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The effects of likes on public opinion perception and personal opinion

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Abstract: Drawing on the spiral of silence theory and heuristic information processing, we contend that individuals use likes as sources for assessing public opinion. We further argue that individuals may even adapt their personal opinions to the tenor reflected in those cues. The assumptions were tested using data from an experiment involving 501 participants, who encountered media items on two issues with or without likes. The findings show that respondents inferred public opinion from the media bias if it was supported by likes, however, only in cases of high levels of fear of social isolation. Respondents further adapted their personal opinion to the media bias if it was supported by likes.

Keywords: likes, public opinion, heuristic processing, online media, media effects

Introduction

In media effects research, public opinion perception is key to understanding individual opinion formation. Most prominently, public opinion perception is addressed in the spiral of silence theory (Noelle-Neumann, 1993), which states that speaking out in public is inhibited if perceived public opinion is not in line with personal opinion. Public opinion perception can thus start a spiraling process that may lead to a change in public opinion. Following Noelle-Neumann's observations of a "last-minute swing" in the 1965 and 1972 German national elections (Noelle-Neumann and Petersen, 2004), public opinion perception may even affect election outcomes. Just a few weeks before the election, individuals changed their party preference to be in line with the perceived majority. This finding suggests that perceived public opinion not only affects speaking out in public, but may also alter personal opinion. These effects are addressed in the conformity hypothesis, which is an often neglected but crucial part of the spiral

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of silence theory. Gonzenbach (1992) even holds that the "pressure to conform is at the heart of Noelle-Neumann's definition of public opinion and the spiral of silence" (p. 633). He explains: "The hypothesis states that one's perception of the opinions of others leads to one's own opinion" (p. 634), thereby clearly conceptualizing opinions as a dependent variable. Studies from informational social influence support this assertion. Individuals seek guidance from public opinion when forming personal opinions (Burnstein and Vinokur, 1975; Price, Nir, and Cappella, 2006).

To assess public opinion, individuals use mass media coverage as an indicator of what most people think (Noelle-Neumann, 1993). The media thus play a key role in public opinion perception. This notion clearly resonates with third person effect theory (Gunther, 2014), which might even amplify the role of media coverage. The more people believe in media influence, the more likely they will expect media coverage to shape public opinion in the near future. While in the offline world, the opinion tenor of news items was the only media cue for inferences of public opinion, today's online news environments provide a wide range of additional cues. Above all, audience feedback of online media items (Singer, 2014) using tools such as likes, shares, and user comments serves as a source for assessing what other people think. These cues may be divided into aggregate user reactions (e. g., number of likes, recommendations, or shares) and individual user reactions (e. g., user comments). While individual user reactions are information-rich because they are language-based, may convey different degrees of support or rejection, and include minimal elaboration on the issue at stake, aggregate reactions are simple. They only indicate the number of positive reactions in the audience. Undoubtedly, likes are among the most common aggregate popularity indicators (Knobloch-Westerwick, Sharma, Hansen, and Alter, 2005; Porten-Cheé, Haßler, Jost, Eilders, and Maurer, 2018) in online environments.

Drawing on the spiral of silence theory and approaches on informational influence concerning opinion formation, this paper investigates the extent to which likes adjacent to online news items shape users' inferences with respect to public opinion and affect their opinion formations.

Theoretical foundations

Spiral of Silence and Heuristic Information Processing

According to the spiral of silence theory, people constantly monitor their social environment to assess public opinion. The theory states that for controversial and morally loaded issues (for a discussion of the spiral of silence theory premises, see Scheufele and Moy, 2000), individuals who see themselves in a minority position refrain from speaking out in public, starting a spiral in which the alleged minority increasingly falls silent, thus reinforcing the impression that the opinion at stake is, in fact, a minority position (Scheufele and Moy, 2000). Noelle-Neumann (1993) claimed that fear of social isolation (FSI) is the driving force for collecting information on what other people think. FSI is an integral part of the theory for two reasons: It represents a motive for monitoring others' opinions, and it explains the silencing effect, which is the most prominent part of the spiral of silence theory. Monitoring is performed either through interpersonal communication or through the mass media. Noelle-Neumann (1993) assigned the media an important role in the spiral of silence theory when she stated that media representations of opinions shape the perception of public opinion (for alternative explanations of public opinion perception and consecutive opinion expression, see, e. g., Fields and Schuman, 1976; Oshagan, 1996). Consequently, media content is frequently used as an indicator of public opinion.

