conversation,” and “the website allows users to communicate back and forth with it.” The other item, “the website is interactive”, focused on the general perceived interactivity of the website (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 & Perk, 2001). The scales and their corresponding items were as follows: **anger** (irritated, angry, and annoyed; \(M = 1.32, SD = 1.20, \alpha = .89\)), **enthusiasm** (happy, cheerful, and elated; \(M = 1.28, SD = 1.14, \alpha = .87\)).

**Cognitive elaboration.** Cognitive elaboration was measured with Perse’s (1990) five-item scale, which has been used in previous studies (e.g., Eveland, 2001; Eveland & Dunwoody, 2002). Respondents were asked to indicate to what extent they agree with five statements when they read the news, including, “I was thinking about what should be done,” “I was thinking about what this means to other people,” “I was thinking about how the news story relates to other things I know,” “I was thinking about the story over and over again.”, “I was thinking about what
this will mean to me and my family.” The scale showed good reliability ($M = 4.78$, $SD = 1.24$, $\alpha = .78$).

In addition, the amount of *time* participants spent on the news page was recorded as another indicator of cognitive elaboration ($M = 163.88$ seconds, $SD = 129.13$).

**Sense of agency.** Adapted from previous studies (Oeldorf-Hirsch & Sundar, 2015; Stavrositu & Sundar, 2012), the sense of agency was evaluated via six items: “the website allows me to have control over my own voice,” “the website enables me to assert myself,” and “the website makes me feel I have a distinct voice,” “I can exercise my free will on this website,” “I have control over my actions on this website,” and “I have control over the information I find on this website.” ($M = 3.92$, $SD = 1.57$, $\alpha = .92$)

**Issue knowledge.** Participants’ knowledge about each issue was evaluated by their awareness of a series of factual knowledge questions related to each issue that are tested in this study (Zaller, 1992). Participants were asked eight multiple-choice questions about the information presented in the news story (see Appendix B). Each answer was coded into 1 for correct and 0 for incorrect or don’t know/not sure. The number of correct answers determined issue knowledge (Gun control: $M = 4.19$, $SD = 2.06$; Marijuana Legalization: $M = 3.77$, $SD = 1.70$; Mandatory vaccination: $M = 4.52$, $SD = 1.76$; Carbon tax: $M = 3.77$, $SD = 1.74$).

Among these eight knowledge questions, six questions were selected to distinguish participants’ *attitude consistent/inconsistent knowledge*. Among these six questions, three of them tested the extent to which participants were familiar with the facts and arguments that support one side (e.g., pro-marijuana-legalization), and the remaining three tested on the facts and arguments that support the other side (e.g., con-marijuana-legalization).
These facts and statements were chosen via another pretest with highly involved individuals recruited from MTurk. For each news story, 10 to 15 participants who scored 5 or higher on the perceived issue importance scale (1 - 7 point) were asked to code factual statements in the news story (1 = support their position on the policy, 2 = neutral, 3 = Doesn’t support their position on the policy). The highly commonly selected statements that support or did not support one side were later designed as knowledge questions that were used in the main study. For example, in this pretest, participants who support marijuana legalization rated the statement “legal marijuana in New York could ultimately generate as much as $300 million in new taxes once the industry is fully operational” as evidence that it supports their position. This statement was designed as a knowledge question – “How much money can recreational marijuana sales generate in new taxes of New York state, once the industry is fully operational?” in the main study for participants who read this article. They rated the statement “Washington State also saw fatal crashes with stoned drivers more than double in the five” as evidence against their position, which was incorporated in knowledge question that asked whether the statement was true (see Appendix B for a full list).

In the main study, on each question, participants received a zero for answering incorrectly or choosing “don’t know/not sure”, and one for correct answer. The number of correctly answered knowledge questions on one side (or the other) were added up separately and calculated based on a participant’s preexisting attitude, ranging from 0 to 3. For example, if a participant showed a pre-exposure attitude that supported recreational marijuana legalization, then their scores on pro-marijuana-legalization knowledge questions were scores for attitude-consistent knowledge, whereas their scores on con-marijuana-legalization questions were
attitude-inconsistent knowledge scores \( (M_{\text{consistent}} = 1.71, SD = 0.93; M_{\text{inconsistent}} = 1.68, SD = 1.01) \).

Issue knowledge difference was calculated using the difference between a participant’s attitude consistent knowledge and attitude inconsistent knowledge \( (M = -0.08, SD = 0.84) \).

Of note, participants who scored four in the prior attitude question were excluded from the data analysis on attitude-consistent/inconsistent knowledge, as they did not have a prior attitude leaning one side or the other.

**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) \( (M_{\text{pre}} = 5.19, SD_{\text{pre}} = 2.09; M_{\text{post}} = 5.39, SD_{\text{post}} = 1.99) \).

*Attitude extremity* was measured by calculating the distance of their issue attitudes from the midpoint (4) \( (M_{\text{pre}} = 2.18, SD_{\text{pre}} = 1.01; M_{\text{post}} = 2.22, SD_{\text{post}} = 0.97) \).

**Willingness to deliberate.** Participants were asked the question that “recently, there has been interest in helping regular citizens get more input into the policy process. For example, many organizations run sessions where citizens discuss [mandatory vaccines/tax carbon emissions/marijuana legalization/gun control]. If you had the chance to participate in such a session, how interested do you think you would be in doing so?” (Neblo, Esterling, Kennedy, Lazer, & Sokhey, 2010). Participants rated their interests on a 1-7 scale (1= “Not at all interested”, 7 = “Extremely interested”) \( (M = 4.52, SD = 1.77) \).

**Deliberation expectation.** Participants’ expectation of deliberation was measured following Hwang et al. (2014). They were asked to rate their expectation about such a discussion session by indicating their agreement on the following four items: “It would resolve conflicts
among participants with differing views on the issue,” “It would be useful for participants to gain a better understanding of the issue,” “It would help participants see the issue from multiple perspectives,” and “It would lead participants to be more open to the opposing views” \((M = 4.79, \ SD = 1.24, \ \alpha = .84)\).

**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, where 0 means the respondent feels “cold” toward the group, a score of 100 indicates a feeling of “warm”. The score given to the party of the participant was labeled as *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 \((M = 45.94, \ SD = 34.33)\).

**Behavioral measures.** Web-log data were collected to measure the behaviors of each participant, specifically the use of expression affordances including the actual comments \(n = 71\).

**Comment analysis.** *Comment length* was analyzed using computer software. The length of comments ranged from 1 to 205 words \((M = 35.48, \ SD = 31.53)\).

Two independent coders were trained to code the *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 \((\text{code} = 0)\). 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 = \text{comment relevant to the news content or delivery but not the issue, e.g., “this is a well-written article”}; \ 2 = \text{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.”). 25% of the comments were randomly selected to perform a reliability test, showing good intercoder reliability (Krippendorf’s $\alpha=0.83$). In total, among 71 comments, 60 of them were opinion statements about the issue (84.5%), 6 were irrelevant or not interpretable expressions (8.5%), 3 of them were relevant to the news content or delivery, and the remaining 2 comments were relevant to the issue but not expressing opinions.

Comment sentiment was analyzed using the NLTK library\textsuperscript{2} with Python 3.6, which is a leading open-source toolkit for language processing and has been used to analyze sentiment of user comments (e.g., Tran & Shcherbakov, 2016). The algorithm would evaluate the comment by comparing its language with existing affective word dictionaries, then give ratings on three dimensions, including negative sentiment, neutral sentiment, and positive sentiment. The total of the scores on these three dimensions is 1. For example, a comment can receive a score of 0.25 on the negative sentiment, 0.75 on the neutral sentiment, and 0 on the positive sentiment, indicating a slightly negative comment. Overall, comments collected in this study were largely neutral ($M_{positive} = 0.15$, $SD_{positive} = 0.17$; $M_{neutral} = 0.73$, $SD_{neutral} = 0.18$; $M_{negative} = 0.12$, $SD_{negative} = 0.15$).

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\textsuperscript{3}, which

\footnotesize
\begin{itemize}
  \item \textsuperscript{2} \url{https://www.nltk.org/}
  \item \textsuperscript{3} \url{https://www.cs.cmu.edu/~biglou/resources/bad-words.txt}
\end{itemize}
contains a comprehensive collection of 1374 offensive lexicons, including swear/profane words (e.g., f*ck, b*tch), negative words (e.g., die, hell) and others (e.g., enemy, drug). The list has been used in previous research that examined incivility in online discourse (Beelen, Kanoulas, & van de Velde, 2017; Maity, Chakraborty, Goyal, & Mukherjee, 2018). Using Python 3.6, each word in the comment was examined to see if the word was included in the list. The total number of bad words was then divided by the length of the comment, constructing an index of comment incivility. Overall, comments were polite, showing a very low level of incivility ($M = 0.03$, $SD = 0.07$).

The following covariates were measured prior to participants’ exposure to the news.

**Partisanship** was measured using the standard 7-point American National Election Studies (ANES) scale, ranging from 1 (strong Democrat) to 7 (strong Republican) ($M = 3.86$, $SD = 2.21$). The distance of their partisanship from the midpoint (4) was constructed as partisanship strength ($M = 3.05$, $SD = 0.85$).

**Perceived issue importance.** Participants were asked to rate the extent to which they perceived the issue to be personally important, from 1 (not at all important) to 7 (extremely important) ($M = 5.54$, $SD = 1.59$).

**Online political expression.** Participants were asked to rate how often they used online media (e.g., news websites, discussion forums, social networking sites) (a) to post links to political stories or articles for others to read, (b) to post their own thoughts or comments on political or social issues, (c) to repost content about political or social issues originally posted by someone else, and (d) to “like/dislike”, or “upvote/downvote” material related to political or
social issues that others have posted on a 7 point scale (1 = “none”, 7 = “always”) (Cho et al., 2018). The alpha reliability was 0.90 ($M = 3.58$, $SD = 1.69$).

**Political interest.** Participants were asked about their degree of interest in “information about what’s going on in politics and public affairs” (Gil de Zúñiga, Weeks, & Ardèvol-Abreu, 2017) ($M = 5.58$, $SD = 1.27$).

**Political awareness.** This variable was measured by an index consisting of six multiple-choice knowledge questions about U.S. politics (e.g., “Who has the final responsibility to decide if a law is constitutional or not? [the President, the Congress, the Supreme Court, don’t know/not sure]” “What is the main duty of the UNITED STATES CONGRESS? [administer the president's policies, write legislation, supervise state governments, don’t know/not sure]” “How many seats does the Democratic Party currently hold in the U.S. Senate? [60 or more, a simple majority, or a minority of seats, don’t know/not sure]” “Which party would you say is more politically conservative? [Democratic Party, Republican Party, Ideologically the same, don’t know/not sure]” “What is the approximate unemployment rate in 2019 in this country? [1.6, 3.6, 6.6, don’t know/not sure]” “How long is the term of office for a representative in the US House of Representatives? [2 years, 4 years, 6 years, don’t know/not sure]” (Clifford & Jerit, 2016; Delli Carpini & Keeter, 1993). Each question was then coded into 1 = correct answer and 0 = wrong answer or don’t know/not sure and correct answers were then summed into an index ($M = 4.04$, $SD = 1.54$).

**Demographic information.** Participants were asked to provide information about gender, age, ethnicity/race, level of education, and income.
Confirmatory factor analysis (CFA) of perceived interactivity and sense of agency.

According to the Correlation Table (see Appendix E), perceived interactivity and sense of agency were strongly correlated with each other, which was statistically significant ($r = 0.76$, $n = 368$, $p < 0.01$). To investigate the question that whether the two instruments measured the same construct, a CFA analysis was conducted using the *lavaan* package in R programming language (Rosseel, 2012). Specifically, two measurement models were compared: a one-factor model that specified the covariance between the two variables, perceived interactivity and sense of agency, as 1; and a two-factor model that allowed the two variables to covary.

The results of the CFA suggest that the two-factor model showed a good fit of the model to the data ($\chi^2 = 109.04$, df = 34, $p<0.01$, CFI = 0.979, TLI = 0.972, RMSEA = 0.077 (90%CI [0.061, 0.094]), SRMR = 0.026). In contrast, the one-factor model provided less satisfactory fit to the data ($\chi^2 = 613.57$, df = 35, $p<0.01$, CFI = 0.838, TLI = 0.791, RMSEA = 0.212 (90%CI [0.197, 0.227]), SRMR = 0.066) (see Appendix F for standardized factor loadings of the CFA). A model comparison test showed that the difference was statistically significant, $\Delta\chi^2 (1) = 504.53$, $p<0.001$. Therefore, the two variables were accepted as highly correlated but distinct variables.

**Data Analysis Strategy**

Overall, in this study, participants’ attitudes about the target issues were measured twice, once in pretest and again in post-exposure questionnaire. The covariates were measured once in the pretest. In addition, the mediators and other dependent variables were measured once in the post-exposure questionnaire.
Because of the unbalanced study design (3X2+1), an omnibus one-way analysis will not be able to show all the interaction effects, and comparisons of interests will only be seen in the post-hoc analyses. Therefore, to probe the effects of interest in a priori manner, the data were analyzed by performing certain specific comparisons between conditions, including both main effects and interaction effects.

First, to examine the cue effect, which is the effect produced by presence of expression affordance cues (vs. absence of expression affordances), the data of participants in the cue conditions were compared with the data of participants who were assigned to the control condition. To examine proposed hypotheses regarding the main effects (H1, H2a, H2b, H3a), a one-way ANCOVA (Analysis of Covariances) was used in which cue (vs. control) was the independent variable. Participants’ partisanship, political interests, political awareness, and past online political expression behaviors were statistically controlled in the analysis. For the mediation effects (H2c, H3c), the PROCESS macro for the statistical software package SPSS (Hayes, 2012) was used.

