Understanding Intent, Behavior and Emotion in User Comments: Assessing the Spiral of Silence Theory

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In memory of Prof. Oren Soffer, a dear and inspiring colleague, who died on December 2020.

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Abstract

This study tests the process of writing a user comment on a news website: it follows the user's exposure to an online article, exposure to others' comments, decision to write their own comment (or not), and the social behavior of writing itself, as well as the characteristics of the writing. We aim to examine whether exposure to positive and negative user comments on an online journalistic article affects the user's intention to send a comment and, more importantly, the sentiment of the comment posted. We also test whether a user's opinion or their perception of majority support of their opinion have an impact on either their intention to post a comment or their comments' sentiment. Results show that exposure to comments, whether positive or negative, almost doubles the intentions of posting a comment. Exposure to negative comments dramatically increases the probability of writing a negative comment, while exposure to positive comments has a moderating effect. In line with the spiral of silence theory, self-perceived support for one's opinion by the majority significantly contributes to the prediction of comment posting, even after controlling for the effect of personal opinion.

Keywords: user-generate content, spiral of silence theory, human-computer interaction, comments sentiment

User comments constitute an encounter between journalistic writing and the voices of the public in the same framework. This encounter enables, at least theoretically, the realization of two competing ideals of journalism: the yearning to main journalistic practices, alongside the fostering of a vivid social dialogue expressing varied opinions and contributing to the democratic discourse

(Ksiazek 2018). User comments have the potential to enhance how "ordinary people" engage in debates in the public sphere about current news (Soffer and Gordoni 2020). In this respect, user comments contribute to deliberative democracy by offering a direct channel for citizens to express their views, often with minimal involvement of traditional gate keepers (Anderson et al. 2014; Van Sikorski 2016; Ksiazek 2018). However, while user comments—as a prominent form of online participation—can advance freedom of speech and deliberation, they can also have negative effects on public discourse. When comments are offensive, hostile, or include inaccurate or fake information they can advance uncivil deliberation, leading to intolerance of diverse opinions and the silencing of minority groups (von Sikorski 2016).

Over the last decade, the corpus of studies related to user comments in the socio-political and journalistic context have widened, evidence of the scholarly interest in this format of professional–public conjunction. Among other things, these studies examine users’ social motivations and considerations in posting comments (Diakopoulos and Naaman 2011); the types of news articles and comments that encourage users to comment (Boczkowski and Mitchelstein 2013; Ziegele et al. 2013; Ziegele and Quiring 2013; Tenenboim and Cohen 2015); the evaluation of user comments by journalists, the wider public, and other commenters (Santana 2014; Bergström and Wadbring 2015); how to improve the quality and deliberative value of comments (Diakopoulos and Naaman 2011; Ksiazek 2015); and discursive strategies, in particular, references to politeness theory and uncivil discourse and their effect on users (Anderson et al. 2014; Santana 2014; Ksiazek 2015; Badarneh and Migdadi 2018).

Another theoretical perspective for understanding the role of users comments in forming and expressing public opinion is the spiral of silence (SOS) theory (Matthes, Knoll and von Sikorski 2018). The key assumption of SOS is that opinion climate perceptions affect the behavior

of opinion expression. This assumption is empirically supported in traditional news media as well as in the online and comments sphere (Nekmat and Gonzenbach 2013; Meyer and Speakman 2016; Matthes, Knoll and von Sikorski 2018; Auther 2018).

Although a significant number of the studies on user comments base their results on online surveys, very few of these have included the simulated writing of comments (exceptions include: Masullo Chen and Lu 2017; Ziegele et al. 2018). This lack is all the more evident in light of findings showing the impact of comments content on the social discourse. Uncivil comments in online news media polarize public perceptions about news issues. As a result of offensive contents, users may ignore relevant information presented in news article and comments, and instead use their preexisting values to form their perception of the issue. This might lead to polarized perceptions of news topics among different segments of the public (Anderson et al. 2014), nullifying the positive contribution of user comments as a means to foster deliberative democracy. Therefore, the effect of user comments on both the social behavior of writing a comment and its content requires further study. This article aims to enrich knowledge about user commenting by following the process of writing a comment. We focus on the decision to comment and the social behavior of writing it in the context of exposure to an online news article and the social environment in which the comment is formulated—that is, the context of others’ comments to the story. We examine this sequence with reference to (1) the user’s personal opinion on a specific topic, (2) the user’s self-perception of majority support of their opinion, (3) the user’s exposure to user comments, and (4) the emotions of the other comments to which the user is exposed. Moreover, while most of studies on the effects of user comments examine the uncivil or prejudiced radical contents of comments and their effect on the users, we focus here on more banal general positive or negative sentiment. Positive comments support the framing of the news story presented

in the journalistic article, while negative comments oppose the framing (Von Sikorski 2016). These are not comments that attract special attention due to extreme impoliteness or that cause users to think twice about the content or the commenters who have written it. However, the banal comments might help users to overcome the cognitive overload from being exposed to large amounts of information on news stories. Users decrease information overload through ongoing updates in the online news media, focusing on the most readily available information—other readers’ comments (Anderson et al. 2014). In this study, we aim to explore commenting intentions and the actual behavior of commenting, along with testing whether the sentiment of other user comments (positive and negative) affects the content of self-generated comments.

