



# Spiral of silence online: How online communication affects opinion climate perception and opinion expression regarding the climate change debate



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## ABSTRACT

This study tests the **spiral of silence theory** under conditions of online communication. It is argued that a **preference for user-generated content may result in different perceptions of the opinion climate than a preference for mass media**. This may also affect willingness to speak out in public. This study tested the effects of selective exposure to information regarding climate change in Germany. The individual media diets were derived from online diaries and content analyses. **The findings show no support for the spiral of silence theory. Individuals who see themselves in the minority were even more likely to express their opinions.**

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## 1. Introduction

The dissemination of online media has changed how people obtain information on current events. One dimension of change involves the increased amount of content on offer. Traditional journalism used to be the only source of information accessible for a large audience, but new sources have emerged, as anyone can now provide information with unlimited reach. User-generated content (UGC) in blogs or on social network sites (SNS), as well as content contributed by political parties, nongovernmental organizations, social institutions, and companies, complements the mass media content in online media outlets and in legacy media such as print and electronic media. The quantitative expansion of content also relates to an increase in opinion diversity, since every additional user-generated item may present a unique perspective not yet addressed by the mass media (Dylko & McCluskey, 2012; Gerhards & Schäfer, 2010). The changes in media content go hand in hand with changes in media exposure. The abundance and diversity of online communication facilitate selective exposure: little effort is required to select media content in accordance with one's personal opinions (Garrett, 2009). The more easily people can put together

distinct media diets in this manner, the more likely they are to lose touch with the issues, perspectives, and opinions being discussed by society at large.

This forms the starting point of our study. It is assumed that exposure to UGC results in different perceptions of the opinion climate and further results in different communicative behavior in public discourse than exposure to mass media. The causal relation between exposure to particular media content and opinion expression in public is the theoretical backbone of the spiral of silence concept put forward by Noelle-Neumann (1974) in her theory of public opinion. According to the spiral of silence, the perception of the opinion climate links cause and effect, thus guiding people's communicative behavior. Hence, the opinion climate or, more precisely, perception of the opinion climate, represents the key concept in research on the spiral of silence. We deliberately use opinion climate rather than public opinion because we distinguish between the aggregate of individual opinions in terms of majority and minority opinions and the normative concept of public opinion, which represents the theoretical reference point in research on the spiral of silence. Public opinion is a very complex and highly contested concept. It is crucial for all analyses contextualizing individual opinion formation in a society or relating it to collective phenomena (Habermas, 2006; Herbst, 1993). Noelle-Neumann (1974, p. 44) defines public opinion as an opinion one can express in public without fear of social isolation. This notion clearly addresses the normative dimension of what other people think. It does not necessarily reflect the perception of the aggregate of

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individual opinions in terms of majority or minority. In contrast to the normative concept of public opinion, “climate of opinion” represents the more matter-of-fact term for what other people think. It is used widely (e.g., Scheufele & Moy, 2000), especially in empirical studies on the effects of the perceived distribution of opinions in a society on willingness to speak out.

From the perspective of the spiral of silence theory, the perception of the opinion climate is likely to inhibit people’s willingness to speak out in public (Noelle-Neumann, 1974) if an individual’s opinion contradicts his or her perception of the opinion climate. Our study investigates the role of the media, in particular, the role of UGC in this process by first asking how exposure to either mass media or UGC affects the perception of the opinion climate. Second, it investigates whether exposure to UGC or the fact that people hold minority opinions affect willingness to speak out in public. Third, it examines the effects of specific online conditions such as anonymity and low-threshold evaluations as modes for opinion expression. The research questions were addressed in an empirical study of the debate on climate change in Germany. It is important to note that Germany stands out by the large share of its population that assigns relevance to climate change and that does not doubt its anthropogenic origin (Engels, H  ther, Sch  fer, & Held, 2013). However, there is considerable variance in the German debate on climate change: media outlets as well as individuals in the audience have different perspectives on the issue; they highlight different aspects and hold different opinions regarding the possible solutions. Since climate change is framed in different ways, we assumed that the debate provides sufficient conflict to make it a case for testing the spiral of silence theory under online conditions.

## 2. Applying the spiral of silence to the online world

The spiral of silence theory (Noelle-Neumann, 1974, 1993) proposes that individuals fear social isolation and only therefore speak out in public if they perceive themselves to be in the present or future majority on an issue. In order to assess the climate of opinion, people closely monitor their social environment via the mass media. The effect of mass media content on people’s perception of the opinion climate represents the first part of the spiral of silence theory, while the assumption that climate of opinion perception affects willingness to speak out forms the second part of the theory. Because the opinion perceived as a majority opinion is expressed in public and the opinion perceived as a minority opinion is not expressed in public, a spiraling process is initiated in which the alleged majority opinion gains ground and the alleged minority opinion loses ground. Thus, the factual opinion climate can eventually be reversed, which means that at the end of the process, the former factual minority opinion can be expressed in public without fear of isolation because media tend to present this opinion as majority opinion (Noelle-Neumann, 1974). The spiral of silence mechanism explains how micro-level individual behavior, such as speaking out in public under particular conditions, might spill over to the macro-level of public opinion formation.

Because of its political sensitivity and the ample plausibility of its assumptions, the spiral of silence theory has sparked many follow-up studies across the world. The results varied with the cultural context, the operationalization, and the issue under investigation. In the overall picture, evidence supporting spiral of silence assumptions is rather weak. A meta-analysis by Glynn, Hayes, and Shanahan (1997) showed a significant average correlation of  $r = .05$  between opinion congruence (between own opinion and climate of opinion) and willingness to speak out in 17 relevant studies. Further, there is evidence for alternative explanations: the silencing

effect can also be explained by the pluralistic ignorance approach, projection effects such as the looking glass effect, or the effect of peer group opinions (Fields & Schuman, 1976; Glynn & Park, 1997; Oshagan, 1996; Taylor, 1982). Some of the limited effects were attributed to violations of the conditions specified by Noelle-Neumann such as moral loading of an issue, the dynamic of the opinion climate for that issue, and the disregard of the time component (Bodor, 2012; Matthes, 2014; Scheufele & Moy, 2000). The difference in the operationalization of the key concepts was another reason frequently brought up to explain why it was hard to find consistent effects. Another explanation for the lack of sound evidence cited the doubts that individuals are actually able to gauge the opinion climate (Bodor, 2012). If people cannot gauge the opinion climate, they cannot estimate the degree of dissonance between their personal opinion and the perceived opinion climate. Consequently, the estimate cannot inhibit people’s opinion expression in public.

