

**I Disagree With you – Should I say Something?**  
**The Impact of the Prevailing Opinion on Opinion**  
**Expression**

**Dissertation**

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## **Chapter I: General Introduction**

### **Expressing Deviant Opinions Initiate (Social) Change**

Due to globalization and increasing migration flows, our cultural norms and values are increasingly volatile (Inglehart, 2020). Societies are becoming more and more diverse, with smaller subgroups joining a larger social group within the same country or region. As a result, nowadays, societies are undergoing vast social changes and need to come to terms with an increasing number of opinions, values, and lifestyles. The social change facilitated by the public exchange of these diverging opinions is slow (Inglehart et al., 2017). It requires people who dare to express opinions that deviate from the “mainstream” opinion or draw attention to things that need to be changed. As a result to people expressing new information (e.g., a deviant opinion), change can take place (Jung et al., 2018; Moscovici, 1976). Hence, only when voicing one’s own opinion, especially when it clashes with the predominant opinion of the society (minority opinion), people can make the wisdom of the crowd visible (Surowiecki, 2004) and initiate (social) change. To mention just one of many examples, Greta Thunberg and the Fridays for Future movement started as a minority expressing their concern about the political inaction with regard to the climate crisis, a deviant opinion. Since then, the ensuing debate and activism has facilitated pro-environmental actions and policy changes in many countries.

Expressing oneself seems to be a part of being human because humans as social beings are “discursive subjects” (Epstein, 2011, p. 335) and want to know about others and want others to know about them. Whether people indeed articulate their opinion and share it with others, however, depends, among other things, on whether the expressed opinion has the potential to spark backlash from others. If, for example, a deviant opinion is expressed, positive responses (e.g., support, acknowledgment) are rare and negative responses (backlash) from others (e.g., social isolation, conflicts, arguments) are common. Because people have a strong need to belong to a social group (Baumeister & Leary, 1995; Cheung & Lee, 2012; Rios & Chen, 2014),

people refrain from voicing deviant opinions that put their social belonging at risk (Ho & McLeod, 2008; Neubaum & Krämer, 2018). Given the long and continuous interest in social influences (e.g., whether people perceive support for their opinions) on opinion expression, the existing literature on this is rich (Asch, 1956; Maass & Clark, 1984; Moscovici, 1976; Noelle-Neumann, 2001; Stasser & Stewart, 1992; Wittenbaum & Bowman, 2005) but findings vary across studies. Some studies found evidence that people will express their opinion even if they did not expect support for it (Hornsey et al., 2003; Matthes et al., 2010; Porten-Cheé & Eilders, 2015), whereas other studies revealed less opinion expression if people perceived no support from others (e.g., society or interaction partners) for their own opinion (e.g., Asch, 1956; Noelle-Neumann, 2001; Stasser, 1992).

Research investigating opinion expression in the absence of support from others can be roughly separated into two strands: The first strand looks at the effects of holding a majority opinion compared to a minority opinion: Support for one's opinion can be provided by society (*majority opinion*) in that one's opinion is in line with the *majority opinion*. The second strand investigates how support can come from the respective interaction partner one faces (*faced opinion*) in a specific situation and whether the faced opinion is in line with one's opinion (e.g., confirming vs. opposing opinion). However, Effect sizes differ between these two strands and paint an inconsistent picture of social influences on opinion expression. Research addressing *majority opinion* found (relying on Lovakov & Agadullina, 2021) only a small effect size for majority opinion on its likelihood to be expressed ( $r \approx .05$ ; Glynn et al., 1997; Glynn & Hüge, 2014;  $r = .10$ , Matthes et al., 2018). In contrast, research that focused on the *faced opinion* revealed a large effect size of the effect of faced opinion on opinion expression ( $d = 2.03$ ; Lu et al., 2012), that is, people who face someone with a confirming compared to opposing opinion preferably express their opinion (e.g., Lu et al., 2012; Stasser, 1992; Wittenbaum & Bowman, 2005).

Unfortunately, research integrating both strands (e.g., examining its interaction) on opinion expression is lacking. However, this integration could provide essential insights on opinion expression, especially regarding the question whether deviant opinions are expressed less in general or only less in confrontational situations (e.g., if one faces an opposing opinion). This question is particularly relevant in the light of research that suggests a reverse effect, namely more expression of deviant opinions, as mentioned above (e.g., Hornsey et al., 2003; Porten-Che  & Eilders, 2015). Therefore, this dissertation revisits the issue of opinion expression and the influence of majority opinion and faced opinion in depth. Using a well-established paradigm and taking new methodological approaches (i.e., providing the opportunity to express an opinion several times within a conversation or contributing to product evaluation portals), I investigate the impact of the majority opinion, the faced opinion, as well as their interaction on opinion expression. Further, opinion expression might vary depending on whether it takes place in interactive (e.g., a situation with direct responses from others like a conversation) or non-interactive (e.g., a situation without direct responses from others like evaluation portals) contexts, as the responses of others in these contexts may vary.

In this chapter, I summarize work that uses different paradigms to provide an overview of existing literature, concluding that previous research suggests that whether an opinion is voiced depends on the prevailing (majority and faced) opinion. Doing so, I distinguish between *majority opinion* and *faced opinion* and I review research that examine the impact of holding a majority opinion or facing an opposing opinion on opinion expression in different contexts. More specifically, in the present chapter, I focus on opinion expression in interactive contexts by summarizing the Spiral of Silence (SOS) approach of Noelle-Neumann (2001) and its critique, the minority slowness effect (MSE; Bassili, 2003), and information sharing in group contexts (e.g., Stasser & Titus, 2003; Wittenbaum et al., 2004). Further, I elaborate on differences of interactive (e.g., a conversation) and non-interactive (e.g., evaluation portals)

contexts on opinion expression based on their characteristics. Finally, I summarize work that generally supports the effect of expressing deviant opinions more (instead of less).

## **Opinion Expression in Interactive Contexts**

### **The Spiral of Silence (SOS) Assumption**

A basic claim whether people express their opinion when holding an opinion not in line with the prevailing majority opinion is the SOS (Noelle-Neumann, 2001). In the early 1970s, Noelle-Neumann claimed the SOS for the first time (Noelle-Neumann, 1974, 2001). According to the SOS, people are more likely to express their opinion when holding an opinion in line with what they perceive the majority opinion to be (*majority opinion*) and remain silent (or at least are less likely to express their opinion) when holding an opinion not in line with the majority opinion (Noelle-Neumann, 2001). Or to put it simpler: People are more likely to express their opinion if they perceive the societal majority opinion to be on their side. Noelle-Neumann (Noelle-Neumann, 2001) argued that this is due to fear of backlash from others like fear of social isolation.

According to Noelle-Neumann (1974), people form an idea of the frequency distribution of opinions in their environment and their development, for instance, which opinions increase in frequency, which decrease. She calls this ability “quasi-statistical sense”. Noelle-Neumann assumes that due to the fear of backlash from others, people use their “quasi-statistical sense” to constantly monitor their environment and the majority opinion to keep track of whether their own opinion is in line with the majority opinion (Noelle-Neumann, 2001). If a discrepancy between their own opinion and the majority opinion is perceived, people will express themselves less likely because they fear backlash from others (e.g., social isolation). Noelle-Neumann (2001) argues that people holding a minority opinion, therefore, should be less likely to express it. Notably, this effect depends on the specific topic at hand. First and foremost, the topic should have a strong moral component because only then “ideology, agitation and

emotions come into play” (Noelle-Neumann & Petersen, 2004, p. 349). Those feelings should convince people holding a majority opinion to be on the “right” side and enable backlash from others towards those who hold a minority opinion (Noelle-Neumann, 2001; Noelle-Neumann & Petersen, 2004). Only then minorities feel a strong (social) pressure to withhold their opinion because they would risk being socially isolated from those holding a majority opinion (Matthes et al., 2018). Second, the topic should be controversial and of high interest to themselves. This interest increases the chance that people are aware of the majority opinion and know whether they hold a minority or majority opinion (Jeffres et al., 1999; Noelle-Neumann, 2001). Third, in line with the latter, the topic should also be discussed in the media. The majority opinion is expressed and disseminated through this, and thus the majority opinion is observable (Jeffres et al., 1999; Noelle-Neumann, 2001). In this sense, studies in the SOS tradition often utilize morally loaded and controversial topics, such as the legal status of abortion (Gearhart & Zhang, 2018; Salmon & Neuwirth, 1990; Wu & Atkin, 2018), immigration policies (Gearhart & Zhang, 2018; Louis et al., 2010; Sherrick & Hoewe, 2018), affirmative action (Hayes, 2007; Moy et al., 2001; Sherrick & Hoewe, 2018), or environmental aspects like genetically modified food or climate change policies (Hayes, 2007; Kim, 2012; Porten-Cheé & Eilders, 2015).

Noelle-Neumann (2001) observed voting processes and interviewed people on political issues to test her claim about the SOS. One of her main research focuses on asking people about their opinions on various politically loaded topics (e.g., the continued support for Willy Brandt as German chancellor or the advocacy of corporal punishment in child education) and what they perceive the majority opinion in society to be. To test her claim that minority opinions are expressed less than majority opinions, she confronted people with the so-called train scenario. In this, people were to imagine being on a 5-hour long train ride. During this train ride, a passenger in the compartment voiced an opinion not in line with the respondents’ opinion (e.g., the majority opinion in case the respondent held a minority opinion). Noelle-Neumann asked whether they would express their opinion in this situation. She later extended this scenario in

some interviews by presenting the passengers' opinion with drastic verbal clarity (verbal threat; Noelle-Neumann, 2001) to implicitly strengthen the fear of backlash from others and thereby obtain a more pronounced effect of less opinion expression. Indeed, when an explicit verbal threat was used instead of the simple opinion statement people were less likely to express their minority opinion in these situations (Noelle-Neumann, 2001). Noelle-Neumann (2001) concluded that the fear of backlash from others (which are more likely in a verbal threat situation) reduces opinion expression when people hold a minority opinion and therefore seems to be the underlying mechanism.

Several studies addressed the SOS and the corresponding claims (for an overview, see Glynn et al., 1997; Glynn & Huge, 2014) using different ways of opinion expression such as the likelihood to engage in a discussion (Hayes et al., 2001), to participate in a TV interview (Kim et al., 2004; Salmon & Oshagan, 1990), or to wear a campaign button publicly (Salmon & Oshagan, 1990). Some studies successfully replicated the findings (Chun & Lee, 2017; Hayes et al., 2001; Kim et al., 2004; Nekmat & Gonzenbach, 2013; Ordoñez & Nekmat, 2019; Salmon & Oshagan, 1990). Other studies, however, did not find evidence for an influence of holding a minority opinion on voicing it (Jeffres et al., 1999; Katz & Baldassare, 1992; Oshagan, 1996; Shamir, 1995). Interestingly, some studies even found a reverse effect, that is, that minorities (e.g., "hardcore individuals"<sup>1</sup>) express themselves more often (Matthes et al., 2010; G. W. Yun et al., 2016). In three meta-analyses, the relationship of the majority opinion and opinion expression was tested (Glynn et al., 1997; Glynn & Huge, 2014; Matthes et al., 2018). In total, 95 studies ( $N_{1studies} = 17$ ,  $N_{2studies} = 12$ ,  $N_{3studies} = 66$ ) were included in the three meta-analyses with a total number of 46492 participants ( $N_1 = 9500$ ,  $N_2 = 9800$ ;  $N_3 = 27192$ ). All analyses revealed a significant but small effect in line with the claim of the SOS in that minority opinions

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<sup>1</sup> People who always express their opinions independent of the topic, the context or the predominant opinion (Noelle-Neumann, 2001).

are expressed less likely than majority opinions ( $r \approx .05$ , Glynn et al., 1997; Glynn & Huye, 2014;  $r = .10$ , Matthes et al., 2018). In addition, those meta-analyses observed heterogeneity in the correlations of holding a minority opinion and expressing it, that might be explained by (undetected) moderators. Glynn et al. (1997) did not find significant evidence for any of their tested moderators (e.g., dichotomization of measurement, the closeness to the target group to which the opinion is expressed like strangers vs. acquaintances, published or unpublished studies). However, Matthes et al. (2018) found a decreased likelihood of opinion expression for less salient (unobtrusive) compared to salient (obtrusive) topics, and also when people expressed their opinion among acquaintances compared to strangers. The latter contradicts the claim of SOS, as Noelle-Neumann (2001) aimed to measure the expression of opinions towards strangers. In sum, there seems to be some evidence for the notion of the SOS, as there is a small but significant impact from the *majority opinion* on opinion expression.

Another strand of research investigated the mechanism assumed by the SOS claim that people express themselves less because of fear of social isolation. Here, researchers either examined fear as a trait (Chan, 2018; Chen, 2018; Kim, 2012; Matthes et al., 2012) or fear as a situational variable like backlash from others (e.g., social isolation; X. Liu & Fahmy, 2011; Soffer & Gordoni, 2018; Varela-Rey et al., 2018). In both cases, a negative correlation of opinion expression and fear was found (e.g., Ho & McLeod, 2008; Kim, 2012; X. Liu & Fahmy, 2011; Matthes et al., 2012; Soffer & Gordoni, 2018). Fear of backlash from others as well as fear as a trait diminished the likelihood to express a minority (compared to a majority) opinion (Kim, 2012; X. Liu & Fahmy, 2011; Moy et al., 2001; Scheufele, 1999; Soffer & Gordoni, 2018; Varela-Rey et al., 2018). Further research also found that not only holding a minority (compared to a majority) opinion but also the faced opinion within a situation (e.g., whether one's opinion is in line with the faced interaction partner) seems to have an impact on fear of backlash from others and thus, on opinion expression (Ho & McLeod, 2008; Neubaum & Krämer, 2018). Or more precisely: People who held a minority opinion and faced an (opposing)

majority opinion expressed themselves less due to fear of backlash from others (Ho & McLeod, 2008; Neubaum & Krämer, 2018). Hence, not only the majority opinion (whether one holds a minority or majority opinion) but also the faced opinion (whether one faces an opposing or confirming opinion) seems to have an impact on opinion expression. Initial evidence was provided by Gearhart and Zhang (2018). They asked about what participants perceived as the majority opinion and faced them either with an interaction partner holding an opposing or confirming opinion and assessed fear of backlash from others. Results showed that more fear of backlash from others was perceived when facing an opposing than confirming others' opinions, resulting in less opinion expression. Taken together, fear as a trait and fear of backlash from others both seem to have a similar negative impact on opinion expression and thus seem to be a potential underlying mechanism of the notion of the SOS. Noelle-Neumann herself, however, based her claim of the SOS on fear of social isolation, hence, fear of backlash from others rather than fear as a trait.

However, the SOS and its corresponding research also provoked criticism due to the inconsistent findings and small effect sizes in general (Bodor, 2012; Glynn et al., 1997; Salmon & Kline, 1985; Scheufele & Moy, 2000). One of the major points of criticism of research on the SOS is the methodological approach, especially the operationalization of opinion expression (e.g., Bodor, 2012; Glynn et al., 1997; Salmon & Kline, 1985; Scheufele & Moy, 2000). Mostly, hypothetical scenarios and survey-based studies with hypothetical opinion expressions were used to capture participants' opinion (Glynn et al., 1997; Matthes & Hayes, 2014; Scheufele & Moy, 2000; Scheufele et al., 2001; W. G. Yun & Park, 2011) and seldomly real situations or actual responses (for an exception see Jeffres et al., 1999). One common approach is to present participants with a hypothetical scenario in which they sit next to another person on a long journey (Noelle-Neumann, 2001; Salmon & Kline, 1985; Soffer & Gordoni, 2018) or one in which they give a TV interview (Kim, 2012; Kim et al., 2004; Salmon & Neuwirth, 1990). Then, the (hypothetical) likelihood to express their opinion by wearing a campaign button in

public (Dvir-Gvirsman et al., 2018; Noelle-Neumann, 2001; Salmon & Oshagan, 1990) or entering a conversation (Noelle-Neumann, 2001; Salmon & Kline, 1985; Soffer & Gordoni, 2018) was assessed. These scenarios were criticized for their weak external validity. Even though Noelle-Neumann (2001) used such scenarios, she later argued that only using scenarios to test her claim about the SOS is insufficient because without an interview situation, the “perceptible pressure from the climate of opinion” (p.351, Noelle-Neumann & Petersen, 2004) is missing. People would not feel the pressure of a hostile majority in studies only using a scenario (Noelle-Neumann & Petersen, 2004).

Another issue is the assessment of opinion expression. As mentioned before, opinion expression is mostly assessed hypothetically (e.g., Glynn et al., 1997; Matthes & Hayes, 2014; Scheufele & Moy, 2000). In addition, most experimental studies assessed opinion expression only once (single trial studies; e.g., Glynn et al., 1997; Salmon & Oshagan, 1990) and not several times (multi-trial studies). Notably, as mentioned above, Noelle-Neumann and Petersen (2004), for example, argued that only within an interactive context (such as an interview or another form of a conversation) minorities express themselves less as only then they perceive the majority opinion. However, an interactive context implies the exchange of different opinions and usually entails several turns in which the opinion can be expressed. If opinion expression is captured only once (as in most previous studies), it remains unclear whether those contexts sufficiently resemble a conversation and whether the majority opinion can be perceived. This lack of what people perceive as the majority opinion could explain, why in some studies “minority” opinions have been expressed more or equally likely as majority opinions. Similarly, an interactive context with several turns compared to only one interaction might increase the fear of backlash from others, as this also provides several opportunities for denunciation by the majority. Expressing an opinion only once rather than several times within a conversation could explain, at least in part, the small effects and should be considered in future

research. This dissertation provides an initial paradigm for capturing expressions of opinion multiple times.

To sum up, research addressing the SOS indicates a small (which might be due to the mentioned deficits) but significant effect of holding a minority opinion (compared to a majority opinion) on opinion expression. People who hold a minority opinion seem to be less likely to express their opinion due to fear of backlash from others or due to fear as a trait. Moreover, the fear of backlash from others is apparently caused by the position of one's opinion (minority vs. majority opinion) and the faced opinion (opposing vs. confirming opinion) of the interaction partner within the situation. Thus, the majority opinion and the faced opinion (for detailed information see section "facing an opposing opinion" of this chapter) seem to impact opinion expression. However, this interplay (e.g., an interaction) of the majority and faced opinion on opinion expression was not yet investigated adequately in earlier research. Similarly, there is a lack of studies so far in which an opinion could be expressed several times within a scenario. Both aspects will be addressed and investigated in this dissertation.

### **The Minority Slowness Effect**

Not only are minority opinions expressed less likely (according to the SOS), but minority opinions also seemed to be expressed after a longer delay, compared to majority opinions. This delayed expression of minority opinions is called the minority slowness effect (MSE). The MSE states that people holding a minority (compared to a majority) opinion take longer to respond and thus to express their opinion (Bassili, 2003; Hoge & Glynn, 2013). Differences in response times are positively related to the size of the majority, for instance, minorities take increasingly longer to respond as the difference in the size of the minority and majority opinion increases (Bassili, 2003; Hoge & Glynn, 2013). Thus, it is conceivable that people holding a minority opinion might miss their opportunity to express their opinion has already passed (e.g., the interaction partner left, or the conversation moved on to another topic).

Similar to what has been proposed in the SOS, Bassili (2003) assumed that fear of backlash from others might explain why people hesitate to express their minority opinion. By using response times to assess the likelihood to express an opinion, a wider range of opinion expression would be enabled, possibly resulting in stronger effects (Bassili, 2003; Rios & Chen, 2014). However, studies so far either assessed response times or whether someone wants to express his/her opinion, but not a combination of both - even though this might provide a deeper insight on opinion expression.

### **Facing an Opposing Opinion**

As mentioned above, not only the majority opinion (and whether one holds a minority or majority opinion) seems to have an impact on opinion expression but also the faced opinion of the direct interaction partners. In this section, I review the impact of the faced opinion on opinion expression. In general, similar to selecting information that confirms one's own opinion, people seem to express their opinion preferably when facing like-minded people, thus when facing people who hold an opinion confirming one's own opinion (Mcpherson et al., 2001). Likewise, people seem to contribute more to a group if others are perceived as similar to themselves, which is more likely when they hold the same opinion (Byrne, 1997; Karau & Williams, 1993). Accordingly, confirming opinions should be expressed more than opposing opinions. In the following, I will summarize three paradigms (Asch paradigm, information sharing in groups, and knowledge sharing) that address opinion expression in different contexts.

#### **Asch Paradigm**

Well-known examples are the experiments of Asch (1956). In his work, unlike research on the SOS, participants were not confronted with the general majority opinion of society but with an opposing opinion. In his experiments (Asch, 1956), people were asked to indicate a line that corresponded to another line in its length. Participants were less likely to express their own (correct) opinion after facing a group that claimed the opposite (Asch, 1956; Asch & Guetzkow,

1951; for a replication, see Ušto et al., 2019), suggesting that people were less likely to express their opinion when faced with a group that held an opposing opinion. Similarly, Hayes (2007) found less opinion expression when people faced a single person (and not a whole group) holding an opposing opinion. More precisely, he revealed that people were less likely to express their opinion within an interactive context (hypothetical campus party) when they faced someone who opposed their own opinion compared to when they faced a confirming others' opinion. Hence, not only the *majority opinion* in society but also the opinion of others in a given situation seem to impact opinion expression.

### **Information Sharing in Groups**

The likelihood to share information in a group varies and depends on several aspects, such as the distribution of information (shared vs. unshared), the status of the people (low vs. high), the barrier to share an opinion (high vs. low), and the publicness (public vs. private). Even though sharing information in groups might not be quite the same as the expression of opinions (because one could make a statement independent of one's opinion, e.g., about the weather), research on information sharing still might provide insights on whether and when opinions might be expressed. In a conversation information and opinions often overlap. Accordingly, similar predictions might apply to the expression of opinions as to the sharing of information in groups. The following section will examine the various aspects and their impact on sharing information in more detail.

In the context of information sharing, the distribution of information (whether the information is shared or unshared) is highly relevant as it influences the group discussion and output (Lu et al., 2012; Stasser & Titus, 2003; Wittenbaum & Bowman, 2005). Shared information, such as an information or opinion that is confirmed by others, is preferably expressed compared to unshared information (e.g., an information or opinion that is opposed by others; Greitemeyer & Schulz-Hardt, 2003; Lu et al., 2012; Stasser, 1992; Wittenbaum et al., 2004). This hesitation to express unshared information seems especially the case within

discussions (Larson et al., 1998). In other words, when facing an interaction partner holding the same information (e.g., facing someone with a confirming opinion), people express their opinion more likely in line with the faced opinions compared to when facing an interaction partner holding a different information (e.g., opposing opinion). A meta-analysis revealed a large effect size for the relation between opinion expression and what kind of information is shared (e.g., preferably expressing shared information;  $d = 2.03$ ; Lu et al., 2012).

Another aspect that seems to impact opinion expression is status differences. Status differences can emerge automatically and quickly (Berger et al., 1977; as cited in Wittenbaum & Bowman, 2005). Competence or capability as one aspect of status for example can be negatively impacted by holding an unshared information (e.g., an opposing opinion; Wittenbaum & Bowman, 2005; Wittenbaum & Park, 2001). In addition, especially when people hold a shared (but not an unshared) information, they can signal to be in agreement (Wittenbaum et al., 2004). This perception of agreement, in turn, can lead to a higher level of trust in the respective (confirming) information and thus to the attribution of a higher status. If people perceive themselves to have low status within a group, for instance, because they hold an unshared information (which could for instance be an opposing opinion and this is not acknowledged by the interaction partners) they may be less likely to express their (unshared) information. Wittenbaum (2000) for example found that unexperienced people or those who are low in status withhold their unshared information and, if at all, express shared information (e.g., a confirming opinion) in group discussions, to gain respect and increase their status (Wittenbaum, 2000; Wittenbaum & Bowman, 2005; Wittenbaum & Park, 2001).