Content of Comments, Public Opinion and Expression

As mentioned, several studies have recently examined the effect of the user comments following online news articles on users’ perceptions. These studies reflect the growing scholarly interest in user comments as a cue for estimating the public opinion climate, the self-perceived majority support of one’s opinion, and the current role of users in contextualizing and co-creating online news (von Sikorski and Hänelt 2016; Waddell 2018, p. 3079). Generally, studies have found that the content of comments affects how people assess public opinion and their social environment and evaluate political actors (Lee and Jang 2010; Houston et al. 2011, p. 840; Lee 2012; Peter et al. 2014). This trend has been explained by, among other things, the “band wagon effect,” in which the reaction of others on an issue affects how one judges public opinion about it (Sundar and Nass 2001, p. 68). Yet, the comments are seen as affecting “not only bandwagon perception, but also the expected effect of media on other readers” (Waddell and Bailey 2017, p. 538).

Researchers have examined the effect of positive and negative comments posted on social media, in particular in the user comment section, on exposed users (Waddell and Sunder,

2017; Winter et al. 2015; Waddell 2018). Yet, while such studies have focused so far mainly on the shift in how users evaluate the content that the comments referred to (journalistic article, television show), some studies on exposure to civil or uncivil comments have examined their effect on the user's behavior: that is, their writing of a comment and the characteristics of the comment itself. Thus, Hsueh et al. (2015) found that exposure to prejudiced or anti-prejudiced comments resulted in users contributing comments that were biased in the direction of the comments they were exposed to. Another study (Masullo, Chen and Lu 2017) examined the effect of comments that disagreed with the user's views, in both civil and uncivil terms, on the user's intention to participate in the comment discourse. The study stressed the role of the user's *personal opinion*—the user values and political views—in the encounter with others' comments. The authors found that “uncivil comments spark intention to participate politically if the comments arouse aggressive intentions, but civil comments do not produce this effect” (p. 121). Uncivil comments' effects on users can be explained as “negative affective involvement,” when the negative emotions of other users stimulated them to be involved in the comment sphere and defend their views (Masullo Chen and Lu, 2017; Ziegele et al. 2018).

Another perspective on the question of what encourages users to write a comment can be found in an attempt to apply Noelle-Neumann's (1974, 1991) theoretical perspective of the spiral of silence to expression in the comment sphere (Nekmat and Gonzenbach 2013; Meyer and Speakman 2016; Zerback and Fawzi 2017). According to Noelle-Neumann, an individual's decision of whether to speak out or remain silent on a specific public issue is determined by what they assume to be the dominant or declining viewpoints. The theory assumes that people tend to conceal their opinion if they believe they are in a minority and are more likely to speak out if they think their opinion conforms with a strengthening majority. The lower the perceived majority

support for one's opinion, the lower their willingness to speak out (Petrič and Pinter 2002; Stoycheff 2016). In a recent meta-analysis of 66 studies applying SOS, Matthes, Knoll, and von Sikorski (2018) suggest that the positive association between the opinion climate and opinion expression is stronger in the online than in the offline sphere. These results support the robustness of the theory and its usefulness for understanding public discourse dynamics in the online news media.

As users see comments as a cue for the public opinion climate, scholars examined whether the SOS theory can be applied with regard to expression in the user comment sphere. In other words, they considered whether the willingness to express an opinion via user comment is positively correlated with self-perceived majority support for one's opinion and with lower deviation between one's opinion and one's perception of opinion climate. Empirical tests of the spiral of silence postulations are robust in the context of the user comment sphere, especially with regard to the importance of the self-estimation of the public opinion and its effect on the willingness to speak out (Matthes, Knoll and von Sikorski 2018). The perceived public opinion climate significantly contributes to the prediction of whether users will be willing to speak out through comments or will keep silent. However, as Zerback and Fawzi (2017) argue, issues related to fear of social isolation seems to be less important in the online environment. Although, the intention to comment on news websites is studied via the theoretical lens of the SOS theory (Matthes, Knoll, and von Sikorski 2018), research on the actual behavior of commenting and its content is still lacking. In this study, we aim to enrich the knowledge on these aspects.

The SOS theory links the personal assessment of the public sphere and the willingness to speak out: the individual expression is related to the self-perceived behavior of others. The appearance of other's comments as behavior predictors is supported by other general social-

psychological theories. Such theories can contribute to our understanding of the impact of user comments, no matter what their content is, on one's willingness to perform the behavior of posting a comment. The Theory of Planned Behavior—TPB (Ajzen 1991—a well-validated theory in social psychology for explaining behavior in range of domains, contexts, and populations (Hagger, 2019)—is highly relevant. The theory has gained empirical support in application to the online sphere in studies on predicting users behaviors, such as on the motivation to write reviews for mobile apps (Beldad and Voutsas 2018) and Facebook users' online privacy protection (Saeri et al. 2018). According to the TPB, behavior can be predicted by a person's readiness to perform the behavior (behavioral intention). This behavioral intention is influenced by (1) a person's evaluation of the expected outcomes of their performing the behavior (attitude); (2) the extent to which they believe they are capable of performing the behavior (perceived behavioral control); and (3) the perceived social pressure to perform the behavior under interest (subjective norm)—in our case, to write a comment. This perceived social pressure includes the perceived expectations as well as the perceived behavior of others (Fishbein and Ajzen 2010).