Under online conditions, the media provide even more indicators for public opinion. Several studies have investigated whether the assumptions of the spiral of silence theory hold true under conditions of oftentimes selective online media use, which is likely to disregard counter arguments. In sum, the state of the research is inconsistent. Some studies present evidence for silencing effects, which means that perceiving a mismatch between one's own opinion and the opinion of others (i. e., online peers, the general public, etc.) lowers the willingness to speak out (e. g., Gearhart and Zhang, 2014; Hampton et al., 2014). Other studies could not find support for the silencing hypothesis (e. g., Ho, and McLeod, 2008; Porten-Cheé and Eilders, 2015). One of the reasons for the contradictory evidence is the lack of research on the effect of online media cues on public opinion perception (Tsfati, Stroud, and Chotiner, 2014; Wojcieszak, 2008) – because understanding the logics of the latter is a prerequisite for studying the subsequent silencing effects.

This article contributes to the research on public opinion perception and aims to shed more light on how people monitor the many and oftentimes contradictory online media cues, and how they infer public opinion from the aggregate cues,

such as the number of likes from fellow audience members. There are several explanations as to why such user reactions may affect public opinion perception:

First, likes may serve as explicit cues that help to derive the opinion of others, in analogy to the unambiguous and easy-to-gather numeric information provided through survey data in media items (Zerback, Koch, and Krämer, 2015). Second, given the absence of dislikes, high numbers of likes may be perceived as previous users' support of the respective media item. Consecutive users may, by ways of heuristic processing, read such "consensus cues" (Walther, Jang, and Hanna Edwards, 2016, p. 4) as indicators of correctness. Thus, users encountering the presumably unanimous assessment are likely to believe that the positive assessment reflected in the likes is accurate. Third, likes may function as anchors (anchor heuristic, see Tversky and Kahneman, 1974): As they are often shown prominently, that is on the top of a media item or post, likes are predestined to be noticed and thus likely to influence the opinion of users who have no clear position on the issue at stake. Fourth, this idea ties in with the bandwagon heuristic. The number of likes reveals collective behavior, that is, the selection of content by other users. This visible behavior may point to acceptable opinions in online items that are helpful to form one's own opinions on abstract issues and thus seem appropriate to select and adapt (Sundar and Nass, 2001). Likes may therefore serve as heuristic shortcuts when assessing public opinion (Lee and Jang, 2010; Porten-Cheé et al., 2018). Fifth, following warranting theory (DeAndrea, 2014; DeAndrea and Carpenter, 2016), individuals may be particularly susceptible to likes because users would rather rely on the information provided by aggregate cues than on information provided through single user comments, which is easier to manipulate for individual users. Sixth, as FSI motivates users to closely monitor their environment for the opinion of others and be more attentive to online audience cues (Neubaum and Krämer, 2017), people with pronounced FSI may anticipate particularly well that likes stand for what many others, or even the majority of the population, think.

Finally, it is debatable whether or not likes may be seen as representing public opinion in the eyes of users, because they are just one of many possible indicators that may be used for inferences of public opinion (for different conceptualizations of public opinion, see, e. g., Herbst, 1993). However, liking is a popular behavior, especially on social media platforms, and research has drawn attention to likes because they are seen as easy to decode, and thus may affect the perceptions and opinions of users more strongly than, for example, textual cues.