Low-status people are not only considered to be less competent but they generally have less speaking time (Berger et al., 1980; Kirchler & Davis, 1986; Wittenbaum & Bowman, 2005). As a consequence, people low in status (e.g., people holding unshared information like an opposing opinion) might also simply have less opportunities to express their (unshared) information.

Aside from the distribution of information and a person's high or low status, the (perceived) barrier that must be overcome seems to impact information sharing. Although people holding unshared information should be similarly convinced of the relevance and validity of their opinions, information is generally perceived as more valuable (e.g., more relevant and accurate) when it is socially validated by others (Larson et al., 1994; Mojzisch et al., 2010; Postmes et al., 2001; Stewart & Stasser, 1995). Within a conversation, shared information are more likely to be believed and accepted (Greitemeyer et al., 2003; Postmes et al., 2001) and to receive a (positive) validation than unshared information. This acceptance, in turn, enhances the likelihood to express shared information (Ma & Agarwal, 2007; Wittenbaum & Bowman, 2005; Wittenbaum et al., 2004). Hence, the hurdle to share information seems to differ between unshared and shared information and seems to be higher for unshared information. Accordingly, the barrier to express an opposing opinion should be higher (and thus less likely) than to express a confirming opinion within a conversation.

Another aspect that impacts opinion expression in the context of information sharing in groups is the publicity of opinion expression (e.g., whether an opinion is expressed publicly or privately). When an opinion has to be expressed in public, people express their opposing opinion less and try to align themselves with others' opinions. When opinion expression is private, they do not hesitate to express their opposing opinion (Kelman, 2017; Maass & Clark, 1983; Mugny, 1974-1975, 1976 as cited in Maass & Clark, 1984; Sakai, 1981).

However, all studies on sharing information in groups have one thing in common: People seem to express shared (e.g., confirming opinions) over unshared (e.g., opposing opinions) information favorably. According to Clark and Brennan (1991), people try to create a common ground and relate to others by expressing confirming opinions. The motivation to withhold unshared information like opposing opinions seems to be the fear of backlash from others, such as the fear of losing mutual trust and cooperation (Hwang & Burgers, 1997; Renzl, 2008), fear of not being respected (Wittenbaum & Bowman, 2005; Wittenbaum & Park, 2001)

or fear of not belonging to the group ( Wittenbaum & Bowman, 2005; Wittenbaum et al., 2004). Hence, similar to holding a minority (vs. majority opinion), the underlying mechanism to express opposing (vs. confirming) opinions seems to be fear of backlash from others.

Taken together, research on information sharing in groups found substantial evidence that people are more likely to express their opinion if they hold shared information compared to unshared information. Shared (unshared) information within a conversation can be equated with a confirming (opposing) opinion since, in both cases, people face an interaction partner in line (not in line) with their opinion. As information sharing is one aspect of expressing an opinion and might overlap in discussions, similar assumptions can be made for opinion expression in general conversations. So far, however, hidden profile tasks were mostly used to investigate the exchange of information (e.g., opinions) within a group and focus on making an optimal decision as a group (e.g., Stasser, 1992; Stasser & Titus, 2003). Accordingly, hidden profile tasks differ from a normal conversation since in the latter, a consensus is not necessary. Nevertheless, based on results on information sharing in groups, it is plausible to suggest that within a conversation, the likelihood to express an opinion is less likely when facing interaction partners holding an opposing opinion than when facing a confirming opinion.

### **Knowledge Sharing**

Not only in the context of information sharing in groups but also in the context of knowledge sharing, initial evidence for a negative correlation of a task conflict (defined as the disagreement or differences in viewpoints and opinions; Jehn, 1995; Simons & Peterson, 2000) and opinion expression was found (Moye & Langfred, 2004; van Woerkom & Sanders, 2010). Disagreement about opinions within the group is negatively related to the openness to express opinions (Moye & Langfred, 2004; van Woerkom & Sanders, 2010). People seem to be less likely to express their opinions when they disagree with others (e.g., when they face an opposing opinion; Moye & Langfred, 2004; van Woerkom & Sanders, 2010).

All in all, across different contexts (Asch Paradigm, information sharing in groups, and knowledge sharing), research revealed great importance of faced opinion on opinion expression. Like the majority opinion (and diminished expression of minority opinion), people are less likely to express their opinions when others' opinions are not in line with one's opinion (e.g., when facing an opposing opinion) within an interactive context, like a conversation. This reduced likelihood to express an opposing opinion, in turn, seems to be due to fear of backlash from others. Thus, less opinion expression seems to occur not only on morally loaded and politically intense topics but generally when opposing opinions are expressed in interactive contexts. Even though the summarized research suggests a greater effect of faced opinion on opinion expression than the majority opinion, both aspects seem to impact opinion expression significantly. Both are relevant for the question of when people express their deviant (minority and/or opposing) opinion. However, as mentioned before, there is a lack of research testing a combination of both strands (majority and faced opinion). Thus, it remains unclear whether an interaction of the prevailing majority and faced opinion would amplify the impact on opinion expression, making it all the more important to consider both aspects jointly. Especially, as expressing a deviant opinion is important for (social) change, circumstances that enable (or disable) it should therefore be identified. Based on the summarized literature and the given effect sizes, I expect that the faced opinion might even play a greater role than the majority opinion when expressing deviant (e.g., opinions not in line with the majority and/or faced) opinions.

### **Opinion Expression in Non-Interactive Contexts**

Despite opinion expression in interactive contexts like face-to-face discussions or chatting on social media, opinion expression can also take place in non-interactive contexts like evaluation portals or online discussion boards. In other words, (online) contexts in which an opinion can be expressed without a direct response to what has previously been expressed and

were especially and only created out of the reason that people can express their opinion. Such platforms are ubiquitous in today's digital era in which opinion expression increasingly takes place online (in interactive as well as non-interactive contexts). Accordingly, it is not surprising that such platforms are becoming increasingly popular for expressing opinions. Consumer research in China, for example, identified that posting a comment online (after purchasing a product) was the most common way of expressing an opinion about it (KPMG, 2017). Similarly, based on market media research, about 1.51 million German internet users express their opinion on online discussion boards (IfD Allensbach, 2016). Such online platforms are easily and quickly accessible for many people. Thereby one's opinion can be made public (more easily) and can spread rapidly. On such non-interactive platforms, people with different opinions and prior knowledge exchange their opinion – and often without redaction. As a result, they offer an ideal opportunity to express deviant (e.g., opposing or minority) opinions, which can help others form a differentiated opinion about the topic in general or reach a (purchase) decision. According to market research by Bitkom Research, product reviews are used as the main decision guidance before purchasing a product, especially among people under 50 years (Lange, 2020). Thus, non-interactive contexts seem to provide a better opportunity to express one's opinion than a conversation within a group. If deviant (e.g., minority and/or opposing) opinions are also expressed more likely in non-interactive contexts this could be a great opportunity to use non-interactive platforms (like discussion boards) to express them and thus might even drive social change. This enrichment, however, seems only to be given if the expressed opinions on such platforms are diverse. How different topics (e.g., whether they are morally loaded) and different contexts (interactive vs. non-interactive) influence how people express their opinions, especially if they deviate from the prevailing (majority or faced) opinion will be addressed in this dissertation.

### **Characteristics of Non-Interactive Contexts**

It is important to note that in non-interactive contexts, the majority and the faced opinion often coincide, for instance, within an overall rating, or if already several opinions had been expressed about a topic on a discussion board. In both cases, people are aware of the majority opinion and simultaneously face individual opinions (e.g., reviews or posts). Hence, in the following, I refrain from distinguishing among majority and faced opinion. Thus, when speaking from a deviant opinion, this refers to one's opinion not in line with the majority and/or faced opinion (e.g., holding a minority and/or facing an opposing opinion).

Further, it is important to keep in mind that not all non-interactive contexts address politically and morally loaded topics and the resulting expression of opinions (as is the case in the literature addressing the SOS). Instead, many portals focus on non-political topics. On discussion boards, the topics vary widely, from specific aspects such as dealing with illness, repairing something, and discussions of various political issues, such as climate change or child education. The focus on evaluation portals, however, is to express one's opinion about a product and whether people would recommend purchasing it or not. So, in non-interactive (just as in interactive) contexts, various topics are discussed.

### **Similarities of Interactive and Non-Interactive Contexts**

In general and in line with findings on opinion expression in interactive contexts, opinions are more likely expressed if people hold a concurring opinion in non-interactive contexts, too (like online discussion boards; Soffer & Gordoni, 2018; Wu & Atkin, 2018; W. G. Yun & Park, 2011). This finding is also in line with research on recommender systems. For example, Cosley et al. (2003) showed that the presented mean rating of a recommendation influenced users of recommender systems in the same way as the majority or faced opinion: Users preferably expressed their opinion when it is in line with the mean rating (hence, a concurring opinion). Thus, as in interactive contexts, there seems to be a tendency to express concurring opinions

more frequently in non-interactive contexts such as online discussion boards or evaluation portals.

Further, consistent recommendations are evaluated more positively than inconsistent recommendations (Schwind et al., 2011). Hence, because expressing a concurring opinion (e.g., an opinion in line with the prevailing opinion of the discussion panel or the given overall rating), might reduce the chance of backlash from others, it is more likely expressed than a deviating opinion.

Because interactive contexts differ from non-interactive contexts in how responses from others are obtained, in their respective anonymity, and their publicness (private vs. public), which can impact opinion expression. Accordingly, both contexts (interactive and non-interactive) should be considered when investigating opinion expression. The following section will explore the differences between interactive (e.g., a conversation) and non-interactive (e.g., evaluation portal) contexts as well as their potential impact on opinion expression.

### **Differences Between Non-Interactive and Interactive Contexts**

The main difference between non-interactive evaluation portals to interactive social network sides is the how responses from others are obtained. In interactive contexts such as (hypothetical) conversations (independent whether those are online or offline), people receive immediate and unfiltered responses from others. Non-interactive contexts (like online discussion boards or product evaluation portals), on the contrary, allow opinions to be expressed without direct responses from others. When people contribute their opinion to an online discussion board or evaluation portal, others may respond in the form of comments on the expressed opinion, but that could be days or even years later. The lack of direct responses is possibly leading to a greater willingness of expressing deviant opinions (e.g., minority and/or opposing opinions) unfiltered and openly (for a general higher willingness to express oneself online, see Joinson, 2001; Sia et al., 2002; Sproull & Kiesler, 1991).

However, people cannot rule out that they will receive negative responses (e.g., backlash from others) in the long term, especially when expressing a deviant opinion. This unpredictability of responses means that they cannot foresee when and to what extent (negative) responses (e.g., backlash from others) will be given and therefore cannot prepare themselves for it. Thus, it can be assumed that people are more likely to express their opinions in non-interactive contexts but maybe only if they expect to receive positive (or at least no negative) responses on their expressed opinion. Less backlash from others is to be expected, if opinions in line with the others' opinion (e.g., concurring opinions like the majority and/or confirming opinion) are expressed.

On the other hand, due to the delayed responses from others, the responses may be less emotional (and dismissive) because words have been better selected and one's opinion has been reflected upon more critically compared to for responses in an interactive context (Scholl & Sassenberg, 2014). Following this, negative responses like backlash from others may vary between interactive and non-interactive contexts. For example, the fear of a confrontation might be higher in an interactive context because the (hypothetical) interaction partner is present and might respond more indignantly or even scuffle. Also, the fear of social isolation might be less present because ostracization or exclusion by others in a non-interactive context, would only be noticeable by a lack of responses. This kind of social isolation might be less frightening than being excluded from a group during a conversation. If less fear of backlash from others is perceived in non-interactive contexts, this should increase the likelihood to express an opposing opinion (for general evidence that less fear increases the expression of opposing opinion, cf. Ho & McLeod, 2008; Neubaum & Krämer, 2018).

Taken together, due to the lack of direct and thereby possibly less emotional responses, people might fear backlash from others less, which in turn might increase opinion expression. However, this has not been adequately investigated in previous research and is thus, so far, only an assumption.

Another difference between non-interactive and interactive contexts is the respective anonymity. As mentioned above on information sharing in groups, even in interactive contexts, people are more likely to express an opposing opinion when it is anonymous or private (e.g., Kelman, 2017; Maass & Clark, 1983). In a non-interactive context, like on product evaluation portals or discussion boards, the identifiability of people is low. People can use pseudonyms, and even if they decide to use their real name, no further information about them (e.g., age, appearance, education) is provided (except when provided voluntary). This anonymity impacts opinion expression. Current research addressing computer-mediated communication found that anonymity facilitates opinion expression if social identity was not salient – especially for deviating opinions (Joinson, 2001; Kiesler et al., 1984; Sia et al., 2002; Siegel et al., 1986; Sproull & Kiesler, 1991). Ho and McLeod (2008), for example, investigated the differences between an interactive context offline (e.g., hypothetical face-to-face conversation) and an interactive context online (e.g., online chat rooms like Facebook) and found that people expressed their (deviant) opinion more likely in online than in offline interactive contexts. Other studies, however, found the reverse: People were less likely to expressed their opinion in online (compared to offline) interactive contexts - especially when they feared backlash from others online (X. Liu & Fahmy, 2011; Neubaum & Krämer, 2018). The authors provided the explanation that in might be that online chat rooms like Facebook are too similar to (hypothetical) face-to-face conversations (Neubaum & Krämer, 2018). Both are interactive contexts, and the interaction partners are mostly known. Hence, in both cases, people might receive immediate feedback on what they said and deal with potential backlash from others. In addition, Facebook (or other interactive online contexts) may still provide too high identifiability and too low anonymity compared to non-interactive contexts such as online discussion boards or evaluation portals. If the anonymity is given, for example, due to the use of pseudonyms (similar in non-interactive contexts), expressing deviating opinions might be more likely. Evidence for this was found by Neubaum and Krämer (2018), who investigated

opinion expression in an anonymous (online discussion board) and a non-anonymous context (Facebook) and found a higher likelihood of opinion expression in the former. However, Yun and Park (2011) found no significant differences in opinion expression when comparing high vs. low anonymity within the same non-interactive context (online discussion board). Hence, the given anonymity might have a smaller impact on opinion expression than in generally assumed. It is possible that other characteristics of non-interactive contexts (e.g., the delayed feedback of others) might influence opinion expression. To explore this, it should be investigated how likely opinions are expressed in non-interactive contexts with high anonymity and interactive contexts with low anonymity.

People generally prefer to express opposing opinions in private, as opposed to in public (e.g., Kelman, 2017; Maass & Clark, 1983). This observation could be a reason why people are hesitant to express their opinion on evaluation portals or other non-interactive contexts, which are public. An opinion posted on such platforms is also permanent and out of one's control, which could decrease people's likelihood to express a deviant opinion in non-interactive contexts.

All in all, it seems that even though non-interactive contexts differ from interactive contexts in certain aspects, such as how responses are obtained or the respective anonymity, both which should increase the likelihood of opinion expression, there is also evidence that in both contexts, deviant opinions are expressed less likely. Due to inconsistent findings across given research, it remains unclear whether deviant opinions indeed are expressed more in non-interactive contexts. Therefore, it is important to examine opinion expression not only in interactive but also in non-interactive contexts.

## **Factors Facilitating Deviant Opinion Expression**

Even though a substantial body of research suggests that people are less likely to express their deviant (than concurring) opinion, there is also literature that suggests the opposite effect,

namely that people express their deviant opinion (e.g., Grice, 1975; Rios, 2012; Wood et al., 1994). As mentioned above, opinions that are not in line with the majority opinion or with the faced opinion may add more information to the society or a conversation and thus, may not only increase the wisdom of the crowd (Surowiecki, 2004) but also may initiate social change (Chun & Lee, 2017). This section will outline factors that increase the likelihood of expressing deviant opinions.

Already Grice (1975) suggested in his conversational maxims that contributed information (such as expressed opinions) should be informative. Accordingly, communication is relevant when people express an opinion that adds something to the conversation (Wilson & Sperber, 1981). This maxim seems to be in line with people's sensitivity to the relevance (e.g., informativeness) of information (e.g., advice; Hütter & Ache, 2016). Advice (which is a form of expressed opinion) that opposes one's own opinion is considered to be more relevant and sampled more (Hütter & Ache, 2016). The higher perceived relevance of the deviant opinion could help explain why people are more likely to express them.

Another factor that might increase the expression of deviant opinions seems to be whether it is in line with the desirable group opinion, such as an opinion that is considered desirable or that is similar to the group prototype (e.g., Levine & Choi, 2009; Miller & Morrison, 2009; Morrison & Miller, 2008). If this is the case, the deviant opinion enhances the group ("deviant but good") and is expressed more likely (as a deviant but accepted opinion might not entail backlash from others; Rios, 2012).

Moscovici (1976) argued that people holding a deviant opinion are aware of possible backlash from others. The likelihood to express deviant opinions in public is higher if individuals perceive their opinion to be valid and correct (see Hornsey et al., 2003). In addition, when people express their deviant opinion confidently, others might listen to what is said and question their own opinion (Moscovici, 1976, 1980). Likewise, only if individuals who hold a deviant opinion are consistent within their opinion (e.g., stick to the respective point of view)

and are consistent with others who hold the same deviating opinion, then others will notice this deviating opinion and might even change their own opinion accordingly (e.g., Moscovici et al., 1969). However, when people holding a deviant opinion lack consistency, they might be ignored or even receive backlash from others (Erb & Bohner, 2009; Moscovici, 1980). Hence, being confident and consistent about a deviating opinion not only diminishes the fear of backlash from others and increases deviant opinion expression, but both aspects also make it more likely that the deviating opinion will be heard and influence the majority (Martin & Hewstone, 2010; Moscovici, 1976).

Another relevant factor that might impact deviant opinion expression, according to Stroebe (2010), is that people express their deviant opinions because they strive to provide a complete account of the topic at hand. This goal seems to be even more important than avoiding backlash from others, especially if the topic is highly relevant for the individual. In line with this idea, Matthes et al. (2010) found that if the topic was of high relevance for people, they expressed their opinion independent of the prevailing opinion. Contrary to this, Martin et al. (2007) found no significant differences between the expression of deviant and concurring opinions when personal relevance was high, whereas when personal relevance was low, people expressed significantly more deviant opinions (signed and sent a protest card). However, as the authors manipulated the prevailing opinion, it remains unclear whether participants indeed perceived themselves to hold a deviant opinion (as they might have perceived the actual prevailing opinion to be on their side).

In general, most of the existing literature of social influences on opinion expression focuses on the (positive) outcomes from expressing deviant opinions (e.g., enhanced decision quality) (e.g., Martin & Hewstone, 2010; Moscovici, 1976; Moscovici et al., 1969; Wood et al., 1994) and only some literature focused on the circumstances facilitating the expression of deviant opinions (Hornsey et al., 2003; Levine & Choi, 2009; Martin et al., 2007; Matthes et al., 2010). Taken together, people might express their deviant opinion in public if several conditions are

met, like perceiving themselves as a consistent and confident deviating group that holds strong opinions about their point of view, as well as fear of backlash from others. However, a much larger body of research on social influence on opinion expression is concerned with the factors leading to reduced expressing deviant opinions (as summarized above). Hence, although there is evidence that deviant (e.g., minority and/or opposing) opinions are sometimes expressed (e.g., because they add something new), the hypotheses in the empirical section of this dissertation are based on the substantial body of research on the diminished expression of deviant opinions.

## **The Impact of (Dis-)Agreement With the Prevailing Opinion on Opinion Expression – a Summary**

Even though deviating opinions are perceived as more valuable when searching for advice (Hütter & Ache, 2016) and also provide new and informative perspectives (Grice, 1975; Phillips, 2003), which might increase the knowledge of the wisdom of the crowd (Surowiecki, 2004) and therefore initiate or contribute to (social) change, most research suggest that deviating (minority and/or opposing) opinions are less likely to be are expressed than concurring (majority and/or confirming) opinions. If people perceive their opinion to be not in line with the opinion of others (either from the majority and/or the faced opinion), the likelihood of expressing it decreases. Across all contexts, this seems to be due to fear of backlash from others (such as fear of isolation or of confrontation) or fear as a trait. Based on the logic of Noelle-Neumann's claim (2001) that people might not express themselves due to fear of backlash from others, this dissertation focusses on fear as backlash and not on fear as trait. Even though there is also evidence that people will express deviant opinions (e.g., Grice, 1975; Wood et al., 1994), this dissertation further follows the majority of evidence on opinion expression and predicts that the disagreement with others (e.g., with the majority and/or the faced opinion) leads to less opinion expression across different contexts.

Therefore, in this dissertation, as elaborated above, I seek to revisit the influence of the majority and faced opinion on opinion expression by investigating different contexts (interactive vs. non-interactive) and provide deeper insights on expressing deviant opinions. First, I will examine opinion expression in interactive contexts like conversational situations (Chapter II) and then in non-interactive contexts, specifically on product evaluation portals (Chapter III). Thereby, I contribute to the existing literature by providing a deeper understanding of when (deviant) opinions might be expressed by addressing the lack of examining the majority and faced opinion jointly and by implementing new approaches like a paradigm in which participants can respond several times to what was said. Furthermore, I cover a broad spectrum of opinion expression when holding a deviant opinion by addressing different (hypothetical) scenarios in interactive and non-interactive contexts.

By working in the framework of the SOS (Noelle-Neumann, 2001), as well as building on the evidence of opinion expression in groups (Stasser & Titus, 2003; Wittenbaum & Bowman, 2005), I combine two aspects of the literature on social influence (namely the majority and faced opinion) on opinion expression and examine their interplay (Chapter II). More precisely, in Chapter IIa, together with colleagues, I examined the impact of the prevailing (majority and faced) opinion on opinion expression as this could have theoretical and practical implications. Depending on whether the expression of deviant opinions is influenced by one or both of these factors, in future situations in which diverse expressions of opinions are desired or even necessary, efforts should be made to counteract these influencing aspects and to facilitate the expression of deviant opinions. Chapter IIb expands on this by improving the used methodological approach, specifically by addressing criticism of the SOS, such as using a more realistic conversational situation.

While Chapter II addresses opinion expression in interactive contexts with direct responses, Chapter III addresses opinion expression in a non-interactive context without direct responses. This dissertation, thus, contributes to the insight of opinion expression across different contexts.

Using the context of product evaluation portals, the current research aims to vary the context and the measurement of opinion expression by capturing actual opinions (e.g., opinion towards a product). Therefore, together with colleagues, I investigate actual opinion expression about a product in an experimental laboratory setting (Chapter IIIa), and in Chapter IIIb we further increased external validity by assessing actual opinion expression on an existing product evaluation portal.

In sum, previous research addressed several factors that impact opinion expression. However, so far it often remains unclear whether these factors facilitate or hinder opinion expression due to inconsistent results. In this dissertation I therefore focus on the following questions: 1) Does opinion expression depend on the prevailing (majority and faced) opinion? 2) Is fear of backlash from others the underlying mechanism to withhold a deviant opinion? 3) Are deviant (compared to concurrent) opinions less likely to be expressed also in non-interactive contexts?

The following Chapter IIa contains a manuscript that results of a cooperation between Birka Zapf (first author), Prof. Dr. Mandy Hütter (second author), and Prof. Dr. Kai Sassenberg (third author). The manuscript entitled “Holding a minority opinion as well as facing an opposing stance silences individuals due to fear of backlash from others” is currently submitted at European Journal of Social Psychology. The contribution of the Ph.D. candidate (and of the co-authors, respectively) to the manuscript can be found in the following table.