The appearance of others' comments can be conceived of as indicator of whether peers perform the behavior; and if they do, this creates the perceived social pressure to behave in the same way—that is, to comment. This postulation can also be supported by the TPB assumption that subjective norms have a direct effect on the behavioral intention to conduct a specific behavior. A systematic literature review of 40 studies applying TPB for intention in various behavioral domains shows a significant sample-weighted average correlation of .39 between subjective norm and behavioral intention (Rise et al. 2010). In the commenting sphere, however, effect of comments was tested for opinion formation but not for the actual behavior of commenting. In line with the concept of commenters as peers, comments on news stories in online news articles were

found to motivate readers to adjust their views after reading them (Chung 2019). Defining the effect of user comment as peer influence is however, different from the concept of perceived social pressure in the TPB. The latter focuses on the user's significant others, such as family, close friends, and colleagues (Fishbein & Ajzen, 2010). In the online news sphere, commenters, in spite of being strangers, exert social pressure that influences other readers (Chung, 2019). Following the definition of commenters in news websites as peers, the subjective norm in TPB can be applied to strengthen the SOS postulation that perceived majority opinion exerts social influence on the willingness to speak out. Thus, commenters, although strangers, serve as reference group for the user and exert social pressure in a similar way to the TPB concept of subjective norm effect. The descriptive component of subjective norm refers to the perceived behavior of others as a cue for expectations. In the context of news websites, exposure to comments on a specific news story is expected to result in higher likelihood of self-commenting. The mechanism of commenting behavior, however, should be considered in light of (1) the sentiment of the opinion expressed in reader comments, (2) the specific news story presented in the article, (3) public opinion expressed by the comments to the article, (4) and the identity of the commenters. In line with the perception of other commenters as peers, the perceived social status of other commenters—inferred from their identification details (e.g. gender, name, occupation, academic degree)—also influences readers of online news articles. Those comments opposing the framing of the news story by high status users (e.g. with academic degrees) have a stronger effect on the reader's opinions concerning a controversial online news story (von Sikorski 2016).

The above-mentioned studies propose two courses of explanations of how comments affect user's participation in the comment sphere. The first, which refers to the contrast effect of comments, focuses on the micro level, that is, of the stimulation caused by a specific commenter's

disagreement with specific content. As these studies emphasize the conflict and emotional arousal of the user's reaction, they tend to focus on radical and offensive comments or on a personalized scandal news story. While such discourse is common in the comment sphere, this focus might miss the banal, perhaps unnoticed, effect of comments. The second line of studies, which relate to the SOS, concerns the macro-social level and assumes that expression is related to the public opinion assessment and the personal psychological effects of perceived support for one's opinion. Personal opinion is a person's own views on a specific public issue (Matthes 2015). In the online sphere, the sentiment of a comment refers to the framing of a story in an online news article. Positive comments refer to content that includes opinions supporting the framing of the news story, and negative comments refer to content that opposes the framing (von Sikorski 2016).

The current study aims to examine the role of positive/negative comments on the willingness to write a comment and the characteristics of the comment written. This will help to assess an influence in the discursive situation that is less vitriolic and more banal—one that does not attract second thought. It will also help us to better understand the mechanisms behind writing a comment, referred to in the two above-mentioned course of studies: those studies that predict that conflict encourages users to express themselves via a comment and those that following the SOS, predict that expression via comments relates to the public opinion assessment. Previous studies on user comments on news stories covered by professional journalists highlight the increasing judgmental and one-sided nature of comments' content as well as the importance of testing the effect of one-sided comments on topic perception and self-commenting (Hsueh et al. 2015; von Sikorski 2016; Waddel and Sunar 2017). One-sided comments are common mainly when the news stories are controversial, with greater effect of negative information on the individual (von Sikorski 2016). In line with this logic and the aim to advance knowledge on the

effect of one-sided comments, we focus on comments supporting and opposing the framing of online news stories.

Our research hypotheses are as follows:

H1: Personal opinion affects readers' intention to post a comment on the news website. The more negative the personal opinion on a certain topic, the greater the intention to post a comment on the news website.

H2: Self-perceived majority support for one's opinion affects readers' intention to post a comment on the news website. The stronger the perception of majority support, the higher the intention.

H3: Users exposed to comments (positive or negative) are more likely to write comments than users exposed to an online article only (with no comments).