While most studies in spiral of silence research have dealt with the degree of reluctance to speak out in public, since this was considered to represent the key effect in the theoretical framework, only a few scholars have focused on the preceding perception of the opinion climate (Dalisay, 2012; Kim, Han, Shanahan, & Berdayes, 2004). This is particularly noteworthy because fear of isolation and monitoring the climate of opinion via the media represent essential concepts of this media effects theory and may be regarded as the premise for any effect on speaking out in public. Hence, the determinants of the perception of the opinion climate deserve special attention. Noelle-Neumann had specified consonance in the mass media as a condition for a spiral of silence to develop. This seemed reasonable, because only a unanimous media environment can be expected to shape people’s perceptions of the present or future dominance of a particular opinion.

Despite weak empirical support for the spiral of silence theory, its fundamental ideas remain compelling. The assumptions of the spiral of silence theory are a sound theoretical basis to further investigate the effects of media exposure on perception and discourse behavior (Schulz & Roessler, 2012). Serving as an important source of information, mass media content influences what individuals perceive as majority or minority opinion and affects whether they adapt their discursive behavior accordingly. Since the media environment has undergone a fundamental expansion through online communication, this paper asks whether different types of media use result in different perceptions and discourse-related effects. It aims to investigate the impact of online communication on the effects spelled out in the spiral of silence theory.

With the advent of online communication, media content previously used for monitoring the climate of opinion has changed considerably. The mass media have been complemented by online content contributed by users. In contrast to professional journalism, UGC comprises unfiltered individual opinions (Dylko & McCluskey, 2012; Wall, 2005), because it need not comply with common journalistic norms, for example, objectivity (see Schudson, 2001). We may assume a multitude of opinions also, because of the vast number of websites maintained by different organizations, e.g., social movements, which are particularly prone to experimentation (Della Porta & Mosca, 2009). Further, online content beyond the news sites of mass media, such as blogs or SNS, is unlikely to follow the mass media logic or reflect the corresponding routines of news selection. Rather, it can be assumed to follow the subjective and highly diverse individual preferences of its producers.

The unavoidable counterpart of the increase in information is therefore an increase in audience selectivity. Facing an abundance of new channels and an unmatched diversity of opinions, individuals who have turned to UGC for current affairs may either

choose to expose themselves only to sources in line with their personal opinions or choose to gather information from a plurality of sources (Schulz & Roessler, 2012). Since it can be assumed that people act according to the classic selective exposure pattern and prefer information supporting their own opinions, they are likely to encounter a fairly consonant set of opinions in their individual media diets (Cotton, 1985; Garrett, 2009; Stroud, 2008). Exposure to UGC may therefore offer a chance for individuals to expose themselves to consonant contents and avoid messages not in line with their opinion. In short, selective exposure—enabled through the expansion of sources—can counteract the increase in diversity on the individual level. Thus, in an adaptation of the spiral of silence research for the online world, consonance would persist on the individual level even under conditions of otherwise diverse media content online. If we want to assess the role of online media in general and, particularly, the role of consonance in shaping the perception of the climate of opinion, we have to relate individual media exposure to individual perceptions of the climate of opinion.

Another relevant change in the media environment to consider when transferring the spiral of silence to the online world concerns the options for opinion expression. Rather than speaking out in public under their real names and risking social consequences in case of unpopular opinions, individuals may express their opinions anonymously. They may “like” or share a piece of content or express support for an opinion in a similar way, which does not imply much effort and commitment. Posting short comments might also be an option, with a low level of threshold, which clearly differs from the face-to-face situation usually evoked in research on the spiral of silence. Public discourse under online conditions not only refers to media exposure, it also includes the way individuals speak out in public.

### 3. The spiral of silence online as a subject of empirical research

As it became obvious that mediated communication has fundamentally changed through the Internet, scholars started discussing the validity of classic media effects approaches under online conditions. The spiral of silence theory was tested early, with willingness to speak out as the focus of empirical research. The few studies on the perception of the opinion climate touched on divergent aspects, hardly suited to add up to a coherent picture. Tsfatı, Stroud, and Chotiner's (2014) survey showed that exposure to right-wing online media had an impact on the perception of its users, as they saw a low level of support for the withdrawal of the Israeli Defense Forces from the Gaza Strip. However, the looking-glass effect proved to be even stronger: people's personal opinions shaped this perception. The more people supported the disengagement strategy, the more they saw a high level of public support for disengagement. Wojcieszak (2008) found evidence for a similar projection effect. Her survey data showed that radical users of both Nazi and environmentalist online discussion forums overestimated public support for their views. Even though evidence is still weak, Tsfatı et al.'s (2014) study suggests that online exposure might affect the perception of the opinion climate and might skew the perception shaped by the less subjective mass media. We therefore derived the following hypothesis:

**H1.** Exposure to mass media and to UGC leads to different perceptions of the opinion climate.

Following the former research focus on willingness to speak out in the offline world, a rich line of research on opinion expression online has emerged. The results, of mainly experimental inquiries, have been mixed. Some studies on the spiral of silence online could not find evidence for the classic assumptions. Experiments

by McDevitt, Kioussis, and Wahl-Jorgensen (2003) showed that the degree of dissonance between the participant's opinions and perceived public opinion did not affect opinion expression on the abortion issue. Mayer-Uellner (2003) also found that holding opinions contrary to the perceived opinions in online discussion forums had no silencing effect. He analyzed discussions on different political issues and found that opinion dissonance even fostered opinion expression in public. Other studies revealed mixed results, mainly contradicting an effect of perceiving a dissonant opinion climate on opinion expression under varying online conditions. This is true for the online experiment by Ho and McLeod (2008), who found no evidence to support a spiral of silence under online conditions or under face-to-face conditions. In contrast, Liu and Fahmy (2011) found evidence for silencing effects in face-to-face settings, but not in online settings. Kwon, Moon, and Stefanone (2014) did not find an effect in the online setting as well: Facebook users' willingness to self-censor could not be explained by dissonance with other users' opinions.