Author	Author position	Scientific ideas %	Data generation %	Analysis & interpretation %	Paper writing
Birka Zapf	1	50	100	50	50
Mandy Hütter	2	20	0	20	15
Kai Sassenberg	3	30	0	30	35
Title of manuscript	Holding a minority opinion as well as facing an opposing stance silences individuals due to fear of backlash from others				
Status in publication process	unpublished manuscript (submitted to the European Journal of Social Psychology)				

## Chapter II – Opinion Expression in Interactive Contexts

### Chapter IIa – Opposing Stances Silence Individuals<sup>2</sup>

The public expression of non-mainstream (i.e., minority) opinions is key to societal progress and social change. But imagine you would hold a minority opinion. Would you express it? And would you behave differently depending on whether you are confronted with someone holding an opposing (vs. confirming) opinion? Research across different paradigms has shown that people are less likely to express their opinion when they expect others to disagree with them (Asch, 1956; Asch & Guetzkow, 1951; Hayes, 2007). Noelle-Neumann (2001), for instance,

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<sup>2</sup> Together with Kai Sassenberg and Mandy Hütter, Chapter IIa has been submitted as a manuscript entitled "Holding a minority opinion as well as facing an opposing stance silences individuals due to fear of backlash from others" to the European Journal of Social Psychology for publication.

has argued that people will withhold their opinion, when they sense that it resembles the minority rather than the majority opinion in society because they fear backlash from others. Given that minority opinions can only exert an impact in society when they are communicated to those not holding this opinion, it is important to know whether (a) sensing that one's own opinion is only shared by a minority (vs. a majority) in society and (b) facing an opposing (vs. a confirming) opinion affect the communicative behavior of those holding a minority opinion. The interaction of these two factors, to the best of our knowledge, has not been studied so far. However, this would be highly relevant because knowing whether minority opinions are generally expressed less or only when facing an opposing opinion would not only add a moderator to existing theorizing but also be relevant for decisions in applied contexts. For instance, such an interaction effect would suggest that important issues should be discussed anonymously. We tested the hypothesis that people who assume to hold an opinion shared by a *minority* in society (compared to a majority) are less likely to express it when facing someone who opposes (compared to confirms) their opinion. Thereby, we contribute to a more differentiated understanding of the factors underlying the expression of minority opinions.

### **Holding a Minority Opinion Predicts Opinion Expression (to Some Extend)**

According to the notion of a "spiral of silence" (SOS; Noelle-Neumann, 1977, 2001), people holding an opinion only shared by a *minority* in society are less likely to express their opinion compared to people holding a majority opinion due to the fear of being treated unfavorably when expressing their opinion. The SOS suggests that people constantly monitor the opinions in their environment and society more generally to keep track of the majority opinion and whether their own opinion is in line with it. If people perceive a discrepancy between their own opinion and the majority opinion in society, they are assumed to be less likely to express themselves.

Noelle-Neumann (2001) tested this assumption by asking participants about their own opinion regarding a number of topics and the opinion they perceived to be held by the majority

in society. In many studies, participants were confronted with the so-called train scenario in which they were to imagine that they met someone on a train talking about his/her opinion, which opposed participants' own opinion. Noelle-Neumann assessed whether participants indicated that they would express their opinion in this situation.

The results reported by Noelle-Neumann (2001) suggest that people are less likely to express minority opinions. Further research has replicated this finding (e.g., Hayes et al., 2001; Kim et al., 2004; Salmon & Oshagan, 1990). Other studies indicate that minority opinions are expressed with a longer delay (e.g., Bassili, 2003). There are, however, also studies that did not find evidence for the impact of minority status on opinion expression (e.g., Katz & Baldassare, 1992; Shamir, 1995). Overall, meta-analyses revealed a very small – but significant – trend that minority opinions are less likely to be expressed ( $r \approx .05$ , Glynn et al., 1997; Glynn & Huges, 2014;  $r = .10$ , Matthes et al., 2018).

Noelle-Neumann (2001) assumed that people holding a minority opinion are less likely to express it because they fear backlash from others. Several studies tested the relation between holding a minority opinion and fear of backlash from others. Some studies merely compared minority and majority opinions (Chen, 2018; X. Liu & Fahmy, 2011; Soffer & Gordoni, 2018). In other studies, researchers also made sure that participants faced an opposing opinion (Ho & McLeod, 2008; Moy et al., 2001; Neubaum & Krämer, 2018). Finally, in several studies, fear of backlash from others mediated the effect of minority (vs. majority) status on opinion expression (Neubaum & Krämer, 2018; Shoemaker et al., 2000).

Taken together, there seems to be a small but reliable effect of minority (vs. majority) status on opinion expression. People who believe to hold a minority opinion are less likely to express it. The fact that fear of backlash from others has been shown to mediate this effect suggests that these others and their opinion might also play a crucial role.

### **Facing an Opposing Opinion Predicts Lower Likelihood of Opinion Expression**

When people face another person or group that holds an opinion that opposes their own, they are less likely to share their opinion (Hayes, 2007; Kelman, 2017; Maass & Clark, 1983). The earliest demonstration of this effect goes back to Asch's (1956) studies on majority influence on the judgment of line length. After being confronted with others' incorrect judgments, participants were less likely to express their own (correct) opinions (for a recent replication, see Ušto et al., 2019). This effect seems to hold when facing an individual stating an opposing (compared to confirming) opinion within a public situation (e.g., during a campus party; Hayes, 2007). Also, in the context of information sharing in groups (e.g., Lu et al., 2012; Stasser & Titus, 2003) similar effects emerged. Arguments opposing the dominant opinion in a group are shared less frequently compared to confirming arguments. Hence, the opinion of others seems to play a crucial role when it comes to opinion expression. The impact of opposing opinions on opinion expression seems to be stronger when the opinion has to be expressed in public rather than privately (Kelman, 2017; Maass & Clark, 1983, Mugny, 1974-1975, 1976, as cited in Maass & Clark, 1984; Sakai, 1981). These findings are in line with the idea that fear of backlash from others leads to reduced expression of minority opinions, given others are less likely to notice privately expressed opinions.

### **Combined Effects of Own Opinion and Faced Opinion**

Some researchers have assessed the likelihood of entering a political discussion with people holding opposing views compared to confirming opinions in interviews (Glynn & McLeod, 1984). People were more likely to join a confirming (compared to opposing) conversation, and people holding a minority opinion were less likely to express their opinion (for similar findings in an online context, see Gearhart & Zhang, 2014). Unfortunately, these authors did not consider the interaction between own opinion (minority vs. majority) and being faced with an opposing vs. confirming opinion. This is because confirming and opposing opinions were only considered to increase generalizability but not to test their impact on opinion

sharing. From the descriptive statistics provided in these articles, opinion expression seems to be predicted to a stronger extent by minority (vs. majority) status when facing an opposing (i.e., holding a minority opinion showed a stronger negative correlation with opinion expression) than when facing a confirming opinion.

### **Overview of the Current Research**

In sum, previous research found a very small negative impact of minority status on opinion expression. This effect was shown to be driven by fear of backlash from others. Given that these backlash from others are only to be expected from people holding opinions opposing rather than confirming the target person's opinion, we assume that the faced opinion plays a crucial role. Moreover, opinions are less likely to be expressed (publicly) towards people holding opposing opinions. Finally, there is initial evidence that the faced opinion (opposing vs. confirming) predicts opinion expression to a stronger extent when holding a minority (vs. majority) opinion. Altogether, this led us to predict that people holding a minority opinion express their opinion less when facing an opposing than when facing a confirming opinion. This effect should be smaller for people holding a majority opinion (H1). In addition, we predict that fear of backlash from others mediates the effect predicted in H1. That is when holding a minority opinion (but less when holding a majority opinion) facing someone with an opposing (compared to confirming) opinion leads to more fear of backlash from others, and fear, in turn, to a smaller likelihood of opinion expression (H2).

We tested these hypotheses in three experiments, assessing own opinion (minority vs. majority) and manipulating faced opinion (opposing vs. confirming). Fear of backlash from others was assessed as a potential mediator and likelihood of expressing an opinion as our main dependent variable. In Experiment 2.3, we further assessed whether participants would respond to various statements. Given that earlier research found slower expression of minority opinions (e.g., Bassili, 2003), we also assessed response latencies. The three experiments used opinions

from different domains (Experiment 2.1: receiving further refugees; Experiment 2.2: justifiability of the gender pay gap, Experiment 2.3: legalization of abortion).

### **Exclusion Criteria**

Across all experiments, we only included native speakers in our analyses because we used language intense material. Given that our material in Experiment 2.1 and 2.2 was designed for undergraduate University students, non-students were excluded. Further, in Experiment 2.1 and 2.2, psychology students were excluded because they might have guessed our hypotheses. In Experiments 2.1 and 2.2, participants who indicated to be familiar with our method or took part in previous related experiments were also excluded<sup>3</sup>. We assessed majority opinion on three levels: majority opinion (e.g., pro-refugees), uncertain, and minority opinion (e.g., contra refugees). Given that the experiment set-up required participants to know about the majority opinion in society, we ran our analyses only with those participants whose perception of the perceived public majority opinion coincided with the actual public majority opinion.

### **Experiment 2.1**

#### **Method**

##### **Design and Participants.**

We conducted an online experiment with a 2 (*own opinion*: majority vs. minority, measured)  $\times$  2 (*faced opinion*: opposing vs. confirming, manipulated) between-participants design. Own opinion was assessed before participants were randomly assigned to faced opinion conditions. We determined ideal minimum sample size with G\*Power before data collection (Erdfelder et al., 2009,  $\alpha = .05$ ;  $(1-\beta) = .95$ ;  $f = .25$ : ideal  $N = 210$  for an interaction effect in a  $2 \times 2$  ANOVA). A total of 308 undergraduates were recruited via a university's official mailing list. As a means of compensation, participants were offered taking part in a raffle for 15 gift vouchers (either for an online store or a local shopping voucher), each worth 10€. Based on our exclusion criteria,

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<sup>3</sup> We conducted two unrelated studies with similar material.

we excluded 97 participants (4 were not German native speakers, 28 were familiar with the materials, 2 did not assume that the majority was pro-refugees, and 63 were uncertain about the majority opinion). The final sample consisted of  $N = 211$  participants (129 female, 80 male, 2 did not indicate their gender; age:  $M = 23.49$ ,  $SD = 3.47$ , range = 18-43 years).

### **Procedure and Measures.**

After providing consent, participants were asked about their opinion regarding the question of how Germany should deal with refugees. In line with Noelle-Neumann's train scenario paradigm (Noelle-Neumann, 1977, 2001), participants first saw a picture in which two sketched manikins expressed their opinions. One manikin (yellow) stated, "*I think Germany is obligated to receive further refugees.*", and the other (blue) stated: "*I do not think it is the duty of Germany to receive further refugees.*". This picture was followed by the question of which manikin the participants would agree more with (-1 = The upper one [yellow] to 1 = the lower one [blue]). On the next page, the majority opinion was assessed as in Noelle-Neumann's studies (1977, 2001) by asking the participants what they believe the majority of students of their university think about receiving further refugees. They could choose one of the three following responses: "*Most are in favor of receiving further refugees*", "*One half is in favor, the other half against it*", and "*Most are against receiving further refugees*".

Next, we manipulated the factor *faced opinion*. Following the procedure applied by Noelle-Neumann (2001), participants were to imagine that they have a five hours train ride ahead of them, and another student in their compartment expresses his/her view regarding receiving further refugees. The communicator on the train either argued in line with the *minority* opinion: "*I do not think it is the duty of Germany to receive further refugees. Whoever speaks out in favor of receiving refugees is simply ignorant; ignorant about the limits of what is possible and the current situation. Simply irresponsible!*" or in line with the *majority* opinion: "*I think it is the duty of Germany to receive further refugees. Anyone who is against receiving refugees is simply ignorant; ignorant about the situation of the refugees and therefore also*

*about any human rights. Simply irresponsible!*". In both cases, we have used harsh statements in line with Noelle-Neumann's threat approach (1977, 2001). Participants holding the majority opinion received the first statement in the *opposing opinion condition* and the second statement in the *confirming opinion condition*. The opposite was true for participants holding the minority opinion.

Next *opinion expression* was assessed by the questions "Would you like to talk to this student to get to know his or her point of view or would you rather not?" (0 - rather not engage in a conversation to 1 - would like to engage in a conversation; Noelle-Neumann, 2001), and "In this situation, how likely is it that you would express your own opinion towards the topic?" (7-point scale, 1 = *very unlikely* to 7 = *very likely*). The two measures were strongly correlated,  $r(211) = .64$ , and including "measure" as an additional factor in the analyses reported below did not moderate any effects. Therefore, we aggregated the standardized measures into an overall measure of opinion expression. Higher values indicate a stronger tendency to express one's own opinion.

Finally, all participants completed a questionnaire about their *fear* of backlash from others (five self-generated items on a 7-point scale, 1 = *completely disagree* to 7 = *completely agree*,  $\alpha = .78$ , "I have the feeling that I can express my opinion regarding receiving further refugees freely and openly.", "I have the feeling that the other person is trying to understand my point of view.", "I'm afraid a conversation on the topic of "receiving refugees" will lead to an aggressive discussion.", "I'm afraid that if I express my opinion, the conversation will become uncomfortable.", and "I'm afraid that I am alone with my opinion on the topic of "receiving refugees"."). A higher score on this scale represents higher fear of backlash from others.

For descriptive statistics, correlations, and measures taken for exploratory purposes after the reported measures for this and the following experiments, see the Appendix B.1.

## Results

We predicted that people holding a minority opinion express their opinion less when facing an opposing than when facing a confirming opinion. This effect should be smaller for people holding a majority opinion (H1). To test this prediction, we carried out an ANOVA with opinion expression as dependent variable and own opinion (majority: -1, minority: 1) as well as faced opinion (confirming: -1, opposing: 1) as between-participants factors.

There was no main effect of own opinion,  $F(1, 207) = 2.43, p = .121, \eta^2_p = .012, 90\%-CI = [.000; .046]^4$ , but a main effect of faced opinion,  $F(1, 207) = 5.62, p = .019, \eta^2_p = .025, 90\%-CI = [.002; .071]$ . Participants were less likely to express themselves when facing an opposing opinion ( $M = -0.12, SD = 0.88$ ) than when facing a confirming opinion ( $M = 0.12, SD = 0.92$ ). However, no interaction was found,  $F(1, 207) = 1.64, p = .202, \eta^2_p = .008, 90\%-CI = [.000; .038]$ . In sum, our hypothesis was not supported, participants with a minority vs. majority opinion did not react differently to confirming vs. opposing opinions. For descriptive statistics see Table 2.1.

To test whether participants who faced an opposing opinion and held a minority (vs. majority) opinion reported more fear of backlash from others, we conducted the same ANOVA on *fear* as a dependent variable. Participants who held a minority opinion reported more fear ( $M = 4.10, SD = 1.39$ ) than participants holding a majority opinion ( $M = 3.29, SD = 1.11$ ),  $F(1, 207) = 21.55, p < .001, \eta^2_p = .094, 90\%-CI = [.040; .160]$ . Also, facing an opposing opinion evoked more fear ( $M = 3.87, SD = 1.15$ ) than facing a confirming opinion ( $M = 3.12, SD = 1.20$ ),  $F(1, 207) = 23.39, p < .001, \eta^2_p = .102, 90\%-CI = [.045; .169]$ . However, the assumed interaction did not emerge,  $F(1, 207) = 1.37, p = .244, \eta^2_p = .007, 90\%-CI = [.000; .035]$  (see Table 2.1).

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<sup>4</sup> For  $\eta^2_p$ , we report 90% instead of 95% confidence intervals following the recommendations of Lakens (2013).

Given that we neither found an interaction on opinion expression nor on fear of backlash from others, we deem it unnecessary to test for the predicted moderated mediation (H2). However, to further explore whether fear of backlash from others mediates the effect of (a) own opinion and (b) faced opinion on opinion expression, we conducted two separate mediation models using the computational tool PROCESS (Model 4, 5000 bootstrap samples, version 3.4, Hayes, 2017).

Indeed, these analyses revealed that the effect of own opinion on opinion expression was mediated by fear,  $B = -0.10$ ,  $SE = 0.03$ , 95%-CI [-0.181; -0.043]. Holding a minority (vs. majority) opinion was related to more fear,  $B = 0.41$ ,  $SE = 0.90$ , 95%-CI [0.219; 0.592], and a higher level of fear predicted a smaller likelihood of opinion expression,  $B = -0.26$ ,  $SE = 0.05$ , 95%-CI [-0.354; -0.158]. The same pattern occurred for the faced opinion,  $B = -0.09$ ,  $SE = 0.03$ , 95%-CI [-0.161; -0.041]. Facing an opposing opinion predicted more fear,  $B = 0.37$ ,  $SE = 0.81$ , 95%-CI [0.214; 0.534], and a higher level of fear predicted a smaller likelihood of opinion expression,  $B = -0.25$ ,  $SE = 0.05$ , 95%-CI [-0.348; -0.151].

## Discussion

Experiment 2.1 provides evidence for a direct effect of faced opinion on opinion expression, but for neither a direct effect of minority (vs. majority) status nor the predicted interaction of both factors. Fear of backlash from others was affected by the own opinion and the faced opinion, but there was no evidence for an interaction of the two factors. Finally, we found indirect effects of own opinion and faced opinion via fear of backlash from others on opinion expression. These results provide no evidence for an interactive impact of own and faced opinion on opinion expression. It rather indicates that opinion expression is determined by orthogonal effects of the faced opinion and (due to the indirect effect via fear of backlash from others) by the minority vs. majority opinion.

## Experiment 2.2

Given that the findings of Experiment 2.1 were not in line with our prediction, we aimed to conceptually replicate them in Experiment 2.2. To test whether the findings generalize, we chose another topic with intense public interest and a clear majority opinion: justifiability of the gender pay gap. The majority of students in Tübingen regards a gender pay gap as unjustified.

### Method

#### Design and Participants.

We conducted an experiment with a 2 (*own opinion*: majority vs. minority; measured)  $\times$  2 (*faced opinion*: opposing vs. confirming; manipulated) between-participants design. Again, we assessed own opinion before participants were randomly assigned to the conditions based on the faced opinion. Minimum sample size was determined with G\*Power before data collection (Erdfelder et al., 2009,  $\alpha = .05$ ;  $(1-\beta) = .95$ ;  $f = .16$  based on Experiment 2.1: minimum  $N = 309$ ). We decided to slightly oversample (ideal  $N = 350$  after controlling for our exclusion criteria).

All in all, five-hundred-seventy undergraduates were recruited via a university mailing list for this online experiment and were compensated as in Experiment 2.1. After excluding 123 participants based on our exclusion criteria (12 were not German native speakers, 1 Psychology student, 58 were familiar with the materials, 14 did not assume that the majority is against a gender pay gap, and 38 were uncertain about the majority opinion), the final sample size consisted of  $N = 360$  participants (247 female, 98 male, 3 diverse and 12 did not indicate their gender; age:  $M = 22.77$ ,  $SD = 3.40$ , range = 18-37 years).

#### Procedure and Measures.

The procedure and measures were identical to those of Experiment 2.1 with the exception that we used a different topic (gender pay gap). Participants indicated their *own opinion* by either selecting a manikin stating: “*I find the gender pay gap is justified.*” or a

manikin stating: *“I find the gender pay gap is not justified.”*. The communicator on the train stated either the majority opinion: *“I do not believe that the gender pay gap is justified in any way. Those who accept the gender pay gap are simply irrational. Women are disadvantaged by the low payment because they now have at least the same qualifications as men and perform at least as well!”* or the minority opinion: *“I think the gender pay gap is justified. Those who express themselves against a gender pay gap are simply ignorant. There are differences between men and women in terms of qualifications, the jobs they do, and the industries they work in. To demand equal pay for men and women is simply irrational!”*. Participants read the statement confirming or opposing their opinion based on the respective condition on the factor *faced opinion* they were in. We again formed the measure of *opinion expression* out of our two expression items,  $r(360) = .51$ , and assessed *fear* of backlash from others as before ( $\alpha = .82$ ).

## Results

We originally predicted people holding a minority opinion express their opinion less when facing an opposing than when facing a confirming opinion. This effect should be smaller for people holding a majority opinion (H1) and that this effect is mediated by fear of backlash from others (H2). Based on the results of Experiment 2.1, one would expect that people facing an opposing opinion express their opinion less (compared to those facing a confirming opinion) and that this main effect is mediated by fear of backlash from others.

We carried out an ANOVA with *opinion expression* as dependent variable and own opinion (majority: -1, minority: 1) as well as faced opinion (confirming: -1, opposing: 1) as independent variables to test our prediction. There was no main effect of faced opinion,  $F(1, 356) = 0.05$ ,  $p = .820$ ,  $\eta^2_p = .000$ , 90%-CI = [.000; .006], but a trend towards a main effect of own opinion,  $F(1, 356) = 2.94$ ,  $p = .088$ ,  $\eta^2_p = .008$ , 90%-CI = [.000; .030]. Participants holding the minority opinion indicated to be less likely to express their opinion ( $M = -0.23$ ,  $SD = 0.87$ ) compared to participants holding a majority opinion ( $M = 0.03$ ,  $SD = 0.87$ ). Again, the predicted interaction was not significant,  $F(1, 356) = 1.31$ ,  $p = .253$ ,  $\eta^2_p = .004$ , 90%-CI = [.000; .020].

To test whether participants holding a minority opinion and face an opposing (compared to confirming) opinion experience more fear of backlash from others than participants with the majority opinion, we conducted the same ANOVA as above on *fear*. Participants holding a minority opinion indicated more fear ( $M = 4.21$ ,  $SD = 1.31$ ) than those holding a majority opinion ( $M = 2.91$ ,  $SD = 1.18$ ),  $F(1, 356) = 52.70$ ,  $p < .001$ ,  $\eta^2_p = .129$ , 90%-CI = [.079; .183]. Also, when facing an opposing opinion participants perceived more fear ( $M = 3.49$ ,  $SD = 1.07$ ) than when facing a confirming opinion ( $M = 2.69$ ,  $SD = 1.31$ ),  $F(1, 356) = 10.98$ ,  $p = .001$ ,  $\eta^2_p = .030$ , 90%-CI = [.008; .064]. However, the interaction fell short of significance,  $F(1, 356) = 3.796$ ,  $p = .052$ ,  $\eta^2_p = .011$ , 90%-CI = [.000; .034] (see Table 2.1). People who faced an opposing opinion and held a minority opinion perceived more fear compared to people holding a majority opinion,  $\Delta M = 0.98$ ,  $SE = 0.29$ , 95%-CI = [0.403; 1.547]. This effect was even stronger for people who faced a confirming opinion and held a minority (vs. majority) opinion,  $\Delta M = 1.69$ ,  $SE = 0.22$ , 95%-CI = [1.250; 2.129].

We then tested for indirect effects of (a) own opinion and (b) faced opinion via *fear* on opinion expression (PROCESS, Model 4, Hayes, 2017, 5000 bootstrap samples). We found an indirect effect of own opinion via fear on opinion expression,  $B = -0.13$ ,  $SE = 0.03$ , 95%-CI [-0.197; -0.073]. People holding a minority opinion indicated more fear,  $B = 0.65$ ,  $SE = 0.10$ , 95%-CI [0.466; 0.841], and increased fear was related to less opinion expression,  $B = -0.20$ ,  $SE = 0.04$ , 95%-CI [-0.270; -0.126]. Similarly, we found an indirect effect of faced opinion via fear on opinion expression,  $B = -0.08$ ,  $SE = 0.02$ , 95%-CI [-0.120; -0.045]. People facing an opposing opinion indicated more fear,  $B = 0.40$ ,  $SE = 0.06$ , 95%-CI [0.274; 0.525], and increased fear was related to less opinion expression,  $B = -0.20$ ,  $SE = 0.04$ , 95%-CI [-0.273; -0.129].

## Discussion

Experiment 2.2 did not find any direct effects of own and faced opinion on opinion expression (but a trend towards an effect of own opinion), whereas it replicated the indirect

effects of both factors via fear of backlash from others on opinion expression. Again, no evidence for an interaction effect was found.

### **Experiment 2.3**

Given that the results of Experiments 2.1 and 2.2 are inconsistent regarding the main effects of own and faced opinion (although the patterns point in the same direction), we conducted a third experiment to determine the effects' reliability.