In contrast to the above-mentioned hypotheses, the fourth hypothesis focuses only on commenters and the sentiment of the comments they write. The hypothesis is more exploratory in nature, with no prediction of the relationship direction. We assume that the sentiment of the comments users are exposed to affects the sentiment of comments they write. However, in light of existing empirical knowledge on the predictors of the sentiment of self-commenting, we focus on the likelihood of self-commenting with a negative tone.

H4: Sentiment of readers' comments affect the likelihood of self-commenting with negative tone.

Method

Participants

A total of 908 Israeli online access panel members, aged 18 and older, participated in a web-based experiment. Participants were randomly assigned to one of the three groups: (1) an

online news article followed by positive sentiment comments ($n=303$); (2) an online news article followed by negative sentiment comments ($n=302$); and (3) a control group whose participants read an online news article with no comments ($n=303$). On average, participants were 39.7 years old ($SD=14.26$), 51.9% of participants were female, and 27.4% of participants had high school or lower level of education. There were no significant differences between the groups in education ($\chi^2_{(df=12)} = 17.64, p = .13$); region of residence ($\chi^2_{(df=8)} = 7.56, p = .48$); country of birth ($\chi^2_{(df=2)} = 1.57, p = .45$); household income ($\chi^2_{(df=20)} = 7.65, p = .663$) and employment status ($\chi^2_{(df=16)} = 13.23, p = .65$). Significant differences were found in gender ($\chi^2_{(df=2)} = 14.76, p = .001$); and age ($F_{(df=2)} = 8.82, p < .001$); thus, these variables were added to the analysis as control variables.

Procedure

The study was part of a research project on users' behavior conducted in July 2017. In this study, we used a subset of the project sample as well as some of the project stimuli (Soffer and Gordoni, 2020). In the larger research project, a random sample of 7,000 panel members was drawn from the database of a well-known Israeli survey company specializing in online surveys among a panel of respondents (i-panel). The sampling frame included the panel's entire database, which consists of more than 100,000 Israeli-Jewish panel members, 18 years and older. The panel database is a quota-based sample. The quota used are demographic characteristics of the adult Israeli population based on the central bureau of statistics estimates (e.g. gender, age, region of residence, country of birth). The respondents sample of the larger study included 1,510 panelists. The response rate (AAPOR RR2) was 66% (out of 7,000 sample members, 1,510 completed the questionnaires, 3,108 partially completed them, and 3,892 did not enter the survey). Of the participants, 51.1% were women, the mean age of the sample was 39.89 ($SD = 14.36$), 36.8% had an undergraduate

academic degree, 84.2% were born in Israel, 56.1% were employed full time, and 21.2% had a family income similar to the mean household income in Israel.

Participants were asked via an e-mail notice with a link to the survey questionnaire to take part in a survey on web-user's attitudes. First, we randomly assigned the participants into three groups. Second, we measured personal opinion on the achievements of students in the Israeli education system with one survey item. The variable was assessed before stimulus presentation among all participants. Third, we presented to all participants an article published in a popular Israeli news website (*Ynet*) about the achievements of students in the Israeli education system. Ynet is Israel's most popular news website, established in 2000 and associated with the long-time popular tabloid *Yediot Aharonot*. It is ranked as the sixth most popular website in Israel, after Google, YouTube, and Zoom.¹

Fourth, participants were exposed to the manipulation (two experimental groups and a control group). Finally, participants were asked to answer a survey questionnaire. In this study we used three out of five groups of participants included in the larger study (see Soffer and Gordoni 2020 for full description of the project).

Stimulus materials

The stimulus was constructed using the layout of an existing news website, presenting an article reporting on students' education achievements. The article presented base-rate information about the improvement in the education achievements, along with statistics and graphs. The story, which portrays varying levels of improvement among sectors in Israeli society, refers to some major

¹ According to Alexa's traffic ranking (<http://www.alexa.com/topsites/countries/IL>) of top Websites.

social rifts. Thus, the article reflects the continuous, albeit decreasing, gap between low and high socio-economic classes. It also compares the relatively high education achievements among the religious-Zionist education system with the general secular system. This issue relates to the allocation of resources by the Education Ministry and to a major issue on the public political agenda: that is, deliberate religious influences on secular education. In order to ensure careful reading of the article, a minimum of a 40-seconds-stay on the page introducing the report was automatically set. A screen capture of a *Ynet* online news article and the comment section (on the left side) appears in Figure 1 in the appendix. The stimuli was published in Soffer and Gordoni (2020).

After they viewed the screen with the article, participants were asked to read the comments that followed the news report (see table A1 in the appendix for comments wording). These comments were not the real comments from the news site but were formulated by the researchers. We formulated comments that supported the framing of the news story in the article and comments that opposed the framing. We based formulation on careful reading of all the original 113 comments, emphasizing the diverse views expressed in them. We added fictitious names and locations. The names included cues for the gender of the commenters, and the location of residence referred to diverse regions in Israel in order to create a heterogeneous profile of commenters.