Some other studies did find support for a spiral of silence online, showing that dissonance between personal opinion and a perceived general opinion climate offline (Gearhart & Zhang, 2013; Kim, Kim, & Oh, 2014) or online (Hampton et al., 2014; Nekmat & Gonzenbach, 2013) inhibits opinion expression in public.

The contradictory findings on the spiral of silence online strongly resemble the literature on the spiral of silence in mass media environments (see the meta-analysis by Glynn et al., 1997). The mixed findings, however, also point to well-known limitations of the study designs. This includes a disregard of public opinion dynamics, the question of time, and a lack of coherent operationalization. It remains unclear whether speaking out in online forums is inhibited by conflicts between personal opinion and perceived opinion climate. With the conflicting evidence in mind, further inquiry is necessary to clarify the validity of spiral of silence's assumptions in the online world. Thus, for the purpose of this paper, we test the classic hypothesis:

**H2.** Dissonance between an individual's personal opinion and his or her perceived opinion climate discourages willingness to speak out.

Comparatively few studies on the spiral of silence theory online have aimed at explaining a person's willingness to speak out not only through the degree of dissonance, but also through exposure to either mass media or UGC. Ho and McLeod (2008) showed that exposure to print media did not inhibit speaking out in public. However, their analysis left unclear whether this effect occurs under online conditions only. The effect of exposure to UGC on opinion expression, particularly on Facebook or Twitter, is contested: Gearhart and Zhang (2013) found evidence for a positive effect, whereas Hampton et al. (2014) and Kwon et al. (2014) detected a negative effect of exposure to UGC on speaking out. This means that, under certain conditions, using UGC can both catalyze and inhibit opinion expression. Given the contradictory findings, we assume the following undirected relationship:

**H3.** Exposure to UGC affects willingness to speak out. More specifically, exposure to UGC may either increase or decrease opinion expression in public.

Individual opinion expression is likely to be facilitated under conditions of anonymity (Bargh, McKenna, & Fitzsimmons, 2002; Joinson, 2001), especially when one's personal opinion conflicts with the perceived climate of opinion. However, willingness to speak out does not seem to be clearly boosted by anonymous online conditions (Mayer-Uellner, 2003; Yun & Park, 2011). At the same time, the online world offers occasions for effortless opinion expression. Facebook's “like” button may serve as an example of low-threshold opinion expression (Sarapın & Morris, 2014). We

assume that opinion expression is facilitated under conditions of anonymity, low threshold, and low commitment. We proposed the following hypothesis:

**H4.** Willingness to speak out is highest under anonymous or low-threshold “like-button” conditions, and is lowest under face-to-face conditions.

The hypotheses stated above are derived from the application of the spiral of silence theory to the online world and from a review of previous research on online spirals. They were tested in an empirical study of the German debate about climate change. Our literature review had revealed three weaknesses in the line of research on the spiral of silence online that were addressed in the study. First, very little attention was directed at the *content dimension* of the media that were used for monitoring the environment. Without content analyses, we have little knowledge about the differences between mass media content on an issue and UGC, which means that the results of individual media exposure are not sufficiently clear. The same is true for the perception that develops as a result of exposure, which marks a second weakness: analyses of the effect of individual media exposure on the perception of the opinion are rare exceptions. If different content patterns can be assumed between mass media and UGC, it is crucial to investigate what types of content were attended to, how this content relates to people’s personal opinions, and how this affects individual willingness to speak out. Relating the media items that individuals exposed themselves to with their perceptions is certainly a step toward a deeper understanding of the role of media in discursive behavior, as suggested by the spiral of silence’s framework. Third, experiments dominate over survey research in real-life settings. Further field studies are needed to obtain a more valid picture of perceptions and behaviors in such settings.

Our study aimed to overcome some of these shortcomings. It set out to examine how individual media diets—representing the result of selective exposure—affect the perception of the climate of opinion and willingness to speak out. Our study translated “different media contacts into a comprehensive pattern of exposure” (Hasebrink & Popp, 2006, p. 369), and was thus sensitive to media use across channels and platforms.

#### 4. Issue context and conceptual consequences

This paper focuses on spiral of silence processes regarding public discourse on the climate change issue. Numerous studies have indicated a severe rise in temperature and sea levels as a result of human carbon dioxide emissions (see, e.g., Solomon, Plattner, Knutti, & Friedlingstein, 2009). The climate change issue is therefore highly relevant, demands political and societal solutions, and receives global media attention (Schmidt, Ivanova, & Schäfer, 2013). Anthropogenic climate change is a widely accepted fact in Germany (Engels et al., 2013). Thus, the operationalization of opinions regarding the climate change issue required an instrument that caught the subtle differences of cognitions and attitudes among quite consensual opinions.

The framing approach was particularly suitable in this respect, as it allowed for a multidimensional operationalization that reflects selective attention to individual perspectives on climate change. Frames capture how the media highlight or neglect certain problem definitions, causal interpretations, moral evaluations, and treatment recommendations regarding certain issues (Entman, 1993, p. 52). The framing approach can also be applied to individual cognitions and opinions on issues (Scheufele, 1999). Regarding the crucial concept of public opinion perception or the perception of the climate of opinion, frames in public communication can be considered as the underlying structure of public opinion (Eilders, 2004). Different patterns of media exposure imply that different

patterns of frames are encountered by the respective media users. Thus, users with different media preferences can be assumed to have different perceptions of the frames underlying the climate change-related opinion climate.

#### 5. Method

##### 5.1. Empirical models

The research question and the hypotheses involved two dependent variables. In line with the spiral of silence theory’s causal chain, two consecutive models of explanations are required with two separate dependent variables. First, in model I, climate change-related media exposure was assumed to affect perceived opinion climate on the issue (H1). In model II, the relationship between the individuals’ opinions on the issue and the perceived opinion climate (H2) as well as the exposure to UGC (H3) were hypothesized to affect willingness to speak out.

##### 5.2. Data collection

We conducted an online diary study on media exposure regarding the debate on climate change in Germany. Participants were recruited several days before the Rio+20 United Nations Conference on Sustainable Development in Rio de Janeiro in 2012, where political actors met to discuss such issues as a green economy, sustainability, and climate change. Like other international conferences (Schäfer, Ivanova, & Schmidt, 2013), the Rio+20 conference was expected to trigger a considerable level of media coverage. We were confident in finding sufficient issue-related media content in the individual media repertoires of the respondents.