Second, 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. Although some participants who were assigned to the voluntary conditions also took actions, their actions were not entirely manipulated by the researcher and their data would not be able to demonstrate causal relationship proposed in the hypotheses. Therefore, participants who took actions in the voluntary action conditions were excluded from this part of the analysis. Again, to examine proposed hypotheses regarding the main effects (H4, H6a, H7, H8, H10, H12) and interaction effects between action
(vs. cue) and effort level, ANCOVA were used. For the mediation effects (H5, H6b, H9, H11), the PROCESS macro was used.

Third, to rule out the influence of the forced nature of the experimental manipulation, participants who were forced to take actions were compared with those who voluntarily took actions, and participants who were exposed to cues were compared with those who voluntarily took no actions, wherein ANCOVA analyses were used. This would help address the ecological validity of the causal relationships for cue effects and action effects that are predicted to be found in this study.

**Power Analysis**

In prior research that experimentally manipulated technological affordance and focused on the relationship between interactivity and political attitudes (e.g., Sundar et al., 2003; Fox et al., 2015), researchers found a medium to large effect size. Specifically, in Sundar et al. (2003), website interactivity showed significant effects on politician evaluations with the omega-squared ranging from 0.07 to 0.12 using ANOVA analysis; in Fox et al. (2015), source interactivity (writing posts vs. retweeting posts) demonstrated a significant effect on sexist attitudes with a partial η² of 0.06 for a MANOVA analysis. Therefore, considering both the findings of previous research and resource constraints, a medium effect size (Cohen, 1988) was assumed for the power analysis.

When examining the cue effects using ANCOVA analysis, a power analysis using G*power⁴ suggests that in this study, a sample of 159 participants has a power of 0.8 to detect a

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⁴ https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower.html
medium size effect (Cohen’s $f = 0.25$) with a 0.05 alpha significance criterion (two-tailed). For the proposed ANCOVA analysis on action effects, the analysis suggests that a sample of 205 participants would have a power of 0.95 to detect a medium size effect (Cohen’s $f = 0.25$) with an alpha significance criterion $= 0.05$ (two-tailed). For the proposed comparison between voluntary actions and forced actions, the sample size of this study ($n = 209$) will have a power of 0.85 to detect a medium-size effect (Cohen’s $f = 0.25$).
RESULTS

This chapter will first report results of experimental manipulation checks and randomization checks, followed by group differences among participants who selected different news stories. It will then report cue effects by comparing cue conditions and control condition, including total effects and indirect effects. Following cue effects, it will report action effects by comparing forced action conditions and cue conditions, including total effects and indirect effects. Finally, the comparison between voluntary action groups and forced action groups are also reported.

Manipulation Checks

Most participants were able to correctly identify the expression affordances that they were assigned. 94.51% of the participants assigned to the low-effort condition correctly identified the thumbs up/down figure, and 93.57% of participants in the high-effort condition correctly identified the comment icon. In the control condition, 86.89% participants were able to correctly select “none of the above” (see Table 1). 28 participants who answered this question incorrectly were removed from the dataset.

Table 1 Contingency Table of Affordance Manipulation Check

<table>
<thead>
<tr>
<th>Manipulation Check</th>
<th>None of the above</th>
<th>Thumbs up/down</th>
<th>Comment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control condition</td>
<td>53</td>
<td>5</td>
<td>3</td>
<td>61</td>
</tr>
<tr>
<td>Low-effort conditions</td>
<td>5</td>
<td>155</td>
<td>4</td>
<td>164</td>
</tr>
<tr>
<td>High-effort conditions</td>
<td>5</td>
<td>6</td>
<td>160</td>
<td>171</td>
</tr>
</tbody>
</table>

Participants in the forced action conditions were instructed to either click the thumbs up/thumbs down button (low effort) or post a comment (high effort). Among them, 8 participants
in the low-effort condition and 10 participants in the high-effort condition did not perform any action. Therefore, these 18 participants were removed from the analysis as well.

The final sample retained for analysis consists of 368 participants. The number of participants in the seven conditions were distributed as follows:

<table>
<thead>
<tr>
<th>Table 2 Number of Participants in Different Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Number of participants</td>
</tr>
</tbody>
</table>

Randomization Checks

There were no significant differences in gender ($\chi^2 (18) = 13.50, p = 0.76$) or ethnicity ($\chi^2 (42) = 51.29, p = 0.15$) between the seven conditions. An one-way ANOVA (Analysis of Variance) showed that no significant differences on education attainment ($F(6, 360) = 1.17, p = 0.32$) and income ($F(6, 360) = 1.30, p = 0.26$) were found. However, there was a significant difference in terms of their age ($F(6, 360) = 2.38, p = 0.03$). Therefore, age was included as a control variable in all our analyses.

News Selection Check

Participants had some freedom in choosing the news story they read. Among 368 participants, 37.5% of them chose to read the news story on mandatory vaccinations, followed by 24.7% of them who read the story about marijuana legalization, 20.4% chose the news about gun control, and 17.4% read the news about taxing carbon emissions.
To ensure that their news selection did not interfere with manipulated variables, a Chi-square test of independence was conducted. The result showed no significant differences among seven experimental conditions regarding participants’ news selection (see Table 3), $\chi^2 (18) = 4.17, p = 1.00$.

*Table 3 Contingency Table of News Selection Check*

<table>
<thead>
<tr>
<th>News Selection</th>
<th>Tax carbon emissions</th>
<th>Gun control</th>
<th>Marijuana legalization</th>
<th>Mandatory vaccinations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>7</td>
<td>14</td>
<td>13</td>
<td>19</td>
<td>53</td>
</tr>
<tr>
<td>Low-effort - Cue</td>
<td>8</td>
<td>8</td>
<td>15</td>
<td>17</td>
<td>48</td>
</tr>
<tr>
<td>Low-effort - Forced Action</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>20</td>
<td>51</td>
</tr>
<tr>
<td>Low-effort - Voluntary Action</td>
<td>11</td>
<td>11</td>
<td>14</td>
<td>22</td>
<td>56</td>
</tr>
<tr>
<td>High-effort - Cue</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>24</td>
<td>58</td>
</tr>
<tr>
<td>High-effort - Forced Action</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td>18</td>
<td>48</td>
</tr>
<tr>
<td>High-effort - Voluntary Action</td>
<td>9</td>
<td>11</td>
<td>14</td>
<td>20</td>
<td>54</td>
</tr>
</tbody>
</table>

Considering the fact that participants selected to read different news stories, it is understandable that they showed significant differences on several outcome variables: anger, enthusiasm, issue knowledge, affective polarization, willingness to deliberate, and deliberation expectation (see Table 4). Further analyses found that neither two-way nor three-way interaction effects were found between news issue and the manipulated independent variables (cue vs. action and effort level) on all these outcome variables proposed in the hypotheses, which suggested that results were consistent across different news topics. Therefore, news issue was entered as a
control variable in the following data analysis, without creating interaction terms with the independent variables.

Table 4 Means and Standard Deviations for Different News Issues

<table>
<thead>
<tr>
<th>News Selection</th>
<th>Perceived Interactivity</th>
<th>Anger*</th>
<th>Enthusiasm*</th>
<th>Sense of Agency</th>
<th>Cognitive Involvement</th>
<th>Issue Knowledge*</th>
<th>Post-exposure Attitude Extremity</th>
<th>Affective Polarization*</th>
<th>Willingness to Deliberate*</th>
<th>Deliberation Expectation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax carbon emissions</td>
<td>3.97(1.65)</td>
<td>1.15(1.10)</td>
<td>1.38(1.10)</td>
<td>3.76(1.54)</td>
<td>4.99(1.15)</td>
<td>3.77(1.74)</td>
<td>2.97(1.10)</td>
<td>49.06(32.34)</td>
<td>4.47(1.65)</td>
<td>5.01(1.01)</td>
</tr>
<tr>
<td>Gun control</td>
<td>3.67(1.67)</td>
<td>1.52(1.20)</td>
<td>1.00(1.00)</td>
<td>3.67(1.63)</td>
<td>4.78(1.26)</td>
<td>4.19(2.06)</td>
<td>3.33(0.93)</td>
<td>55.51(32.20)</td>
<td>4.57(1.80)</td>
<td>4.52(1.37)</td>
</tr>
<tr>
<td>Marijuana legalization</td>
<td>4.14(1.67)</td>
<td>0.85 (1.02)</td>
<td>1.80(1.08)</td>
<td>4.16(1.53)</td>
<td>4.70(1.22)</td>
<td>3.77(1.71)</td>
<td>3.36(0.88)</td>
<td>40.54(36.31)</td>
<td>4.90(1.64)</td>
<td>4.90(1.64)</td>
</tr>
<tr>
<td>Mandatory vaccinations</td>
<td>3.90(1.73)</td>
<td>1.61(1.25)</td>
<td>1.04(1.14)</td>
<td>3.98(1.57)</td>
<td>4.76(1.28)</td>
<td>4.53(1.76)</td>
<td>3.18(0.98)</td>
<td>42.85(34.16)</td>
<td>4.14(1.82)</td>
<td>4.14(1.82)</td>
</tr>
<tr>
<td>One-way ANOVA Test</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*Note. *Between-group differences significant at p<0.05 level.

Cue Effects

H1 predicted that the presence of expression affordance would lead to a higher level of perceived interactivity, which will be associated with a lower level of negative emotional reactions and more positive emotional reactions (H2), as well as a lower level of affective polarization compared to those who are not exposed to any expression affordances (H3). To test this, 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, different emotions, and affective polarization.

A series of one-way ANCOVA (Analyses of Covariance) analyses was conducted, with participants’ age, prior attitude, online political expression habits, political interest, political awareness, partisanship, partisanship strength, prior-exposure issue attitude, 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.

**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. Specifically, according to post-hoc comparisons using Bonferroni adjustment, 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 did not significantly differ from each other \((p = 0.43)\).

**Emotional reactions.** Results show that the cue effect of expression affordance on participants’ enthusiasm was not significant, \(F(2, 145) = 1.66, p = .19, \) partial \(\eta^2 = .02\). H2a was not supported. In addition, results showed that no significant cue effect was found on participants’ feeling of anger, \(F(2, 145) = 2.07, p = .13, \) partial \(\eta^2 = .03\) (see Table 4 for means), H2b was thus not supported.

*Table 5 Estimated Means of Anger and Enthusiasm as a Function of Cues vs. Control*

<table>
<thead>
<tr>
<th></th>
<th>Anger</th>
<th>Enthusiasm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Affective polarization. Expression affordance cues showed a significant effect on affective polarization, $F(2, 145) = 3.50, p = .03$, partial $\eta^2 = .05$. Post-hoc comparisons using Bonferroni test reveal 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 ($M = 36.31, SE = 4.10$), but not different from participants in the low-effort cue condition ($M = 45.70, SE = 4.44$). H3a was partially supported.

When using ingroup party warmth and outgroup party warmth as dependent variables separately, results showed that expression affordance cues did not have a significant effect on participants’ evaluations of their feelings of ingroup warmth, $F(2, 145) = 0.42, p = .66$, partial $\eta^2 = .01$. However, expression affordance cues affected participants’ feelings of outgroup warmth significantly, $F(2, 145) = 3.60, p = .03$, partial $\eta^2 = .05$. Specifically, participants in the high-effort 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 not different from participants in the low-effort cue condition ($M = 29.79, SE = 3.38$).

Mediation analyses. H2c predicted that perceived interactivity is the key mediator linking expression affordance cues and positive affective outcomes, which can further reduce affective polarization (H3c). A series of mediation analyses was conducted to test this effect, with the experimental condition (low-effort cue condition vs. high-effort cue condition vs. control group) being the categorical independent variable using the indicator coding, perceived
interactivity being the mediator, emotions (enthusiasm and anger) and affective polarization being the dependent variable, and previously listed covariates.

Model 4 of PROCESS (Hayes, 2013) Macro 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.

Results revealed a significant mediation effect of perceived interactivity on affective polarization: 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. However, the thumbs up/down cue did not lead to a higher level of perceived interactivity than the control condition, thus the mediation path was not significant (Table 6).

Table 6 Indirect Effects on Affective Polarization via Perceived Interactivity

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>Relative Indirect Effect Bootstrap Estimate</th>
<th>95% Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumbs up/down -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Comparison</td>
<td>-1.92(1.49)</td>
<td>-5.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td>Comment - Control</td>
<td></td>
<td>-20.26</td>
</tr>
<tr>
<td>Comparison</td>
<td>-10.66(4.77)</td>
<td>-1.26</td>
</tr>
</tbody>
</table>

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

Action Effects on Issue Knowledge

To test action effects of expression affordances, forced action conditions, including thumbs up/down action condition (n = 51) and comment action condition (n = 48), were compared to the two cue groups (low-effort cue: n = 48; high-effort cue: n = 58).
H4 and H5 proposed that participants who acted on the expression affordance would experience stronger cognitive involvement, which in turn could predict higher level of issue knowledge. A series of ANCOVA analysis was conducted, with action (vs. cue) and effort level being three independent factors with their respective interaction term, self-reported cognitive involvement, time spent on the news page, issue knowledge (overall, consistent, inconsistent) being outcome variables, participants’ age, prior attitude, online political expression habits, political interest, political awareness, partisanship, partisanship strength, prior-exposure issue attitude, and perceived issue importance as covariates. Educational attainment was added as another covariate considering its relevance to knowledge.