In addition, we aimed to go one step beyond the two preceding studies by addressing a common criticism for the current paradigm adopted from SOS research: the assessment of opinion expression with a single self-report measure (e.g., Bodor, 2012; Glynn et al., 1997). Therefore, participants in Experiment 2.3 did not only indicate whether they would express their opinion in general but also whether they would respond to a sequence of statements. Further, we increased the perceived majority by presenting the statements of three instead of one person. Again, we chose a topic with intense public interest and a clear majority opinion: the legalization of abortion in Great Britain. Among females of the United Kingdom, the majority is Pro-Choice (in line with public opinion poll results by YouGov, 2018, 2019).

### **Method**

#### **Design and Participants**

We conducted an experiment online via Prolific Academic with a 2 (*own opinion*: majority vs. minority; measured)  $\times$  2 (*faced opinion*: confirming vs. opposing; manipulated) between-participants design as before. We assessed participants' own opinions before they were randomly assigned to the conditions that varied in faced opinion. Based on Experiment 2.1 and 2.2, we expected an effect of  $f = .16$ , indicating a minimum sample size of  $N = 309$  (G\*Power:  $\alpha = .05$ ;  $(1-\beta) = .80$ ; Erdfelder et al., 2009). However, as we expected a ratio of 1 (minority: Pro-Life) to 4 (majority: Pro-Choice) in the sample, we oversampled by 55% ( $N = 479$ ) and an additional 10% to compensate for our exclusion criteria (total  $N = 527$ ).

A total of 532 women<sup>5</sup> took part and were compensated with £1.30. We used the Pre-Screening criteria (Pro-Life vs. Pro-Choice) of Prolific and excluded participants ( $N = 14$ ) whose presetting in the pre-screening did not match their self-report in the main experiment (e.g., pre-screening = Pro-Life and main experiment = Pro-Choice, or vice versa). Twenty participants were excluded based on our exclusion criteria (perceived majority opinion not in line with the actual majority opinion:  $N = 18$ ; English not as native language:  $N = 2$ ). We further excluded people ( $N = 2$ ) who were not female as the topic concerns women's rights. A sample of  $N = 496$  female participants (age:  $M = 30.05$ ,  $SD = 10.40$ , range = 18-73) remained for our analyses.

### Procedure and Measures

The procedure largely followed the one of Experiments 2.1 and 2.2 with some alterations. First, participants indicated their own opinion by selecting one of two manikins stating, “*I am Pro-Choice*” or “*I am Pro-Life*”, followed by a question assessing the majority opinion and the description of the train scenario. Participants faced not only one but three persons in the compartment. We also adjusted our measure of opinion expression. Therefore, the conversation was divided into eight sections. Every section consisted of a short argument that was presented in randomized order, either stating the minority or majority opinion (e.g., minority/Pro-Life: “*To have an abortion when the woman's mental health is at risk is contradictory. After all, an abortion causes intense psychological pain and stress. Thus, this can't justify abortion.*”). Hence, all three communicators either held a majority (Pro-Choice) or minority (Pro-Life) opinion. After each section, participants indicated their *readiness to respond* (“*Would you respond to what has been said?*” 1- yes to 0 - no). Values were recoded for analyses to 0 – *no response* to 1- *response*. We assessed *willingness* to express one's opinion

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<sup>5</sup> Only people of Great Britain were invited, because abortion laws differ between Great Britain and Northern Ireland.

with only one of the two questions of the expression index ("Would you like to talk to this person to get to know his or her point of view, or would you rather not?" 0 - *rather not engage in a conversation* to 1 - *would like to engage in a conversation*). Finally, we assessed fear of backlash from others as before ( $\alpha = .82$ ).

## Results<sup>6</sup>

A logistic regression with *willingness* to express one's opinion as dependent variable and own and faced opinion as independent variables was carried out. People who faced an opposing opinion indicated less willingness ( $M = 0.33$ ,  $SD = 0.47$ ) compared to those facing a confirming opinion ( $M = 0.46$ ,  $SD = 0.50$ ),  $B = -0.33$ ,  $SE = 0.13$ ,  $z = -2.48$ ,  $p = .013$ , 95%-CI = [-0.590; -0.070]. No main effect of own opinion,  $B = 0.21$ ,  $SE = 0.13$ ,  $z = 1.58$ ,  $p = .115$ , 95%-CI = [-0.052; 0.468], and no interaction were obtained,  $B = -0.08$ ,  $SE = 0.13$ ,  $z = -0.61$ ,  $p = .540$ , 95%-CI = [-0.344; 0.176].

To test whether these effects hold also for the *readiness to respond* to the statements in the discussion, we carried out a logistic multilevel analysis of *readiness to respond* (0, 1) on own opinion (majority: -1, minority: 1) and faced opinion (confirming: -1, opposing: 1) as fixed effects, and random intercepts for participants, the respective trial without the first trial (because we assumed that the response in the first trial may vary from the others as participants need to get used to the paradigm)<sup>7</sup>, and the presented argument. There was no main effect of own opinion,  $B = 0.04$ ,  $SE = 0.13$ ,  $z = 0.29$ ,  $p = .772$ , 95%-CI = [-0.222; 0.298]. We found a trend for faced opinion. Different from the results for willingness, people who were faced with an opposing opinion descriptively indicated a slightly higher readiness to respond ( $M = 0.55$ ,  $SD = 0.50$ ) than when faced with a confirming opinion ( $M = 0.52$ ,  $SD = 0.50$ ),  $B = 0.25$ ,  $SE = 0.13$ ,

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<sup>6</sup> We also ran our analyses without women who are currently or were pregnant before to check whether the pattern of results differ significantly from the one found for all women. This was not the case; therefore, the results include all women.

<sup>7</sup> Excluding this effect from the analyses does not substantially change the reported effects.

$z = 1.92, p = .055, 95\%-CI = [-0.008; 0.513]$ . The predicted interaction was not significant,  $B = 0.19, SE = 0.13, z = 1.47, p = .142, 95\%-CI = [-0.067; 0.462]$  (Table 2.1).

To test whether participants holding a minority opinion and face an opposing opinion experience more fear of backlash from others, and this, in turn, leads to less expression of one's own opinion, we submitted *fear* to an equivalent ANOVA. People holding a minority opinion indicated more fear ( $M = 4.64; SD = 1.31$ ) than those holding a majority opinion ( $M = 3.98, SD = 1.46$ ),  $F(1, 492) = 25.43, p < .001, \eta^2_p = .049, 90\%-CI = [.023; .083]$ . Also, when facing an opposing opinion participants perceived more fear ( $M = 4.99, SD = 1.10$ ) than when facing a confirming opinion ( $M = 3.12, SD = 1.14$ ),  $F(1, 353) = 119.42, p < .001, \eta^2_p = .195, 90\%-CI = [.146, .245]$ . Both main effects were qualified by the interaction,  $F(1, 353) = 13.13, p < .001, \eta^2_{part.} = .026, 90\%-CI = [.008; .053]$  (see Table 2.1). Simple comparisons revealed facing an opposing opinion resulted in more fear than facing a confirming opinion, but unexpectedly less so when holding a minority opinion,  $\Delta M = 1.01, SE = 0.26, 95\%-CI = [0.509; 1.520]$ , than when holding a majority opinion,  $\Delta M = 2.02, SE = 0.10, 95\%-CI = [1.816; 2.226]$ .

Next, we tested (PROCESS, Model 4, Hayes, 2017, 5000 bootstrap samples) whether fear mediates the effect of (a) own opinion and (b) faced opinion on willingness and summed readiness (sum of all responses). Indeed, there was an indirect effect of (a) own opinion via fear on *willingness*,  $B = -0.15, SE = 0.05, 95\%-CI [-0.250; -0.067]$ . People holding a minority opinion reported more fear,  $B = 0.33, SE = 0.09, 95\%-CI [0.146; 0.511]$  and increased fear was related to less willingness,  $B = -0.46, SE = 0.07, 95\%-CI [-0.596; -0.315]$ . The indirect effect of (b) faced opinion via fear on willingness was also significant,  $B = -0.93, SE = 0.18, 95\%-CI [-1.312; -0.616]$ . Again, people who were faced with an opposing opinion indicated more fear,  $B = 1.89, SE = 0.10, 95\%-CI [1.672; 2.066]$ , and more fear was related to less willingness,  $B = -0.50, SE = 0.09, 95\%-CI [-0.677; -0.321]$ .

Similarly, we found an indirect effect of (a) own opinion via fear on summed readiness,  $B = -0.08, SE = 0.04, 95\%-CI [-0.166; -0.021]$ . People holding a minority opinion indicated

more fear,  $B = 0.33$ ,  $SE = 0.09$ , 95%-CI [0.146; 0.511], and fear was related to less summed readiness,  $B = -0.25$ ,  $SE = 0.08$ , 95%-CI [-0.413; -0.094]. Finally, there was also an indirect effect of (b) faced opinion via fear on summed readiness,  $B = -0.48$ ,  $SE = 0.11$ , 95%-CI [-0.702; -0.282]. People facing an opposing opinion indicated more fear,  $B = 0.93$ ,  $SE = 0.05$ , 95%-CI [0.836; 1.033], and a higher level of fear predicted less summed readiness,  $B = -0.52$ ,  $SE = 0.10$ , 95%-CI [-0.720; -0.316].

## Discussion

In line with Experiment 2.1 (and partly also Experiment 2.2), we found a main effect of faced opinion on opinion expression. Moreover, we obtained indirect effects of both own opinion and faced opinion via fear of backlash from others on opinion expression. The effects occurred for both general willingness to express one's opinion and readiness to respond to individual statements. However, we did not find evidence for a smaller readiness to respond when people faced a communicator holding an opposing (compared to confirming) opinion, and also holding a minority (compared to a majority) opinion did not change readiness to respond. Different from the findings for willingness, a trend towards higher readiness to respond emerged for people facing an opposing (compared to confirming) opinion. Given that this was only a trend in an analysis with many observations and the indirect effects for readiness were in line with those for willingness, this finding should be interpreted with caution. Nonetheless, it suggests that it is important to differentiate whether a person wants to start a conversation (*willingness*) or to respond to certain arguments in an ongoing conversation (*readiness to respond*). Hayes (2007) already noted that expressing an opinion in a conversation and entering a conversation may not be the same. He argued that when being in a conversation, one can respond to what was said without expressing one's actual opinion (e.g., by articulating an argument that does not refer to a definite opinion). Hence, the willingness to respond in such a situation may be higher (because a response may be less controversial) than the willingness

to start a conversation based on one's opinion, which might explain why the results differ between the two measures.

### **General Discussion**

The present research aimed to investigate the relationship between facing an opposing opinion when holding a minority opinion and the likelihood of expressing one's own opinion and its mediation through fear of backlash from others. In three experiments, we tested whether people are less likely to express their opinion when facing an opposing (compared to confirming) opinion and when holding a minority (instead of majority) opinion. We expected that this would especially be the case for people holding an opposing opinion and facing a minority opinion.

This prediction was not supported, but we found in Experiments 2.1 and 2.3 that facing an opposing opinion led to less opinion expression compared to facing a confirming opinion. Moreover, the results of all three studies confirmed an indirect effect of own and faced opinion via fear of backlash from others on opinion expression. Holding a minority opinion (compared to a majority opinion) and facing an opposing (compared to a confirming) opinion led to higher levels of fear of backlash from others, which in turn predicted less willingness to express one's opinion. This is in line with earlier research showing that fear of backlash from others can explain differences between minority and majority opinions (Moy et al., 2001; Neubaum & Krämer, 2018).

Our experiments overall also support the assumption that facing an opposing opinion within a conversation reduces the likelihood to express one's own opinion and therefore is in line with earlier research (Hayes, 2007; Moussaïd et al., 2013; Ušto et al., 2019). Further, we obtained evidence in support of the mediation process via fear of backlash from others. Therefore, similar mechanisms seem to underlie opinion expression for own (minority vs. majority) and faced (confirming vs. opposing) opinion.

Furthermore, the likelihood to express one's own opinion seems to depend on the situation. Specifically, we observed a higher willingness to express their opinion with someone who held an opposing opinion when assessed during an ongoing conversation than when expressing their opinion is meant to initiate a conversation. Thus, it seems to make a difference for people facing an opposing communicator whether they would initiate a (critical) conversation or whether the conversation is already ongoing, and to remain silent could indicate implicit consent with the disputants. In addition, already Noelle-Neumann (2001) found no evidence for people holding a minority opinion to express themselves less when she used a scenario of a social gathering in which an ongoing conversation on a controversial topic came up. Thus, this is in line with our results. Further, it is also in line with research stating that minorities express themselves under certain circumstances (e.g., if they are confident and consistent) and possibly even more than the majority when facing a majority opinion (e.g., Martin, 1998; Moscovici, 1976). In sum, our hypothesis that minority opinions are expressed less than majority opinions when facing an opposing opinion compared to when facing a confirming opinion was not supported. According to our findings, facing a confirming vs. opposing opinion is the crucial factor determining whether opinions are expressed. The fact whether the opinion is in the minority or a majority within the society's opinion seems to be much less relevant. This conclusion is also derived from the fact that we did not find clear support for the prediction of the SOS that minority opinions are shared less (independent of the faced opinion). This lack of a main effect of minority vs. majority opinion is not particularly surprising given that a meta-analysis showed that this effect is on average very small ( $r \approx .05$ , Glynn et al., 1997; Glynn & Huye, 2014;  $r = .10$ , Matthes et al., 2018).

### **Limitations and Future Research**

Differing from Experiment 2.1 and 2.3, we did not find a main effect of faced opinion in Experiment 2.2 (but an indirect effect via fear of backlash from others). Additional analyses suggest that these inconsistent results might be a function of the importance ascribed to the

topic. Participants of Experiment 2.2 who held a minority opinion or faced an opposing opinion perceived the topic to be less important but perceived more self-efficacy compared to participants of the other experiments. Earlier research has shown that people who believe that their behavior (e.g., opinion expression) will have an impact are more likely to express their opinion (Neuwirth & Frederick, 2004; Neuwirth et al., 2007) regardless of the majority (or minority) opinion (Lasorsa, 1991). It is thus conceivable that this increase in self-efficacy led to the disappearance of group differences for opinion expressions in Experiment 2.2. In addition, the importance of the topic is positively correlated with opinion expression (Gearhart & Zhang, 2014; Hayes et al., 2001; Matthes et al., 2010; Salmon & Neuwirth, 1990). As participants in Experiment 2.2 ascribed less importance to the topic (compared to participants in the other experiments), their willingness to share their opinion generally might have been very low, preventing us from documenting differences between faced-opinion groups. In sum, in line with earlier research, the importance of the topic (Gearhart & Zhang, 2014; Hayes et al., 2001) and perceived self-efficacy (Lasorsa, 1991; Neuwirth et al., 2007) could potentially influence opinion expression and explain differences between experiments. Further research should test the impact of these potential moderators of the effect of faced opinion on opinion expression.

Another limitation of the current research is that across our experiments, our analyses were based on fewer observations in the minority group than the majority group. We anticipated this problem and oversampled at recruitment but still did not succeed in equating the sample size of both groups. Moreover, we only used hypothetical scenarios and self-assessment and did not assess actual opinion expression. We did this to reproduce the original approach of Noelle-Neumann (2001) as closely as possible. It would be desirable for future research to create more balanced samples and to investigate their behavior in more ecologically valid settings (e.g., face-to-face conversation).

Finally, our last experiment suggests that the scenario for which one's willingness to express an (opposing) opinion is assessed moderates the results. Specifically, contributing to an ongoing conversation is more likely than initiating a conversation. However, as data from an individual experiment are far from conclusive, future research should further investigate this aspect (possibly also in actual conversations; see above).

### **Conclusion**

Three experiments suggest that people holding a minority opinion are less willing to express their opinion due to fear of backlash from others. The same applies to people facing an opposing opinion. Accordingly, if work groups, policy makers, groups of scientists, and the like wish to encourage their members to express their (different) point of view, they need to ensure that they will not face and do not expect to face backlash from other members. Our research suggests that minority opinions and dissenting opinions are more likely to be expressed in fear-free contexts.

## **Chapter IIb – Silence Over Time? - Developing and Testing a Multi-Trial Paradigm to Address the Critique of the Spiral of Silence**

The previous experiments aimed to understand better why minority opinions are shared less towards those holding majority opinions and whether facing an opposing compared to confirming interaction partner has an impact on it. Contrary to the notion of the SOS, the three experiments in the preceding chapter demonstrated that the *majority opinion* (holding a minority compared to a majority opinion) on opinion expression seems to be not as relevant as the faced opinion (facing a confirming compared to opposing others opinion) but that fear of backlash from others mediates both aspects. Thus, no clear evidence for a SOS was found. The reported effects of the SOS in earlier research, however, could also be considered as faced opinion effects since the paradigm describes a confrontational situation in which one is on a train ride and faces someone holding a majority/minority opinion. Therefore, this chapter proceeds with the basic idea that facing an opposing opinion diminish opinion expression. It further takes up the criticism of the SOS, as this can explain the inconsistent effects.

We, as well as most researchers in the SOS tradition, used scenarios rather than actual interactive situations and single statements (except for Experiment 2.3 in Chapter IIa) rather than social interactions with several turns. Therefore, the experiments presented in the current chapter aim to develop a paradigm that allows addressing those deficits by considering a more realistic and conversational situation and the opportunity to respond several times and focuses on the faced opinion.

### **The Relevance of Studying Multiple Turns in a Realistic Setting**

Inconsistent findings of earlier research (Matthes et al., 2010; Salmon & Neuwirth, 1987; Soffer & Gordoni, 2018) and failed attempts to confirm the SOS (Katz & Baldassare, 1992; Oshagan, 1996; Shamir, 1995) already provoked criticism of the SOS and their

methodological approach (Bodor, 2012; Gearhart & Zhang, 2014; Scheufele & Moy, 2000, see Chapter I of this dissertation for detailed information on criticism).

One major point of criticism in previous research is the lack of adequate assessment of opinion expression (Bodor, 2012; Matthes, 2015; Noelle-Neumann, 2001, see also Chapter I of this dissertation). Bodor (2012) remarked that the insufficient considerations of multiple opinion expressions in previous research could explain the weak results. Noelle-Neumann argued that only when opinion expression is observed for a longer period (e.g., if multiple expressions of opinions are captured) the effect of the SOS can be detected (Noelle-Neumann, 1977, 2001; Noelle-Neumann & Petersen, 2004). Although she related this primarily to observations in a population, this could also apply to individuals. Particularly in interactive contexts, it is conceivable that differences between individuals facing a confirming vs. opposing opinion may only become apparent upon multiple opinion expressions. People holding an opposing opinion may be more likely to expect backlash from others if they continue to express their opinion because giving counter-arguments several times (e.g., by expressing an opposing opinion) increases the likelihood that the positions might harden or that the conversation will escalate. However, so far, only long-term experiments on election survey data were conducted (and the perceived prevailing opinion in society about voting preferences) with a retrospective assessment of individual opinion expression about the topic (Bodor, 2012; Matthes, 2015; Noelle-Neumann, 2001) but not in a controlled experiment for on an individual level.

With Experiment 2.3 of Chapter IIa, we already conducted a first experiment that addressed the critique of single responses by enabling several opportunities for opinion expression on an individual level. However, the results of Experiment 2.3 were inconsistent. On the one hand, when people were asked to express their opinion once, they were less likely to express their opinion when facing an opposing (compared to confirming) others' opinion. On the other hand, when people were asked to express their opinion several times within a hypothetical scenario, the likelihood to express one's opinion tended to be higher when facing

an opposing (compared to confirming) opinion. One explanation for this inconsistent result between a single statement and several statements may be due to the chosen methodological approach. Since we used written statements clearly marked as scenarios instead of spoken statements, the situation might have been too artificial as it was quite different from an interactive context (like a conversation) or an opinion expression situation with several turns.

This is also in line with another decisive point of criticism of previous research on the SOS. Besides the inadequate consideration of multiple turns, the methodological approach, such as the use of hypothetical scenarios instead of more realistic interactive scenarios and actual opinion expression, received much criticism (Glynn et al., 1997; Hayes et al., 2001; Scheufele & Moy, 2000; see also Chapter I of this dissertation). Based on the notion of the SOS, an interactive context like a conversation is important, as otherwise, the perceived pressure of the prevailing opinion is absent and has no influence on opinion expression (Noelle-Neumann, 2001; Noelle-Neumann & Petersen, 2004). The artificial train scenario we used and the resulting unrealistic conversational situation, which was reinforced by using written instead of spoken statements, could therefore also explain the inconsistent findings of the previous experiments in Chapter IIa, as we might have been too far away from a real interactive context.

Since, to the best of our knowledge, opinion expression has not yet been tested and analyzed in controlled experiments within a realistic interactive context with several turns, the experiments reported in Chapter IIb aim for the first time to overcome the mentioned deficits. To this end, within a multi-trial paradigm that more closely resembled a realistic conversation, several opportunities were given to express one's own opinion. We hypothesized that people who face an opposing opinion are less likely to express their opinion than people who face a confirming opinion (H1a).

As in Chapter I and IIa mentioned, people facing an opposing (compared to confirming) opinion are less likely to express themselves due to fear of backlash from others. Another explanation could be the minority slowness effect (MSE; Bassili, 2003, for more detailed

information, see Chapter I of this dissertation). A delayed opinion expression also could hinder opposing opinions from being expressed. Besides, response times are a good measure of opinion expression because it assesses a wider range of behaviors than simply using survey measures to indicate one's opinion expression (Rios & Chen, 2014) and might be more accurate and informative. Thus, we further hypothesized that people who face an opposing opinion express their opinion after a longer delay (H1b) and later in the conversation (H1c) than people who face a confirming opinion.

### **Overview of the Current Research**

Based on the notion of the SOS and the MSE we predict that people who face an opposing opinion are less likely to express their opinion (H1a), after a longer delay (longer response times; H1b), and later in a conversation (first response to the conversation is later; H1c) than people facing a confirming opinion. Participants listened to a pre-taped conversation with various statements on a diversely discussed topic. Two people brought forward the statements in Experiment 2.4 and three people in Experiment 2.5. After each statement, participants had the opportunity to express their own opinion on what was said. Different from Chapter IIa, we did not consider the minority status in society in the following experiments, but rather locally create a minority vs. majority by confronting participants with a group of people expressing a confirming vs. opposing opinion.

We conducted two pretests before we ran the two multi-trial experiments. In the first pretest, we conducted the topic for the experiments. Expressing opposing opinions less should only be true when there is no consensus in society about the topic (e.g., Jeffres et al., 1999, see also Chapter I of this dissertation). The pretest revealed that the implementation of a Veggie Day in canteens is diversely discussed among students, and thus both sides of the argumentation strands are plausible in a conversation. In a second pretest, we evaluated the experiments' arguments to ensure that all arguments are equally persuasive. In order to select 24 arguments (12 in favor and 12 against a Veggie Day), we excluded all arguments which were accepted or

rejected by most students and selected arguments that had a high conviction (arguments with a high mean). All arguments were recorded by women and men to avoid gender confounds. For those indicating male gender, participants heard the recordings of the male speakers; if another gender was specified (female, diverse, other), participants heard the recordings of the female speakers.

In addition, we investigated whether fear of backlash from others mediated the impact of the faced opinion on all three dependent variables, given that we found such an effect in Chapter IIa.

### **Preregistration**

Given that our experimental material was language intense material and designed for undergraduates, we only included German native speakers in our analyses and excluded non-students and atypical students older than 35 years. Further, psychology students were excluded because they might be aware of our hypotheses.

Ideal minimum sample size was computed prior to data collection for both experiments with G\*power (Erdfelder et al., 2009;  $(1-\beta) = .90$ ,  $\alpha = .05$ , expected medium effect size:  $f = .25$ : required  $N = 171$ ). Data collection stopped after the end of a pre-defined duration (two weeks).

## **Experiment 2.4**

### **Method**

#### **Participants**

One hundred and ninety-eight undergraduate students from the University of Tübingen participated in the experiment in exchange for 8.00 €. Twenty-five participants were excluded due to our preregistered exclusion criteria (one data withdrawal, one over 35 years, 18 not German native speakers<sup>8</sup>, five psychology students). The final sample size was  $N = 178$

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<sup>8</sup> Analyses with non-German native speakers show similar results in both experiments.

participants (141 females, 34 men, 3 did not indicate their gender;  $M_{\text{age}} = 22.98$ ,  $SD_{\text{age}} = 3.32$ , range = 18-34).