We recruited participants via screening in ecological Facebook groups and blogs and from a commercial online-access panel. Prospective participants were sampled based on three quota criteria: individuals aged between 18 and 50, who reported being at least moderately interested in politics, and who used mass media or UGC on a routine basis. Our restriction to this age range allowed for more valid comparisons between the mass media users and the UGC users. The other two quota criteria served the purpose of primarily collecting data from individuals susceptible to media use about the climate change issue. Further, the quota criteria counteract some undesirable biases of participant characteristics caused by self-selected online samples. By screening participants in UGC and an online access panel, we aimed to recruit individuals who used different types of media.

Respondents were invited to take part in an online diary study for 7 days during the Rio+20 conference. The diary, which was previously tested with undergraduate social science students, mapped the respondents’ climate change-related exposure to mass media and UGC. Exposure to well-known television news programs, daily newspapers, and news magazines was assessed using closed questions. Because of the greater diversity of online items, exposure to UGC was assessed using open-ended questions. Participants were asked to fill in the URLs or the names of the websites with climate change-related content that they had visited on a given day. The diary study aims to overcome possible limitations of recall-based news exposure measures using surveys, given that Prior (2009) showed that individuals overestimate their media exposure in self-reports. Diaries limit the degree of misjudgments by explicitly requesting the day-by-day media use. Our approach did not bias the participants’ daily routines (e.g., as via media-use tracking) and allowed us to measure valid media repertoires.

After reporting their media use in the diaries for 7 days, the participants took part in an online survey that comprised questions



regarding their perception of the climate of opinion on the climate change issue, their opinions on the issue, their willingness to speak out, and other relevant individual characteristics. All individuals who had kept the online diary for 7 days and who had taken the online survey were included in the data analysis ( $n=444$ ). Our design led to dropouts, especially during the diary period, since it required participants to invest a substantial amount of time. We had to accept this limitation in order to get an unprecedented in-depth account of individuals' media use. In view of this limitation, we rewarded participants with the chance to win one of 10 Amazon Kindle e-readers if they completed the online diaries and the two other questionnaires as requested.

### 5.3. Measures

#### 5.3.1. Models I and II: individual media use preference as independent variable

By applying a quantitative content analysis, we categorized the type of media through which the individual respondents had encountered media items ( $n=1163$ ) on climate change as either mass media or UGC. Intercode reliability was assessed using Holsti's (1969) coefficient. The intercode reliability for the media type variable based on a sample of 20 media items was .98. Mass media consisted of newspapers, news magazines, television broadcasts, and online versions of the respective mass media (68% of all media items). UGC consisted of blogs, SNS, and miscellaneous websites (32% of all media items). Respondents were then divided into two groups, according to their preferences for either mass media or UGC regarding climate change. The *individual media use preference* consisted of the respective balance when subtracting mass media items from the number of respective UGC items in the individual media repertoires. A positive balance indicated a predominant use of UGC or a preference for UGC (12% of the participants) and a negative balance indicated a predominant use of mass media or a preference for mass media (60% of the participants;  $M=-3.38$ ,  $SD=5.17$ ). Participants without climate change-related media use (25%), or without a clear preference for a specific type of media (3%), were not considered in the analysis. Individual media use preference was used for testing H1 and H3.

#### 5.3.2. Model I: perception of the opinion climate as dependent variable

To test the first component of the theory, we conceptualized the *perception of the opinion climate* as a dependent variable. The framing approach was adopted in order to reduce the complexity of the plurality of perceived opinions on climate change. Individual emphases of climate change perspectives were grouped into larger units marking common perspectives in the sample. These perspectives on climate change shared by several respondents were statistically derived from survey answers of 444 participants regarding different aspects of the climate change issue via cluster analysis. The individual aspects of climate change that the respondents had reported in the survey were considered frame elements, which were grouped into larger homogeneous units based on their similarities. These units consisted of respondents sharing similar perceptions of the opinion climate and were considered frame clusters of individuals. This statistical approach to the identification of frames was first introduced by Matthes and Kohring (2008). As opposed to identifying frames from mere theoretical considerations, it allows for the reliable and objective identification of frames in any body of text and can also be applied to survey answers.

Perception of the opinion climate was operationalized using 10 frame-element variables. Respondents were asked: "What do you think most Germans think about . . . ?" regarding the causes and consequences of climate change, the responsibility for the solution,

the solvability of the problem, the political and nonpolitical subissues of climate change, and the societal sectors affected by climate change. In order to obtain consistent levels of measurement for the variables entered into cluster analysis, the 10 mostly nominally scaled frame elements were transformed into 45 dummy variables, which were then used as cluster variables in a hierarchical cluster analysis with SPSS software. Individuals showing the lowest squared Euclidean distances (differences) between their opinion climate perceptions were clustered together. We applied the Ward agglomeration method, as it is supposed to derive the most coherent clusters of cases that differ most from other clusters (Breckenridge, 2000). Using the elbow criterion to determine the appropriate amount of coherent clusters, we identified three frames in our sample: Almost half of the participants (45%) believed that most Germans viewed climate change as a *global problem of environmental politics*. This frame included aspects that emphasized the global scope of climate change and the political environment-related objectives, rather than economic or ecological dimensions. Further, according to this frame, climate change represents a problem that is relevant to anyone, in any part of the world. Almost a third of the respondents (31%) believed that most Germans consider climate change an *urgent political problem*. This frame implies that other people were perceived as alarmed by an approaching climate catastrophe. Although the political sphere was viewed as being responsible for solving the climate problem, there was no consensus on a strictly political perspective on the issue. A quarter of the participants (25%) believed that most people thought of climate change as a *solvable political problem*. This frame was characterized by a low degree of awareness of the multiple and serious consequences of climate change. In contrast to the other frames, climate change was considered a manageable problem. These frames identified in the cluster analysis served as the dependent variable in H1.

#### 5.3.3. Model II: opinion dissonance as independent variable

Regarding the second step of the theory, we introduced the *dissonance between people's personal opinions and perceived opinion climate* as the central predictor of willingness to speak out. Perceived opinion climate was measured as described above (see Section 5.3.2). Individuals' opinions were measured using the same set of answers to the question regarding perceived opinion climate. They were asked for their opinions on the climate change issue: "What do you think about . . . ?" The degree of dissonance was calculated as the sum of absolute differences between people's own opinions and the individual's perceptions of the opinion climate. Again, 45 dummy variables were constructed ( $M=10.34$ ,  $SD=4.63$ ). The dissonance measure served as an independent variable in H2.