**Cognitive involvement.** Action (vs. cue) had a significant main effect on participant’s self-reported cognitive involvement, $F(1, 189) = 4.98, p = .03$, partial $\eta^2 = .03$. However, contrary to hypothesis, participants in the cue groups reported a higher level of cognitive involvement ($M = 5.05, SE = .12$) than participants in the action conditions ($M = 4.67, SE = .12$). No main effect of effort level was found, $F(1, 189) = 0.65, p = .42$, partial $\eta^2 = .00$. There was no interaction effect between action (vs. cue) and effort level, $F(1, 189) = 2.16, p = .14$, partial $\eta^2 = .01$.

*Time spent on the webpage* was used as another indicator of cognitive involvement ($M = 163.88$ seconds, $SD = 129.13$). Results revealed that the data was not normally distributed, given the skewness was $1.87$ and the kurtosis score was $5.93$, which was beyond the normal range ($-2, +2$). As a result, a log transformation was performed using number $e$ as its base. The transformed time variable showed an approximate normal distribution ($M = 4.78, SD = 0.85$, skewness $= -0.34$, kurtosis $= -0.53$) and was used in the analyses.
The ANCOVA analysis showed a significant main effect of effort level on time spent on the webpage. Specifically, participants who were assigned to the high-effort conditions ($M = 4.94, SE = 0.07$) spent more time than those who were in the low-effort conditions ($M = 4.62, SE = 0.08$), $F(1, 189) = 4.06, p = .06$. On average, participants in the high-effort condition spent 139.77 ($e^{4.94}$) seconds on the website whereas participants in the low-effort condition spent 101.49 ($e^{4.62}$) seconds. In addition, the interaction effect of action (vs. cue) and effort level on time spent on the news approached significance, $F(1, 189) = 3.61, p = .06$, partial $\eta^2 = .02$.

Specifically, according to the post-hoc comparisons, participants who took high-effort actions spent more time ($M_{log} = 5.13, SE = 0.11, M_{raw} = e^{5.13} = 169.01$ seconds) than those in the high-effort cue condition ($M_{log} = 4.76, SE = 0.10, M_{raw} = e^{4.76} = 116.74$ seconds), $p = 0.02$. However, those who took low-effort actions did not spend longer time on the page ($M_{log} = 4.59, SE = 0.11, M_{raw} = e^{4.59} = 98.49$ seconds) than the low-effort cue group ($M_{log} = 4.64, SE = 0.11, M_{raw} = e^{4.64} = 103.54$ seconds), $p = .76$.

*Self-reported cognitive involvement vs. Time spent on the webpage.* The above finding suggests that while participants’ self-reported cognitive involvement decreased in the action groups, they nonetheless spend more time on the website in the high-effort affordance condition. This result is at odds with the positive correlation between cognitive involvement and time spent on the webpage, shown in the correlation table (Appendix E). In reconciling this apparent contradiction, it should be noted that the correlation table used data from all 368 participants, while the above analysis was built upon the data of 205 participants who were assigned to the cue conditions and forced action conditions. When analyzing the relationship between cognitive involvement and time using the data of cue conditions and forced action conditions, the
correlation was not statistically significant, \( r = 0.11, n = 205, p = 0.11 \). Probing further, for participants who were assigned to the low-effort affordance conditions, their cognitive involvement and time spent on the website was positively correlated, \( r = 0.22, n = 99, p = 0.03 \). This is consistent with the finding that participants who took low-effort actions were less cognitively involved and spent slightly less time on the page \( (M_{\log} = 4.59, SE = 0.11, M_{raw} = e^{4.59} = 98.49 \text{ seconds}) \) than the low-effort cue group \( (M_{\log} = 4.64, SE = 0.11, M_{raw} = e^{4.64} = 103.54 \text{ seconds}) \). In contrast, for participants in the high-effort affordance conditions, their cognitive involvement and time spent on the webpage were not related, \( r = 0.003, n = 106, p = 0.97 \). This is not contradictory to the finding that participants who wrote comments spent more time on the website but also reported less cognitive involvement than those who were exposed to the comment cue. Therefore, while the overall relationship between self-reported cognitive involvement and time spent on the webpage was positive, it was not applicable for participants in the high-effort affordance conditions. Moreover, this also suggests that in the high-effort condition, participants spent more time on the website to compose comments, which was not related to their message elaboration.

**Issue knowledge.** There was no significant main effect of action (vs. cue), \( F(1, 189) = 0.99, p = .32, \) partial \( \eta^2 = .01 \). Participants in cue condition \( (M = 4.12, SE = .17) \) and action condition \( (M = 3.88, SE = .18) \) scored similarly on knowledge questions. In addition, neither the main effect of effort level nor the interaction effect of action (vs. cue), effort level, and news issue was significant. Thus, H4 was rejected.
**Attitude-consistent/attitude-inconsistent knowledge difference.** As mentioned in the method section, only participants who did not show neutral prior attitude (n = 189) were included in this part of the analysis.

Taking action (vs. being exposed to a cue) did not have a main effect on participants’ *attitude-consistent knowledge*, $F(1, 173) = 0.81, p = .37$, partial $\eta^2 = .01$. However, effort level of expression showed a significant positive effect on attitude-consistent knowledge, $F(1, 173) = 3.85, p = .05$, partial $\eta^2 = .02$. Specifically, participants in the comment condition showed more attitude-consistent knowledge ($M = 1.83$, $SE = .09$) than participants in the low-effort condition ($M = 1.58$, $SE = .09$).

Regarding *attitude-inconsistent knowledge*, there was an interaction effect between action (vs. cue) and effort level, $F(1, 173) = 3.62, p = 0.06$, partial $\eta^2 = .02$, approaching significance. As shown in the Figure 4, clicking the thumbs up/down button increased participants’ attitude-inconsistent knowledge than simply seeing the thumbs up/down cue on the interface, while acting on the commenting function or not did not influence participants’ attitude-inconsistent knowledge.
In addition, results revealed a significant action effect on participants’ knowledge difference, $F(1, 173) = 4.33, p = 0.04$, partial $\eta^2 = .02$. Participants who took actions showed a decreased knowledge difference ($M = -0.02, SE = .08$) than participants who were exposed to cues ($M = 0.05, SE = .08$), which ran counter to H6a. The two-way interaction between action (vs. cue) and effort level on knowledge difference also approached significance, $F(1, 173) = 3.72, p = 0.06$, partial $\eta^2 = .02$. Post-hoc comparisons showed that taking low-effort actions significantly decreased participants’ knowledge difference than merely seeing cues, $p <0.01$; however, high-effort actions (vs. cues) did not influence participant’s attitude-consistent or attitude-inconsistent knowledge difference, $p = 0.95$ (see Figure 5).
Mediation analysis. While no main effect of affordance or effort was found on issue knowledge, this does not necessarily invalidate any indirect effects (Hayes, 2009; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Therefore, mediation analyses were conducted, with the action (vs. cue) being the independent variable, effort level being the moderating variable, cognitive involvement (self-reported and time spent on the webpage) being the mediators, issue knowledge being the dependent variable, and other covariates controlled for.

Model 8 of PROCESS Macro was employed with 5,000 bootstrap samples. The patterns were similar for all three issue knowledge measures (issue knowledge, attitude-consistent knowledge, and attitude-inconsistent knowledge). According to the index of moderated mediation, no significant moderated mediation effects were found. There was one significant mediation path: for participants in the high-effort affordance condition, taking the commenting action led to a longer time spent on the webpage, which then increased their issue knowledge. H5 was partially supported. To note, a significant negative direct effect of high-effort action (vs. cue)
cue) on issue knowledge was also revealed, $\beta = -0.71, SE = 0.33, \text{95\% CI [}-1.37, -0.06],$
suggesting a suppression effect.

*Table 7 Indirect Effects on Issue Knowledge via Cognitive Involvement*

<table>
<thead>
<tr>
<th>Outcome: Issue Knowledge</th>
<th>Relative Indirect Effect Bootstrap Estimate</th>
<th>Indirect Effect 95% Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LLCI</td>
</tr>
<tr>
<td>Low-effort Action vs. Cue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>via Cognitive Involvement</td>
<td>-.02(.07)</td>
<td>-.18</td>
</tr>
<tr>
<td>via Time on Page</td>
<td>-.025(.13)</td>
<td>-.32</td>
</tr>
<tr>
<td>High-effort Action vs. Cue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>via Cognitive Involvement</td>
<td>-.00(.03)</td>
<td>-.06</td>
</tr>
<tr>
<td>via Time on Page</td>
<td>.28(.13)</td>
<td>.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome: Attitude-consistent Knowledge</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-effort Action vs. Cue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>via Cognitive Involvement</td>
<td>-.01(.03)</td>
<td>-.07</td>
</tr>
<tr>
<td>via Time on Page</td>
<td>.00(.01)</td>
<td>-.02</td>
</tr>
<tr>
<td>High-effort Action vs. Cue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>via Cognitive Involvement</td>
<td>-.03(.06)</td>
<td>-.15</td>
</tr>
<tr>
<td>via Time on Page</td>
<td>.13(.06)</td>
<td>.03</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome: Attitude-inconsistent Knowledge</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-effort Action vs. Cue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>via Cognitive Involvement</td>
<td>-.03(.03)</td>
<td>-.11</td>
</tr>
<tr>
<td>via Time on Page</td>
<td>-.00(.01)</td>
<td>-.04</td>
</tr>
<tr>
<td>High-effort Action vs. Cue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>via Cognitive Involvement</td>
<td>-.01(.02)</td>
<td>-.07</td>
</tr>
<tr>
<td>via Time on Page</td>
<td>.12(.06)</td>
<td>.02</td>
</tr>
</tbody>
</table>

*Note: Standardized estimates (beta) are included in parentheses. Indirect effect confidence intervals apply to unstandardized estimates.*
H6b predicted that cognitive elaboration would mediate the relationship between action (vs. cue) and attitude-consistent/inconsistent knowledge difference. A mediation analysis showed no significant indirect effects. Therefore, H6b failed to receive support.

**Action Effects on Issue Attitude**

H7 predicted that participants would show more extreme attitudes after they expressed themselves using the affordance compared with participants who only saw the affordance on the interface. Another two-way ANCOVA analysis was conducted, with action (vs. cue) and effort level being independent variables with respective interaction terms, post-exposure attitude extremity being the dependent variable, participants’ age, online political expression habits, political interest, political awareness, partisanship, partisanship strength, and perceived issue importance as covariates. Participants’ pre-exposure attitude extremity was also controlled. In addition, news issue did not interact with the independent variables to influence attitude extremity, and was therefore entered only as a control variable rather than as a moderator.

**Attitude extremity.** A significant main effect of action (vs. cue) on attitude extremity was discovered, $F(1, 189) = 6, p = .02$, partial $\eta^2 = .03$. In line with H7, participants who took actions demonstrated more extreme post-exposure attitudes ($M = 2.33, SE = .07$) than participants who only saw expression affordance cues ($M = 2.08, SE = .07$). Effort level of expression did not have a main effect on attitude extremity, $F(1, 189) = 0.92, p = .34$, partial $\eta^2 = .01$. In addition, no interaction effect was found between action (vs. cue) and effort level, $F(1, 181) = 0.05, p = .82$, partial $\eta^2 = .00$.

Alternatively, to model the within-person change in attitude extremity, a repeated measures ANCOVA with Greenhouse-Geisser correction was conducted. In this model, time
(pre-exposure vs. post-exposure) was defined as a factor, with action (vs. cue) and effort level being the other two independent variables. All aforementioned covariates were retained for this analysis. Results showed that, overall, mean attitude extremity did not differ significantly between time points \(F(1, 67.30) = 1.83, p = .18, \text{partial } \eta^2 = .01\). However, the interaction effect between time and affordance \(F(1, 67.30) = 3.22, p = .08, \text{partial } \eta^2 = .02\) approached significance. Post hoc tests using the Bonferroni correction revealed that participants who took actions showed a more extreme post-exposure attitude \((M = 2.35, SE = 0.08)\) than their pre-exposure attitude \((M = 2.17, SE = 0.09)\) \((p < .05)\); however, in the cue conditions, participants’ post-exposure attitude extremity \((M = 2.07, SE = 0.08)\) did not differ from their pre-exposure attitude extremity \((M = 2.12, SE = 0.09)\) \((p = .55)\).

In sum, the results were generally consistent across the two different statistical methods: participants demonstrated more extreme attitudes after taking expressive actions, while participants’ attitude extremity did not change significantly when merely being exposed to cues.

**Action Effects on Affective Polarization**

H8 & H9 predicted that participants would show a lower level of affective polarization because of their reduced negative emotions and increased positive emotions. Another series of ANCOVA analyses were conducted.

**Emotional reactions.** There was a significant action (vs. cue) effect on participants’ enthusiasm, \(F(1, 189) = 4.93, p = .03, \text{partial } \eta^2 = .03\). However, contrary to the hypothesis, enthusiasm was significantly higher in the cue condition \((M = 1.50 SE = .10)\) than the action condition \((M = 1.17, SE = .11)\). In addition, the two-way interaction between action (vs. cue) and effort level of expression affordance on enthusiasm approached significance, \(F(1, 189) = 2.88, p\)
=.10, partial $\eta^2 = .02$. As shown in Figure 6, for participants who were assigned to the low-effort conditions, taking the action lowered their enthusiasm significantly. In contrast, for participants in the high-effort conditions, leaving a comment or not did not alter their enthusiasm.