State of the research on the effects of likes

There is plenty of evidence that users take notice of likes and process them with regard to both media exposure and further reactions (e. g., Messing and Westwood, 2014; Winter and Krämer, 2014). Given such effects of likes on media use, it may be expected that users rely on them as cues in assessing public opinion and in forming personal opinions. Although references to the spiral of silence are the exception rather than the rule in empirical studies on likes, there are obvious conceptual ties in many studies dealing with public opinion perception.

Oh (2014) examined the effect of "top comments" on perceived public opinion about presidential candidates on mock news websites. Top comments integrate aggregate and individual cues; they represent individual user comments that received many likes. In Oh's (2014) experiment, subjects encountered opinionated user comments about the main presidential candidates. The control condition was an even distribution of pro-liberal vs. pro-conservative user comments; the top-comments condition consisted of visually highlighted comments liked by many users that mainly supported liberal candidates in the United States and in Korea. Oh found that those exposed to the top-comments condition perceived public opinion as supportive of the liberal candidates—in contrast to those exposed to the comments-only condition. Contrary to Oh's findings, experimental data by E.-J. Lee and Jang (2010) did not indicate any impact from aggregate user reactions. Examining the effects of aggregate and individual user reactions attached to online media items, the scholars found that the aggregate support of other users did not change public opinion perception.

Literature on the effects of likes on personal opinion primarily involves health issues. Related findings, however, are most likely applicable to political contexts as well. Peter, Rossmann and Keyling (2014) studied the effects of likes in the topical context of flu vaccinations. Their data showed that reading social media comments supporting flu vaccinations with additional likes promoted a positive attitude toward them in contrast to the no-likes condition. Moreover, Jin, Phua and Lee (2015) found experimental evidence for a positive effect of a Facebook breastfeeding page's number of likes on breastfeeding attitudes. Finally, Walther et al. (2016) showed that aggregate user ratings had a positive effect on the perceived quality of user advice messages regarding anonymous HIV testing.

Hypotheses

Against the background of the spiral of silence theory, the present study scrutinizes some of the theory's assumptions under conditions of online communication. We therefore suggest a set of hypotheses that do not test the theory as a whole but serve to show whether or not aggregate audience cues affect recipients' perceptions and personal opinions at all. This exploration is necessary given the scarce findings of the underlying research field. Especially the effects on public opinion perception are particularly contested.

The effects of likes on opinions or perceptions may not be seen as effects by likes themselves, but they may reinforce the effects of the media items (news items, user posts, etc.) to which they refer. This means that likes adjacent to media items may lead to the adoption of the opinion reflected in the item— either as the user's personal opinion or as his/her perception of public opinion. To extend the rather small body of evidence in this field of research, we conducted an experiment on the effects of likes on public opinion perception and personal opinion. We expected likes to affect public opinion perception and personal opinion as follows:

> H1a: When subjects are exposed to a biased media item with likes, they will perceive public opinion to be more in line with that bias than when exposed to a media item only.

> H1b: When subjects are exposed to a biased media item with likes, they will adapt their personal opinion to be more in line with that bias than when exposed to a media item only.

Following the spiral of silence theory, the FSI concept (Noelle-Neumann, 1974, 1993) is the main driver used to monitor the social environment and to adapt both the willingness to speak out and personal opinion is in line with perceived public opinion. Accordingly, subjects with a high degree of FSI are expected to pay more attention to media cues of public opinion and to show stronger effects than subjects with a low degree of FSI. We expected this to also apply to the additional cues provided in online media environments. Concerning likes adjacent to biased media items, we therefore expected stronger effects for subjects with high degrees of FSI. Thus, two hypotheses were stated:

> H2a: When exposed to biased media items with likes, high-FSI individuals show stronger effects on public opinion perception than low-FSI individuals.

> H2b: When exposed to biased media items with likes, high-FSI individuals show stronger effects on personal opinion than low-FSI individuals.