#### 5.3.4. Model II: willingness to speak out as dependent variable

*Willingness to speak out* indicates an individual's likelihood of expressing an opinion that deviates from his or her perceived opinion climate. We asked the respondent to indicate the likelihood of expressing his or her opinion to unknown individuals (a) in a bar, (b) in a blog when his or her real name was required, (c) in a blog with only a nickname required, and (d) via a "like" button on an SNS. Answers ranged from 0 (very unlikely) to 4 (very likely), and results were as follows: in the bar setting,  $M=1.96$ ,  $SD=1.22$ ; in the blog setting with real name,  $M=2.04$ ,  $SD=1.24$ ; in the anonymous blog setting,  $M=2.35$ ,  $SD=1.25$ ; in the "like"-button setting:  $M=2.61$ ,  $SD=1.41$ .

#### 5.3.5. Models I and II: control variables

Since spiral of silence research mostly considers a set of relevant individual characteristics as additional explanations (e.g., Kim et al., 2014; Neuwirth, 2000; Shamir, 1997), we included the following control variables in both models: *interest in politics* ( $M=3.78$ ,

**Table 1**  
Regression coefficients for predicting willingness to speak out.

Predictor	Bar setting (n = 308) $\beta$ (SE)	Real-name blog setting (n = 309) $\beta$ (SE)	Anonymous blog setting (n = 313) $\beta$ (SE)	Like-button setting (n = 310) $\beta$ (SE)
Block 1: control variables				
Age	.07 (.01)	.05 (.01)	–.04 (.01)	.05 (.01)
Education	.02 (.05)	–.02 (.05)	–.04 (.06)	.08 (.06)
Sex	–.01 (.14)	.04 (.14)	–.00 (.15)	.03 (.17)
Interpersonal comm. face-to-face	.20 (.06)**	–.01 (.06)	.08 (.06)	.08 (.07)
Interpersonal comm. online	.16 (.07)*	.28 (.07)***	.17 (.07)**	.09 (.08)
Interest in politics	.14 (.08)*	.13 (.08)*	.08 (.08)	.01 (.09)
Importance of CC issue	.10 (.07)	.14 (.08)*	.18 (.08)**	.10 (.09)
R <sup>2</sup> (%)	16.5	15.3	11.5	6.6
Block 2: focal predictors				
Dissonance between personal opinion and the opinion climate	.04 (.02)	.14 (.02)*	.10 (.02)	.23 (.02)***
Preference for UGC use	–.01 (.21)	.02 (.21)	.05 (.21)	.02 (.24)
Dissonance $\times$ preference for UGC use	–.01 (.00)	.04 (.00)	.12 (.00)	.19 (.00)**
Incremental R <sup>2</sup> (%)	0.1	1.6	2.5	6.4
Total R <sup>2</sup> (%)	16.6	16.9	14.0	13.0

Note. OLS regression models.  $\beta$  = final standardized regression coefficient, SE = standard error.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

$SD = 0.90$ ), ranging from 2 (somewhat interested) to 5 (very interested) and *importance of climate change issue* ( $M = 3.14$ ,  $SD = 0.90$ ), ranging from 0 (very unimportant) to 4 (very important). In order to identify social factors influencing the effects under scrutiny, respondents were asked about their *climate change-related interpersonal communication face-to-face* ( $M = 0.93$ ,  $SD = 0.92$ ) and *online* ( $M = 0.38$ ,  $SD = 0.69$ ). These variables ranged from 0 (not interested in/no occasion for discussion) to 3 (comprehensive discussion). Age (18–29 years = 34%, 30–39 years = 31%, 40–50 years = 36%,  $M = 35.03$ ;  $SD = 9.02$ ), education ( $M = 3.70$ ,  $SD = 1.30$ ) ranging from 1 (secondary general school) to 5 (university degree), and gender (females 57%, males 43%) were also considered. For model I, the individual's opinion was inserted as a further control variable and operationalized as personal opinion frame clusters. Four personal opinion frame clusters on climate change were calculated following the same procedure applied to the frame identification in the perceived opinion climate: *global economic responsibility* (42% of participants), *global political problem* (30% of participants), *climate pessimism* (15% of participants), and *moderate problem awareness* (12% of participants).

## 6. Results

Owing to the categorical character of the dependent variable of the first model, effects on *perception of the opinion climate* were analyzed by applying logistic regression models<sup>1</sup> with dummy variables for each of the three frames. The findings show that all of the perceptions of the opinion climate (climate change as a *global problem of environmental politics*, *urgent political problem*, or *solvable political problem*) were independent of the type of preferred information on climate change (no table). Exposure to either mass media or UGC did not affect the perception of the opinion climate. This means that H1 was not supported. Further, no looking-glass effects were found. Contrary to previous findings (Tsati et al.,

2014), people's own opinions did not affect their perceptions of the opinion climate. However, several other predictors affected the perception of the opinion climate. Talking to others face-to-face about the climate change issue decreased the likelihood that people thought most others would consider climate change a solvable political problem ( $B = -.24$ ,  $p < .05$ ). If people thought the climate change issue was important ( $B = .36$ ,  $p < .05$ ), the chances that people thought most others would consider climate change a solvable political problem increased. While interpersonal communication seems to inhibit the perception of a rather optimistic opinion climate, assigning importance has the opposite effect. Assigning importance to the climate change issue also had a negative effect on the perception that most people see climate change as a *global problem of environmental politics*. Individuals who assessed climate change as important were less likely to see other people placing particular emphasis on the global dimension of the problem and linking the issue to environmental politics ( $B = -.36$ ,  $p < .05$ ). This finding seems odd at first sight, but there is a possible explanation for it: individuals engaged in climate change problems may be falsely convinced of the uniqueness of their problem awareness and may deny that others could see the problem in a very similar way (Chambers, 2008).

In order to test the effect of opinion dissonance and media exposure patterns on willingness to speak out in four hypothetical settings, we applied ordinary least-squares regression models (Table 1). Dissonance between individuals' own opinion and perceived climate of opinion did not show the expected negative effect on willingness to speak out. Contrary to our assumptions, dissonance even increased willingness to speak out under certain conditions. This was related to two online settings (blog with real name:  $\beta = .14$ ,  $p < .05$ ; "like"-button:  $\beta = .23$ ,  $p < .001$ ). Therefore, H2 is not supported. This finding ties in with the ambivalent evidence on the effects on online opinion expressions, which is in accordance with some previous studies (e.g., Liu & Fahmy, 2011; McDevitt et al., 2003), but contradicts others (e.g., Gearhart & Zhang, 2013; Nekmat & Gonzenbach, 2013).