Six comments were then presented in each of the treatment groups varying by sentiment: positive versus negative comments. The number of comments was chosen to enable usability based on the screen layout, to allow us to present the article followed by the comments in one screenshot. The control group was introduced to the article only. After reading the article, with or without comments, questions measuring the self-perceived support for one's opinion by the majority and

the intention to write a comment to the news website were introduced. Then, a request to generate a self-comment was introduced, followed by various background questions.

Measures

Intention to send a comment to the news website. Two 6-point Likert-scale items were used for the intention measure: “If you had the opportunity to send a comment to the article you have just read: 1. Would you have liked to post a comment on the website? (1. would like to very much....6. not at all); 2. In your estimation, is it likely that you would have posted a comment on the website? (1. very likely....6. not at all likely). Answers were recoded for higher scores to indicate higher intention. The two items had a high correlation ($r=.86, p<.001$). Scale score was computed as the mean score of the two items (Scale mean=3.08 $SD=1.54$).

Behavior. The behavior of writing a comment was measured by the number of participants who actually added a comment. Of the 908 participants, 83.3% wrote a comment.

Sentiment of self-commenting. The variable was measured with an open question that included the following instruction: “In the following box, you can add an anonymous comment on the article you have just read (the comment will not be published on the news website and used only for research purposes)”. The box provided for comment writing simulated the situation of comment writing on the news website.

The title and comments, added by respondents, were coded independently for the entire sample by two independent researchers into three categories: (1) positive sentiment (supporting the article’s point of view on the news story); (2) negative sentiment (opposing the article’s point of view on the news story); (3) ambivalent or natural sentiment. First, all comments were read carefully to identify negative, positive, and neutral terms related to the news story. Second, the key terms were

used to classify the sentiment of the comment to a specific category. We present descriptive results in table 2. Inter-coder reliability for nominal data was computed, with 81.2% percent agreement (*Cohen's Kappa* of .732). The non-agreements were discussed by the researchers for achieving coding agreement.

Personal opinion. Respondents were asked on a 6-point Likert scale ranging between “very much agree” (1) to “very much disagree” (6) how much they agree or disagree with the statement that in comparison to 2015, students' achievements in 2016 improved. Scores were reverse-coded so that higher scores would indicate higher level of agreement ($M = 3.82, SD = 1.09$). After randomization and before the manipulation, the groups did not differ on the measure of personal opinion ($\chi^2_{(df=20)} = 17.31, p = .63$).

Self-perceived support for one's opinion by the majority. Self-perceived majority support of one's opinion was measured with seven items on a six-point Likert scale ranging between “very much agree” (6) and “very much disagree” (1). Three items were adopted from Matthes' (2015) scale relating to three social cycles: (i) surrounding people; (ii) people in the neighborhood; and (iii) people in the country. The additional four items were adopted from Soffer and Gordoni (2018) and included other cycles relevant to the online sphere. These items refer to friends in the social network, journalists publishing articles in news websites, and people who read articles in news websites and post or do not post user comments.

Respondents were asked: How much do you agree or disagree with the following claims referring to achievements of students in the Israeli education system:

- 1) My opinion about achievements of students in the Israeli education system is similar to most of the opinions I hear from others around me ($M = 4.52, SD = 1.21$);

- 2) Where I live, most people think the same way about achievements of students in the Israeli education system ($M = 4.69$, $SD = 1.01$);
- 3) Most of my friends in social networks such as Facebook think the same way about achievements of students in the Israeli education system ($M = 4.54$, $SD = 1.2$);
- 4) Most people in Israel share my opinion about achievements of students in the Israeli education system ($M = 4.35$, $SD = 1.22$);
- 5) My opinion about achievements of students in the Israeli education system is similar to the opinions of the majority of people who sent comments to articles published on this issue in news websites ($M = 4.03$, $SD = 1.39$);
- 6) My opinion about achievements of students in the Israeli education system is similar to the opinions of the majority of people who publish articles on this issue in news websites ($M = 3.83$, $SD = 1.34$);
- 7) My opinion about achievements of students in the Israeli education system is similar to the opinions of the majority of people who read articles on this issue in news websites, and do not send comments to these articles ($M = 4.32$, $SD = 1.22$).

Measure score was computed as the mean of seven items ranging between 1 and 6. Factor analysis (principal axis factor) with varimax rotation was conducted in order to analyze the structure of the construct. Results indicate high total variance accounted for by one factor (eigenvalue > 1) with about 52% of items variance explained by the factor. Factor loadings for all items were higher than .5, ranging between .53 to .71. The scale had high reliability (*Cronbach's* $\alpha = .81$), All items proved high quality. The corrected item-total correlation, which indicates how strongly the item measures the concept measured by the total multiple-item scale, ranged between .49 and .60.

Manipulation check

The manipulation check included an external sample of 55 online panel members. Of these, 50.9% of participants were women, 52% had an academic degree, and 23.1% had a household income similar to the average household income in Israel. In order to assure careful reading of the article, participants were asked to read the news article carefully before moving to the next page. They could leave the screen and continue with the survey only after a minimum of 30 seconds stay. In the first stage, participants were asked to assess the attitude posed by the article towards the education system achievements in Israel (In your opinion, what is the main claim of the article you have just read about the state of the education system in Israel in 2016? 1. got very much worse; 2. got much worse; 3. got a little bit worse; 4. got a little bit better; 5. got much better; 6. got very much better). Most participants (87%) reported that the main claim of the article refers to a positive trend in the state of the education system ($M=4.07$, $SD=.77$).