### **Design**

Participants were randomly assigned to one of two conditions (*faced opinion*: confirming vs. opposing). To be able to provide them with the respective materials, we assessed their own opinion (against vs. in favor of a Veggie Day).

### **Procedure and Measures**

The experiment was programmed and ran in Medialab (v2016.1.104) and was the third experiment of a set of unrelated experiments<sup>9</sup>. The experiment was conducted in the laboratory in private cubicles. Up to six participants took part in the experiment at a time. They received all instructions on screen.

First, we assessed participants' opinions regarding several political stances, among them the implementation of a Veggie Day in Tübingen canteens. We assessed own opinion on a 10-point scale (*1 - On certain days (Veggie Days) only vegetarian and vegan food and no meat should be offered in canteens to 10 – The canteen should not introduce a fixed meat-free day (Veggie Day). A meat variant should always be available*). For the analyses, the responses of *own opinion* were recoded to a two-level scale (in favor vs. against a Veggie Day). For this, numbers from 1 to 5 were coded as in favor, and responses from 6 to 10 as against a Veggie Day. After this initial assessment, we ran an unrelated experiment in order to have some time passed between the opinion expression and the main part of the experiment. Thus, participants were not suspicious of the underlying research question.

In the second phase of this experiment, we asked participants to put on headsets and imagine being in the following situation: "*You are at a party of friends from the university. You have been in the kitchen with two other people from the party for some time. One of the two*

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<sup>9</sup> Reported effects were qualified by these manipulations.

*persons brings up the implementation of the Veggie Day in canteens, and a conversation develops. Both are in favor of (or against) the implementation of a Veggie Day.*” Depending on the own opinion, participants either faced a confirming or opposing others’ opinion (*faced opinion*). Participants were instructed that the conversation is an exchange of different statements. As with any conversation, they had the opportunity to comment on what has been said after each statement or continue listening. Participants decided as quickly as possible to express their opinion (press the space bar) or not (wait till the next person takes the floor). Participants heard 12 statements in total. As mentioned above, to avoid confounds due to the gender of the speakers, participants always listened to a speaker of the same sex (diverse participants listened to female speakers).

**Dependent Measures.** We recorded whether participants responded (*readiness to respond, H1a*), their response times on each trial (*response time, H1b*), as well as on which trial participants responded the first time (*first response, H1c*).

Further, participants completed a questionnaire about their *fear* of backlash from others (three self-generated items on a 7-point scale, *1- not at all* to *7-extremely strong*,  $\alpha = .61$ , e.g., “How strong did you feel that you would have been excluded when you would have expressed yourself in the conversation?”). For correlations and other measures that were taken for exploratory purposes after the reported measures for this and the following experiment, see Appendix B.2.

## **Results**

Multilevel analyses were carried out as they allow assessing relationships on a trial-by-trial level (Judd et al., 2012). The models were fit using the *R* packages *lmerTest* and *lme4* (Bates et al., 2015; Kuznetsova et al., 2016). To control for eventual differences, random intercepts for participants, the respective trial without the first trial (because we assumed that the response in the first trial might differ from the others as participants need to get used to the

paradigm)<sup>10</sup>, and for the played argument (because arguments slightly varied in length) were planned. However, due to almost no variance of *played argument* and thus, singularity and convergence problems for H1a the random effect for played argument was not included in the model<sup>11</sup>. Fixed effects for the predictors *own opinion* (against: -1, in favor: 1) and *faced opinion*: (confirming: -1, opposing: 1) were included in all models.

To test H1a, a logistic regression of *readiness to respond* on own and faced opinion, as well as their interaction, was carried out. We conducted a linear multiple regression with the same predictors as before and *response times* as criterion for H1b. Response times were log-transformed to correct for skewed distribution. For H1c, we conducted a Poisson regression for *first response* with the same predictors as above. For an overview of descriptive statistics for the dependent variables of the two experiments, see Table 2.1).

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<sup>10</sup> Excluding this random intercept from the analyses qualifies reported effects of Experiment 2.4 and does not change the reported effects of Experiment 2.5.

<sup>11</sup> Analyses with played argument in the model as random intercept show similar results (with warnings).

**Table 2.1***Means and (Standard Deviations) for all Dependent Variables for Experiments 2.4 and 2.5*

Own opinion	Against		In favor	
	Confirming	Opposing	Confirming	Opposing
Faced opinion	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>
Experiment 2.4				
Readiness to respond	0.66 (0.48)	0.64 (0.48)	0.62 (0.49)	0.75 (0.43)
Response time	6.85 (0.90)	6.81 (0.87)	7.03 (0.81)	6.74 (0.84)
First response	1.76 (0.93)	1.72 (0.85)	2.05 (1.49)	1.49 (0.60)
Fear of backlash	2.81 (1.30)	4.39 (1.39)	2.87 (1.42)	4.05 (1.32)
Experiment 2.5				
Readiness to respond	0.35 (0.48)	0.49 (0.50)	0.39 (0.49)	0.43 (0.50)
Response time	6.69 (0.83)	6.81 (0.78)	6.87 (0.78)	6.74 (0.88)
First response	2.63 (2.24)	2.57 (1.79)	3.51 (2.72)	3.24 (3.09)
Fear of backlash	3.31 (1.26)	5.41 (1.97)	3.45 (1.83)	4.49 (1.92)

**Test of Hypotheses**

**Predicting Readiness to Respond (H1a).** We hypothesized that people who face an opposing opinion are less likely to express their opinion than people facing a confirming opinion. Different than expected, we did not obtain a main effect of faced opinion,  $B = 0.21$ ,  $SE = 0.13$ ,  $z = 1.62$ ,  $p = .105$ , 95%-CI = [-0.462; 0.046], and also no effect of own opinion,  $B = 0.17$ ,  $SE = 0.13$ ,  $z = 1.38$ ,  $p = .167$ , 95%-CI = [-0.076; 0.432]. However, the interaction of own and faced opinion was significant,  $B = 0.26$ ,  $SE = 0.13$ ,  $z = 2.08$ ,  $p = .038$ , 95%-CI = [0.012; 0.520]. Pairwise comparisons revealed that when faced with an opposing opinion, participants who were against (compared to in favor of) the Veggie Day expressed themselves less,  $\Delta M = -0.44$ ,

$SE = 0.18, p = .016, 95\%-CI = [-0.794; -0.081]$ . No significant differences occurred when faced with a confirming others opinion.

**Predicting Response Times (H1b).** We further predicted that people who face an opposing opinion express their opinion after a longer delay than people who face a confirming opinion. Different than expected, participants responded faster when facing an opposing ( $M = 6.77, SD = 0.85$ ) than a confirming ( $M = 6.93, SD = 0.87$ ) opinion,  $B = -0.08, SE = 0.03, t(159.20) = -2.67, p = .008, 95\%-CI = [-0.144; -0.022]$ . No main effect of own opinion,  $B = 0.03, SE = 0.03, t(159.23) = 1.10, p = .272, 95\%-CI = [-0.027; 0.096]$ , but again an interaction of both predictors emerged,  $B = -0.06, SE = 0.03, t(60.76) = -2.07, p = .043, 95\%-CI = [-0.127; -0.002]$ <sup>12</sup>. Pairwise comparisons showed that people who were faced with a confirming opinion expressed their opinion after a longer delay when they were in favor (compared to against) a Veggie-Day,  $\Delta M = 0.10, SE = 0.04, p = .029, 95\%-CI = [0.010; 0.188]$ , whereas no such differences occurred when facing an opposing others opinion.

**Predicting the First Response (H1c).** We predicted that people who face an opposing opinion express their opinion later in a conversation than people facing a confirming opinion. Results showed neither a main effect of faced opinion,  $B = -0.08, SE = 0.06, z = -1.44, p = .150, 95\%-CI = [-0.201; 0.030]$ , nor a main effect of own opinion,  $B = 0.00, SE = 0.06, z = 0.04, p = .968, 95\%-CI = [-0.114; 0.118]$ , nor an interaction of both predictors,  $B = -0.08, SE = 0.06, z = -1.29, p = .196, 95\%-CI = [-0.192; 0.039]$ . Hence, people facing an opposing compared to confirming others' opinion did not differ regarding their first opinion expression within the conversation.

### **Additional Analysis.**

**Fear of Backlash From Others Depending on Faced Opinion.** To test whether people who face an opposing (compared to confirming) opinion experience more fear of backlash from

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<sup>12</sup> Exclusion of response times below 300ms resulted in a marginal interaction of own and faced opinion but were not preregistered.

others, we submitted *fear* to an ANOVA. People who faced an opposing opinion indicated more fear ( $M = 4.21$ ,  $SD = 1.36$ ) than those who faced a confirming opinion ( $M = 2.84$ ,  $SD = 1.34$ ),  $F(1, 174) = 46.61$ ,  $p < .001$ ,  $\eta^2_p = .211$ , 90%-CI = [.127; .294]<sup>13</sup>. No significant differences occurred for own opinion,  $F(1, 174) = 0.43$ ,  $p = .513$ ,  $\eta^2_p = .002$ , 90%-CI = [.000; .027] and also the interaction was not significant,  $F(1, 174) = 0.97$ ,  $p = .327$ ,  $\eta^2_p = .006$ , 90%-CI = [.000; .036], (see Table 2.1).

**Mediation via Fear of Backlash From Others.** We further investigated whether fear of backlash from others mediates the impact of faced opinion on all three dependent variables: readiness to respond, response times, and first response. Tests were conducted using the packages *lavaan* (Rosseel, 2012) and *processR* (Moon, 2020) in R with 5000 bootstrap samples. Analyses revealed that only the indirect effect of *faced opinion* via fear on *response times* emerged,  $B = -0.03$ ,  $SE = 0.01$ , 95%-CI = [-0.049; -0.006], (for statistical details see Table 2.2). An opposing opinion increased fear,  $B = 0.66$ ,  $SE = 0.03$ , 95%-CI = [0.599; 0.734], and increased fear led to *faster* response times,  $B = -0.04$ ,  $SE = 0.02$ , 95%-CI = [-0.073; -0.009]. However, as the other indirect effects did not emerge significant fear of backlash from others seems not to mediate the impact of faced opinion on opinion expression and first response.

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<sup>13</sup> For  $\eta^2_p$ , we report 90% instead of 95% confidence intervals following the recommendations of Lakens (2013).

**Table 2.2**

*Indirect Effects of Faced Opinion via Fear of Backlash From Others on Readiness to Respond, Response Times, and First Response Conducted With Lavaan and ProcessR in R for Experiment 2.4*

	Faced opinion	
	<i>B</i>	95%-CI
Readiness to respond	0.00	[-0.007; 0.014]
Response times (log)	-0.03	[-0.049; -0.006]
First response	-0.07	[-0.163; 0.006]

## Discussion

The goal of the present experiment was to investigate whether people who face an opposing opinion are less likely to express their opinion and, if they do so, whether it happens after a longer delay and later in a conversation. To this end, we developed a multi-trial paradigm to address the criticism of earlier research. We did not find support for our hypotheses. Contrary to our hypotheses, people who were faced with an opposing (than confirming) others opinion responded faster. This is not in line with the MSE (e.g., Bassili, 2003).

Even though the interaction of own and faced opinion on readiness to respond and response times emerged, both interactions were driven by different simple comparisons. The readiness to respond differed, depending on the position of one's own opinion, only when confronted with an opposing opinion, whereas the response times differed when confronted with a confirming opinion. Therefore, the findings are inconsistent.

As expected, and in line with Experiment 2.3 of Chapter IIa, people who were faced with an opposing others opinion indicated more fear of backlash from others. However,

increased fear of backlash from others resulted in faster (and not slower) response times and therefore contradicts our assumption.

However, due to programming restrictions and the experimental design of the experiment, some arguments had a delay of some milliseconds before participants were able to respond. Thus, it remains unclear whether the effects on response times emerged due to personal aspects or due to impure response times. Hence, we designed Experiment 2.5 as a conceptual replication of Experiment 2.4 with some exceptions. First, we reduced methodological weaknesses and measured exact response times. By doing so, we addressed the problem of impure response times from Experiment 2.4 and can make a more precise statement whether people respond faster when facing an opposing others opinion within our paradigm. Second, we used a different scenario, as a party setting is still artificial for participants in the laboratory. Besides, Noelle-Neumann (2001; Noelle-Neumann & Petersen, 2004) already argued that a social gathering scenario such as a party is less optimal because people might be too polite towards the host to express their true opinions, and also the public character may not be ensured. Third, for the adequate assessment of *fear* we used improved and more items to measure fear of backlash from others and extended the number of faced communicators from one to two.

## Experiment 2.5

### Method

#### Design and Participants

The same between-participants design as in Experiment 2.4 was conducted with two conditions for *faced opinion*: confirming vs. opposing. Similarly, participants' own opinions (against vs. in favor of a Veggie Day) were assessed to provide them with respective materials. Participants were compensated with 8 € for an hour-long laboratory session.

Two hundred undergraduate students from the University of Tübingen participated in the experiment. Twelve participants were excluded due to our preregistered exclusion criteria

(one over 35 years, nine not German native speakers, two psychology students). Final sample size was  $N = 188$  participants (134 females, 49 men, 1 diverse, 4 did not indicate their gender;  $M_{\text{age}} = 23.76$ ,  $SD_{\text{age}} = 3.41$ , range = 18-35).

### **Procedure and Measures**

This time, the experiment was programmed and ran in directRT (v2016.1.104). The main procedure and measures were almost the same as in Experiment 2.4 with the following exceptions: First, we asked participants about their opinion about implementing a Veggie Day in canteens and dropped the filler items. Second, we changed the scenario. This time, participants were told that the recorded conversation is the product of a previous experiment in which participants had to record their opinion on the implementation of a Veggie day. Third, we increased the number of speakers to three and announced that participants would tape their own arguments if they respond within the scenario. These arguments would then be presented to the speakers, and participants could sign up for another experiment to meet the speakers and to discuss the topic in person. Therefore, headsets and cameras were attached. All this was meant to put participants into a stronger minority position and to increase the feeling of a social situation (i.e., an audience). Finally, we assessed *fear* of backlash from others with ten self-generated items ( $\alpha = .91$ , e.g., “I have the feeling that the other participants will accept me”). Higher values indicated more fear of backlash from others. All variables were assessed on a 10-point-scale.

### **Results**

As in Experiment 2.4 *own opinion* was recoded into a dichotomous response: Responses from one to five indicated an own opinion against and responses below six an opinion in favor of a Veggie Day. Again, multilevel analyses to test H1a (logistic regression on readiness to respond) and H1b (linear multiple regression on log-transformed response times) were carried out and were fit using the *R* packages lmerTest and lme4 (Bates et al., 2015; Kuznetsova et al., 2016). Equivalent random intercepts for participants, the respective trial without the first trial

(as the first trial may vary), and the played argument, as well as fixed effects for the predictors own opinion (against: -1, in favor: 1), and faced opinion: (confirming: -1, opposing: 1) were included in all models. To test H1c, a Poisson regression for first response with the same predictors was conducted.

### Test of Hypotheses

**Predicting Readiness to Respond (H1a).** We predicted that people who face an opposing opinion are less likely to express their opinion compared to people who face a confirming opinion. Different than predicted, people who faced an opposing opinion responded more often ( $M = 0.70$ ,  $SD = 0.50$ ), compared to people who faced a confirming opinion ( $M = 0.64$ ,  $SD = 0.48$ ),  $B = 0.35$ ,  $SE = 0.17$ ,  $z = 2.05$ ,  $p = .040$ , 95%-CI = [0.011; 0.693]. There was no main effect of own opinion,  $B = -0.03$ ,  $SE = 0.17$ ,  $z = -0.19$ ,  $p = .850$ , 95%-CI = [-0.371; 0.308], and no interaction,  $B = -0.23$ ,  $SE = 0.18$ ,  $z = -1.28$ ,  $p = .200$ , 95%-CI = [-0.594; 0.126].

**Predicting Response Times (H1b).** Our prediction that people who face an opposing opinion express their opinion after a longer delay than people who face a confirming opinion, was not supported. Different than in Experiment 2.4, analyses revealed no main effect of faced opinion,  $B = -0.00$ ,  $SE = 0.04$ ,  $t(142.31) = -0.11$ ,  $p = .916$ , 95%-CI = [-0.087; 0.078], no main effect of own opinion,  $B = 0.01$ ,  $SE = 0.04$ ,  $t(142.17) = 0.32$ ,  $p = .753$ , 95%-CI = [-0.070; 0.096], and no interaction of faced and own opinion,  $B = -0.08$ ,  $SE = 0.05$ ,  $t(51.71) = -1.64$ ,  $p = .107$ , 95%-CI = [-0.017; 0.179]<sup>14</sup>.

**Predicting the Time of the First Response (H1c).** We further predicted that people facing an opposing opinion express their opinion later in a conversation compared to people facing a confirming opinion. People holding an opinion in favor of a Veggie-Day responded later ( $M = 3.38$ ,  $SD = 2.89$ ) than people holding an opinion against it ( $M = 2.60$ ,  $SD = 2.00$ ),  $B = 0.13$ ,  $SE = 0.05$ ,  $z = 2.59$ ,  $p = .010$ , 95%-CI = [0.033; 0.230]. However, our predicted main effect of

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<sup>14</sup> Exclusion of response times below 300ms did not change results.

faced opinion did not emerge,  $B = -0.03$ ,  $SE = 0.05$ ,  $z = -0.52$ ,  $p = .602$ , 95%-CI = [-0.125; 0.072], and neither did the interaction,  $B = -0.01$ ,  $SE = 0.05$ ,  $z = -0.28$ ,  $p = .779$ , 95%-CI = [-0.113; 0.084].

### **Additional Analysis**

**Fear of Backlash From Others Depending on Faced Opinion:** Again, we explored with an ANOVA whether people who face an opposing (compared to confirming) opinion experience more fear of backlash from others. As in Experiment 2.4, participants who were faced with an opposing others opinion indicated more fear ( $M = 4.83$ ;  $SD = 1.98$ ) than those who faced a confirming others' opinion ( $M = 3.39$ ,  $SD = 1.62$ ),  $F(1, 184) = 31.07$ ,  $p < .001$ ,  $\eta^2_p = .144$ , 90%-CI = [.074; .221]. No significant differences occurred for own opinion,  $F(1, 184) = 1.77$ ,  $p = .186$ ,  $\eta^2_p = .010$ , 90%-CI = [.000; .044]. However, a trend towards an interaction of own and faced opinion revealed,  $F(1, 184) = 3.89$ ,  $p = .050$ ,  $\eta^2_p = .021$ , 90%-CI = [.000; .065], (see Table 2.1). Pairwise comparison revealed that among people against a Veggie Day the effect of faced opinion was stronger,  $\Delta M = 2.10$ ,  $SE = 0.42$ ,  $p < .001$ , 95%-CI = [1.273; 2.935] than among people in favor of a Veggie Day,  $\Delta M = 1.05$ ,  $SE = 0.33$ ,  $p = .002$ , 95%-CI = [0.395; 1.700].

**Mediation via Fear of Backlash From Others:** We tested whether fear of backlash from others mediated the impact of faced opinion on readiness to respond, response times, and first response. Tests were conducted using the packages lavaan (Rosseel, 2012) and processR (Moon, 2020) in R with 5000 bootstrap samples. Different than in Experiment 2.4, none of the indirect effects of *faced opinion* via fear on any of the expression variables emerged. Accordingly, fear of backlash from others did not mediate the impact of faced opinion on readiness to respond, nor on response times, nor on first response (for statistical details, see Table 2.3).

**Table 2.3**

*Indirect Effects of Faced Opinion via Fear of Backlash From Others on Readiness to Respond, Response Times, and First Response Conducted With Lavaan and ProcessR in R for Experiment 2.5.*

	Faced opinion	
	<i>B</i>	95%-CI
Readiness to respond	-0.00	[-0.011; 0.006]
Response times (log)	0.02	[-0.003; 0.050]
First response	0.14	[-0.057; 0.362]

## Discussion

The aim of Experiment 2.5 was a conceptual replication of Experiment 2.4 with improved measurements and the usage of a more realistic scenario. None of our hypotheses were confirmed, and the results also did not replicate the effect found in Experiment 2.4. People were even more (and not less) likely to express their opinion when facing an opposing compared to confirming opinion. This is in line with the results of Experiment 2.3 of Chapter IIa. Facing an opposing opinion seems to increase readiness to respond in an ongoing conversation.

Also different from Experiment 2.4, neither own nor faced opinion or an interplay of both indicated differences in response times. Further, the indirect effect via fear of backlash from others on response times did not emerge. Hence, results in Experiment 2.4 may indeed have been an artifact due to programming restrictions and not due to personal aspects or differences in the persuasiveness of arguments.

Finally, when people faced an opposing (than confirming) opinion, they indicated more fear of backlash from others. This finding is in line with earlier results. In addition, we found that this is more prevalent for people holding an opinion against (compared to in favor of) a

Veggie Day. This also could indicate that people in favor of a Veggie Day think to have the future majority opinion on their side or are more used to confrontations (as they may experience those more often in their daily life), and therefore experience less fear of backlash from others when facing an opposing opinion.

### **General Discussion**

The present research investigated opinion expression in a conflictual situation (inspired by the SOS) and the MSE within one paradigm for the first time and thus addressed criticism on the SOS research such as methodological weaknesses in an experimental setting by using a conversational context with pre-taped statements and several turns to respond. We aimed to test whether people who face an opposing opinion are less likely to express their opinion after a longer delay and later in a conversation compare to people who face a confirming opinion. We further investigated whether this is mediated by fear of backlash from others. Across both experiments, we found inconsistent results and no evidence for our predictions.

Different than expected, in Experiment 2.5, people who faced an opposing opinion were even more likely to express their opinion than people who faced a confirming others' opinion<sup>15</sup>. While this is in line with our earlier findings (see Experiment 2.3 of Chapter IIa), it is neither in line with the notion of the SOS (Noelle-Neumann, 2001) nor with information sharing in groups (Asch, 1956; Ušto et al., 2019). As assumed in Chapter IIa, one explanation could be that whether a conversation is already ongoing (compared to whether it would be initiated when an opinion is expressed) indeed makes a difference. People might express themselves more often when they can add something to a conversation, and this might especially be the case if people feel that they can add a new stance and point of view to the conversation and thus improve it. Earlier research already demonstrated a sensitivity of people to the informativeness of information (e.g., advice; Hütter & Ache, 2016). In addition, people seem to express

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<sup>15</sup> Descriptively this was also the case for Experiment 2.4.

themselves more (Schulz-Hardt et al., 2006), for instance, by expressing innovative thoughts (De Dreu & West, 2001) when a dissent about a topic exists, especially when this is morally loaded (Hornsey et al., 2003). Thus, within an ongoing conversation (a situation with several turns, as in our experiments) about a morally loaded topic (e.g., a Veggie Day), in particular, people with an opposing opinion seem to express their opinion as they can add something new – even though this could lead to a conflictual situation and backlash from others. Future research should, therefore, explicitly investigate and compare the differences between an ongoing conversation and a single statement on opinion expression and investigate why people facing an opposing opinion contribute more and whether adding something is one reason to gain more insights in this regard.

We further could not find evidence for a MSE (e.g., longer response times) nor for a later response within the conversation in the current experiments. A MSE does not seem to occur in a conversational setting like ours, or the paradigm was not suitable for measuring a MSE. Our paradigm deviated strongly from the MSE paradigm. In the present experiments, participants responded if they wanted to express themselves and waited for the conversation to continue when they did not want to express their opinion. In contrast, within the MSE research (Bassili, 2003; Huge & Glynn, 2013), participants were supposed to respond to a stimulus as quickly as possible. It can be assumed that the different tasks (and their framing) hindered a MSE from occurring. By the nature of our task, more reflective considerations/opinions may have already been made than in the MSE task, thereby possibly prevented the MSE.