Preference for mass media or UGC showed no effect on either the perceived opinion climate or willingness to speak out. The interaction of preference for UGC use with opinion dissonance only increased the willingness to speak out regarding the "like"-button setting ( $\beta = .19$ ,  $p < .01$ ). This effect may be explained

<sup>1</sup> Logistic regressions ( $n = 313$ ) resulted in the following explained variances: (1) model with DV *global problem of environmental politics*,  $R^2_{\text{Nagelkerke}} = 7.5\%$ ; (2) model with DV *solvable political problem*,  $R^2_{\text{Nagelkerke}} = 7.0\%$ ; (3) model with DV *urgent political problem*,  $R^2_{\text{Nagelkerke}} = 2.6\%$ . Unstandardized regression coefficients ( $B$ ) were reported.

**Table 2**

Willingness to speak out across types of media use preferences.

	Preference for mass media use		Preference for UGC use		All subjects	
	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>
Bar setting	256	2.05 <sup>a</sup> (1.22)	53	2.08 <sup>a</sup> (1.25)	427	1.96 (1.22)
Real-name blog setting	259	2.10 <sup>a</sup> (1.26)	51	2.39 <sup>a</sup> (1.10)	431	2.04 (1.24)
Anonymous blog setting	261	2.39 <sup>a</sup> (1.25)	53	2.87 <sup>b</sup> (0.96)	438	2.34 (1.22)
"Like"-button setting	257	2.67 <sup>a</sup> (1.42)	54	3.11 <sup>b</sup> (1.19)	431	2.61 (1.39)

Note. Horizontal comparisons between means marked by lowercase superscripts. Means that do not share a letter in their superscripts differ at  $p < .05$  according to *t*-tests for independent samples.

by the familiarity with low-threshold modes of opinion expression on SNS platforms. However, because of limited evidence, H3 was not supported. All the models underlined the influence of predictors known from previous studies. The findings show that the more people talked about climate change, the more they were willing to speak out in public (see, e.g., Neuwirth, 2000). If people talked about climate change face-to-face, they were more willing to express their opinion in a bar ( $\beta = .20, p < .001$ ), but not in online environments. In contrast, if people talked about climate change online, they were more willing to speak out in online public spaces than in other settings (bar,  $\beta = .16, p < .05$ ; blog with real name,  $\beta = .28, p < .001$ ; anonymous blog,  $\beta = .17, p < .01$ ). These findings point to the important role of familiarity with different social environments for opinion expression. When people are used to talking with others in face-to-face environments, they are also likely to express deviating opinions in such public spaces. The same holds true for online environments: Individuals familiar with any sort of online chat and discussion groups are likely to speak out online. Further, interest in politics (bar,  $\beta = .14, p < .05$ ; blog with real name,  $\beta = .13, p < .05$ ) and importance of climate change issue (blog with real name,  $\beta = .14, p < .05$ ; anonymous blog,  $\beta = .18, p < .01$ ) fostered willingness to speak out in different types of settings. This supports findings from traditional spiral of silence research.

Finally, H4 predicted differences regarding willingness to speak out in different settings, depending on the degree of anonymity and the effort involved. Our data (Table 2) strongly support this hypothesis. People were significantly more willing to express their opinions in anonymous ( $M = 2.34, SD = 1.22$ ) and low-threshold online scenarios ( $M = 2.61, SD = 1.39$ ) than in face-to-face conditions ( $M = 1.96, SD = 1.22$ ).<sup>2</sup> These findings were even more pronounced for users with a preference for UGC, who showed a significantly higher willingness to speak out in public than users with a preference for mass media. Again, familiarity with online discourse proves to be the accelerator of online opinion expression.

## 7. Conclusions

The starting point of our study was a straightforward assumption advocated by the spiral of silence theory: People monitor the social environment via the media in order to gauge the opinion climate. In the case of conflict between one's personal opinion and the perceived opinion climate, people are unlikely to speak out in public. In view of the expansion and diversification of the media environment, the spiral of silence theory required a new empirical test. We investigated whether the assumptions hold under online conditions, and how exposure to UGC affects the perception of the opinion climate and people's willingness to speak out. Since UGC is likely to present a picture of climate change that differs from the picture presented in the mass media, and since users can put together largely individual media diets based on these sources, we assumed that individuals who monitored the debate about climate

change through UGC formed a different picture of the opinion climate on the issue than people who monitored the debate via mass media coverage. In accordance with the spiral of silence theory, we further assumed that exposure to those sources would reduce their willingness to speak out if individuals saw themselves in the minority position.

The findings contradicted our assumptions. Exposure to UGC affected neither the perception of the opinion climate nor the opinion expression in public, and individuals who viewed themselves as part of the minority were even more willing to speak out in public than those who viewed themselves as part of the majority. The latter finding was evident under online conditions of real-name blog communication, and when opinion expression was reduced to "liking" a certain position online. Possible explanations for the lack of impact of the particular media source relate to a diffusion of mass media content into UGC and vice versa (frame interactions, see Zhou & Moy, 2007), thus leaving only marginal differences between the picture of the climate change debate presented in the two types of sources. The fact that dissonance between people's opinions and perceptions of the opinion climate did not keep people from speaking out ties in with empirical evidence from some previous studies, which also found no silencing effect under online conditions. However, given the plausibility of the theoretical assumptions, the results nevertheless raise the question why we did not find the expected effects. The lack of support for the spiral of silence might be explained by the low degree of moral conflict in the German climate change debate. Under these conditions, fear of isolation is unlikely to inhibit the articulation of a minority opinion, especially if the debate is on differences in perspective, rather than on fundamentally diverging opinions or values. In addition, the finding might also be due to the large number of respondents in our sample who were interested in climate change. They might represent the small group of individuals, the hard core, who are always willing to speak out (Glynn & McLeod, 1984). In summary, there is still a lack of undisputed evidence for the spiral of silence with regard to both offline and online settings.