In the next step, participants were asked to read the comments that followed the article. Then they were presented with all the comments, framed by the researchers, to be included in the study. The perceived sentiment of each comment was assessed by an item presented after each comment: “In your opinion, how much does the comment support the main claim of the article? 1. Very much support; 2. Much support; 3. Little support; 4. Little oppose; 5. Much oppose; 6. Very much oppose.” Response options were recoded for higher scores to represent more support in the positive slant of the article. Participants perceived the 12 positive framed comments as significantly ($p<.001$) more positive ($M=4.88$, $SD=.55$) than the 12 negative framed comments ($M=2.57$, $SD=.95$). The analysis thus suggests a successful manipulation.

Results

Research hypotheses include three dependent variables, measuring different aspects of user comments: behavioral intention—reader's intention to send a comment to a news website (H1, H2); behavior—writing a comment (H3); and the sentiment of self-comment (H4). We present the results separately for each of the dependent variables.

Behavioral intention

To test the hypotheses on the negative effect of personal opinion (H1) and the positive effect of self-perceived support for one's opinion by the majority (H2) on the intention to send a comment, an OLS regression was conducted. The regression model included the intention to send a comment to the news website as dependent variable. Personal opinion about students' achievements in the Israeli education system, and self-perceived majority support of one's opinion were included as independent variables. Sentiment of comments, gender and age served as covariates.

Results point to significant positive effect of personal opinion ($\beta=.15$, $p<.001$) and significant positive effect of self-perceived support for one's opinion by the majority ($\beta=.24$, $p<.00$). However, the positive effect of personal opinion, found in our model, was in the opposite direction from the hypothesized. Thus, H1 is only partially supported and H2 is supported. The effect of the sentiment of comments and the background variables, gender and age, was not significant. Results are presented in Table 1.

Table 1. OLS Regression for Predicting Behavioral Intention (n=908).

Variables	<i>b</i>	<i>SE</i>	β	<i>t</i>
Personal opinion	.22***	.04	.15	4.85
Self-perceived support for one's opinion by the majority	.42***	.05	.24	7.54
Sentiment of readers' comments (reference group: no comments)				
Positive sentiment (1)	.07	.12	.02	.57
Negative sentiment (2)	.02	.12	.01	.15
Age	.00	.01	.00	.16
Gender (reference group: women)	-.12	.01	-.04	-.18

Note. $F(6,901) = 14.28$, *** $p < .001$. $R^2 = .09$

Behavior

Logistic regression was used for testing the effect of the independent variable—exposure vs. non-exposure to users' comments—on the likelihood of writing a comment after reading an on-line news article (H3). Personal opinion, the intention to send a comment, the self-perceived support for one's opinion by the majority, age, and gender were added to the model as control variables. Descriptive statistics for the behavior by experimental groups are presented in Table 2.

Table 2. Self-Commenting by Experimental Condition – Descriptive Statistics (n=908)

	Self-comment added	Self-comment not added
Online news article only – control group (n=303)	73.9% (n=224)	26.1% (n=79)
Exposure to comments (n=605)	84% (n=508)	16% (n=97)

The model explained 5.6% (Nagelkerke R^2) of the variance of self-commenting. The probability of self-commenting was significantly affected by exposure to comments and intention to post a comment on the news website. A significant positive effect was evident for exposure to comments ($OR = 1:1.91$): participants reading the article followed by comments were about twice as likely to add a comment than those reading the online news article only. The intention to post a comment on the news website also had a positive effect ($OR = 1:1.28$): the higher the intention, the higher the likelihood of adding a comment. The effect of the control variables, gender and age, was not significant. H3 is supported by the results.

Sentiment of self-commenting

Logistic regression was used for testing the effect of the independent variable sentiment of user comments on the likelihood that users' self-commenting would have a negative sentiment (H4). Personal opinion, self-perceived support for one's opinion by the majority, age, and gender were added to the model as control variables. The model explained 32.4% (Nagelkerke R^2) of the variance in emotional content of self-commenting. The probability of negative self-commenting was affected by the sentiment of the comments that users were exposed to, personal opinion, and

age. The effect of a user's self-perceived majority support for their opinion and gender was not significant. A negative effect was evident for positive sentiment comments ($OR = 1:0.39$), with respondents that read only the article with a positive slant (control group) being about twice and a half as likely to write a negative sentiment comment ($OR = 1:2.56$) compared to respondents reading positive sentiment comments as well. Respondents who read the negative sentiment comments were more likely to write a negative sentiment comment than respondents reading the article only. Respondents in the negative sentiment group were nearly twice ($OR = 1:1.95$) more likely than those in the control group to write a negative sentiment comment. A higher positive personal opinion was associated with a reduced likelihood of writing a negative sentiment comment ($OR = 1:0.33$). Increasing age was associated with an increased likelihood of writing a negative sentiment comment. Results support H4. Results are presented in Table 3.