Across both experiments (and in line with Experiment 2.3 of Chapter IIa), more fear of backlash from others was indicated when facing an opposing opinion. Hence, people seem to be aware that backlash from others may follow if they would express their opinion when facing an opposing opinion. This is in line with existing research, which also found evidence for increased fear of being treated unfavorably for people facing an opposing opinion (Ho & McLeod, 2008; Neubaum & Krämer, 2018). However, within the paradigm of the current

experiments, the results suggest that fear of backlash from others does not seem to mediate opinion expression. This may be due to the different fear items we used compared to the previous experiments in Chapter IIa. The items of the present experiments focused more on fear of social isolation, whereas in Chapter IIa the focus was on fear for confrontation – both are different instances of backlash from others. A difference of those two fear aspects on opinion expression was already found by Neubaum and Krämer (Neubaum & Krämer, 2018). They tested different aspects of fear of backlash from others (fear of rejection, fear of being judged, and fear of being personally attacked) and found only a mediation of the latter on opinion expression. Fear of confrontation is closest to fear of being personally attacked, whereas fear of rejection or being judged is closest to fear of isolation. This could explain the inconsistent results across experiments in Chapters IIa and IIb.

An explanation why we found no evidence for any of our predictions could be that – even though our paradigm already addressed several points of the criticism – it might have still not addressed all aspects properly. As the conversation consisted of audio files of pre-taped statements, participants did not face the speakers in reality or saw any mimic or other social cues. Maybe due to this diminished social richness, the faced opinion was not as strong as it would be in face-to-face interactions (for first evidence see, Ho & McLeod, 2008). Further, even though we assessed readiness to respond, people only could indicate that they would express their opinion but could not actually express their opinion. Hypothetical communication scenarios (as it was the case in the present experiments) were questioned about their external validity (Glynn et al., 1997; Hayes, 2007; Scheufele et al., 2001) as no actual opinion expression takes place. Future research should therefore expand and improve the used paradigm of this chapter by not only providing the opportunity of several responses but also providing the opportunity of actual opinion expression, and thus increase external validity and generalizability.

Despite the limitations mentioned above, the current experiments also offer a major strength. The present research was the first to develop and test a paradigm that addresses some of the criticisms of the SOS within an interactive context. As a result, it provides a valuable and innovative paradigm to investigate social influence on opinion expression in experimental contexts and should be used in future research. Within our experiments, we used it to examine the faced opinion within a conversation (and thus, the local minority/majority opinion within a situation), but it is also assumable to test the notion of the SOS by using a topic with a clear majority opinion in society as this might provide a deeper understanding of whether minority opinions are (not) expressed.

To sum up, the current experiments do not support our assumption that people who face an opposing opinion express themselves less in a conversation. The findings rather indicate that opposing opinions are more likely to be expressed when it comes to a more realistic interactive context than confirming opinions. An interactive context such as an ongoing conversation with multiple turns might increase the expression of opposing opinions, as it might be a lower barrier to bring up a new, differing thought to an ongoing conversation (which can subsequently be discussed).

All in all, our experiments of Chapter IIa and IIb, however, indicate that, contrary to existing research, the notion of the SOS has a smaller impact on opinion expression as assumed. In addition, across Chapter IIa and IIb, our research provides first insights about some important issues such as the impact of different aspects of fear of backlash from others on opinion expression as well as the importance of whether a conversation is already ongoing or would be initiated by an expression of opinion. However, thus far, in both Chapters (Chapter IIa and IIb), we used scenarios and did not provide the opportunity for expressing or writing down their opinion. This, however, would increase external validity and therefore seems necessary.

## **Chapter III – Opinion Expression in Non-Interactive Contexts**

### **Chapter IIIa – Actual Opinion Expression in the Laboratory in a Non-Interactive Context**

The previous Chapter II addressed opinion expression within interactive contexts such as a conversation on a train ride, at a party, or the possibility to interact with other participants. Across the presented research, findings on opinion expression were inconsistent. However, in preceding experiments, opinion expression of people holding a deviant (e.g., a minority or opposing) opinion in an interactive context was mostly tested in hypothetical face-to-face contexts (e.g., within a train scenario). Such hypothetical interactive contexts have already been lamented by researchers because of questionable external validity (Glynn et al., 1997; Hayes, 2007; Scheufele et al., 2001) and might explain inconsistent findings. A first attempt to assess actual rather than hypothetical responses was made in Experiment 2.3 of Chapter IIa as well as in experiments of Chapter IIb by pressing a keyboard key if people wanted to express their opinion within the scenario. We further announced a discussion at the end of Experiment 2.5 of Chapter IIb and installed webcams and headsets to strengthen the impression of a subsequent recording of opinion. Nevertheless, people never really had the opportunity to express their actual opinion and put forward their arguments. In the experiments presented in this chapter, we aim to go one step further and ask people about their opinion and provide the opportunity for actual opinion expression.

For this, we chose the context of product evaluation portals. The advantage of product evaluation portals is that a clear majority opinion is visible by the given overall rating of a product as well as the faced opinion due to the reviews of others. Furthermore, those websites are specifically created to express opinions and thus provide an optimal context for assessing opinion expression and thereby gaining a deeper understanding of whether deviant opinions are being expressed. In line with the summarized literature in Chapter I and the preceding Chapters

Ila and I Ib, we still predict that the likelihood to express one's opinion (e.g., writing a review) will be smaller when the overall rating of a product is not in line (compared to in line) with one's own opinion.

### **Product Evaluation Portals and Opinion Expression**

Product reviews are public testimonials from customers about products that can be submitted in an online store or on an online marketplace such as Amazon. For customers, they offer the opportunity to express their opinion about a product and thus help other interested parties in their purchase decision. When searching for a specific product, a consumer no longer necessarily must rely on product information from the manufacturer or seller but can take advantage of the real experiences of other consumers. To be able to rely on such reviews, it is important that people express their opinion by contributing product reviews in evaluation portals. Already in 2016, over 80% of Germans had written at least one review for an online evaluation portal (HolidayCheck Group, 2016). Still, so far, research had mostly focused on the influence of reviews on sales (e.g., Chevalier & Mayzlin, 2006; Park et al., 2019) or the motives for contributing (Cheung & Lee, 2012; Hennig-Thurau et al., 2004) but limited attention, however, was paid to whether the summary statistics of existing reviews (e.g., an overall rating) influences one's prospective opinion expression (e.g., contributing a review). Hence, we aim to investigate opinion expression in product evaluation portals in our research after seeing a summary statistic (overall rating).

Even though in the experiments reported so far we did not find evidence for less opinion expression when facing an opposing and majority opinion, a substantial body of earlier research supported this assumption as described in Chapter I: People express their opinion either when they face a confirming opinion (faced opinion; e.g., Asch, 1956; Wittenbaum & Bowman, 2005) or when they perceive that the majority opinion is in line with their own opinion (majority opinion; Noelle-Neuman, 2001). In daily life, the majority and faced opinion often coincide like it is the case in the context of product evaluations. The summary statistics of given reviews

(overall rating) reflects the majority opinion, as well as the faced opinion, as it reflects the opinions of most people of society about the product and at the same time the opinion with which one is faced in the (contribution/purchase) situation. Purchasers see the overall rating (and respective reviews) when purchasing a product and may remember this overall rating when contributing a review. In some cases, people are even exposed to the overall rating again before expressing their opinion (contribute a review). This re-presentation might have an impact on opinion expression.

The main difference between our former experiments and expressing opinions on product evaluation portal is the given anonymity. So far, we assessed opinion expression in an interactive context. Participants imagined interacting with certain persons face-to-face or at least thought to record statements that will be played to a group of people afterwards. Hence, the participants' anonymity in those situations was relatively low, whereas in the context of rating a product, the given anonymity will be high. As mentioned in Chapter I, people seem to be more willing to express their (deviant) opinion if the given anonymity is high, which is mostly the case in non-interactive contexts such as a product evaluation portal (Ho & McLeod, 2008; Wu & Atkin, 2018). In product evaluation portals, people can use pseudonyms or even contribute a review anonymously if they want to. Further, within an anonym context (such as product evaluation portals) the fear of backlash from others is diminished (W. G. Yun & Park, 2011) and differ from those in interactive contexts as scuffles might be minimized (for further details, see Chapter I). Both, the high anonymity and the reduces fear of backlash can lead to even more opinion expression of deviant opinions (Ho & McLeod, 2008; Wu & Atkin, 2018; W. G. Yun & Park, 2011).

However, research on contributing reviews found that more positive reviews are contributed to evaluation portals (Chevalier & Mayzlin, 2006, 2012; Dellarocas, 2003; Hu et al., 2009; Schindler & Bickart, 2012). As most overall ratings of product evaluation portals are relatively positive, opinions in line with the (positive) overall rating seem to be expressed

preferably. Initial evidence that a given overall rating, however, indeed influences one's opinion expression was found by Cosley et al. (2003), who found that the presented overall rating influences users of recommender systems and that they adapt their opinion on it. In general, people express shared information over unshared information preferably (e.g., Stasser, 1992) as shared information is easily assessable because it is shared by many and therefore has a sampling advantage (Stasser, 1992). Especially in evaluating portals, many reviews that correspond to the overall rating exist, and only some contradict it. Hence, due to the higher accessibility of shared information, it seems that information in line with it (hence, opinions in line with the overall rating) will mainly be expressed. In addition, people try to relate to others by expressing shared information (Clark & Brennan, 1991) and thus avoid backlash from others such as negative comments or accusations of false statements. Expressing an opinion in line with the overall rating indicates that one is on the same page as others (Rios & Chen, 2014; Wittenbaum et al., 2004) and may entail less backlash.

Overall, expressing an opinion within an anonym non-interactive context like a product evaluation portal seems to increase opinion expression. However, much evidence for expressing an opinion in line with the prevailing opinion (e.g., overall rating) exists. In line with our former predictions and the evidence of previous research on expressing deviant opinions less in interactive and non-interactive contexts, we assumed that opinions in line (compared to not in line) with the overall rating are expressed preferentially.

An overall rating may further impact the length of contributed reviews (word count of a review). The existent research investigated the role of review length for helpfulness (Mudambi & Schuff, 2010; Pan & Zhang, 2011; Salehan & Kim, 2016; Schindler & Bickart, 2012; Wang et al., 2019) or product sales (e.g., Chevalier & Mayzlin, 2006; Park et al., 2019) but, to the best of our knowledge, did not examine the influence of a given overall rating on the length of contributed reviews. Hence, it remains unclear whether the contributed reviews differ in their length depending on whether the overall rating is (not) in line with one's own opinion.

However, as contributing a review and how long it is, is both a question of motivation we assumed the same effects for review length as for contributing a review.

Thus, we assumed that the likelihood to express an opinion (contribute a review) is smaller when one's opinion about a product is not in line with the overall rating than when it is in line with the overall rating (i.e., interaction of own opinion and overall rating; H1a). We further predicted that the number of words a review contains is smaller when one's own opinion about a product is not in line with the overall rating (hence, shorter review length) than when it is in line with the overall rating (i.e., interaction of own opinion and overall rating; H1b).

### **Overview of the Current Research**

In two experiments, we investigated whether the contribution of reviews differs depending on one's own opinion and the overall rating presented. The own opinion was mainly assessed to provide participants with the respective materials, but additionally provides insights into whether people would be more likely to express their opinion to warn about bad products (e.g., would express their opinion more in the case of negative overall ratings).

We invited participants to test and rate headsets. They were then informed about the ostensible distribution of opinions (overall rating) in the respective population before the main measures were taken by providing them with the opportunity to contribute a review. We predicted the likelihood to contribute a review (H1a) and the number of words a review contains (H1b) is smaller when the overall rating is not in line with one's own opinion about a product than when the overall rating is in line with it (i.e., an interaction of own opinion and overall rating).

### **Preregistration**

For Experiment 3.1, we originally preregistered a main effect of *faced overall rating* rather than an interaction of own opinion and overall rating, but given that both analyses imply the same comparison of cells, we consistently report the analyses as preregistered in Experiment 3.2 (an interaction of one's own opinion and overall rating).

Due to language intense material, we only included German native speakers in our analyses. We excluded psychology students (as they might be suspicious of our hypothesis and procedure), participants older than 35 years (due to specific characteristics of our local participant pool), and participants with a hearing aid. For Experiment 3.2, we further excluded participants with hearing impairment, red-green weakness, and participants who took part in Experiment 3.1.

For both experiments ideal minimum sample size for a medium effect size ( $f = .20$ ) was determined with G\*power (Erdfelder et al., 2009;  $\alpha = .05$ ;  $(1-\beta) = .80$ ;  $N = 199$ ).

### **Experiment 3.1**

#### **Method**

##### **Design and Participants**

Experiment 3.1 was the first part of a one-hour long laboratory experiment with a 2 (*own opinion*: negative vs. positive, measured) x 2 (*overall rating*: negative vs. positive, manipulated) between-participants design. Own opinion was assessed before participants were randomly assigned to the conditions based on the overall rating. One hundred and ninety-nine participants completed the experiment and were compensated with 8€ (for an hour). Thirteen participants were excluded based on our preregistered criteria (5 Psychology students and 8 non-native speakers). The final sample consisted of  $N = 186$  participants (52 male, 130 female, 1 diverse, and 3 did not indicate their gender; age:  $M = 23.75$  years,  $SD = 3.58$ , range: 18-35).

##### **Procedure and Measures**

Participants received the information that we were looking for new headsets for our laboratory and asked them to test these headsets for us as part of the experiment. First, in order to generate a realistic setting and a plausible overall rating, participants saw an overview of internet reviews for the headsets. Some reviews were very positive, some negative but balanced in valence on average. The reviews provided no additional visual clue (e.g., stars) according to

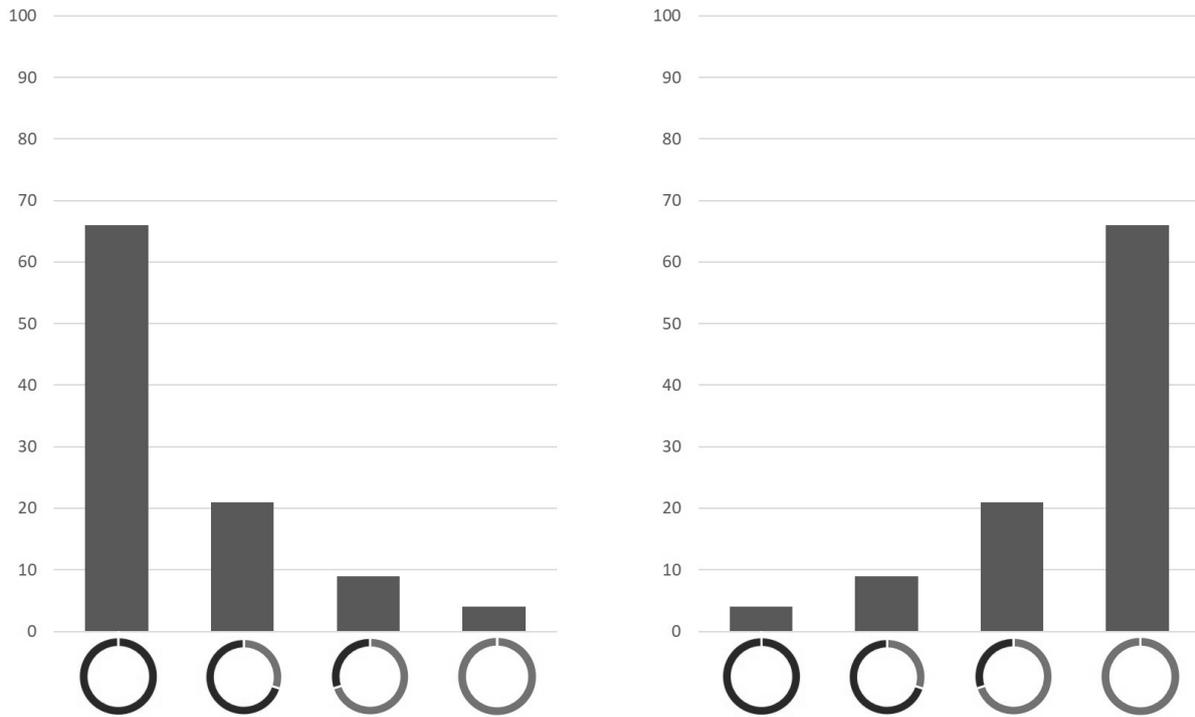
their valance. Afterwards, participants tested the headsets by themselves. To this end, they listened to four different audio files (spoken words, noise, beep tones, and music).

Then, we assessed participants' *own opinions*. Therefore, we asked them to rate the headset on a self-generated four-point scale (1- *very bad* to 4 – *very good*). Participants could choose one of four circles to indicate their own opinion about the product. A completely red circle represented a very negative evaluation of the product, whereas a completely green circle represented a very positive evaluation. We computed a dichotomous variable (*own opinion*) out of the rating. A rating of 1 or 2 was counted as negative own opinion and a rating of 3 or 4 as positive opinion.

Afterwards, participants saw a population rating (*overall rating*) in the form of a distribution chart stating the summary opinion of earlier ratings. The overall rating either indicated that in general, the product was rated very negative (-1: high percentage of given reviews at the red circle) or very positive (1: high percentage of given reviews at the green circle; see Figure 3.1).

**Figure 3.1**

*Population Rating (Overall Rating) in the Form of a Distribution Used in Experiments 3.1 and 3.2. The Left Distribution Indicated a Negative Overall Rating, the Right Distribution a Positive Overall Rating*



*Note.* Colour legend: dark grey = proportion of red, light grey = proportion of green; "very bad" circle was completely red, a "very good" circle completely green

An open text field followed this with the opportunity to contribute a review by themselves with the instruction: "Is there anything else you want to tell us about the headset?". An open text field provides a high external validity as people can express their actual opinion the same way as they would do it on real evaluation portals. We measured the *likelihood* to contribute (0 – no review written to 1- review written) as well as the length of the reviews (*word count*). Participants were debriefed after the full laboratory session and received their compensation. For correlations and an overview of complete measures for this and the following experiment, see Appendix C.1.

## Results

### Test of Hypotheses

We tested our prediction that the *likelihood* to contribute a review is smaller when one's own opinion about a product is not in line (compared to is in line) with the overall rating, by carrying out a logistic regression on likelihood of *own opinion* (negative: -1, positive: 1) and *overall rating* (negative: -1, positive: 1), as well as their interaction. Neither overall rating  $B = -0.05$ ,  $SE = 0.15$ ,  $z = -0.29$ ,  $p = .769$ , 95%-CI = [-0.348; 0.258], nor own opinion  $B = -0.04$ ,  $SE = 0.15$ ,  $z = -0.26$ ,  $p = .797$ , 95%-CI = [-0.344; 0.262] led to a smaller likelihood. Contradicting our hypothesis, the interaction of own opinion and overall rating did not emerge  $B = -0.21$ ,  $SE = 0.15$ ,  $z = -1.35$ ,  $p = .177$ , 95%-CI = [-0.513; 0.093].

Further, we predicted that the number of words a review contains is smaller when one's own opinion is not in line (compared to is in line) with the overall rating. To test this prediction, we log transformed *word count* to correct for skewed distribution and conducted a linear regression with the same predictors as above, and *word count* as criterion. Analyses revealed no main effect of overall rating,  $B = 0.02$ ,  $SE = 0.08$ ,  $t(94) = 0.21$ ,  $p = .831$ , 95%-CI [-0.147; 0.183], no main effect of own opinion,  $B = -0.02$ ,  $SE = 0.08$ ,  $t(94) = -0.19$ ,  $p = .849$ , 95%-CI [-0.181; 0.149], nor a significant interaction of both predictors,  $B = -0.04$ ,  $SE = 0.08$ ,  $t(94) = -0.42$ ,  $p = .672$ , 95%-CI [-0.200; 0.130]. For descriptive statistics for Experiment 3.1 and 3.2 see Table 3.1.

**Table 3.1**

*Means and Standard Deviations for Written Reviews and Word Count Across Experiment 3.1 and 3.2*

Overall rating	Negative		Positive	
Own opinion	Negative	Positive	Negative	Positive
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Experiment 3.1				
Review	0.50 (0.51)	0.58 (0.50)	0.58 (0.50)	0.46 (0.50)
Word count	19.30 (14.30)	18.40 (0.51)	21.30 (14.20)	20.05 (15.20)
Experiment 3.2				
Review	0.68 (0.48)	0.76 (0.43)	0.70 (0.47)	0.86 (0.35)
Word count	25.80 (17.90)	29.40 (20.50)	28.10 (12.10)	30.30 (12.20)

## Discussion

Experiment 3.1 did not provide evidence for our hypothesis that the likelihood to contribute a review and the length of a review (word count) are both lower when one's own opinion is not in line with the overall rating (e.g., own opinion is positive and overall rating is negative) about a product compared to in line (e.g., own and overall rating are positive). One constraint could have been our experimental manipulation. As our review selection at the beginning was balanced in valance, the impression might evoke that the product was rated neutral rather than positive or negative on average. In other words, our initial presentation of a balanced review selection in their valances might have denounced the perception of the presented overall rating. Further, we presented the overall rating on one page without ensuring that participants may have continued without taking the overall rating into account (just clicking through the experiment). To address both potential limitations of Experiment 3.1, we conducted a conceptual replication in which we made the overall rating more salient.

## Experiment 3.2

### Method

#### Design and Participants

Experiment 3.2 closely replicated Experiment 3.1. Therefore, only differences in the methods are described here. One hundred and ninety-nine undergraduates participated. 25 were excluded based on our preregistered exclusion criteria (5 Psychology students, 14 not native speakers, 5 hearing impairment, and 1 with red-green weakness). The final sample size consisted of  $N = 174$  participants (48 male, 117 female, 3 diverse, and 6 did not indicate their gender, age:  $M = 23.09$  years,  $SD = 3.07$ , range: 18-34).

#### Procedure and Measures

Different than in Experiment 3.1, participants did not see an overview of reviews before testing the headset by themselves. Instead, reviews were presented after the overall rating. Further, these reviews were not balanced in valence but rather corresponded to the underlying overall rating (e.g., in case of a negative overall rating, more negative reviews were displayed). Nine reviews were presented with a visual cue and a header to indicate straight away whether it is positive or negative in valence. The reviews themselves were only revealed one after the other with a delay of 4000 ms to increase the likelihood that participants start with reading.

### Results

#### Test of Hypotheses

As in Experiment 3.1 we predicted that the likelihood to contribute a review is smaller when one's own opinion about a product is not in line (compared to is in line) with the overall rating. To test this, we carried out a logistic regression on *likelihood of own opinion* (negative: -1, positive: 1) and *overall rating* (negative: -1, positive: 1), as well as their interaction. No main effect of overall rating,  $B = 0.179$ ,  $SE = 0.19$ ,  $z = 0.95$ ,  $p = .340$ , 95%-CI = [-0.188; 0.552], and only a marginal effect of own opinion emerged,  $B = 0.36$ ,  $SE = 0.19$ ,  $z = 1.94$ ,  $p = .053$ , 95%-CI = [-0.006; 0.734], suggesting that a positive own opinion about the product is linked to

a slightly higher likelihood to contribute a review. However, the predicted interaction was again not significant,  $B = 0.15$ ,  $SE = 0.19$ ,  $z = 0.82$ ,  $p = .414$ , 95%-CI = [-0.213; 0.526].

Further, to test whether the number of words a review contain is smaller when one's own opinion is not in line (compared to is in line) with the overall rating, we conducted a linear regression on *word count* with the same predictors as before. A marginal main effect of overall rating emerged,  $B = 0.12$ ,  $SE = 0.06$ ,  $t(130) = 1.85$ ,  $p = .066$ , 95%-CI [-0.008; 0.241], pointing out that people contribute slightly longer reviews when facing a positive overall rating. There was neither a main effect own opinion,  $B = 0.04$ ,  $SE = 0.06$ ,  $t(130) = 0.70$ ,  $p = .484$ , 95%-CI [-0.080; 0.169], nor a significant interaction of both predictors,  $B = -0.01$ ,  $SE = 0.06$ ,  $t(130) = -0.23$ ,  $p = .815$ , 95%-CI [-0.139; 0.110].