![Figure 6 Action (vs. Cue) x Effort Level Interaction on Enthusiasm.](image)

No significant action (vs. cue) effect was found on participants’ feeling of anger, $F(1, 189) = 1.24, p = .27$, partial $\eta^2 = .01$. Results also showed no interaction effect between action (vs. cue) and effort level on anger, $F(1, 189) = 1.58, p = .21$, partial $\eta^2 = .01$.

**Affective polarization.** Contrary to H8, 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 quite significant, $F(1, 189) = 2.51, p = .11$, partial $\eta^2 = .01$. In addition, effort level’s main effect on affective polarization was significant, $F(1, 189) = 5.04, p = .03$, partial $\eta^2 = .03$, 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 \((M = 39.01, SE = 2.99)\). No two-way interaction between action (vs. cue) and effort level was found on affective polarization, \(F(1, 189) = 0.02, p = .90\), partial \(\eta^2 = .00\).

Participants’ ratings of ingroup warmth and outgroup warmth were further analyzed separately. Results revealed that neither action (vs. cue) nor effort level had an effect on ingroup warmth evaluations. In contrast, participants who took actions rated outgroup less warmer \((M = 27.15, SE = 2.50)\) 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. Specifically, participants who were assigned to the high-effort affordance conditions rated outgroup warmer \((M = 34.22, SE = 2.37)\) 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, with the action (vs. cue) being the independent variable, effort level being the moderating variable, enthusiasm being the mediator, affective polarization being the dependent variable, with all the covariates in place. Model 8 of PROCESS Macro was employed with 5,000 bootstrap samples. Results suggested no significant mediation effects (see Table 8). H9 was thus rejected.

**Table 8 Indirect Effects on Affective Polarization via Enthusiasm**

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>Relative Indirect Effect Bootstrap Estimate</th>
<th>95% Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LLCI</td>
</tr>
<tr>
<td>Low-effort - Action vs. Cue</td>
<td>1.99(1.85)</td>
<td>-1.08</td>
</tr>
<tr>
<td>High-effort - Action vs. Cue</td>
<td>-10.66(4.77)</td>
<td>-1.18</td>
</tr>
</tbody>
</table>

*Note: Standardized estimates (beta) are included in parentheses. Indirect effect confidence intervals apply to unstandardized estimates.*
**Action Effects on Deliberation Willingness/Expectation**

H10 and H11 stated that taking expressive actions would lead to a higher level of sense of agency compared to only seeing the cue, which will increase participants’ willingness to deliberate and their deliberation expectation. ANCOVA analyses were conducted, with action (vs. cue) and effort level being independent variables with their respective interaction term, sense of agency, willingness to deliberate, deliberation expectation being dependent variables, participants’ age, prior attitude, online political expression habits, political interest, political awareness, partisanship, partisanship strength, prior-exposure issue attitude, and perceived issue importance as covariates. News issue was entered as a control variable.

**Sense of agency.** Action (vs. cue) \((M_{\text{action}} = 4.03, SE_{\text{action}} = 0.13, M_{\text{cue}} = 4.25, SE_{\text{cue}} = 0.13)\) did not have a main effect on sense of agency, \(F(1, 189) = 1.36, p = .25\), partial \(\eta^2 = .01\). However, there was a significant effect of effort level on sense of agency, \(F(1, 189) = 66.31, p < .01\), partial \(\eta^2 = .26\). Participants in the high-effort condition reported a greater sense of agency \((M = 4.89, SE = 0.13)\) than participants in the low-effort condition \((M = 3.39, SE = 0.14)\). No interaction effect between action (vs. cue) and effort level was found, \(F(1, 189) = 0.00, p = 0.95\), partial \(\eta^2 = 0.00\).

**Willingness to deliberate.** Results indicated no main effect of action (vs. cue) on participants’ willingness to deliberate either, \(F(1, 189) = 0.38, p = 0.54\), partial \(\eta^2 = .00\). Effort level also had no main effect on willingness to deliberate, \(F(1, 189) = 1.14, p = 0.29\), partial \(\eta^2 = 0.01\). The interaction effect between the action (vs. cue) and effort level was not significant, \(F(1, 189) = 2.35, p = .12\), partial \(\eta^2 = .01\) (see Table 9 for estimated means). H10 was rejected.
Table 9 Estimated Means of Willingness to Deliberate as a Function of Action (vs. Cue) and Effort Level of Expression Affordances

<table>
<thead>
<tr>
<th>Effort Level</th>
<th>Cue M</th>
<th>SE</th>
<th>Action M</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low effort</td>
<td>4.76</td>
<td>0.25</td>
<td>4.23</td>
<td>0.24</td>
</tr>
<tr>
<td>High effort</td>
<td>4.64</td>
<td>0.22</td>
<td>4.86</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Deliberation expectation. A significant main effect of action (vs. cue) was seen in the analysis, $F(1, 189) = 4.55, p = 0.03$, partial $\eta^2 = .02$. However, contrary to the hypothesis, the data showed that participants in the cue condition had a higher expectation toward deliberation ($M = 5.02, SE = 0.12$) than participants who took actions ($M = 4.64, SE = 0.13$). No effort level effect ($F(1, 189) = 1.37, p = 0.24$, partial $\eta^2 = .01$) or interaction effect ($F(1, 189) = 0.47, p = 0.49$, partial $\eta^2 = .00$) were found.

Mediation analysis. Mediation analyses were conducted to test whether sense of agency mediated the relationship between effort level of expression affordance and willingness to deliberate. Effort level was entered as the independent variable, action (vs. cue) was entered as the moderator, sense of agency being the mediator, willingness to deliberate being the dependent variable, and other covariates controlled for. Results 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 10).

Table 10 Indirect Effects on Willingness to Deliberate via Sense of Agency

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>Relative Indirect Effect Bootstrap Estimate</th>
<th>95% Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LLCI</td>
</tr>
</tbody>
</table>

64
Cue - High-effort vs. Low-effort

<table>
<thead>
<tr>
<th>Effect</th>
<th>Beta (SE)</th>
<th>SE</th>
<th>CI Lower</th>
<th>CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action - High-effort vs. Low-effort</td>
<td>0.36(0.16)</td>
<td>0.05</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>Action - High-effort vs. Low-effort</td>
<td>0.37(0.17)</td>
<td>0.06</td>
<td>0.73</td>
<td></td>
</tr>
</tbody>
</table>

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

Effects of Forced Actions versus Voluntary Actions

So far, this chapter has reported the cue effects and the action effects based on the experimental manipulation of this study. A question that has yet to be answered is how individuals perceive and behave differently when their expressions are voluntary, which is the most likely manner they express (or not) in real-life settings. Therefore, to explore whether the forced nature of actions in the experiment changed any of the action effects compared with voluntary actions, the two forced action conditions, i.e., the low-effort action condition (n = 51) and the high-effort action condition (n = 48), were compared to the two voluntary action groups (low-effort: n = 56; high-effort: n = 54).

Descriptive results. In the low-effort action conditions, participants were able to click the thumbs up or thumbs down buttons. Among them, in the forced action group, 42 participants clicked the thumbs up button, whereas 9 participants chose “thumbs down”. In the voluntary action group, a total of 42 participants (75%) took actions voluntarily, among which 34 participants clicked “thumbs up” and 8 participants clicked “thumbs down”. A Chi-square test of independence showed no significant differences on the number of “thumbs up” or “thumbs down” as a function of forced (vs. voluntary) action, $\chi^2 (1, N = 93) = 0.03, p = 0.89$. 

65
In addition, compared with participants who were forced to click “thumbs up” or “thumbs down”, participants who voluntarily took low-effort actions did not significantly differ from the former group regarding news selection, demographic information (age, gender, education, income, ethnicity) or individual differences (prior attitude, online political expression habits, political interest, political awareness, partisanship, partisanship strength, and perceived issue importance).

Additionally, in the high-effort voluntary action conditions, 23 participants (42.59%) posted comments. Compared with participants who were forced to post comments, they were more likely to identify themselves as male, $\chi^2 (1, N = 71) = 6.65$, $p = 0.01$. And they were 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 comparison.** Participants’ comments in the voluntary action and forced action groups were further analyzed. 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 was not quite statistically significant, $t(69) = 1.74$, $p = .09$. In addition, 87.5% of participants in the forced action group expressed their opinions in the comment ($n = 42$), whereas 78.3% of participants ($n = 18$) in the voluntary action group expressed their opinions. Chi-square test showed no significant differences on comment categories between these two conditions, $\chi^2 (3, N = 71) = 1.79$, $p = 0.73$.

In terms of the sentiment analysis, comments in these two conditions were largely neutral ($M_{\text{negative}} = 0.12$, $M_{\text{neutral}} = 0.73$, $M_{\text{positive}} = 0.15$), and they did not differ in their negative or
positive sentiment scores significantly. However, participants in the forced action condition were more likely to express neutral comments than those who voluntarily left their comments, a difference that approached statistical significance (see Table 11). In other words, users who voluntarily wrote comments tended to be more affective in their expression.

**Table 11 Mean Comparisons of Comment Sentiments**

<table>
<thead>
<tr>
<th>sentiment</th>
<th>affordance</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Two-tailed t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>forced action</td>
<td>0.1172</td>
<td>0.12415</td>
<td>$t(31) = -0.52, p = .60$</td>
</tr>
<tr>
<td></td>
<td>voluntary action</td>
<td>0.1403</td>
<td>0.19297</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>forced action</td>
<td>0.7588</td>
<td>0.12724</td>
<td>$t(28) = -1.24, p = .10$</td>
</tr>
<tr>
<td></td>
<td>voluntary action</td>
<td>0.6652</td>
<td>0.25062</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>forced action</td>
<td>0.124</td>
<td>0.10419</td>
<td>$t(69) = -0.38, p = .70$</td>
</tr>
<tr>
<td></td>
<td>voluntary action</td>
<td>0.1945</td>
<td>0.26375</td>
<td></td>
</tr>
</tbody>
</table>

Regarding comment incivility, comments posted by participants in the voluntary action condition had a relatively higher level of incivility ($M = 0.06, SD = 0.11$) than comments by participants in the forced action condition ($M = 0.02, SD = 0.03$). The difference approached statistical significance, $t(23) = -1.70, p = .10$.

**Comment characteristics and user attitudes.** To explore whether different comment characteristics affect user perceptions and attitudes, comment length, comment category (opinion expression = 1 vs. others = 0), comment incivility, and affectiveness of comments (positive sentiment score + negative sentiment score) were tested as predictors of attitude extremity and affective polarization using linear regression models, with voluntary action (vs. forced action), participants’ gender, age, prior attitude extremity, online political expression habits, political interest, political awareness, partisanship, partisanship strength, perceived issue importance and news issue as covariates.
Results revealed that none of the comment characteristics were significantly related to participants’ post-exposure attitude extremity (comment length, $\beta = 0.13, p = 0.25$; comment category, $\beta = -0.04, p = 0.73$; incivility, $\beta = -0.002, p = 0.99$; affectiveness, $\beta = 0.26, p = 0.14$). However, comment category (opinion expression vs. others) was positively associated with affective polarization, $\beta = 0.26, p = 0.02$. Specifically, participants who expressed their issue opinions (vs. those who did not express opinions) in their comments showed a higher level of affective polarization. Comment length ($\beta = 0.07, p = 0.54$), incivility ($\beta = -0.12, p = 0.36$), and comment affectiveness ($\beta = -0.05, p = 0.77$) were not significantly correlated with affective polarization. When analyzing ingroup warmth and outgroup warmth separately, issue opinion expression (vs. others) in comments increased participants’ feelings of ingroup warmth ($\beta = 0.39, p < 0.01$), but did not affect their evaluations of outgroup warmth ($\beta = -0.10, p = 0.42$).

**Comparisons between forced action effects and voluntary action effects.** Participants who took actions voluntarily (low-effort: $n = 42$, high-effort: $n = 23$) were compared with participants who were required to take actions (low-effort: $n = 51$, high-effort: $n = 48$) using ANCOVA analyses. Voluntary (vs. Forced) action and effort level were entered as independent variables, all measured outcome variables were entered as dependent variables one by one, with participants’ gender, age, prior attitude, online political expression habits, political interest, political awareness, partisanship, partisanship strength, perceived issue importance and news issue as covariates.
A significant interaction effect between voluntary (vs. forced) action and effort level was found on affective polarization, \( F(1, 140) = 5.48, p = 0.02, \) partial \( \eta^2 = .04 \). As shown in Figure 7, post hoc comparisons using Bonferroni test showed that participants who voluntarily left a comment reported a higher level of affective polarization than participants who were forced to comment, \( p = 0.04 \), whereas those who voluntarily clicked the “thumbs up/down” showed a similar level of affective polarization as participants who were forced to take a low-effort action, \( p = 0.34 \).

![Figure 7 Voluntary (vs. Forced) Action x Effort Level Interaction on Affective Polarization](image)

No other significant main effect of voluntary (vs. forced) action or interaction effects were found (see Appendix C for all variable means).