Table 3. Logistic Regression for Predicting Sentiment of Self-Commenting

Predictors	<i>Coefficient</i>	<i>SE</i>	<i>Exp(b)</i>
Sentiment of user comments (reference: without user comments)			
Positive sentiment	-.94***	.22	.39
Negative sentiment	.67***	.22	1.95
Personal opinion	-1.11***	.09	.33
Self-perceived support for one's opinion by the majority	-.10	.10	.902
Age	.02**	.01	1.02
Gender (reference: male)	-.21	.18	.81

Note. n=723; * $p < .05$; ** $p < .01$; *** $p < .001$

Discussion

This study aimed to understand the intention to post a comment on a news website on an issue under public discussion and the characteristics of the actual behavior of comment posting. First, we tested how a user's opinion on a publicly debated topic (the improvement in the achievements of the education system) affected their intention to post a comment to an online article on the topic. Results support the hypothesized effect (H1) but in an opposite direction than expected, that is, the more positive the user's opinion about the achievements of the education system, the greater their willingness to post a comment. While our hypothesis was based on the theoretical assumption that negative feeling towards an issue would be more affective in stimulating users' involvement (Masullo Chen and Lu 2017), this was not proved to be the case here. It may be that these users who assumed an improvement in the achievement of the education system saw themselves as part of the majority and therefore were more willing to post a comment. This assumption refers to the macro level of the assessment of public opinion supported by the SOS theory, relating personal opinion and willingness to speak out depending on whether a person's evaluates their own opinion to be majority or a minority opinion. The partial support for H1 (opposite direction than expected between personal opinion and willingness to comment) can imply that the explanation based on SOS theory is more plausible.

Second, we test how the user's self-perceived majority support for their opinion affected their intention to post a comment on a news website on the issue under discussion. The hypothesized effect (H2) was supported, as self-perceived support for one's opinion by the majority was found to significantly contribute to the prediction of intention to post a comment. In line with the spiral of silence theory, which was found relevant to opinion-expression in the user comments sphere (Matthes et al. 2018), the more strongly the user feels they hold a majority opinion, the

higher is their willingness to post a comment. In fact, self-perceived majority support for one's opinion has a significant added value on the intention to post a comment even after controlling for the effect of personal opinion. These results, which are in line with results of previous studies, such as Woong and Park (2011), stress that while user comments are usually written in isolation and often are anonymous, user's considerations of social and public opinion still play a dominant role in their decision whether to engage with this online activity. Among others, this can be related to the hostile atmosphere and incivility in user comment sections, which the users are increasingly exposed to, in the online journalistic sphere, even if they are posting the comment under the veil of anonymity. In this study, we did not measure hostility and incivility. We focused on more banal topics and one-sided comments rather than hostile or offensive. This enabled us to assume that in more controversial topics and hostile commenting environments the effect will be even stronger. The result is also in line with the TPB postulation that the perceived social pressure to conduct behavior affects behavioral intention, as well as being in line with empirical findings across various behaviors and contexts, such as the systematic review by Rise et al. (2010). The positive direction and medium magnitude of the association between self-perceived majority support for one's opinion found in our study is similar to the systematic review finding by Rise et al. (2010).

When we examine the behavioral level—that of posting a comment—we find that a user's exposure to comments, whether positive or negative, almost doubles the probability of their posting a comment. This appearance of comments can be explained as a social pressure to perform the same activity: the more comments appear, the higher the expectation the users feel to post comments of their own. The significance effect of the behavioral intention of commenting on the actual behavior, found in our study, is in line with the TPB postulation that intention is the direct determinant of behavior. A postulation that gained empirical support in various behavioral

domains (Fishbein and Ajzen, 2010; Rise et al. 2010). However, the probability that users will post a negative comment is highly dependent on the sentiment of the comments they are exposed to. When we compare the group that was exposed to the online article only, which contains base-rate positive information, with the group exposed to the same article followed by positive comments, we find that the probability of posting a negative comment in the latter group is 2.5 times less than in the former group. When we compare the probability of posting a negative comment in the group exposed to the article only with that of the group exposed to the article and negative comments, we see that in the latter group the probability to post a negative comment is two times higher.

No effect was found of self-perceived support for one's opinion by the majority on comments' sentiment—this variable affects users' willingness to write a comment but is not relevant to the characteristics of the comments written. However, as expected, the more negative the personal opinion of the user is, the higher the probability the user will write a negative comment. Thus, hypotheses 3 and 4 were both empirically supported by the present study results. It should be noted that H4 is more exploratory in nature, with no preliminary assumption about the direction of the relationship between the sentiment of other readers' comments and sentiment of self-commenting. Thus, results need to be tested empirically in future studies.