## Discussion

As in Experiment 3.1, we did not find group differences regarding the likelihood of contributing a review or review length. Thus, even with a stronger manipulation of the overall rating participants did not differ in their likelihood to contribute a review. Results indicate that people who rated the headset positive tended to contribute more reviews. Further, a positive overall rating was tendentially associated with longer reviews. However, those findings did not emerge significantly and were only found in one of the two experiments. Therefore, we consider them not substantiated. As both experiments did not reveal significant results but had an identical experimental design and dependent variables, we carried out an internal meta-analysis on aggregated effects. Thereby, we gain a comprehensive overview of the effects and an understanding of the robustness of the (null) results and get an insight into how to proceed in the future.

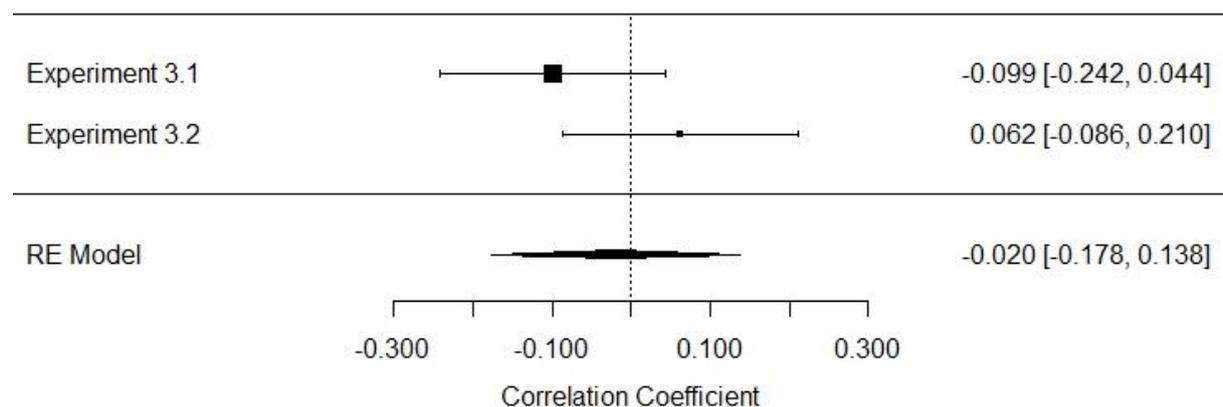
### Meta-Analysis Across two Experiments

In two internal meta-analyses, we sought to test our predictions that the likelihood to contribute a review (H1a) and the number of words a review contains (H1b) are smaller when one's *own opinion* about a product is not in line (compared to is in line) with the *overall rating*. Using

meta-analyses on aggregated effects to test effects across experiments, we first converted effect sizes from both experiments to Pearson's effect size  $r$ . Second, by using the R package "metafor" (Viechtbauer, 2010) we calculated the correlation coefficient  $r$ , "which is used to measure the strength of the (linear) relationship between two quantitative Variables". We did not find meta-analytical evidence for our predicted interaction across both experiments. Neither for *likelihood* to contribute reviews,  $r = .02$ ,  $SE = 0.08$ ,  $p = .805$ , 95%-CI [-0.178; 0.138] (see Figure 3.2), nor for *word count*,  $r = .03$ ,  $SE = 0.05$ ,  $p = .538$ , 95%-CI [-0.071; 0.136] (see Figure 3.3). Thus, the interplay of opinion and the overall rating did not lead to fewer or shorter reviews across both experiments. It further should be highlighted that the aggregated effect size is small. Thus, it is very unlikely that the lack of effects found here can be attributed to the statistical power of the reported studies.

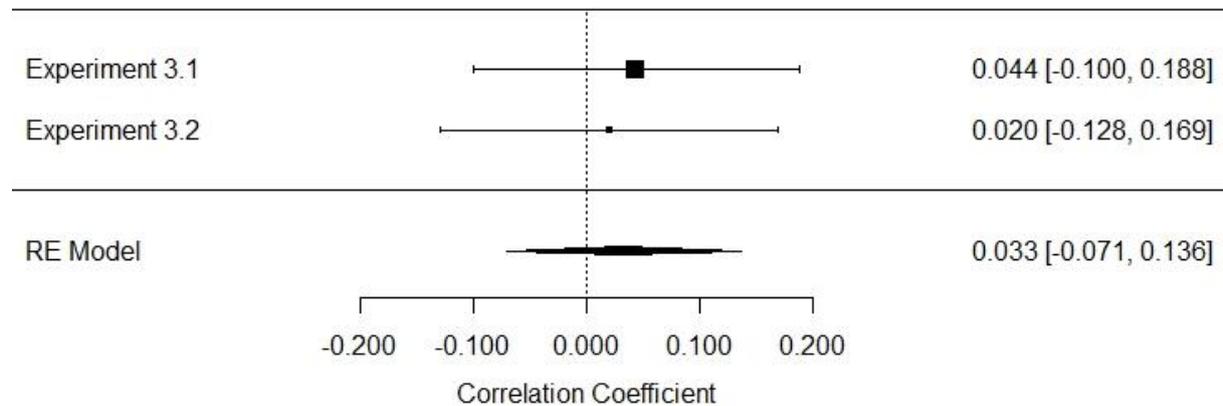
### Figure 3.2

*Correlation Coefficient and 95% CIs From an Internal Meta-Analysis Across Experiment 3.1 and 3.2 for Likelihood to Contribute*



**Figure 3.3**

*Correlation Coefficient and 95% CIs From an Internal Meta-Analysis Across Experiment 3.1 and 3.2 for Word Count*



### General Discussion

The current research investigated whether opinion expression in the form of contributing reviews and their length differ depending on whether one's own opinion is in line (compared to is not in line) with the presented summary statistic of reviews (overall rating). The results suggest that this is not the case – at least in laboratory contexts.

Research has shown that with increasing anonymity, people are more likely to share their opinion independent of the majority opinion (in our case, the overall rating; Ho & McLeod, 2008; Wu & Atkin, 2018), and less fear should be perceived (W. G. Yun & Park, 2011). A high anonymity was given in our context. Since we informed participants beforehand that the data cannot be assigned to them afterwards and they worked on the tasks alone in a cubical, the anonymity of participants was extremely high. Besides, we asked participants to share their opinion beforehand. This might also have reduced fear to contribute, especially among those who held an opinion not in line with the overall rating. As a result, people who held opinions not in line and those in line with the overall rating might have contributed equally.

Hennig-Thurau and colleagues (2004) further found that consumers differ in their motives and divided consumers into different segments. One segment can be referred to as “true

altruists”, including people who are strongly motivated in helping others as well as the company. Expressing an opinion by contributing a review in our setting would be not only helpful to us (to make a good investment for the laboratory) but also to other participants who would use the headsets in future studies. If participants were interested in helping us and others, it could explain why no significant differences occurred between the groups as all participants wanted to express their opinion to help.

Another reason why people contributed as much when the overall rating was not in line as when the overall rating was in line with their opinion could be that the context chosen was different from those in evaluation portals. Participants did not purchase the headset themselves but were asked whether to test it and rate whether it is better compared to existing headsets. Hence, the motivation to contribute a review might be different. On an evaluation portal, people contribute due to social benefit (Cheung & Lee, 2012; Hennig-Thurau et al., 2004) and the desire to alter reputation (Cheung & Lee, 2012). When contributing in a laboratory context, people cannot be viewed as an expert by a large group because the reach is very small, and (if at all) only a few will read the reviews. Further, the need for belonging might not be as important in a laboratory context as no backlash from others might be expected.

All in all, our experiments provide a first insight that an opinion in line compared to not in line with a given overall rating seems not to influence the contribution of reviews and their respective length. However, so far, it remains unclear whether there is no impact on review contribution and length at all or whether the laboratory context and different underlying motives might play a role. Hu et al. (2009) already found in their laboratory studies that results seem to differ from those in real life in a laboratory context when it comes to contributing reviews. It is therefore important to observe whether in the field (e.g., on actual product evaluation portals), the overall rating impacts contributing reviews. As a next step, we, therefore, tracked products on product evaluation portals in a correlational field experiment to see whether people contribute reviews (express their opinion) in line vs. not in line with the overall rating.

The following Chapter IIIb contains a Research Spotlight that results from a cooperation between Birka Zapf (first author), Prof. Dr. Mandy Hütter (second author), and Prof. Dr. Kai Sassenberg (third author). The manuscript entitled “Are minority opinions shared less? A conceptual replication using web-based reviews” is currently re-submitted to the *Zeitschrift für Psychologie*. The contribution of the Ph.D. candidate (and of the co-authors, respectively) to the manuscript can be found in the following table.

Author	Author position	Scientific ideas %	Data generation %	Analysis & interpretation %	Paper writing
Birka Zapf	1	50	100	45	45
Mandy Hütter	2	20	0	10	10
Kai Sassenberg	3	30	0	45	45
Title of Research Spotlight		Are minority opinions shared less? A conceptual replication using web-based reviews			
Status in publication process		unpublished manuscript (re-submission to the <i>Zeitschrift für Psychologie</i> )			

### Chapter IIIb – Opinion Sharing on the web<sup>16</sup>

Product evaluations on the web provide an excellent opportunity to observe the sharing of opinions in a natural setting. Given that online shopping limits the opportunities for direct experience with an item before buying it, consumers often rely on others’ ratings and reviews (Lange, 2020). Most platforms collect ratings and reviews and provide summary statistics of past ratings. According to laboratory and interview research, opinions that disagree with the dominant opinion are less likely to be shared than those in line with it (e.g., Asch, 1956; Noelle-Neumann, 2001). Sharing these opinions is, however, particularly important, because they add information that make visible the wisdom of the crowd (Surowiecki, 2004). They are the basis

<sup>16</sup> Together with Kai Sassenberg and Mandy Hütter, Chapter IIIb has been submitted as a manuscript entitled "Are minority opinions shared less? A conceptual replication using web-based reviews" to the *Zeitschrift für Psychologie* for publication.

for social change and progress, and, most important in the current context, they influence consumer decisions.

If similar effects hold for product evaluations on the web, people who hold an opinion in line with the mean rating (majority opinion) should be more likely to contribute ratings or reviews than people who hold a minority opinion (i.e., people who lean towards the opposite pole of the evaluation dimension). Thus, the mean new rating should be more extreme than the mean initial rating. Therefore, based on data from product evaluation portals, we tested whether opinions not in line with the central tendency are also shared less on product evaluation portals. Thereby, we do not only contribute to the understanding of the dynamics of contributions to product evaluation portals but also present an example of how hypotheses about opinion sharing can be tested on the web.

### **Minority Opinions are Shared Less Than Majority Opinions**

In line with the approach often taken in survey research, we define *majority opinion* as the half of a rating scale (i.e., pro or anti) that receives more agreement (Bassili, 2003). The more the mean voiced attitude differs from the midpoint of the scale, the larger the majority in the respective sample. Research across different paradigms found that minority opinions are less likely to be shared than majority opinions. Using a scenario approach, Noelle-Neumann (2001), for instance, found that people are less willing to state their opinion publicly the more they assume that they hold a minority opinion. Similarly, Bassili (2003) found that minority opinions are expressed more slowly than majority opinions and that this effect was larger the larger the majority was. Likewise, research on group polarization has shown that after (compared to before) hearing others' attitudes, people state opinions that lean more toward the pole of the attitude dimension that is closer to the mean of the others' attitudes (e.g., more positive on a continuum, if the average attitude is positive; e.g., Turner et al., 1989). Finally, similar effects had been documented even earlier for categorical judgements. In Asch's (1956) classical studies, participants did not share their solution to line length comparison tasks when

they were confronted with a group of people who stated a solution that was obviously wrong (for similar effects in information sharing in groups, see Stasser and Titus, 2003).

In sum, there is pervasive evidence indicating that people are more likely to share majority compared to minority opinions. There is also evidence that such effects occur online. People are for instance more likely to express opinions on Facebook when they are in line with the majority opinion (Liu et al., 2017), and evidence for group polarization has also been found under conditions of mutual anonymity in computer-mediated communication—and to a stronger extent when the initial attitude indicated a clear majority (called norm in this literature Sassenberg & Boos, 2003; Spears et al., 1990).

Given that the preferred sharing of majority opinions has been shown in offline and online contexts and product evaluation portals provide users with a mean rating for each product (i.e., a clear indication of the majority opinion) as well as with the opportunity for contributing anonymously or using a pseudonym, it seems likely that the effect also generalizes to product evaluation portals. To be more precise, people should be more likely to add ratings in line with the majority than ratings in line with the minority. The preferred sharing of majority compared to minority opinions should lead to newly contributed ratings that indicate a growing majority, that is, a more positive mean of the added ratings in case of a positive mean of the initial rating, and more negative mean of the added ratings in case of a negative mean of the initial rating displayed in a product evaluation portal at a given point in time. Importantly, we assume that this polarization can be the result of the preferential sharing of majority opinions. Specifically, if primarily those people add ratings who share the opinion of the majority, their ratings should shift the distribution toward the pole of the attitude dimension that represents the majority opinion in the initial distribution.

Given the pervasive evidence that majority opinions are shared more than minority opinions, we predict that the higher (lower) the mean initial rating of a product, the more positive (negative) will the newly contributed ratings differ from this baseline. In statistical

terms, this implies that a positive difference between the mean initial rating and the mean of the added ratings should be predicted by the mean initial rating. This prediction will naturally not hold for extreme cases with initial means at the poles of the attitude dimension. However, based on the summarized research it should hold on average across initial means along the attitude dimension.

It should be noted that this prediction is based on the assumption that the ratings on a product evaluation portal are seen as values on a continuous scale. This is indeed suggested by the mean rating communicated prominently on these portals. However, often the distribution of ratings (i.e., the relative or absolute frequency for each scale point) is just one click away from the mean rating. One could thus argue that the single rating (e.g., 4 stars), which most users opted for, can also be considered a majority rating. Given, however, that the discrete ratings are meaningless without considering the whole range of options – a 4-star rating only gains its meaning from the fact that ratings from 1 to 5 stars are possible and that more stars are better – we assume that the displayed mean rating is perceived as the majority opinion. This approach is in line with the approach often taken in survey research (Bassili, 2003; Noelle-Neumann, 2001).

### Study 3.3

#### Method

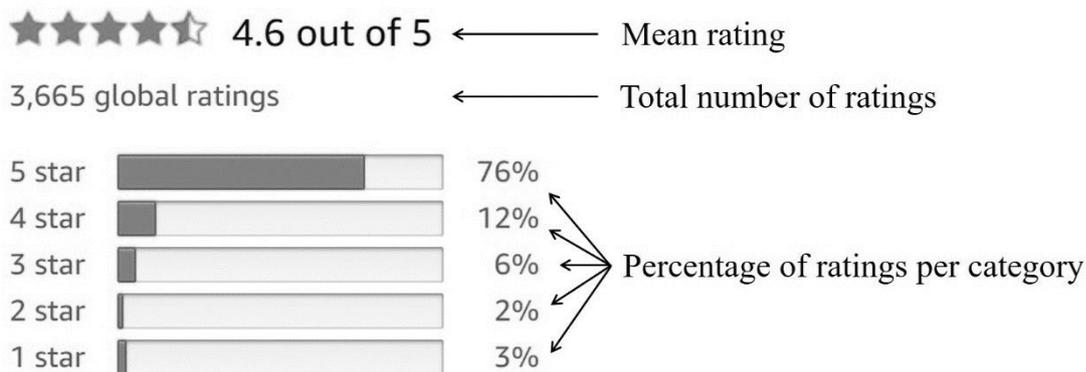
We tracked 87 products (e.g., toys, household items, sports equipment) on Amazon.de twice a week at 12 occasions ( $t_0$ - $t_{11}$ ). Diverse products were selected covering a wide range of mean ratings ( $M = 3.59$ ,  $SD = 1.12$ , *range* 1.1 to 5.0 stars) and number of initial reviews ( $M = 562.17$ ,  $SD = 907.52$ , *range* 2 to 5173 ratings) at  $t_0$ . For details about the sampling procedure see the Online Supplement ([https://\[to be added\]](https://[to be added])). During the tracking period, two products were removed from Amazon.de and 9 products did not receive additional ratings. The analyses below regard the remaining 76 products. Data and code are available under the following URL: [https://\[to be added\]](https://[to be added]).

Prior to data collection, we conducted a pilot study in which we developed a standardized tracking procedure. Data from each product was collected twice a week at a fixed time of the day (Monday & Friday, 8 pm) for 6 weeks (at 12 occasions). At each of these points in time ( $t_0$ - $t_{11}$ ), we recorded the *mean rating* of the product, the *total number of ratings*, and the *percentage of ratings* for each of the five categories. We needed to record all of this information rather than just the number of reviews and the mean rating, because according to *Amazon.de*<sup>17</sup> the mean rating is based on a weighted mean and hence does not allow to compute the number of new items at each point in time (for an illustration of the collected data see Figure 3.4).

**Figure 3.4**

*Illustration of Measures Assessed in Product Tracking*

## Customer reviews



Based on the collected data, we calculated the mean of the newly *added ratings* from  $t_k$  to  $t_{k+l}$  for the measurement points  $k = 0 \dots 10$  and the lags  $l = 1 \dots 10$ .  $l = 11$  was not considered because of the low number of observations included in this analysis. To be more precise, we computed the frequency of reviews for each category at  $k$  and  $k+l$  by multiplying the proportion of entries in the category with the total number of entries. The number of new reviews for each

<sup>17</sup> Amazon.de states "To calculate the overall star rating and percentage breakdown by star, we don't use a simple average. Instead, our system considers things like how recent a review is and if the reviewer bought the item on Amazon. It also analyses reviews to verify trustworthiness".

category was then computed by subtracting the number at  $k$  from the number at  $k+l$ . Based on the five resulting scores (1-5 stars), we computed the mean of the added ratings. See Figure 3.5 for an illustration of this calculation.

**Figure 3.5**

*Fictitious Example for the Calculation of Mean of Added Ratings. Numbers Collected From Amazon.de in Italics, Calculation*

	$t_k$		$t_{k+1}$		$t_k - t_{k+1}$		
Number of ratings (n)	<i>200</i>		<i>250</i>				
	Percentage of rating per category	* n /100	Respective number of ratings	Percentage of rating per category	* n /100	Respective number of ratings	
5 stars	<i>50</i>	→	100	<i>54</i>	→	135	35
4 stars	<i>20</i>	→	40	<i>20</i>	→	50	10
3 stars	<i>10</i>	→	20	<i>10</i>	→	25	5
2 stars	<i>10</i>	→	20	<i>8</i>	→	20	0
1 star	<i>10</i>	→	20	<i>8</i>	→	20	0
						} mean	
Mean of added ratings						4.6	

Given that users and Amazon.de can remove ratings, the *added ratings* scores entail this noise and sometimes indicate a decrease in the number of ratings between tracking points. The relatively high frequency (twice a week) with which we collected the data allows to correct for this to some extent. Negative values were replaced by 0 given that we had no evidence that ratings had been added. On average  $M = 10$  ( $SD = 28$ , range 0 - 407) ratings were added per product between two subsequent measurement points. More positive scores for the *added ratings* ( $M = 3.79$ ,  $SD = 0.95$ , range 1 - 5) indicate more positive ratings.

The main dependent variable *biased sharing* ( $M = -0.03$ ,  $SD = 0.81$ , range -3.24 - 3.05) was computed by subtracting the mean initial rating at  $t_k$  from the added ratings score between

$t_k$  and  $t_{k+l}$  with  $k = 0 \dots 10$  and  $l = 1 \dots 10$ . To support our hypothesis that people holding a majority opinion are more likely to contribute, the mean added ratings need to be more extreme than the mean initial rating.

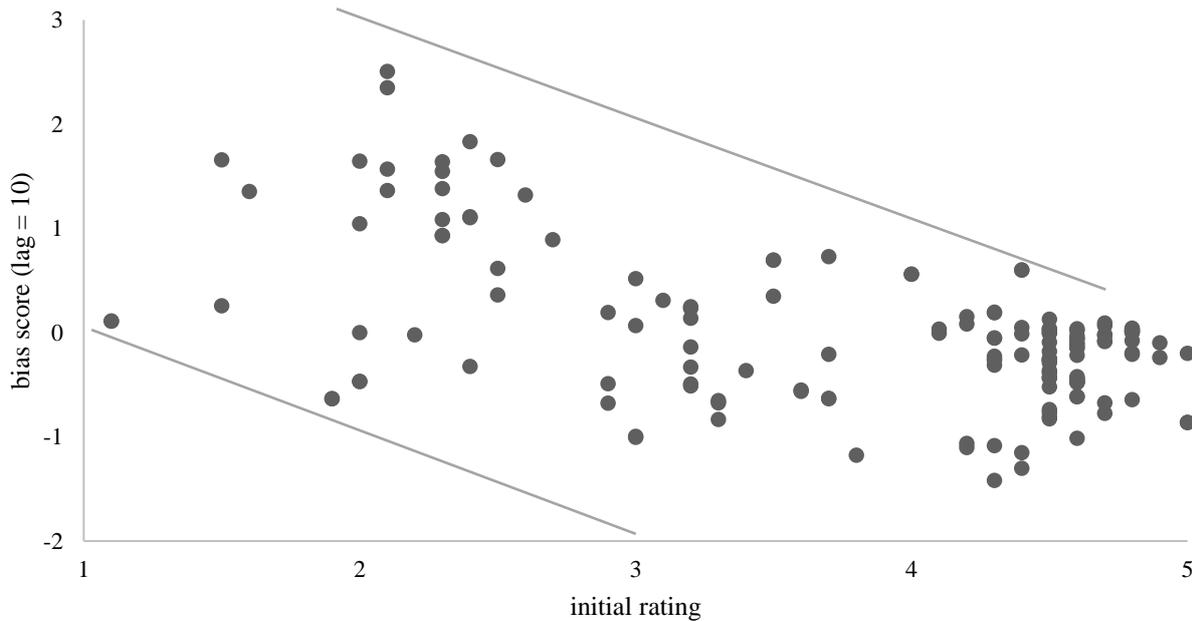
We tested our hypothesis by regressing the *biased sharing* at  $t_{k+l}$  scores on the initial mean rating scores at  $t_k$ . In line with the recommendation of McNeish et al. (2017), we conducted these regressions for clustered data (by product) using type complex in Mplus (Muthén & Muthén, 2017). In addition, we also regressed the *added ratings* scores at  $t_{k+l}$  on the initial mean ratings at  $t_k$  to test the assumption that the initial mean ratings predict the mean of the added ratings (i.e., added and initial ratings are similar and the respective product and its evaluation has not substantially changed). Given that we conducted ten tests for each of the two dependent variables, we adjusted the critical  $\alpha$ -error from .05 to .005.

## Results

We hypothesized that the initial mean ratings correlate positively with the bias scores. Contrary to this prediction, we obtained negative correlations for all time lags with standardized regression weights ranging from -0.53 to -0.31 (see Table 3.2, left panel). Higher initial mean ratings predicted *lower* positive deviations from these ratings. Participants did not add more ratings in the direction of the initial mean rating but fewer. Descriptively these effects became stronger across longer time intervals (based on 95% CIs but not 99.5% CIs). Figure 3.6 illustrates this trend: the biased sharing scores are generally larger than 0 for products with an initial rating  $< 3$  and lower than 0 for products with an initial rating  $> 3$  (72% for lag 10), indicating the sharing of more positive opinions for initially negatively evaluated products and of more negative ratings compared to the initially positively rated products (in both cases compared to the initial mean rating). In sum, our hypothesis that majority opinions are shared more than minority opinions is not supported by these data.