Method

Experimental design

We conducted a one-factorial between-subjects online experiment (number of likes: no likes, few likes, many likes) to test the effects of likes on perception of public opinion and personal opinion. The subjects encountered two issues, carefully selected to comply with the spiral of silence theory's premises of controversy and moral loading. The issue selection was based on the results of a pretest consisting of a small online survey (n = 103) testing individuals' awareness of, and involvement with, six controversial issues (fracking, childcare subsidy, the increase in the retirement age, the anonymity of online discussions, assisted suicide, and the legalization of cannabis). All issues had received moderate attention in the German media at the time of the study. Moderate attention ensured external validity because the issues were not completely new to the participants. Accordingly, participants were likely to be aware of the issue but unlikely to hold fixed opinions about it. Furthermore, issue involvement was required to be at least moderately pronounced, so the participants were likely to fear social isolation because the issue mattered to them. With regard to these requirements, childcare subsidy and the anonymity of online discussions proved to be particularly well suited for the stimulus construction.

The childcare subsidy issue deals with the German Federal Constitutional Court's ruling that the childcare subsidy is unlawful. Advocates point to the freedom of choice offered to parents through financial support, while opponents state that the "kitchen premium" supports only an outdated idea of family. The issue of anonymity in online discussions concerns a debate on the question of whether the quality of online discourse could be improved by forcing people to use their real names. While proponents argue that, in particular, underprivileged or discriminated users depend on voicing their opinions without using their real names, opponents claim that people must be identifiable to hold them accountable in cases of undesirable behavior.

Sample

In total, 501 German participants were recruited through a commercial online access panel. To avoid the overrepresentation of certain demographic groups (Sills and Song, 2002), we applied two quota criteria. First, we sampled equal shares of female and male participants (each 50 %). Second, we collected data

only for subjects between 18 and 49 years old (M = 34.19, SD = 9.11). The age quota consisted of equal proportions of three age groups: 18–29, 30–39, and 40–49 years (each 33 %). By applying the age quota, we intended to include both younger and older online users, thereby also considering older users, who may not be very familiar with recent online phenomena, such as likes.

Participants were asked whether they supported or opposed the childcare subsidy and the anonymity of online discussions. Afterwards, two experimental stimuli, mock online media items on the two issues, were presented consecutively. The participants were asked to read the stimuli carefully. The online media items either clearly supported or opposed childcare subsidy and the anonymity of online discussions. To induce FSI, participants were always exposed to online media items that opposed their pretest personal opinion.

Experimental manipulations

The experimental stimuli (see Figure 1) consisted of two online media items: one on childcare subsidy and one on the anonymity of online discussions. Based on real text fragments from popular German online media sites, the items presented a clear bias with either a supporting or an opposing position on the issue. The manipulation consisted of presenting different numbers of likes next to the online media item. Based on a previous analysis of popular German online news sites, we found that the average number of likes that was typically displayed next to news items on the two issues was rather moderate and differed strongly between the issues. Against this background, we used 62 (few-likes condition) and 372 likes (many-likes condition) for the childcare subsidy issue and 31 (few-likes condition) and 186 likes (many-likes condition) for the anonymity issue to ensure external validity. In the no-likes condition, we presented the media item with no likes icons or counts. Potentially confounding factors (e. g., media source cues) were blurred.

Measurement

Based on operationalizations from previous studies, three indicators were measured: perception of public opinion (e. g., Kim, Han, Shanahan, and Berdayes, 2004), personal opinion (pre- and posttest), and FSI (Hayes, Matthes, and Eveland, 2013). The variables were measured with identical seven-point Likert scales (1 = totally disagree to 7 = totally agree).

Figure 1: Many-likes condition, news slant pro childcare subsidy.