Comparisons between cue effects and voluntary no-action effects. In the cue conditions, participants were forced to not take actions. To rule out the influence of the forced manipulation, participants who didn’t take actions voluntarily (low-effort: \( n = 14 \), high-effort: \( n = 31 \)) were compared with participants who were exposed to cues (low-effort: \( n = 48 \), high-
effort: \( n = 58 \) using ANCOVA analyses. Voluntary no action (vs. cue) and effort level were entered as independent variables, all measured outcome variables were entered as dependent variables one by one, with participants’ gender, age, prior attitude, online political expression habits, political interest, political awareness, partisanship, partisanship strength, and perceived issue importance as covariates. Results showed no significant differences between these two groups (see Appendix C for all variable means). However, it should be noted that in this analysis, the sample sizes among different conditions varied significantly. As a result, although the total sample size was able to achieve a power of 0.8 to detect a medium effect size, the non-significant findings might be attributed to the insufficient statistical power.

Overall condition comparisons. Among the seven experimental conditions, many possible comparisons are not tested by the hypotheses. Therefore, to give an overview of the experimental manipulation’s effect on major political outcomes, participants’ issue knowledge, attitude extremity, affective polarization, willingness to deliberation, and deliberation expectation were compared across seven conditions (see Appendix D for all variable mean plots).

Summary of Findings

Cue effects of expression affordances. In summary, participants who saw a high-effort (commenting) function on the news website perceived the website to be more interactive than participants who were not exposed to any expression affordances. Higher perceived interactivity was associated with a significantly lower level of affective polarization.

Action (vs. cue) effects of expression affordances. Results revealed that participants in the cue conditions reported a higher level of cognitive involvement than those who took actions.
In addition, cue groups also reported a more positive expectation about deliberation than participants who took actions.

Compared with being exposed to cues, taking actions made participants spend more time on the news website, especially if they were required to leave a comment, which then further increased their issue knowledge. For participants in both low-effort and high-effort conditions, taking actions (vs. being exposed to cues) increased participants’ attitude extremity significantly.

In addition, the effort level of the expression affordance matters. Participants who were assigned to low-effort affordance conditions were more affectively polarized than individuals who were exposed to high-effort cues or took high-effort actions. Those who were exposed to or acted on the commenting function also felt a stronger sense of agency than those who were assigned to thumbs up/down conditions. In addition, a stronger sense of agency was associated with a higher level of willingness to deliberate.

**Comparisons between forced action effects and voluntary action effects.** The only significant difference was that individuals who voluntarily left their comments showed a greater level of affective polarization than participants who were required to leave comments.

**Comparisons between cue effects and voluntary no-action effects.** No significant differences on outcome variables were found between these two groups.
DISCUSSION

Online media have provided unprecedented access for users to express themselves through various affordances. Not only can these expressions alter other viewers’ perceptions, but also expressors’ attitudes, feelings, and behaviors. Based on TIME theory (Sundar et al., 2015), this dissertation expands the field’s research on expression effects by focusing on technological affordances. In support of the distinction made by this framework, the clearest results from this study is that 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. Such findings advance our understanding of expression effects from an affordance perspective and have practical implications for news media interface designers, both of which are discussed in the following sections.

Cue Effects of Expression Affordances

Overall, the results of this study showed a positive effect of the presence (vs. absence) of expression affordance cues. Specifically, participants who were exposed to a low-effort expression affordance cue (i.e., thumbs up/down) were more likely to feel enthusiastic about the news than those who were in the control condition. Furthermore, users perceived people on the other side as much “colder” than their ingroup members, if they were only being presented news without any chance of conversation. In contrast, even if users didn’t have a chance to act on it, merely being exposed to a comment cue reduced their affective polarization. It should be noted, however, that this effect on affective polarization was only found for high-effort expressive behaviors (e.g., commenting) but not one-click actions. These findings suggest that while users
may not necessarily use the affordance, the invitation for elaborated expression from the news site is important and meaningful, the effect of which was carried over to their evaluations of political parties, and specifically, outgroup parties.

The mediation analysis revealed that perceived site interactivity is the key underlying mechanism. The commenting function, compared with thumbs up/down function, was perceived to allow two-way communication and conversation, which further reduced participants’ affective polarization. This finding supported the proposed idea that the presence of a commenting affordance signals an openness to dialogue for individuals, which does not change their evaluations of ingroup members, but helps mitigate their negative feelings towards outgroup members. Without a commenting affordance, individuals may feel helpless in reaching out to the other side, thus leaving them with less outgroup warmth. It appears that choosing from thumbs up or thumbs down is be too superficial for users, which may not fit into their conception of an interactive, two-way communication.

An alternative explanation for the comment cue’s effect on reduced affective polarization is that the comment cue might have increased participants’ reflection on the issue, such that participants rehearsed writing their comments in their minds, which decreased their affective polarization. To explore this possibility, mediation analyses were conducted using Model 4 of PROCESS Macro with 5,000 bootstrap samples. Time spent on the website and self-reported cognitive involvement were entered as mediators, with the comment cue (vs. control) being the independent variable and affective polarization being the dependent variable. Results showed that neither time ($b = .13, SE = 0.49, 95\% CI[- .97, 1.17]$) nor cognitive involvement ($b = -.14, SE = 0.44, 95\% CI[- 1.17, 0.71]$) were significant mediators between the comment cue and affective polarization.
polarization. Therefore, it is unlikely that reduced affective polarization is due to individuals’ reflection triggered by the comment cue.

The proposed relationship between emotions (i.e., enthusiasm and anger) and affective polarization was not supported. While it contradicts previous research, which has shown that anger and enthusiasm towards ingroup or outgroup candidates were associated with affective polarization (Lu & Kim, 2019; McLaughlin, Holland, Thompson, & Koenig, 2020), it is worth noting that, in this study, emotions were measured as responses to reading the news article rather than toward any specific ingroup or outgroup member. This may suggest that while there can be differences in individuals’ emotional responses to news articles when different expression affordances are present, these emotional reactions do not serve as a basis for their subsequent feelings toward different parties. One possible explanation is that the relevance of the emotion is low in this context. In other words, when the source of emotion was the news article, participants did not make salient associations between the emotion and their evaluations of Democrats or Republicans, but possibly the news organization. As proposed by Dillard and Nabi (2006), emotions can generate influence if and only if the emotion is relevant to the evaluated subject. In addition, news stories used in this study presented two-sided information. Unlike partisan information, participants’ emotions may not have a clear source, such that their anger may not necessarily be aroused by opposing arguments, which further reduce the relevance between the emotion and their affective polarization.

**Action Effects of Expression Affordances**

**Issue Knowledge.** The dissertation hypothesized that taking actions (vs. cues) would increase users’ cognitive involvement and lead to a higher level of knowledge. However,
contrary to the hypothesis, participants in the action conditions reported a lower level of cognitive involvement, i.e., they were less likely to make mental associations between new information presented in the news and old information in memory, compared to those who were assigned to the cue conditions. The most plausible explanation of this unexpected result is that when individuals spend effort in composing their expressions, they have less resources for meaningful message elaboration, as suggested by the limited capacity model (Lang, 2000). It further implies that online users’ expressive actions, such as comments or “likes” to a news story, do not necessarily rely on an extensive processing of the story. This might be particularly true for the issues tested in this study, about which most participants held strong pre-existing opinions.

Unsurprisingly, participants who wrote a comment did spend longer time on the page, which was positively associated with their issue knowledge, as indicated by a significant indirect effect. This result is consistent with previous research showing that participants who spent more time on a political site had a significantly better recall of knowledge questions (Warnick, Xenos, Endres, & Gastil, 2005). At the same time, a suppression effect emerged, wherein a significant negative relationship between comment action (vs. cue) and issue knowledge was discovered, suggesting that if users make comments without taking more time, they show less knowledge about the issue then merely seeing the comment cue. It is highly likely that commenting without extra time indicates that the user processes the news in a cursory manner and provides superficial commentary, which reduces their chances of learning from the news.

Evidence still exists that taking actions helps with individuals’ learning about the other side, despite the fact that taking expression actions did not show a significant effect on
individuals’ overall issue knowledge. Specifically, this study revealed that participants who took low-effort actions demonstrated a higher level of attitude-inconsistent knowledge than those who were exposed to the low-effort affordance cue, which significantly reduced the difference between their attitude-consistent and attitude-inconsistent knowledge. Because participants in our study were highly involved individuals, they probably already possessed a high level of attitude-consistent knowledge, which was not likely to be affected by acting or not (i.e., a ceiling effect). However, regarding attitude-inconsistent knowledge, taking low-effort actions (vs. cues) promoted learning. One possible explanation is that when participants were asked to choose between thumbs up/down, they were more likely to notice the two-sided arguments presented in the article and paid more attention to the attitude-inconsistent facts than participants who did not commit any actions.

Overall, the effects of expression affordances on political knowledge are quite complex. For users, writing a comment compared with being exposed to the comment cue, increases their attention but potentially decreases their cognitive resources for learning. This finding corresponds with previous conflicting results on interactivity’s effect on learning, such that a higher level of interactivity does not necessarily benefit participants’ knowledge acquisition and recall of information (Yang & Shen, 2018). But, by distinguishing attitude-consistent knowledge from attitude-inconsistent knowledge, there is a potential benefit of action (vs. cue) on diminishing the distance between attitude-consistent and attitude -inconsistent knowledge.

Results also reveal an intriguing discovery of the effects of political knowledge. While scholars usually assume that more knowledgeable individuals have higher efficacy and are more inclined to participate in political discussion (e.g., Spruyt, Kuppens, Spears, & van Noord, 2018),
this study reveals an opposite effect. According to the correlation table (Appendix E), general political knowledge was negatively associated with enthusiasm, sense of agency, and deliberation expectation. Similarly, issue knowledge also showed negative correlations with enthusiasm, sense of agency, willingness to deliberate, and deliberation expectation. A speculative explanation is that individuals who are more informed about political issues also have a deeper understanding about how opposing sides see things differently and may have an exaggerated sense of the sharp divisions between the sides. As a result, they probably feel less hopeful in resolving the conflict via deliberation. More research is needed to replicate the finding and empirically test such possibilities.

**Issue attitude.** In line with the hypothesis, the results showed that participants’ post-exposure attitude became more extreme after they took action. Taking a closer look at the actual comments collected in this study, results indeed showed that users 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: a composition process leads to an effortful thinking about the issue topic, wherein individuals are able to organize their ideas and ultimately produce more consistent thoughts (Pingree, 2007; Tesser & Leone, 1977; Zaller, 1992). The finding also echoes previous longitudinal survey results (Cho et al., 2018) and deliberative discussion effects (Gastil & Dillard, 1999; Wojcieszak, 2011), such that expressing political opinions reduces individuals’ attitude uncertainty and reinforces the expresser’s initial opinions.

Additionally, the publicity associated with online expression may motivate users to adhere to their expressions during the message release stage. As argued by TIME (Sundar et al.,
2015), making use of agency affordances, such as active expressions, becomes a way for users to highlight and insert their identities in the online space. In the context of interpersonal communication, scholars have also found that self-presentation in a public forum makes individuals feel obligated to behave in a consistent manner (Gonzales & Hancock, 2008). Given that participants were informed that their actions would be public to others (as described in the methods section), they were probably more conscious about their attitude and were more likely to keep it consistent with their expressions.

This effect of expressive actions on attitude extremity appears to be particularly robust given that participants in this study simply performed a one-time expression behavior. Moreover, there was no moderating effect of effort level on the action effect on attitude extremity. That is, for participants in both low-effort and high-effort conditions, taking actions generated more extreme attitude than being exposed to the cues. It is possible that even though it was just a one-click action, such as a thumb up/down, participants might have gone through a deliberative thinking process when making the action, which probably reinforced their preexisting attitude. In addition, this attitude reinforcement effect can be independent of the expression content, as results suggested that comment length or category was not correlated with attitude extremity. Overall, both composition and message release stages of online expression provide opportunities to reinforce one’s attitude, regardless of the effort involved in expression.

**Affective polarization.** Based on the cathartic aspect of self-expression, this study posited that taking actions was more likely to ameliorate affective polarization than being exposed to cues of expression affordances. While taking actions did make participants feel much more enthusiastic about the news, this feeling did not translate into positive feeling towards
outgroups. This, again, suggests that emotional reactions aroused by news stories are not directly associated with readers’ evaluations of ingroup and the opposing camp.

What stands out from the results is still a possible reinforcement of expressive actions on participants’ initial positions on affective polarization. Results showed that taking actions enhanced participants’ negative feelings towards outgroup members, which seemed to at least maintain, if not enlarge, the gap between individuals’ feelings on ingroup and outgroup parties (Affective polarization: $M_{\text{action}} = 47.43, SE = 3.06$; $M_{\text{cue}} = 40.27, SE = 3.16, p = 0.11$). For participants who expressed their issue opinions (vs. issue-irrelevant opinions) in their comments, they also evaluated their ingroup party members warmer. Previous research found a positive association between positive feelings towards a group and expression in support of the group, as well as negative feelings towards a group and expression against the group (Boyle et al., 2006). The result of this study shows support for a possible reciprocal relationship between these two variables, such that when individuals express their support or opposition to the policy preference of a certain group (e.g., Democrats or Republicans), their initial feelings towards the group get asserted and confirmed.

**Deliberation expectation.** Although actions (vs. cues) on expression affordances did not affect willingness to deliberate, they did influence deliberation expectation. However, contrary to the prediction, deliberation expectation was more positive in the cue conditions than the action conditions. One potential explanation for this result is related to the design of the current study: participants who expressed did not receive any feedback from other users. This might have undermined their interaction experience and led to worse expectations about deliberation. For participants who were exposed to expression affordance cues, they still sensed hope for openness
to dialogue and conflict resolution through deliberative communication. This highlights the importance of having richer social interactions (Brinker, Gastil, & Richards, 2015) and receiving valuable feedback (Oeldorf-Hirsch & Sundar, 2015; Stavrositu & Sundar, 2012) in empowering online users.