Unlike most studies on the spiral of silence under online conditions, which use experimental designs and thus suffer from limited external validity, our diary study applied a field study design with a real-world setting. Therefore, the study claims a high degree of external validity. In addition, our design allows for examining the role of individual media exposure, which is often neglected as an explanation of perception and silencing effects. Finally, we overcame the problems regarding the adequate media use measurement (Prior, 2009) by using a diary design that limited the time to recall media exposure to only one day during one week of study. Our precise measurement of media use allowed the media units in the individual media diets to be traced back. This provided grounds for combining survey data on individual media exposure with content analyses in a very reliable way. Future media effects studies may consider applying online diaries to connect differentiated, though reliable, sets of media use reports with individual cognitions and behaviors.

<sup>2</sup> According to *t*-tests for paired samples.



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## References

- Bargh, J. A., McKenna, K. Y. A., & Fitzsimmons, G. M. (2002). Can you see the real me? Activation and expression of the true self on the Internet. *Journal of Social Issues*, 58(1), 33–48.
- Bodor, T. (2012). The issue of timing and opinion congruity in spiral of silence research: Why does research suggest limited empirical support for the theory? *International Journal of Public Opinion Research*, 24(3), 269–286. <http://dx.doi.org/10.1093/ijpor/eds016>
- Breckenridge, J. N. (2000). Validating cluster analysis: Consistent replication and symmetry. *Multivariate Behavioral Research*, 35(2), 261–285.
- Chambers, J. R. (2008). Explaining false uniqueness: Why we are both better and worse than others. *Social and Personality Psychology Compass*, 2(2), 878–894. <http://dx.doi.org/10.1111/j.1751-9004.2008.00076.x>
- Cotton, J. L. (1985). Cognitive dissonance in selective exposure. In D. Zillmann, & J. Bryant (Eds.), *Selective exposure to communication* (pp. 11–33). Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Dalissay, F. S. (2012). The spiral of silence and conflict avoidance: Examining antecedents of opinion expression concerning the U.S. military buildup in the Pacific island of Guam. *Communication Quarterly*, 60(4), 481–503. <http://dx.doi.org/10.1080/01463373.2012.704567>
- Della Porta, D., & Mosca, L. (2009). Searching the Net. *Information, Communication & Society*, 12(6), 771–792. <http://dx.doi.org/10.1080/13691180802109063>
- Dylko, I., & McCluskey, M. (2012). Media effects in an era of rapid technological transformation: A case of user-generated content and political participation. *Communication Theory*, 22(3), 250–278. <http://dx.doi.org/10.1111/j.1468-2885.2012.01409.x>
- Eilders, C. (2004). Von Links bis Rechts - Deutung und Meinung in Pressekommentaren. In: C. Eilders, F. Neidhardt, & B. Pfetsch (Eds.), *Die Stimme der Medien* (pp. 129–166). Wiesbaden: VS Verlag für Sozialwissenschaften.
- Engels, A., H  ther, O., Sch  fer, M., & Held, H. (2013). Public climate-change skepticism, energy preferences and political participation. *Global Environmental Change*, 23(5), 1018–1027. <http://dx.doi.org/10.1016/j.gloenvcha.2013.05.008>
- Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, 43(4), 51–58.
- Fields, J. M., & Schuman, H. (1976). Public beliefs about the beliefs of the public. *Public Opinion Quarterly*, 40(4), 427–448.
- Garrett, R. K. (2009). Echo chambers online?: Politically motivated selective exposure among Internet news users. *Journal of Computer-Mediated Communication*, 14(2), 265–285. <http://dx.doi.org/10.1111/j.1083-6101.2009.01440.x>
- Gearhart, S., & Zhang, W. (2013). Gay bullying and online opinion expression: Testing spiral of silence in the social media environment. *Social Science Computer Review*, 32(1), 18–36. <http://dx.doi.org/10.1177/0894439313504261>
- Gerhards, J., & Sch  fer, M. S. (2010). Is the Internet a better public sphere? Comparing old and new media in the USA and Germany. *New Media & Society*, 12(1), 1–18. <http://dx.doi.org/10.1177/1461444809341444>
- Glynn, C. J., Hayes, A. F., & Shanahan, J. (1997). Perceived support for one's opinions and willingness to speak out: A meta-analysis of survey studies on the spiral of silence. *Public Opinion Quarterly*, 61(3), 452–463.
- Glynn, C. J., & McLeod, J. M. (1984). Public opinion du jour: An examination of the spiral of silence. *Public Opinion Quarterly*, 48(4), 731–740.
- Glynn, C. J., & Park, E. (1997). Reference groups, opinion intensity and public opinion expression. *International Journal of Public Opinion Research*, 9(3), 233–247. <http://dx.doi.org/10.1093/ijpor/9.3.213>
- Habermas, J. (2006). Political communication in media society: Does democracy still enjoy an epistemic dimension? The impact of normative theory on empirical research. *Communication Theory*, 16(4), 411–426. <http://dx.doi.org/10.1111/j.1468-2885.2006.00280.x>
- Hampton, K. N., Rainie, L., Lu, W., Dwyer, M., Shin, I., & Purcell, K. (2014). *Social media and the spiral of silence*. Retrieved from <http://www.pewinternet.org/2014/08/26/social-media-and-the-spiral-of-silence/>
- Hasebrink, U., & Popp, J. (2006). Media repertoires as a result of selective media use. A conceptual approach to the analysis of patterns of exposure. *Communications*, 31(3), 369–387. <http://dx.doi.org/10.1515/COMMUN.2006.023>
- Herbst, S. (1993). The meaning of public opinion: Citizens' constructions of political reality. *Media, Culture & Society*, 15(3), 437–454. <http://dx.doi.org/10.1177/016344393015003007>
- Ho, S. S., & McLeod, D. M. (2008). Social-psychological influences on opinion expression in face-to-face and computer-mediated communication. *Communication Research*, 35(2), 190–207. <http://dx.doi.org/10.1177/0093650207313159>
- Holsti, O. R. (1969). *Content analysis for the social sciences and humanities*. Reading, MA: Addison-Wesley.