Perception of public opinion was measured using the question: "Regardless of your personal opinion, how strongly do you think the general public agrees or disagrees with the following statement?" The statements read: "Childcare subsidy should be paid further" (M = 4.17, SD = 1.53) and "Discussions on the internet should continue to be conducted anonymously as well" (M = 4.82, SD = 1.59). Personal opinion before and after exposure was measured by asking the participants about their opinions on the same statements (childcare subsidy, pretest: M = 4.19, SD = 1.99, posttest: M = 3.83, SD = 1.96; anonymity, pretest: M = 4.89, SD = 1.80, posttest: M = 4.43, SD = 1.82). The FSI scale (α = .84, M = 4.15, SD = 1.40) consisted of five items such as: "It is important to me to fit in the group I am with."

Results

Treatment check

A treatment check was conducted to test whether the experimental variation led to different perceptions of the stimuli. Participants were asked to indicate how many people liked the article. Response options ranged from 1 (less than 50) to 7 (more than 300). Subjects in the many-likes condition recalled more likes than those in the few-likes condition. This was particularly true for the childcare subsidy issue (many likes, M = 4.28, SD = 1.89 vs. few likes, M = 3.83, SD = 1.96, $t(211) = -1.66$, $p \leq .05$, one-sided). The difference between the subjects in the many-likes (M = 4.50, SD = 1.98) and few-likes (M = 4.10, SD = 1.86) conditions implied that the participants also perceived the correct number of likes regarding the anonymity issue. Although the size of the difference suggested that participants had perceived the treatment as intended, the measured difference was not significant ($t(208) = -1.51$, p = .07, one-sided). We discuss this limitation in the concluding section.

Hypotheses tests

H1a stated that likes affect public opinion perception, and H2a proposed moderating effects for FSI. The hypotheses were tested using moderation analysis (model 1) by applying the PROCESS macro for SPSS (Hayes, 2013). H1 suggested that likes would provoke a shift in either public opinion perception or personal opinion in line with the media item's bias. The moderation models explained the effects of likes for each one of four media biases to which the subjects could have been exposed:

pro or contra childcare subsidy or pro or contra anonymity in online discussions. FSI was entered into the models as the moderator. Moreover, we re-grouped the conditions into a no- and few-likes condition and a many-likes condition. From a theoretical perspective, re-grouping follows the implicit assumption that people have more or less concrete ideas of threshold numbers that help them to assess which aggregation can be considered as possibly representing a significant proportion of the society or even the majority. From this view, low numbers can be included within a category of popularity cues which do not indicate the prevalent public opinion because they do not exceed the number of people in classrooms or seminar rooms. In contrast, high numbers presumably indicate the prevalent public opinion because they exceed typical group sizes and rather point to masses, as comparable to such at demonstrations or political rallies.

The moderation models explaining public opinion perception revealed that many likes had no main effect; thus, the data did not support H1a. However, the FSI provoked the effect of likes (interaction effect: $b = 0.18$, $t = 2.52$, $p \leq .05$, CI = [0.10, 0.81]) on public opinion perception regarding childcare. Employing the Johnson-Neyman technique revealed that subjects with an FSI higher than 5.65 (on a 1–7 scale) who were exposed to a pro-childcare item with many likes perceived more public support for childcare subsidy than when exposed to the same item with no or only few likes (Figure 2). Thus, although H1a cannot be supported, the data show some support for H2a—at least for one issue and for the pro media item bias (but not the contra- bias). The test of the moderation effect also showed an additional effect for subjects with a FSI lower than 2.11. These participants showed less support for childcare subsidy after being exposed to the pro-biased media item with many likes. This effect does not contradict H2a but provides a new aspect in the function of FSI.

H1b tested the effects of likes on personal opinion, and H2b tested the interaction effects with the FSI. A moderation model was therefore conducted, including likes as the independent variable, FSI as the moderator, and controlling for pretest personal opinion as the baseline factor. Concerning both issues, as expected, most of the variance of posttest personal opinion was explained by pretest personal opinion (e. g., for the anonymity issue: $b = 0.50$, $t = 5.06$, $p \leq .001$, CI = [0.31, 0.70]), that is, personal opinion was rather consistent irrespective of the stimuli. However, likes, at least for the anonymity issue, did affect personal opinion in line with the contra-biased media items. Likes inhibited support for anonymity in online discussions directly, thus reinforcing the contra media bias ($b = -0.46$, $t = -1.96$, $p \leq .05$, CI = [-0.93, 0.00]). As this effect was limited to one of two issues, and was shown only for the contra media bias, there is partial support for H1b. Finally, FSI did not provoke the hypothesized effects of likes on personal opinion regarding both issues. H2b is therefore not supported.