**Effort Effects of Expression Affordances**

Aside from examining the cue effect and action effect of expression affordances, the current study also revealed how high-effort affordance (i.e., commenting) and low-effort affordance (i.e., thumbs up/down) differed from each other. These effects are discussed as effort effects of expression affordances.

First, we hypothesized that users perceived a greater sense of agency by *acting* upon the expression affordance. However, results in this study suggested users obtained a significantly stronger sense of agency by seeing or using a commenting feature than seeing or acting on the thumbs up/down button. This suggests that in the context of political expression, one-click actions may not be able to imbue users with a strong sense of being the source, while a symbolic, representational cue of commenting enables them to perceive such possibility.

Furthermore, this perceived sense of agency elicited by the high-effort affordance was positively associated with willingness to deliberate. That is, offering users commenting affordances, rather than the thumbs up/down, can partially lead to greater deliberation interest. This may not be surprising, considering that deliberation represents an ideal form of communication wherein individuals reason through articulated, justified arguments (Cappella, Price, & Nir, 2002). Therefore, simply making a choice between thumbs up and thumbs down does not meet individuals’ expectation about deliberation, thus decreasing their interest.
Nonetheless, the significant association between sense of agency and willingness to deliberate is still striking, as it implies that the sense of “sourceness” originating from highly interactive online media 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 than commenting cues or actions. One possible explanation is that the format of the thumbs up/down feature leaves no room for middle ground in terms of opinion expression, but forces individuals to take sides. Hence, participants were more likely to form an impression of disagreement and polarization between different camps. As shown in previous research, when individuals were exposed to news reports of a polarized electorate, their negative feelings toward the outgroup party increased (Levendusky, & Malhotra, 2016). Put another way, perceived polarization may be the underlying mechanism by which the thumbs up/down affordance (vs. commenting affordance) increased affective polarization. In this regard, commenting affordance represents a higher level of interactivity that enable dialogues among different sides, which may undermine perceived polarization and further reduce affective polarization.

Nonetheless, low-effort actions do lower the threshold of expression than high-effort actions. As shown in the voluntary action conditions of this study, more users acted upon the thumbs up or down buttons than the commenting function. Moreover, clicking thumbs up/down or not, was unrelated to a person’s gender, age, political interest, knowledge, education, or online expression habit, whereas voluntary commenting was positively associated with male identity and past engagement in online expressions. Therefore, as suggested in Bode (2017), easy and low-effort expressions, such as one-click thumbs up/down, can serve as gateway behaviors that lead to wider public engagement in political discussions.
Forced Actions vs. Voluntary Actions

Up until now, this chapter has examined the causal link between expression affordances and users’ perceptions and attitudes. By comparing forced action groups and voluntary action groups, the following section then discusses the ecological validity of the findings.

This study showed that voluntary expression and forced expression did not produce many significant different outcomes. However, voluntary commenters showed a higher level of affective polarization than participants who were forced to leave their comments, suggesting an even stronger expression effect. Comments by voluntary actors were indeed more likely to be affective and used more “bad words” in their expressions than forced comments. This shows that in the real-life setting, to activate high-effort expressions, individuals are more likely to be motivated by strong emotions as indicated in previous research (e.g., Boyle et al., 2006; Lu & Myrick, 2016). These authentic expressions may in turn influence their ingroup/outgroup evaluations to a greater extent. In addition, participants who chose to not take actions showed similar perceptions and attitudes as those who were assigned to the cue groups. It merits noting that participants who voluntarily acted (or not) were not randomly assigned to that condition. Therefore, even though the data analysis controlled many individual differences, no causal inference could be drawn. It is highly possible that more affectively polarized participants were more likely to voluntarily express themselves. But the similarity between these two pairs of conditions justifies the ecological validity of the findings.

Theoretical Implications

This dissertation provides important theoretical implications for understanding online expression effects from a technological affordance perspective.
First, the results here uncover two distinct routes by which an affordance can influence users, i.e., cue route and action route proposed by TIME. This further highlights the nature of a technological affordance, which is constituted of both the physical materiality of the technology (cue route) and the role of human agency (action route). For example, when users were provided a commenting cue, they perceived the site to be more interactive and showed a lower level of affective polarization. However, when they were asked to act upon the commenting affordance, they nonetheless became less optimistic about deliberations. While previous survey research on the effect of online political expression usually focuses on human actions such as the frequency of online expression (e.g., Lane et al., 2019; Yamamoto et al., 2015; Yu, 2016), this experimental study demonstrated that the physical attribute of the interface can also exert strong psychological effects on users. The significant effect of comment cue on affective polarization is also intriguing, highlighting the importance of showing openness to communication in mitigating intergroup conflict.

In addition, this study extends the examination of expression effects from the lens of technological affordance, detailing more nuanced, multi-dimensional influences of expression on message senders. Supporting the literature on expression effects (Pingree, 2007), results showed expressive actions, even if it is merely a one-time expression, it strengthened participants’ preexisting issue attitude. In addition, the null findings on the relationship between expressive actions and negative emotions (e.g., anger) contributes to an understanding of expressive actions in the context of political domain. Unlike sharing emotions in social settings (Rime, 2009), where it is often assumed that talking about emotional experience is a relief for negative emotions, this study showed that the venting process in the form of news commentary does not
necessarily lead to a reduction of negative emotions. This thus highlights a more salient attitude rehearsal aspect of online political expression.

Moreover, the study contributes to the research on interactivity’s effect on learning from the perspective of expression affordances. Although action on the expression affordance is overall inconsequential to user’s issue knowledge, the mediation paths did uncover the potential double-edged effect of expressive actions: via one path it increases user’s attention, via another it may lower user’s ability to recall information from the news. This finding is consistent with previous study findings on interactivity’s effect on learning. Furthermore, it contributes to this line of literature by showing the value of distinguishing between different types of knowledge (attitude-consistent vs. attitude-inconsistent), such that acting on the low-effort expression affordances compared to cues is important for users to gain attitude-inconsistent information. Further research on the effect of interactivity on learning should consider measures of how biased individuals are informed, in addition to the extent to which they are informed.

This study is also the first attempt to study the relationship between daily online expressive behaviors such as the thumbs up/down and commenting and willingness to engage in deliberative communication. Having a comment affordance than the thumbs up/down option empowers users psychologically by enhancing their perceived sense of agency, which is associated with higher level of willingness to deliberate. This finding thus extends the effect of agency affordance proposed in MAIN model (Sundar, 2008), by showing that whether people take actions does not matter; merely cues affording expression are able to trigger individuals’ sense of agency.
Regarding methodology, the current study makes a novel contribution to the research on the effect of communication technology. Although affordance perspective is gaining its popularity in this field, very few online expression studies adopt an experimental approach to study its causal influence. This study thus complements previous research on political effects of online expression by showing causal relationships between different technological interfaces and critical political outcomes. Moreover, the novel inclusion of both voluntary (no) action conditions and forced (no) actions in the study design provides further information on the issue of ecological validity that forceful manipulation may create, which can be used in future affordance research.

Practical Implications

This dissertation research also has practical implications for news website, news discussion forums, and social media sites in terms of affording user reactions to news content. First, it is important to show willingness to communication to news readers. As evidenced in this study, having no expression affordances for controversial political topics make users more affectively polarized. While it is understandable that websites like Popular Science wanted to avoid uncivil and toxic comments that sway readers from learning the fact and polarize their perceptions (LaBarre, 2013), completely shutting down channels for readers to give feedback can fall into another pitfall of promoting affective polarization. Therefore, ideally, news website should allow for readers to express themselves for controversial topics.

However, there are several caveats which concern the deployment of one-click expression affordances. This study reveals that the inclusion of and the contrast between “thumbs up” and “thumbs down” can intensify affective polarization while bringing limited benefits in
other aspects. Therefore, although it helps with lowering the threshold for participation, interface designers should consider different forms of low-threshold actions. For example, by manipulating the label of the button, Stroud, Muddiman, and Scacco (2017) showed that including a “respect” button as a reaction to news comments resulted in less partisan behaviors. Similarly, news content providers should consider using different labels for low-effort expression affordances, especially those ones with positive tones, which can even play a role in mitigating partisan conflict.

In addition, we show the utility of implementing a commenting feature. Compared with a low-effort “thumbs up” or “thumbs down”, commenting as an expression affordance has the potential to alleviate affective polarization by signaling two-way communication. Users also perceive a strong sense of agency when offered a comment function to express their thoughts and feelings. In our study, users’ comments also appear to be highly civil and polite, which may be related to the nature of the design in which participants were not able to see other users’ comments. They were thus less likely to be affected by possible incivility shown in other comments, as incivility is shown to be contagious (Suhay, Bello-Pardo, & Maurer, 2018). As a result, designers of news comment section can consider adopting a “replying before seeing other comments” policy, encouraging expression while avoid the “nasty” effect.

It may be a concern regarding the polarization effect of online expressive actions. Indeed, in this study, participants who acted on the expression affordances showed more extreme attitudes and were more likely to be affectively polarized. However, trying to eradicate this attitude rehearsal effect is very difficult, considering it is human nature to remain consistent and cognitive consonant (Mercier & Landemore, 2012). All things considered, results indicated that
writing comments did not reduce individuals’ willingness to join deliberative communication. Therefore, despite polarized issue stances, there is still hope that deliberative forums can convene and facilitate dialogues between various perspectives, which may eventually create informed and enlightened public engagement.

**Limitations and Future Research**

Several limitations of the current study are noteworthy. To begin with, all four issue topics in this study were heatedly debated political issues. As a result, for highly involved participants who probably had a high level of issue knowledge before reading the news, the news article might fail to provide them with enough new information. The design makes it difficult to test the knowledge they acquired from the news and their prior-existing knowledge. Thus, in future studies, adding news topics that have varied personal importance may enhance the generalizability of the findings.

The current design is also limited to the interaction with news on a news website, which may be different from a social media setting where many other cues and affordances are co-presented. For instance, social media users can easily access other users’ reactions to the news, such as the number of likes, comments, and shares, all of which can be influential on reader judgements and perceptions (Go, Jung, & Wu, 2014; Sundar, 2008). With increasingly more people getting news from social media sites (Shearer & Grieco, 2019), future studies can test the research question in a setting that with more social affordances. In addition, in this study, participants were asked to choose the news article that interests them the most. While this design has its validity, it excludes situations where readers are incidentally exposed to news, which may produce different outcomes (Weeks et al., 2017) and are worth exploring.
Furthermore, participants in this experiment only read the news and used the affordance once. Although it showed a powerful influence, it is unclear whether longitudinally the expression effects will be strengthened or weakened. Similarly, news events occur every day, individuals may be able to update their knowledge and opinions through repeated exposure to the same issue topic. Future research should further explore how a longitudinal use of expression affordances and a repetitive exposure to the same issue affect political outcomes.

Conclusion

Affordances of digital media offer users numerous opportunities to express themselves in the realm of political communication. Do the presence and the usage of these expression affordances influence users? Built upon TIME theory (Sundar et al., 2015), this study investigates the question from a technological affordance perspective. Results clearly demonstrate that not only does the actual usage of the expression affordance shape users’ perceptions and judgements, but also the presence of the expression affordance, revealing both strong action effects and cue effects. This study also suggests that different types of expression affordances can influence user psychology differently by providing different levels of interactivity and sense of agency. These findings provide novel insights into how online media users are influenced by their own expressions, and shed new light on the effects of online political expression by detailing the role of technology affordances. Based on the complex and nuanced interplay between technology materiality and user agency, this study may not be able to provide a simple answer to the question that whether offering expression affordances to users is beneficial or not. Nonetheless, the current study represents one such attempt and should prompt 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.
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Virginia’s Historic Gun Control Fight, Explained

VIRGINIA DEMOCRATS ARE PUSHING TO PASS STRONGER GUN CONTROL LAWS — AND GUN RIGHTS ACTIVISTS AREN’T HAPPY ABOUT IT.

BY GERMAN LOPEZ

Virginia Democrats’ push for new gun control laws has already attracted a huge backlash. Tens of thousands of gun rights supporters rallied in the state capital, Richmond, on Martin Luther King Jr. Day to protest the proposals.

Compared to other states, though, the proposals under consideration in Virginia aren’t so radical. The bills that currently seem most likely to pass are universal background checks, a purchase limit for one handgun a month, a “red flag” law letting authorities temporarily seize a person’s guns if he’s deemed a threat, and a law giving local governments the ability to ban guns in public spaces during permitted events. In U.S., seventeen states have passed red flag laws and 21 have similar universal background check laws.

These measures are a far cry from, say, Massachusetts’s laws requiring a license to buy and own a firearm. They’re not anywhere as comprehensive as California’s laws, which, among other measures, ban assault weapons and require a 10-day waiting period for firearm sales. In fact, one of the Virginia proposals — the one-gun-a-month limit — simply brings back a law that was repealed in 2012.

But there are several reasons Virginia became such a focal point in the fight for stronger gun laws. For one, the state is home to the National Rifle Association’s headquarters, a testament to the state’s history as a haven for gun rights.

At the same time, Virginia has swung blue in recent years, with Virginians electing two Democratic governors, including current Gov. Ralph Northam, in a row, and flipping the legislature in 2019 to Democrats for the first time in decades.

As the prospects of new gun control laws have grown in Virginia, so have the protests around
such proposals.