- Joinson, A. N. (2001). Self-disclosure in computer-mediated communication: The role of self-awareness and visual anonymity. *European Journal of Social Psychology*, 31(2), 177–192. <http://dx.doi.org/10.1002/ejsp.36>
- Kim, S.-H., Han, M., Shanahan, J., & Berdayes, V. (2004). Talking on sunshine in North Korea: A test of the spiral of silence as a theory of powerful mass media. *International Journal of Public Opinion Research*, 16(1), 39–62. <http://dx.doi.org/10.1093/ijpor/16.1.39>
- Kim, S.-H., Kim, H., & Oh, S.-H. (2014). Talking about genetically modified (GM) foods in South Korea: The role of the Internet in the spiral of silence process. *Mass Communication and Society*, 17(5), 713–732. <http://dx.doi.org/10.1080/15205436.2013.847460>
- Kwon, K. H., Moon, S.-I., & Stefanone, M. (2014). Unspeaking on Facebook? Testing network effects on self-censorship of political expressions in social network sites. *Quality & Quantity*. <http://dx.doi.org/10.1007/s11135-014-0078-8>. Advance online publication
- Liu, X., & Fahmy, S. (2011). Exploring the spiral of silence in the virtual world: Individuals' willingness to express personal opinions in online versus offline settings. *Journal of Media and Communication Studies*, 3(2), 45–57.
- Matthes, J. (2014). Observing the spiral in the spiral of silence. *International Journal of Public Opinion Research*. <http://dx.doi.org/10.1093/ijpor/edu032>. Advance online publication
- Matthes, J., & Kohring, M. (2008). The content analysis of media frames: Toward improving reliability and validity. *Journal of Communication*, 58(2), 258–279.
- Mayer-Uellner, R. (2003). *Das Schweigen der Lurker: Politische Partizipation und soziale Kontrolle in Online-Diskussionsforen*. M  nchen: Reinhard Fischer.
- McDevitt, M., Kiousis, S., & Wahl-Jorgensen, K. (2003). Spiral of moderation: Opinion expression in computer-mediated discussion. *International Journal of Public Opinion Research*, 15(4), 454–470. <http://dx.doi.org/10.1093/ijpor/15.4.454>
- Nekmat, E., & Gonzenbach, W. J. (2013). Multiple opinion climates in online forums: Role of website source reference and within-forum opinion congruency. *Journalism & Mass Communication Quarterly*, 90(4), 736–756. <http://dx.doi.org/10.1177/1077699013503162>
- Neuwirth, K. (2000). Testing the spiral of silence model: The case of Mexico. *International Journal of Public Opinion Research*, 12(2), 138–159. <http://dx.doi.org/10.1093/ijpor/12.2.138>
- Noelle-Neumann, E. (1974). The spiral of silence. A theory of public opinion. *Journal of Communication*, 24(2), 43–51.
- Noelle-Neumann, E. (1993). *The spiral of silence: Public opinion—Our social skin*. Chicago: Chicago University Press.
- Oshagan, H. (1996). Reference group influence on opinion expression. *International Journal of Public Opinion Research*, 8(4), 335–354.
- Prior, M. (2009). Improving media effects research through better measurement of news exposure. *The Journal of Politics*, 71(3), 893–908.
- Sarapin, S., & Morris, P. (2014). When like-minded people click: Facebook interaction conventions, the meaning of speech online, and Bland v. Roberts. *First Amendment Studies*, 48(2), 131–157. <http://dx.doi.org/10.1080/21689725.2014.962557>
- Sch  fer, M. S., Ivanova, A., & Schmidt, A. (2013). What drives media attention for climate change? Explaining issue attention in Australian, German and Indian print media from 1996 to 2010. *International Communication Gazette*, 76(2), 152–176. <http://dx.doi.org/10.1177/1748048513504169>
- Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication*, 49(1), 103–122.
- Scheufele, D. A., & Moy, P. (2000). Twenty-five years of the spiral of silence: A conceptual review and empirical outlook. *Journal of Public Opinion Research*, 12(1), 3–28.
- Schmidt, A., Ivanova, A., & Sch  fer, M. S. (2013). Media attention for climate change around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environmental Change*, 23(5), 1233–1248. <http://dx.doi.org/10.1016/j.gloenvcha.2013.07.020>
- Schudson, M. (2001). The objectivity norm in American journalism. *Journalism*, 2(2), 149–170. <http://dx.doi.org/10.1177/146488490100200201>
- Schulz, A., & Roessler, P. (2012). The spiral of silence and the Internet: Selection of online content and the perception of the public opinion climate in computer-mediated communication environments. *International Journal of Public Opinion Research*, 24(3), 346–367. <http://dx.doi.org/10.1093/ijpor/eds022>
- Shamir, J. (1997). Speaking up and silencing out in face of a changing climate of opinion. *Journalism & Mass Communication Quarterly*, 74(3), 602–614.
- Solomon, S., Plattner, G.-K., Knutti, R., & Friedlingstein, P. (2009). Irreversible climate change due to carbon dioxide emissions. *Proceedings of the National Academy of Sciences*, 106(6), 1704–1709. <http://dx.doi.org/10.1073/pnas.0812721106>
- Stroud, N. J. (2008). Media use and political predispositions: Revisiting the concept of selective exposure. *Political Behavior*, 30(3), 341–366. <http://dx.doi.org/10.1007/s11109-007-9050-9>
- Taylor, D. G. (1982). Pluralistic ignorance and the spiral of silence: A formal analysis. *Public Opinion Quarterly*, 46(3), 311–335.
- Tsfati, Y., Stroud, N. J., & Chotiner, A. (2014). Exposure to ideological news and perceived opinion climate: Testing the media effects component of spiral-of-silence in a fragmented media landscape. *The International Journal of Press/Politics*, 19(1), 3–23. <http://dx.doi.org/10.1177/1940161213508206>
- Wall, M. (2005). Blogs of war: Weblogs as news. *Journalism*, 6(2), 153–172. <http://dx.doi.org/10.1177/1464884905051006>
- Wojcieszak, M. E. (2008). False consensus goes online. *Public Opinion Quarterly*, 72(4), 781–791. <http://dx.doi.org/10.1093/poq/nfn056>
- Yun, G. W., & Park, S.-Y. (2011). Selective posting: Willingness to post a message online. *Journal of Computer-Mediated Communication*, 16(2), 201–227. <http://dx.doi.org/10.1111/j.1083-6101.2010.01533.x>
- Zhou, Y., & Moy, P. (2007). Parsing framing processes: The interplay between online public opinion and media coverage. *Journal of Communication*, 57(1), 79–98.