These results indicate that positive comments have a moderating effect in the comment sphere. This is a theoretical contribution, as some previous studies show the effect of positive comments (von Sikorski and Hänel 2016); studies have mainly found effects of negative comments, with no effect (Kümpel and Unkel, 2020) or only limited effect of positive user comments (von Sikorski 2016). This led to research setups that used the positive comments mainly to understand the effect of the negative ones (Winter et al. 2015; Waddell 2018). The present study results on the effect of negative comments correspond with previous findings that incivility makes

users respond in an uncivil way (Masullo and Lu 2017). In our study we see similar effect of negative comment, which further encourage negative discourse. While it is clear that uncivility triggers scholar's attention, our study implies that it is not only the rudeness of the content that should be studied, but also the negative sentiment of comments. However, it should be noted that the effect of positive comments can contribute to the deliberative discourse in the comment sections and the public discourse in general.

Limitations

In closing, we should mention several limitations of this study. These include the social norms of the specific Israeli comment sphere (the commenting box offered by a specific news site), the context of the conversation (achievements of the Israeli education system), the social relationships among the participants (anonymous commenting sphere), the cultural context of the country (Israel). These factors might limit the generalizability of our results.

Limitations related to study design include the method we used to ensure careful reading of the article. Although verification questions might be more useful, we did not implement them because of the potential addition of cognitive burden for the respondent or the effect on opinion or other measures in the study. Our use of a base-rate positive article followed by positive and negative comments might also influence our results, especially regarding the role of positive comments. Since the study aimed to advance knowledge on the effect of one-sided comments, our findings are limited to this specific context and cannot be generalized to online environments with a full range of comments. To increase the possible effect of the comments, we exposed users to positive or negative comments but not to mixed ones. Although this research setup was effective and is in line with previous studies (von Sikorski, 2016), it differs in most cases from typical comments' discourse, which is much more heterogeneous. In this regard, the control group differs from the

treatment groups on more than one variable and might result in recognizing effects. The control group lacks comments and therefore also lacks the sentiment of readers' comments. This characteristic weakens our conclusion that the appearance of comments versus no comments raised the probability of responding. We suggest future studies use a modified setup that also includes a mix or neutral user comments. The behavior of writing a comment might be affected by the information given to participants that comment posting is not public and is only for research purposes. Thus, if the experimental environment led participants to feel compelled to provide a comment, the high rate of commenting behavior found in our sample might overestimate the actual behavior in a real environment of news site.

Finally, the study is embodied in the Israeli cultural and political context. The user comment sphere in Israel is identified as a vital, brief, and conflictual arena (Aharony 2012; Melamed 2006). Further studies should examine the role of comment sentiment in different setups and national contexts.

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Appendix

Figure 1. Screen Capture of *Ynet* Online News Article and the Comment Section (on the left side)*

*The figure was published in Soffer and Gordoni, 2020.

Table A1. Comments Wording in each Treatment Group

Negative group	Positive group
<p>113. Reminding Pravda in the Soviet Union</p> <p>Improvement in the security situation, improvement in student grades, economic prosperity, and agricultural prosperity. So how come it is that every second Israeli youth's dream is to emigrate abroad?</p> <p>Tali, Kfar Saba</p>	<p>113. Investment in education is worthwhile.</p> <p>You see that there is an improvement in grades. The Effectiveness Measures exams results demonstrate how important it is to invest in education.</p> <p>Tali, Kfar Saba</p>
<p>112. You can play with the numbers. There is really no improvement in the students' knowledge!!!</p> <p>The Education Ministry, which is responsible for the Effectiveness Measures test, simply lowers the tests' level to show that seemingly there is an improvement.</p> <p>Einat, South</p>	<p>112. The weak receive more and results are evident.</p> <p>The Ministry of Education is investing in the periphery and in weaker social groups, and now we are finally beginning to see the improvement.</p> <p>Einat, South</p>
<p>111. There is nothing to boast about</p> <p>Students are needed to be taught things that will contribute to their lives and not just to make them memorize material.</p> <p>Udi, Tel Aviv</p>	<p>111. The gap between the weak and the strong shrank – well done.</p> <p>This is not just the overall improvement in achievement. There is also reference to the gaps between groups in Israeli society. They also make sure to narrow gaps – well done.</p> <p>Udi, Tel Aviv</p>

<p>110. A sad joke.</p> <p>I don't believe [there is improvement]. The teachers must have told the students the answers</p> <p>Ziv, Netanyahu</p>	<p>110. Amazing !!</p> <p>What a pleasure to open the morning with this! Great country to live in, great to see the improvement here, fun to live with our people. There is nowhere like our country!</p> <p>Ziv, Netanyahu</p>
<p>109. It is not very wise to memorize material in order to pass the Effectiveness Measures tests.</p>	<p>109. The data speak for itself. Well done.</p>
<p>108. How can one know that the Effectiveness Measures exams are not being skewed?</p> <p>After all, the Ministry of Education finances the exams and it is in its interest to show that there is improvement.</p> <p>Ido, Ramat Hasharon</p>	<p>108. Stop complaining!</p> <p>I am very optimistic. We're on the right track.</p> <p>Ido, Ramat Hasharon</p>