Most recently, more than 20,000 people on Monday marched and rallied in Richmond, the state capital, to defend their gun rights. Despite concerns that the protests would be hijacked by the racists and extremists who led the violent Charlottesville rally in 2017, the Richmond protests came and went with no violence. The hour-long demonstration concluded a little after noon with only one arrest.

In the past few months, more than 100 localities across Virginia have taken their own action by declaring themselves “Second Amendment sanctuaries.” Inspired by the “sanctuary city” movement for immigration laws, Second Amendment sanctuaries claim they won’t enforce any laws that they feel violate the Constitution and especially the Second Amendment.

"It's taking a stand to protect your constitutional rights and sending a message to Richmond that we will not stand by and do nothing," said Pam Carter, a local official in Augusta County.

Northam and his Democratic allies have emphasized that the goal of stricter gun laws is to save lives. In Virginia, more than 1,000 people die due to gun violence every year.

To that end, they’re backed by the research: A 2016 review of 130 studies in 10 countries, published in Epidemiologic Reviews, found that new legal restrictions on owning and purchasing guns tended to be followed by a drop in gun violence — a strong indicator that restricting access to guns can save lives. A review of the US evidence by RAND also linked some gun control measures, including background checks, to reduced injuries and deaths.

Not all gun laws are created equal. The evidence for assault weapons bans is particularly weak. The bill would have banned the sale or transfer of certain assault-style weapons in Virginia. It also would have made it illegal to possess silencers and magazines holding more than 12 rounds. However, the guns make up a small fraction of gun deaths, especially in comparison to handguns, which are the most commonly used. Critics also claimed the measure in this bill was not clear enough on how it defined assault weapons. And recent studies produced lackluster findings for universal background checks.

State laws like the ones Virginia is proposing, however, are particularly limited. Because travel and trade is largely unrestricted within the US, it’s easy for people to ship guns from state to state.

Virginia knows this well. Due to its relatively weak gun laws, the state has often acted as a crucial hub in the “Iron Pipeline” from the South to Northern states that have stricter firearm laws. In New York state, for example, almost 74 percent of guns used in crimes between 2010 and 2015 came from states with lax gun laws, based on a report from the New York State Office of the Attorney General. About 15 percent of likely trafficked crime guns came from Virginia — the most from any single state.
The upshot is that states’ stricter gun laws do reduce gun deaths, but they can only go so far.

(2) News on Marijuana Legalization

All Eyes on New York State Plan to Legalize Marijuana

BY TREVOR HUGHES

Marijuana activists are poised for a major victory in New York as state lawmakers consider a sweeping plan to legalize and tax cannabis, and pour money into minority communities devastated by the War on Drugs.

Gov. Andrew Cuomo, a moderate Democrat, is this year strongly backing marijuana legalization and hopes to persuade governors and voters in surrounding states to adopt similar measures.

New York lawmakers considered a similar legalization plan last year but failed. While it was predictably opposed by law enforcement, conservatives and teacher groups, it also found opposition from an unexpected quarter: progressive activists who said the measure didn't do enough to help minority communities.

Most states that have legalized marijuana have made only minor steps to aid communities historically targeted with unfair drug-law enforcement, and progressive activists said they would rather wait a year than accept yet another law that didn't do enough to correct policies upheld by the War on Drugs that targeted many blacks and Latinos for decades in the U.S.

New York is one of several states that may legalize cannabis this year, as lawmakers and voters also consider proposals in Arizona, Arkansas, Pennsylvania, Connecticut, New Hampshire, North Dakota, South Dakota, Rhode Island and New Jersey. Eleven states already permit recreational cannabis, while 33 states permit some form of medical marijuana.

Cuomo's proposal is similar to plans proposed by Democratic state legislators and creates a new Office of Cannabis Management to oversee and regulate the entire industry. Advocates say having a powerful centralized office will be an effective way to make sure women, minorities and farmers get help in acquiring licenses. Critics fear that central office could be improperly influenced by politics, given the huge sums of money at stake. But both agree minority communities should have the opportunity to benefit from new business opportunities.

In other states that have legalized marijuana without making special equity provisions, sales
licenses have overwhelmingly gone to wealthy white men without criminal records. Activists have said this system perpetuates the harms of the War on Drugs and its impact on minority communities.

Jessica Gonzalez, general counsel for Minorities for Medical Marijuana, pointed to Illinois, where despite having a social equity program, there were few low-income or minority applicants during the first round of licensing. It opened too quickly, benefiting established companies and rich entrepreneurs who knew how to navigate the complicated process. “Even the timelines can be prohibitive,” Gonzalez said.

Washington State also saw fatal crashes with stoned drivers more than double in the five years after recreational pot became legal. And while Cuomo and state Sen. Liz Krueger’s legalization bills impose strict punishment on people who drive while high, no state has yet developed the marijuana equivalent of a “breathalyzer,” a quick roadside test to determine whether someone is driving impaired.

Cuomo's office says legal marijuana in New York could ultimately generate as much as $300 million in new taxes once the industry is fully operational. New York is facing a $6.1 billion budget deficit driven largely by rising health care costs, and lawmakers across the country have eagerly taxed pot to help bridge budget gaps.

But activists are increasingly pushing politicians to acknowledge that it's wrong to tax marijuana users without also offering assistance to unfairly targeted communities.

Like other cannabis legalization efforts before state lawmakers or voters across the country this year, Cuomo's proposal contains provisions to address youth use, target stoned drivers and track marijuana production from seed to sale to reduce the black market. His plan also allows people who might not otherwise qualify for a license on their own to join cooperatives, and uses some of the tax money collected on pot sales to help boost marijuana businesses in communities previously targeted by unfair drug-law enforcement.

Holland, of New York City-based On The Revel, said he would have preferred to see New York be further along with legalization by 2020, rather than still debating the plan's specifics. Holland said he worries that minorities like him trying to break into the cannabis space could be left even further behind if the federal government acts before New York gets its system running.

For critics, however, federal legalization remains unlikely for the foreseeable future. In fact, Congress face long odds in the Senate, which has yet to move on a House-passed bill that is limited to offering protections for banks that do business with marijuana companies.

"I am concerned he's going to spend some political capital and twist arms. I think it's going to be tough but it's winnable," Anti-legalization campaigner Kevin Sabet said of his opposition plans. "Legalization has hit some walls."
A Carbon Tax for the United States?
A BILL IN CONGRESS COULD SLASH AMERICAN GREENHOUSE-GAS EMISSIONS. IT’S EVEN BIPARTISAN—IF YOU SQUINT.

BY ROBINSON MEYER

In Washington, the immaculate solution to climate change has a name: a bipartisan, revenue-neutral carbon tax.

That bill is the Energy Innovation and Carbon Dividend Act (EICDA). Under the plan, the government would charge companies for every ton of greenhouse gas they emit. Instead of spending that money, the government would immediately send it back to Americans as a tax cut or check. Over time, Americans would make greener choices (a win for Democrats) without growing the size of the government (a win for Republicans). And so climate change would slow (a win for everyone).

The research is promising. Last week, a study from economists at Columbia University found that the tax plan with the most support in Congress would slash American carbon pollution by almost 40 percent within a decade. It would outperform any Obama-era climate policy and go well beyond the United States’ 2015 commitment under the Paris Agreement.

“A lot of Republicans are at least getting the intellectual argument” for a carbon tax, Representative Francis Rooney of Florida said, who was the only Republican co-sponsor. But actually joining a bill is risky for them. “It’s like walking out in muddy water—you’re not sure whether there’s a stingray down there or something.”

The bill is “a very aggressive, climate-hawk version of a carbon tax,” Noah Kaufman, an economist at Columbia University and an author of the study said. In the bill’s first year, it imposes a price of $15 on every ton of carbon pollution. That fee then rises by at least $10 a year—except in years when pollution does not decrease fast enough, in which case the fee would increase by $15. By 2030, the United States could see a carbon price in excess of $100 a ton, adding at least 90 cents to the cost of a gallon of gas.

“Coal is basically gone in 2030 under the carbon tax,” Kaufman said. At the same time, renewables grow to generate nearly half of American power.
There is one big benefit associated with high taxes: bigger checks. In 2020, every adult with a Social Security number would receive a monthly check for $50, the study projects. But after a decade, those same checks would come to roughly $275 a month, or $3,300 a year. Children with a Social Security number would receive a check half that size.

Matto Mildenberger, a political scientist at UC Santa Barbara who studies carbon prices, is not so confident: Years of research have convinced him that many carbon taxes do not survive for very long after they pass. “It is very difficult to sustain political coalitions to pass and then maintain carbon prices,” he told me. “A cost is very easy to make salient for consumers.”

Carbon prices tend to focus all the political debate on a single number—the price of a ton of carbon. They place most of the benefits of that policy, and the cost of inaction on climate change, in the background. The regular checks guaranteed by the EICDA are a “really interesting, compelling idea” to surmount those political problems, he said. “But it’s not clear to me that there’s a lot of empirical evidence that it’s true.”

For advocates, the situation is frustrating. The idea of a carbon tax seems to have broad support, but no momentum. In January, more than 3,500 economists—including 27 Nobel laureates and every living former chair of the Federal Reserve—said that a carbon tax was “the most cost-effective lever to reduce carbon emissions at the scale and speed that is necessary.” The International Monetary Fund recently called for a global carbon price of at least $75 a ton, a much heftier price than is in effect almost anywhere in the world.

Yet look around and you’ll notice: The idea has faltered in practice. There’s still not an economy-wide carbon tax in the United States. Washington State has twice rejected a carbon tax by ballot referendum. And the latest setback for the greens comes in Oregon where, despite Democrat-control of state government, Republican legislators have, thus far, blocked passage of cap & trade legislation, doing so for a second straight year.

“We have 1% of the total U.S. emissions,” Senator Bill Hansell (R-Athena) said, adding that Oregon represents one tenth of 1% of global emissions. “This will not reduce carbon, but only raise taxes,” Senator Hansell said of the cap & trade bill pending in Oregon, adding that “it does not make sense.”

Under cap & trade, New Hampshire Governor Chris Sununu explained in rejecting a similar proposal for his state this past December, “rural communities would be left at a severe disadvantage…as drivers will bear the brunt of the artificially higher gas prices.”

“The bottom line is that you’ve got to change the market,” Rooney said. “CO2. Can’t get around it.”

(4) News on Mandatory Vaccination
Get Vaccinated or Leave School: 26,000 N.Y. Children Face a Choice

RELIGIOUS EXEMPTIONS FOR VACCINATIONS ARE NO LONGER AVAILABLE. WITH THE START OF THE SCHOOL YEAR, SOME PARENTS FACE A RECKONING.

BY SHARON OTTERMAN

Jacquelynn Vance-Pauls, a real-estate lawyer in upstate New York, has a 14-year-old son with autism who was recently kicked out of his private special needs school. Her 9-year-old twins and her high-school senior are also on the verge of being expelled from their public schools.

The children did not do anything wrong, nor are they sick. Instead, Ms. Vance-Pauls has resisted complying with a new state law, enacted amid a measles outbreak, that ended religious exemptions to vaccinations for children in all schools and child care centers.

Ms. Vance-Pauls said she believed vaccines contributed to her son’s autism, despite more than a dozen peer-reviewed studies showing no such link. The Bible, she said, barred her as a Christian from “desecrating the body,” which is what she says vaccines do.

Under the new law, all children who previously had obtained religious exemptions to vaccinations must begin getting their vaccines within the first two weeks of classes and complete them by the end of the school year. Medical exemptions to school vaccinations remain. Otherwise, their parents must home school them or move out of the state.

The measles outbreak that prompted the new law is actually easing. On Tuesday, Mayor Bill de Blasio declared an end to the measles outbreak in New York City, its epicenter. Since the start of the outbreak in October 2018, there have been 654 measles cases in the city and 414 in other parts of the state, where transmission has also slowed.

The large majority of cases have involved unvaccinated children in Hasidic Jewish communities, where immunization rates were sometimes far lower than the state average of 96 percent.

When 95% of a population is immune to measles, the disease cannot spread. This is known as herd immunity, and it is the cornerstone of the WHO’s long-held plan to eradicate measles globally.

“The threat remains, given other outbreaks in the U.S. and around the world,” said Dr. Oxiris Barbot, the city’s health commissioner. “Our best defense against renewed transmission is
having a well-immunized city.”

With the passage of the new law on June 13, New York became only the fifth state to bar all nonmedical exemptions to vaccination and now has among the strictest policies in the nation.

“I assure you, vaccines are safe and effective,” Dr. Howard A. Zucker, the state health commissioner, says in a public service announcement running on television. But for parents who remain deeply skeptical, more steps will be needed, according to doctors who study vaccine refusal.

Dr. Daniel Salmon, the director of the Institute for Vaccine Safety at the Johns Hopkins Bloomberg School of Public Health, pointed out that unease about vaccines is not just a fringe issue. A 2011 study, for example, found that roughly a quarter of all American parents had serious concerns about vaccines and 30 percent worried that vaccines may cause learning disabilities, such as autism.

Illinois State Rep. Darren Bailey, R-Xenia, said he has concerns about the vaccine bills. He said he understood the importance of working to get rid of measles, but said people have a problem mandating away parental choice.

“If 1.5 percent of families opt-out as the state figures show, then that would suggest that they would be the only ones really susceptible, everyone else should be OK,” Bailey said.

In New York, a tiny fraction of children had religious exemptions: about 0.8 percent of all school children statewide in 2017-18, the last school year for which data was available.