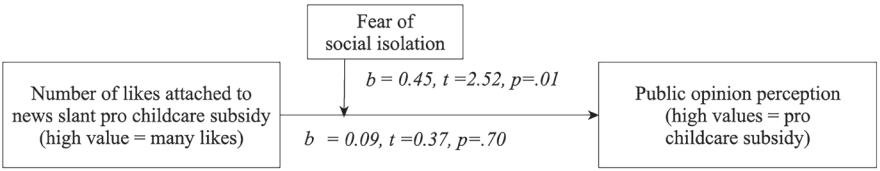

Figure 2: Moderation effect of likes on public opinion perception regarding childcare subsidy (condition: news slant pro childcare subsidy).

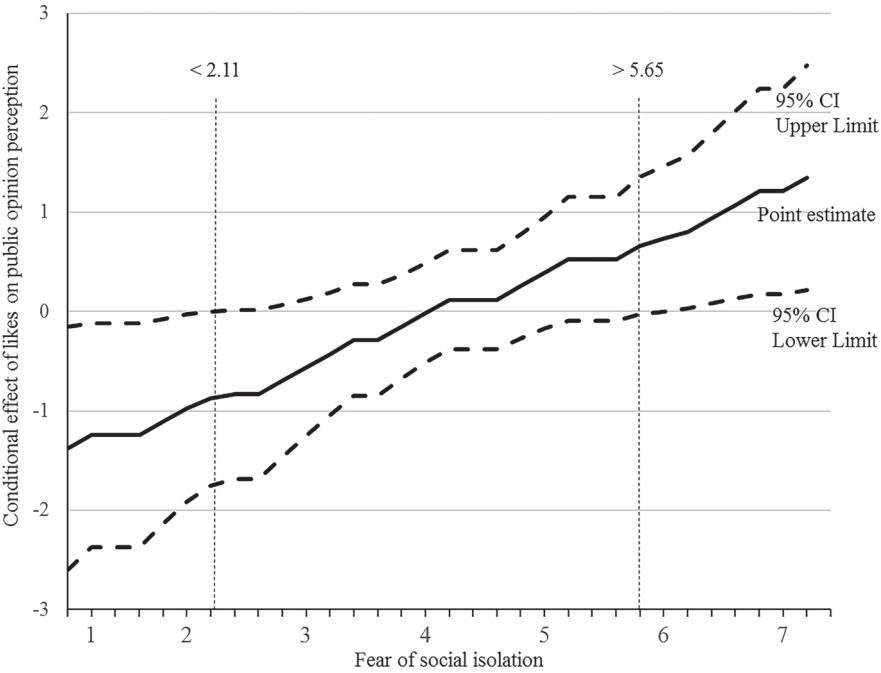

Figure 3: Conditional effect of likes on public opinion perception as a function of fear of social isolation.

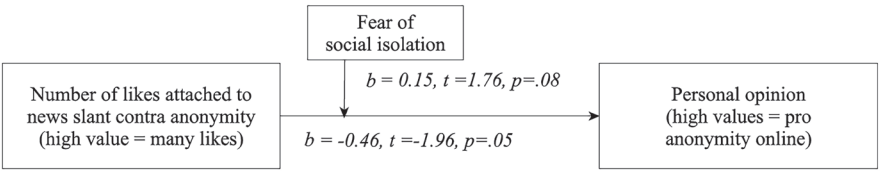

Figure 4: Direct effect of likes on personal opinion regarding anonymity online (condition: news slant contra anonymity).