California made it impossible for people to opt out of immunization on anything other than medical grounds in 2016. There is evidence that the California legislation has worked — between 2013 and 2017 the proportion of children attending kindergarten who were not up to date on their vaccinations halved, to 4.9%. But this might not tell the whole story. Daniel Salmon points out that the number of unvaccinated children being educated at home in California almost quadrupled between the 2016–17 and 2018–19 school years.

For Ms. Vance-Pauls, Tuesday marked the end of the line. With school starting on Wednesday, she had made a 6:30 p.m. appointment with a doctor on Tuesday for each of her children to get one shot apiece, and appointments over the coming weeks for the rest of the required shots. Mandatory school vaccinations in New York include shots to protect against polio, mumps, measles, diphtheria, rubella, chickenpox, pertussis, tetanus, and hepatitis B.

Her family did not have the option to home school or move so she felt she had no other choice.
Appendix B. News Knowledge Questions

(1) News on Gun Control

1. The proposed gun purchase limit of Virginia is stricter than which of the following state?
   a. Massachusetts
   b. California
   c. none of the above
   d. don't know/not sure

2. Approximately how many protesters participated in the rally against gun control bills in Richmond, Virginia?
   a. more than 5,000
   b. more than 20,000
   c. more than 100,000
   d. don't know/not sure

3. Which of the following proposed bills did Virginia use to have?
   a. one-month-a-gun limit
   b. a redflag law
   c. universal background checks
   d. don't know/not sure

4. What is the reason why critics oppose the bill of assault weapon ban in Virginia?
   a. There was confusion over what types of guns would constitute an assault weapon.
   b. There were only very few assault weapon owners in Virginia.
   c. Studies produced lackluster findings for assault weapon ban.
   d. don't know/not sure

5. How many states have adopted some sort of universal background checks for gun purchase?
   a. 11
   b. 21
   c. 31
   d. don't know/not sure

6. How many percent of guns used in crimes between 2010 and 2015 in New York state came from Virginia?
   a. 15%
   b. 26%
   c. 44%
   d. don't know/not sure

7. Which types of firearms are most associated with gun deaths in the U.S., according to the article?
   a. Assault weapons
   b. Handguns
   c. Shotguns
d. don't know/not sure

8. Stricter gun control laws proposed by Virginia will prevent shipping guns from state to state.
   a. True
   b. False
   c. don't know/not sure

Consistent/Inconsistent Knowledge Questions:
Pro- stricter gun control questions: 1, 3, 5
Con- stricter gun control questions: 2, 4, 8

(2) News on Marijuana Legalization

1. How many states in the U.S. have already permitted recreational marijuana??
   a. 11
   b. 22
   c. 33
   d. don't know/not sure

2. Both sides agreed that having a central Cannabis Management office to oversee and regulate the entire industry would ensure minority communities having opportunities to benefit from new business opportunities.
   a. True
   b. False
   c. don't know/not sure

3. Where have first-round sales licenses primarily gone to in Illinois, where there is an equity program?
   a. women, minorities and farmers without criminal records
   b. wealthy people without criminal records
   c. distributed somewhat equally
   d. don't know/not sure

4. How much money can recreational marijuana sales generate in new taxes of New York state, once the industry is fully operational?
   a. 60 million
   b. 300 million
   c. 1 billion
   d. don't know/not sure

5. New York is the only state that may legalize marijuana this year.
   a. True
   b. False
   c. don't know/not sure

6. Which of the following statements is true?
b. Washington D.C. has developed a quick roadside test to determine whether someone is driving impaired.
c. Cuomo's proposal does NOT contain provisions to address stoned drivers.
d. don't know/not sure

7. According to the article, which one of the following measures was proposed to address social equity and help minority communities?
   a. prioritize low-income or minority applicants in sales licensing
   b. use tax money collected on pot sales to help minority communities
   c. all of the above
   d. don't know/not sure

8. The Congress approved a bill that offers protections for banks that do business with marijuana companies.
   a. True
   b. False
   c. don't know/not sure

Consistent/Inconsistent Knowledge Questions:
Pro- marijuana legalization questions: 4, 7, 5
Con- marijuana legalization questions: 3, 6, 8

(3) News on Carbon Tax

1. How many Republican Representatives cosponsored this bipartisan tax plan?
   e. 0
   f. 1
   g. 10
   h. don't know/not sure

2. Which of the followings is the estimated outcome if the proposed carbon tax plan (EICDA) is enacted?
   a. increased government size
   b. decreased carbon pollution
   c. all of the above
   d. don't know/not sure

3. Under the EICDA plan, the fee will start from $15/ton and rise by $10 a year steadily.
   a. True
   b. False
   c. don't know/not sure

4. How much money would every adult with a Social Security number get from a monthly check by 2030, if the proposed carbon tax plan (EICDA) is enacted in 2020?
5. The International Monetary Fund was NOT in favor of the idea of a carbon tax.
   a. True
   b. False
   c. don't know/not sure

6. What was the reason why New Hampshire Governor rejected a cap & trade bill?
   a. The level of carbon emission in New Hampshire was low.
   b. He perceived it a law to increase tax.
   c. He was concerned about adding fuel cost to rural drivers.
   d. don't know/not sure

7. According to the article, which of the following states has adopted an economy-wide carbon tax?
   a. California
   b. New York
   c. none of the above
   d. don't know/not sure

8. In Oregon, the cap & trade legislation finally passed this year because of Democrat-controlled state government.
   a. True
   b. False
   c. don't know/not sure

Consistent/Inconsistent Knowledge Questions:
Pro- carbon tax questions: 2, 4, 5
Con- carbon tax questions: 1, 6, 8

(4) News on Mandatory Vaccination

1. The measles outbreak in New York were largely associated with:
   a. unvaccinated children in certain New York communities
   b. outbreak around the world
   c. home schooling children
   d. don't know/not sure

2. Scientific evidence showed that the link between vaccination and autism is:
   a. Weak
   b. Strong
   c. No such link
   d. don't know/not sure
3. What percentage of parents have concerned that vaccines may cause learning disabilities?
   a. 10%
   b. 30%
   c. 50%
   d. don't know/not sure

4. If there are only 0.8% children who don't get vaccinated in New York, the community should have achieved herd immunity?.
   a. True
   b. False
   c. don't know/not sure

5. How many states are barring all non-medical exemptions to vaccination in the United States, according to this article?
   a. 5
   b. 10
   c. 25
   d. don't know/not sure

6. The increases in immunization rates in California is due to which of the following reasons?
   a. mandatory vaccination with only medical exemptions
   b. parents turn to homeschooling
   c. all of the above
   d. don't know/not sure

7. After the passage of the new law, the measles outbreak in New York State?
   a. is easing
   b. remains severe
   c. is worsening
   d. don't know/not sure

8. Why did Illinois State Rep. Darren Bailey have concerns about the mandatory vaccine bills?
   a. He had concerns that more vaccines could be made mandatory for school children.
   b. He worried that it would be an infringement on parental rights.
   c. He was not sure about the safety of vaccines.
   d. don't know/not sure

Consistent/Inconsistent Knowledge Questions:
Pro- mandatory vaccinations questions: 1, 2, 7
Con- mandatory vaccination questions: 3, 6, 8
## Appendix C. Means of Variables in Voluntary Action Groups

### Comparing Voluntary Action vs. Forced Action

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*Significant at p < 0.05
Comparing Voluntary No-Action vs. Cue conditions

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<td>Post-exposure Attitude Extremity</td>
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<td>1.03</td>
<td>3.71</td>
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<tr>
<td>Affective Polarization</td>
<td>45.08</td>
<td>35.76</td>
<td>44.57</td>
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<tr>
<td>Willingness to Deliberate</td>
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<td>4.86</td>
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<td>5</td>
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Appendix D. Means of Variables across Seven Experimental Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<tbody>
<tr>
<td>control</td>
<td>4.47</td>
<td>1.97</td>
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<td>low effort - cue</td>
<td>3.88</td>
<td>1.73</td>
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<tr>
<td>low effort - forced</td>
<td>3.88</td>
<td>1.88</td>
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<tr>
<td>low effort - voluntary</td>
<td>4.00</td>
<td>1.58</td>
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<td>high effort - cue</td>
<td>4.19</td>
<td>1.91</td>
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<td>high effort - forced</td>
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<tr>
<td>high effort - voluntary</td>
<td>4.43</td>
<td>1.91</td>
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</table>

One-way ANOVA: $F(6, 360) = 0.91, p = 0.49$

Post-hoc analysis: No significant differences
### Post-exposure Attitude Extremity Means across Seven Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<tr>
<td>control</td>
<td>2.00</td>
<td>0.98</td>
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<tr>
<td>low effort - cue</td>
<td>2.08</td>
<td>1.03</td>
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<td>low effort - forced</td>
<td>2.27</td>
<td>0.90</td>
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<td>low effort - voluntary</td>
<td>2.45</td>
<td>0.89</td>
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<td>high effort - cue</td>
<td>2.05</td>
<td>1.11</td>
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<td>high effort - forced</td>
<td>2.44</td>
<td>0.77</td>
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<tr>
<td>high effort - voluntary</td>
<td>2.26</td>
<td>1.01</td>
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</table>

One-way ANOVA: $F(6, 361) = 1.87, p = 0.09$. Significant differences were found in the following post-hoc comparisons: control < low-effort voluntary action, $p<0.05$; control < high-effort forced action, $p<0.05$; high-effort cue < high-effort forced action, $p<0.05$; high-effort cue < low-effort voluntary action, $p<0.05$.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
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</thead>
<tbody>
<tr>
<td>control</td>
<td>51.64</td>
<td>29.31</td>
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<td>low effort - cue</td>
<td>45.08</td>
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<td>low effort - forced</td>
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<td>high effort - cue</td>
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<td>high effort - forced</td>
<td>41.50</td>
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<td>high effort - voluntary</td>
<td>54.78</td>
<td>31.36</td>
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</table>

One-way ANOVA: F(6, 361) = 2.03, p = 0.06
Significant differences were found in the following post-hoc comparisons: control > high-effort cue, p<0.05; low-effort forced action > high-effort cue, p<0.05; high-effort voluntary action > low-effort free action, p<0.05; high-effort voluntary action > high-effort cue, p<0.05.
### Deliberation Willingness Means across Seven Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<tbody>
<tr>
<td>control</td>
<td>3.91</td>
<td>1.78</td>
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<tr>
<td>low effort - cue</td>
<td>4.77</td>
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<td>low effort - forced</td>
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<td>low effort - voluntary</td>
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<td>1.75</td>
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<td>high effort - forced</td>
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<td>high effort - voluntary</td>
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<td>1.55</td>
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</table>

One-way ANOVA: $F(6, 360) = 1.64, p = 0.13$

Significant differences were found in the following post-hoc comparisons: control < low-effort cue, $p<0.05$; control < low-effort voluntary action, $p<0.05$; control < high-effort cue, $p<0.05$; control < high-effort forced action, $p<0.05$. 
One-way ANOVA: $F(6, 361) = 2.08, p = 0.06$

Significant differences were found in the following post-hoc comparisons: control < high-effort cue, $p<0.05$; control < high-effort voluntary action, $p<0.05$; low-effort forced action < high-effort cue, $p<0.05$; high-effort forced action < high-effort cue, $p<0.05$. 
Appendix E. Correlation Table

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<tr>
<th>Variables</th>
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<td>-0.03</td>
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<td>.207**</td>
<td>.147**</td>
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<td>.107</td>
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<td>13. sense of agency</td>
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<td>.756**</td>
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<td>.303**</td>
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<td>0.03</td>
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</tr>
</tbody>
</table>

* indicates significance at p < .05
** indicates significance at p < .01
| 14. deliberation interest | -0.02 | .200 ** | .255 ** | -0.01 | .147 ** | .249 ** | -0.06 | .360 ** | -0.132 * | 0.09 | .171 * | .245 ** | .204 ** | 1.00 |
| 15. deliberation expectation | 0.00 | .145 ** | 0.09 | -.131 * | .238 ** | .119 * | 0.01 | .374 ** | -.140 ** | 0.01 | -0.08 | .291 ** | .257 ** | .415 ** | 1.00 |
| 16. post_att_extreme | -.229 ** | .277 ** | .514 ** | 0.09 | -0.08 | 0.02 | 0.08 | 0.07 | 0.09 | 0.03 | -0.01 | -0.02 | -0.07 | .211 ** | 0.08 | 1.00 |
| 17. pre_att_extreme | -.218 ** | .242 ** | .525 ** | 0.09 | -0.06 | 0.07 | 0.08 | .122 * | 0.03 | 0.04 | 0.07 | 0.01 | -0.10 | .179 ** | .122 * | .676 ** | 1.00 |
| 18. affective polarization | -.139 ** | .194 ** | 0.10 | .134* | -0.09 | 0.05 | .114 * | 0.01 | -0.03 | -0.03 | -0.02 | -0.06 | -0.07 | -0.08 | .134 ** | .186 ** | 1.00 |

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Appendix F. Factor Loadings for the Confirmatory Factor Analysis on Perceived Interactivity and Sense of Agency

1. One-factor Model

2. Two-factor Model
VITA

Jinping Wang

EDUCATION

Ph.D. in Mass Communication, Penn State University, 2020
M.A. in Communication Studies, Renmin University of China, 2016
B.A. In Advertising, Renmin University of China, 2014

SAMPLE PUBLICATIONS


TEACHING EXPERIENCES

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- COMM 428C Strategic Communication in a Global Environment (Online)
- COMM 420 Advertising/Public Relations Research Methods (Offline)