Discussion

This study examined the impact of likes on opinion formation. We argued that likes are cues that help individuals process often complex media messages because they emphasize the media's opinions on issues and indicate the number of supporters. If an online media item transmits a certain opinion and has received many likes, the likes may function as proxies for public opinion and thus as an acceptable and possibly even a convincing opinion. Hence, likes might even serve as a cue for societal consensus.

Against the backdrop of a rather small body of research literature, our analyses showed that exposure to likes directly affected personal opinion. Likes next to media items changed users' opinions, making them consistent with the media bias. However, evidence for this effect was limited to one of two issues (anonymity) and media biases (contra). Thus, the effect is restricted to specific conditions and must be validated for further issues. Moreover, likes had no direct effect on public opinion perception. However, being exposed to likes next to a pro-childcare subsidy media item led users to perceive public opinion in line with the media bias. As expected, this effect was observed only under the condition of higher levels of FSI.

Against the general background of how user reactions affect attitudes and behaviors of fellow users, the presented findings regarding the effects of aggregate user reactions add to existing research on the effect of individual user reactions such as user comments: While user comments seem to directly affect personal opinion (C. Peter et al., 2014; Shi, Messaris, and Cappella, 2014), their effect on public opinion perception is less clear or bound to moderators (Lee and Jang, 2010; Zerback and Fawzi, 2016). Strikingly, likes seem to affect both personal opinion and public opinion perception in a similar way as user comments do.

For many individuals, public opinion might be a very abstract concept to imagine (Herbst, 1993), yet, the online world offers many more possibilities to infer what others think than existed ever before. For today's high-choice media environments, we showed that the spiral of silence theory is a useful theoretical architecture that offers conceptual "slots" to integrate new cues, for example, user reactions, from which people may derive public opinion and get hints to acceptable opinions to conform with. While under online conditions the spiral of silence's premises, for example, FSI, seem to be as equally valid as in low-choice media environments, likes and other user reactions to online items can be systematically included in the spiral of silence modeling. This allows us to consider the many cues for public opinion from the users that add to the existing cues from the media.

When including user reactions as new public opinion cues in the spiral of silence theory it would make sense to assess how these fit with the theory's

premises of consonance and cumulation (J. Peter, 2004). Hence, this assessment would need to consider how users who over time continuously rely on online media (cumulation) and thus encounter more of the same user reactions (consonance) perceive public opinion and form personal opinions as compared to users who rely on traditional offline media without indicators of what the others think about the issues depicted by the media. We did not investigate such long-term effects, but investigating whether such shifts become visible in a short-term perspective provides the foundation for long-term inquiries.

Some limitations of this study must be addressed. As shown in the treatment check, the participants did not consistently recall the number of likes. This shortcoming might be caused by the particularly low number of likes for the anonymity issue (186) in the many-likes condition as compared to the higher number of likes (372) for the childcare issue. This difference in the many-likes condition resulted in significant recall differences regarding the childcare issue and in only non-significant recall differences regarding the anonymity issue – which point to the right direction, however. This shows that the perception of likes needs to be examined in greater depth. Why do likes have effects even though they are not always recalled? Although the issues were selected based on a pretest, individual issue involvement regarding the anonymity issue (where the likes were not consistently recalled) may still have been so low that the users' attention was focused on processing the media messages instead of likes. Further research should therefore include issue involvement as an additional moderating variable. The same applies to other personal factors that should be taken into account. The measure of warranting value which has been introduced only recently could be applied to assess the perceived degree of manipulation concerning the number of likes (DeAndrea and Carpenter, 2016). This measure should be considered when modeling the effects of likes because users may assess the warranting value of aggregate cues differently.

In sum, our findings suggest that likes directly affect personal opinion and, under conditions of high FSI, also affect public opinion perception. These results support the applicability of the spiral of silence theory when predicting how users are affected by reactions of their fellow users.

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