**Figure 3.6**

*Bias Scores From Ratings Added Within 5 Weeks (lag = 10) by Initial Rating (N = 149). The Diagonal Lines Above and Below the Data Points Mark the Highest and Lowest Possible Value Respectively*



Given that the results did not confirm our prediction derived from earlier research, we aimed to rule out that the current findings result from specific distributions of the initial mean rating. First and foremost, for bimodal distributions our assumption that the *mean* rating at the beginning of the interval is perceived (and functions) as the majority opinion may not be valid, given that the mean is not necessarily occupied by a high relative frequency of cases. Therefore, we reran the analyses for biased sharing, *excluding* 24 products with a bimodal distribution of ratings at  $t_0$ . Less negative correlations between initial mean ratings and biased sharing scores would suggest that our results might be driven by specific distributions. However, if anything, the opposite was the case: the standardized correlations between initial mean ratings and biased sharing ranged from -0.36 at a lag of half a week ( $l = 1$ ) to -0.61 for a lag of 5 weeks ( $l = 10$ ) and was, thus, descriptively even more negative than for the full sample (for details see Table 3.3). We obtained similar results when using the median rather than the mean as a predictor. In

sum, these additional analyses suggest that results (and the non-replication of earlier findings in the current context) do not result from the specific analysis strategy.

In addition, we assumed that more positive initial mean ratings are related to more positive added ratings, given that the initial and the added ratings represent the same population. In line with this assumption, the correlation between the initial mean rating and the mean of the newly added ratings was positive for all time lags ( $l = 1 \dots 10$ ; see Table 3.2, right panel). The standardized regression weights ranged between 0.57 and 0.72, showing that the higher the mean rating at the beginning of an interval, the more positive were the later contributed reviews. In other words, earlier ratings positively predict later ratings. In addition, the correlation tended to become stronger across longer time intervals (0.57 across half a week and 0.72 at lag 10, after 5 weeks). Based on 99.5% CIs none of these differences between time intervals were statistically meaningful but based on 95% CIs the correlation between initial rating and added ratings added after half a week ( $l = 1$ ) is smaller than after 2 weeks ( $l = 4$ ); similarly, the correlation across one week ( $l = 2$ ) is smaller than the one across 5 weeks ( $l = 10$ ). Overall, the added ratings match the initial ratings reasonably well (and more so for longer time intervals), which implies that the attitudes towards the products or the products themselves have not changed dramatically during the study.

**Table 3.2**

*Results From Regressions of Biased Sharing (Left Panel) and Mean Added Ratings (Right Panel) on Initial Mean Rating at the Beginning of Interval for Lags of  $l = 1 \dots 10$  Measurement Points (0.5-5 Weeks). Bs are Standardized Regression Weights*

Lag (N)	Biased sharing				Added ratings			
	B (SE)	Z	p	95%-CI	B (SE)	Z	p	95%-CI
1 (597)	-0.31 (0.05)	-6.74	<.001	[-0.398; -0.218]	0.57 (0.05)	11.22	<.001	[0.470; 0.668]
2 (625)	-0.35 (0.05)	-6.55	<.001	[-0.451; -0.243]	0.61 (0.05)	11.82	<.001	[0.512; 0.715]
3 (599)	-0.38 (0.06)	-6.49	<.001	[-0.500; -0.268]	0.63 (0.06)	11.39	<.001	[0.523; 0.740]
4 (553)	-0.42 (0.07)	-6.30	<.001	[-0.547; -0.287]	0.67 (0.06)	11.24	<.001	[0.549; 0.780]
5 (497)	-0.43 (0.07)	-5.86	<.001	[-0.575; -0.287]	0.67 (0.06)	10.81	<.001	[0.551; 0.795]
6 (432)	-0.45 (0.08)	-5.447	<.001	[-0.607; -0.285]	0.68 (0.07)	10.48	<.001	[0.555; 0.810]
7 (365)	-0.46 (0.09)	-5.28	<.001	[-0.631; -0.289]	0.69 (0.07)	10.12	<.001	[0.557; 0.824]
8 (294)	-0.48 (0.09)	-5.33	<.001	[-0.661; -0.305]	0.70 (0.07)	10.39	<.001	[0.571; 0.837]
9 (222)	-0.51 (0.09)	-5.70	<.001	[-0.689; -0.336]	0.71 (0.07)	10.76	<.001	[0.581; 0.840]
10 (149)	-0.53 (0.09)	-5.82	<.001	[-0.708; -0.351]	0.72 (0.07)	11.22	<.001	[0.598; 0.851]

**Table 3.3**

*Regression of Biased Sharing on Initial Mean Rating for Products Excluding Those With a Bimodal Distribution of Ratings at  $t_0$*

Biased sharing				
Lag ( $N$ )	$B$ ( $SE$ )	$Z$	$p$	95%- $CI$
1 (472)	-0.36 (0.06)	-6.35	<.001	[-0.475; -0.251]
2 (476)	-0.44 (0.07)	-6.40	<.001	[-0.573; -0.305]
3 (452)	-0.48 (0.08)	-6.13	<.001	[-0.633; -0.326]
4 (418)	-0.50 (0.09)	-5.67	<.001	[-0.672; -0.327]
5 (375)	-0.51 (0.10)	-5.24	<.001	[-0.700; -0.319]
6 (326)	-0.53 (0.11)	-4.99	<.001	[-0.735; -0.320]
7 (276)	-0.54 (0.11)	-4.86	<.001	[-0.758; -0.322]
8 (222)	-0.56 (0.12)	-4.84	<.001	[-0.791; -0.335]
9 (167)	-0.59 (0.12)	-5.03	<.001	[-0.815; -0.358]
10 (112)	-0.61 (0.12)	-5.25	<.001	[-0.836; -0.381]

## Discussion

We aimed to replicate the established finding that minority opinions are shared less than majority opinions using web-based data from an online shopping portal. The results did not support this hypothesis. Newly added reviews did not indicate a larger majority than the initial rating, but the opposite was the case. This finding can be interpreted either as regression to the mean (i.e., *random* extreme mean ratings are followed by *valid* less extreme added ratings) or as an intentional sharing of minority opinions. It adds to existing work demonstrating general negativity biases in the sharing of online reviews (Godes & Silva, 2012) and towards adding less positive ratings for popular products (Le Mens et al., 2018). Minority opinions are more useful as they add more information than reiterations of the majority opinion (Surowiecki, 2004). This might motivate users of product evaluation portals to share opinions deviating from the mean rating in particular. Furthermore, the authors of many ratings are given online are not identifiable. Given previous research suggests that low (own) identifiability reduces conformity to majority influence (e.g., Wu & Atkin, 2018), whereas the anonymity of others increases majority influence (for a detailed discussion see Sassenberg & Jonas, 2007), low own identifiability in an online context might contribute to the current finding. Alternatively, the current findings might differ from research on sharing majority and minority opinions in that it often dealt with categorical opinions (e.g., decisions between discrete alternatives or opinions favoring one alternative over another in the political realm). In our analysis, we treated the product ratings as a continuous dimension and analyzed the data accordingly. However, given that survey research and the group polarization literature also dealt with attitude dimensions and found more sharing of majority than of minority opinions, we do not believe that this is the crucial factor. But ultimately, this and all other interpretations are highly speculative and should thus be tested in future research. In addition, given that the current study relied on a limited number of products and a single online shopping portal, the generalization of the present results is open to question, and replications are highly desirable.

Interestingly, Vinson et al. (2019) obtained similar effects when studying individuals' rating trajectories. In their data, individuals' own ratings correlated negatively with subsequent ratings they gave, just as in our case the ratings a product received in the past correlated negatively with subsequent ratings. This validates the general idea that new ratings are likely to be less extreme than existing ratings for the same target on product evaluation portals, be it within individuals or in a collective setting.

This study illustrates how web data can be used to conceptually replicate well-established findings from experimental or lab research on opinion sharing in a naturalistic setting. Product evaluation portals and other social media collect and publicly document opinions on a large scale. This information can be tracked manually or automatically by crawling product evaluation portals with suitable scripts to assess newly added ratings (as in the current case) or archival data (Vinson et al., 2019). Thereby, large amounts of data can be anonymously collected (in line with common ethical guidelines) that resemble people's natural behavior and, thus, allow for the externally valid testing of psychological hypotheses.

Web-based data of this type come with challenges that should be considered when interpreting the current and similar findings. Companies at times pay people to contribute positive information about them (or even negative information about others) to product evaluation portals (Luca & Zervas, 2016). This can lead to biased reviews and contribute error variance to studies like the current one—a factor that can barely be controlled for in data collection, but platforms try to address it, for instance, by only accepting ratings and review from verified customers.

Further, some ratings and reviews are computer-generated or removed by the platform host, which also contributes error variance. By tracking ratings at a high frequency, we were able to identify the deletion of ratings (to some extent) and reduce its impact on the results. Some platforms claim to remove fake ratings and reviews (He et al., 2020). Whether or not they succeed to do so is hard to judge, but when tracking the ratings or reviews over a longer period

of time, faked ratings and reviews should mostly add error variance, and the findings should become more reliable the longer the considered time period is. This stresses the importance of multiple measurements and the consideration of various time intervals when collecting and analyzing web-based data. Shorter intervals help to detect irregularities such as deleted ratings in our case, and longer intervals lead to more stable effects. Depending on the research topic, the time or the number of interactions with a web-platform might be the crucial factor (cf. Godes & Silva, 2012).

Especially in the context of product evaluations, most ratings are positive. Although we tried to find negatively rated products (less than two stars), still many of the tracked products were rated positively (J-shaped distribution; Hu et al., 2009). Future research should put an even stronger emphasis on the even or normal distribution of the products regarding the initial rating.

To conclude, web-based data provide a good opportunity to replicate well-known effects from social influence research in a naturalistic setting. In the present research, we did not find evidence for the prediction that minority opinions are shared less frequently than majority opinions, although this effect has been demonstrated across various paradigms. Rather, online raters tend to add ratings that communicate a diverging evaluation.

## Chapter IV: General Discussion

This dissertation investigates two main concepts of social influence on opinion expression, namely the majority opinion and the faced opinion in a specific situation across different contexts. More specifically, we examined the influence on opinion expression of whether one's opinion is in line with the *majority opinion* in society (e.g., holding a minority vs. majority opinion) and/or whether one's opinion is in line with the *faced opinion* within a situation such as a conversation (e.g., facing an opposing vs. confirming opinion). To this end, interactive (e.g., a setting with potential direct responses from others) and non-interactive (e.g., a setting without potential direct responses from others) contexts are addressed, as well as actual opinion expression assessed. More precisely, a well-established paradigm (train-scenario) of Noelle-Neumann (2001) was used and improved to receive a deeper understanding of the impact of the majority and faced opinion on expressing opinions (Chapter II). To gain insights on actual opinion expression and to increase external validity, opinion expression was assessed within product evaluation portals (Chapter III). In the following, I will carefully scrutinize these two empirical contributions and draw an overall conclusion.

In *Chapter II*, we investigated whether majority and faced opinion jointly influence participants' opinion expression (e.g., an interaction of both aspects). For this purpose, we experimentally manipulated the faced opinion in five experiments and used the train paradigm of Noelle-Neumann (2001) for assessing the likelihood of opinion expression in the experiments. We further improved this paradigm by providing the opportunity of several responses. More specifically, in the first three experiments (Chapter IIa), we implemented a 2 (majority opinion: majority vs. minority) x 2 (faced opinion: confirming vs. opposing) design. In these, participants should imagine facing someone in a train either holding an opposing (confirming) majority (minority) opinion. Based on earlier research, we expected a smaller likelihood to express an opinion when holding a minority opinion and facing an opposing opinion (compared to confirming opinion) and that this difference is mediated by fear of

backlash from others. No empirical support for our assumptions was found across the experiments. Moreover, contrary to the proposed literature of the SOS (Glynn et al., 1997; Matthes et al., 2018; Noelle-Neumann, 2001), no empirical support for an effect of majority opinion on opinion expression was found. But results indicate that people are less likely to express their opinion when facing an opposing (vs. confirming) stance, which is in line with literature on information sharing in groups (Asch, 1956; Lu et al., 2012; Wittenbaum & Bowman, 2005). Further, we found evidence that opinion expression is mediated by fear of confrontation (e.g., high fear of a confrontation decreases opinion expression). In the following two experiments of Chapter IIb (based on the results of the preceding experiments), participants faced a group of people (and thus, a majority) holding an opposing (vs. confirming) opinion. Our assumption that people express themselves less when facing an opposing (compared to confirming) opinion was not confirmed. And also, no mediation via fear of social isolation. Hence, across Chapters IIa and IIb, a mediation via fear of confrontation rather than fear of social isolation was found, which is in line with existing literature (Neubaum & Krämer, 2018). Further, across the five experiments we found the meaningful opposite effect namely that people are even more likely to express their opinion when facing an opposing (compared to confirming) opinion. To sum up, in line with meta-analyses of the corresponding literature, faced opinion seems to influence opinion expression to a greater extent than the majority opinion. Or more precisely, it seems to be less important whether one is in the societal majority or minority, but more important whether one is faced with an opposing or confirming opinion in the current situation.

The studies in *Chapter III* did not differentiate between the two aspects (faced and majority opinion) as those aspects often coincide in real life. Instead, we examined whether opinions that are generally not in line with a prevailing opinion (e.g., an overall rating on evaluation portals) are expressed less. Therefore, I set my focus on actual opinion expression in a non-interactive context such as a product evaluation portal and thus, increased external

validity. More precisely, participants tested a product and could contribute a customer review to express their opinion about it in two out of three studies of Chapter III. In the last study, actual contribution (opinion expression) on a product evaluation portal was assessed. Across all studies in Chapters IIIa and IIIb, no empirical support was found for the prediction that an opinion is less likely to be expressed when it is not in line with the overall rating. If at all, the last study suggests that people are more likely to express their opinion when their opinion *is not in line* with the overall rating.

Overall, across Chapters II and III, inconsistent findings emerged within the current research, such as more compared to less opinion expression when facing an opposing opinion, and the different impact of the two aspects of fear of backlash from others (fear of confrontation and fear of isolation). Important issues arising from these inconsistencies, among others, are addressed in more detail below. More precisely, I will discuss 1) the differences on opinion expression of the two aspects of fear of backlash from others (fear of confrontation and fear of social isolation), 2) the inconsistent results for (not) expressing deviant opinions, and 3) the impact of the prevailing opinion on opinion expression.

### **Differences Between Fear of Isolation and Fear of Confrontation**

Results of this dissertation indicate that fear of a confrontation mediates opinion expression (as shown in Chapter IIa). Thus, fear of backlash from others should not be disregarded when assessing opinion expression. However, in experiments in which we assessed fear as a mediator, fear of confrontation but not of social isolation mediated the effect of faced and majority opinion on opinion expression. Fear of isolation in our experiments indicated to be ignored by others, or that one's opinion is not taken seriously or heard, and thus being excluded from the conversation. In contrast, fear of confrontation within our experiments indicated that participants perceive fear of an aggressive or uncomfortable conversation. These differences in the expected backlash from others may impact whether a (deviant) opinion is

expressed openly. It could be that fear of isolation is perceived as less severe as fear of a confrontation because, in the context of a confrontation, one could be hurt oneself. Thus, people may still express their opinions even though they fear that they may be isolated, or their opinion might not be heard by others, as this might not be perceived as severe backlash. Although an opposing opinion led to more fear of isolation, this did not indicate less opinion expression. Thus, it seems that even if one fears being isolated, that alone is not enough to withhold one's opinion, but if one fears that the conversation might escalate, this seems to influence opinion expression. In contrast, if people fear that as soon as they express their opinion, they might be in an argument and might not be able to get out of it, this seems to decrease opinion expression. Within our train scenarios, there was no possibility to leave the train or to change compartments for the next five hours. This different framing could explain our inconsistent findings of opinion expression via fear of confrontation and fear of social isolation across Chapters IIa and IIb.

Overall, a mediation via fear of confrontation but not of social isolation suggests that other aspects might play a role in whether fear of backlash from others is perceived and whether one's opinion is expressed. It might be that if one senses that a conversation is on an equal footing and/or the topic is not so morally loaded that someone becomes offensive or aggressive within the conversation (e.g., not afraid of a confrontation), one may be more likely to express one's opinion (regardless of the fear of social isolation). Thus, it might be that the topics (refugees, gender pay gap, and abortion) were more conflictual (and thus increased fear of confrontation) compared to an implementation of a Veggie Day and, therefore, might have led to differences in opinion expression. However, this remains merely an assumption, which we have not tested in our experiments so far.

A mediation via fear of confrontation from others also implies that under certain conditions - when there is no fear of backlash from others or, more precisely according to our experiments no fear of confrontation - no effect of fear of backlash on opinion expression should occur. In some studies, we did not find any effect of a deviant (minority and/or opposing)

opinion on opinion expression. In these studies (due to our settings), no fear might have been perceived. For example, when assessing opinion expression in a non-interactive online context, fear of backlash from others is less present or might even be absent. If this is the case, one might achieve the reasonable effect that deviant opinions might be expressed more likely in such situations. This seems to be in line with our results. In Chapter IIa, we simulated a conversation with an interactive audience and found less opinion expression due to fear of backlash from others. In Chapter IIb, we reinforce the interactive context through the paradigm used, which should lower the likelihood of expressing opposing opinions. Unfortunately, we simultaneously used a (party) scenario (Experiment 2.4), which offers the potential opportunity to simply leave if a conversation becomes conflictual, which could explain the lack of differences on opinion expression. In Experiment 2.5, we announced that the interaction partners were former participants, and the subsequent (hypothetical) face-to-face conversation was voluntary. It might be that this implied that they were no longer physically present, and participants might have received the impression that they could avoid a real interaction with the opposing (confirming) others and thus did not need to fear a confrontation from others which may have increased (instead of decreased) the likelihood of expressing opposing opinions. Chapter IIIa, on the contrary, was a laboratory, non-interactive context without any potential public audience or direct interaction partners to which an opinion could have been expressed. This lack of addressee may explain the null effects in Chapter IIIa, as opinion expression would not matter nor have a great impact. Another explanation is that the situation was too artificial since, in Chapter IIIb, more expression of deviant opinions was found when assessing opinion expression on a real evaluation portal. This finding is also in line with literature showing that anonymity (as it is given in evaluation portals, for instance, by pseudonyms) leads to a higher likelihood to express the (deviant) opinion (Joinson, 2001; Neubaum & Krämer, 2018; Sproull & Kiesler, 1991). Unfortunately, we did not assess both aspects of fear of backlash from others (fear of a confrontation and fear of social isolation) within one experiment. Thus, it remains

unanswered whether fear of confrontation (but not fear of isolation) indeed is the underlying mechanism or whether differences in our findings might be due to the different paradigms and contexts we used across our studies. In this regard, future research should address both aspects of fear within one experiment to confirm fear of confrontation (but not of isolation) as a mediator and further test fear of confrontation as a moderator.

### **Opinion Expression Depending on Whether a Conversation is Initiated or Ongoing**

Besides the influence of fear of backlash from others across contexts on opinion expression, another explanation for the inconsistent findings on (not) expressing a deviant opinion could lie in the conversational situation. The main difference between the current studies indicating more than less opinion expression when holding an opinion not in line with the prevailing opinion (e.g., opposing or deviant opinion) is the question asked to capture opinion expression. We found a higher likelihood to express an opinion not in line with the prevailing opinion when several opinions on a topic were already brought forward (e.g., in ongoing conversations or on product evaluation portals) and participants were asked whether they want to respond to what was said. In contrast, when people were asked whether they want to engage in a conversation with an opposing other to get to know his/her point of view (and thus would initiate the conversation), opinion expression was less likely. Thus when people are asked about their general willingness to express their opinion to interaction partner(s), as it usually is the case in the SOS research (Glynn et al., 1997; Noelle-Neumann, 2001) and in experiments presented in Chapter IIa, it seems that people are less likely to express their deviant opinion. This decreased likelihood to express a deviant opinion might be because people generally prefer to talk to like-minded people (Mcpherson et al., 2001). People who are in the mindset of an (ongoing) conversation, however, and may even face a controversy might take their point of view and express their opinion against other-minded people (for first evidence in

this direction, see Buttlere & Buder, 2017). As only Experiment 2.3 of Chapter IIa used both questions to capture opinion expression, the results must be treated with caution, and future experiments are needed to shed more light on this possible moderator.

Another aspect within our settings that can explain more compared to less opinion expression is that in an ongoing conversation compared to one that would be initiated by an expressed opinion, people can respond to what was said by providing new arguments and thus enriches the conversation (as suggested by different strands of research, e.g., Grice, 1975; Wilson & Sperber, 1981). However, a more likely explanation seems to be that within an ongoing conversation, it might be easier to express an opinion and still be part of the conversation without revealing one's true point of view. Thereby, people can avoid backlash from others by expressing neutral opinions, lying, or just agreeing on parts of what was said. Especially people who hold a deviant opinion (e.g., an opinion not in line with the majority and faced opinion) might face such conflictual conversations more often in real life. Several studies examined aspects of opinion expression avoidance (e.g., changing the topic, expressing uncertainty or ambivalence) as a form of opinion expression (Hayes, 2007; Neuwirth et al., 2007). Avoidance strategies such as changing the topic were used more often when one's opinion was not in line (compared to in line) with the prevailing opinion (Hayes, 2007; Neuwirth et al., 2007). Thus, if people can use avoidance strategies within a conversation, that might be more likely if several arguments have already been brought in (e.g., in an ongoing conversation), the likelihood of engaging in a conversation might increase as one's true opinion can be withheld. This assumption should be investigated in future research, for instance, by strengthening our paradigm and not only announcing the possibility to record own opinions but record participants' opinions to what was said.

## **The Impact of the Prevailing Opinion on Opinion Expression**

Given the results from our studies, it cannot be assumed that the majority opinion is as important when it comes to opinion expression as has been assumed in previous research. More precisely, current studies found no clear evidence of the influence of the majority opinion on opinion expression. If at all, the proposed indirect effect of fear of confrontation on opinion expression was obtained. Thus, consistent with previous research, our findings indicate a greater impact of faced opinion on opinion expression than the majority opinion.

One question that arose across all studies and that cannot be answered by the presented literature on the majority opinion is whether the assumption that minorities express themselves less likely persists nowadays or whether it might have changed over time. In society, very vocal minorities take to the streets, but the majority remains silent, and society faces more of a challenge in making it clear that those out there is indeed the minority. It might be that expressing one's opinion and standing up for it has changed over the years. One major aspect that changed over the last years is that people receive more personalized information about the majority opinion and thus might be in their own bubble without realizing whether they hold a minority or majority opinion. If people who hold a minority opinion believe in holding a majority opinion instead (due to the given information), they might express their opinion in public. However, it is more likely, that people indeed express minority opinions and stand up for their opinion as long as certain circumstances are present such as a low likelihood of a backlash from others or, as other literature suggests, a sense of being a consistent minority (Moscovici, 1976). For instance, in countries such as Germany, it is relatively safe to express a (minority) opinion freely and openly within a demonstration because there is hardly a chance of serious backlash from others. However, if one would ask these people holding (and expressing) a minority opinion whether they would generally like to engage in a conversation with a non-like-minded other, they might also avoid initiating such a conversation. Thus, it seems that the (maybe misperceived) majority opinion is less relevant than previous (and our)

research assumed. If at all the faced opinion, the question asked to assess opinion expression (whether they want to respond to what is already said or to engage in a conversation), and whether people fear backlash from others seem to play a more important role.

### **Strength and Limitations**

The current work contributes to the existing literature on opinion expression not only by providing an improved methodological paradigm for assessing opinion expression in an interactive context (e.g., an ongoing conversation) but more generally by examining opinion expression across a heterogeneous set of paradigms (e.g., train scenario, product evaluation portal in and outside of the lab). On a related note, a variety of different measurements was used to assess opinion expression (e.g., survey-based measures, response times, actual opinion expression). It further confirmed fear of backlash from others (especially fear of confrontation) as a potential mediator and identified potential moderators such as the questions being asked to assess opinion expression and opinion expression avoidance that may impact expressing deviant opinions. All in all, this dissertation provides a methodologically diverse set of empirical studies that shed light on whether opinion expressions differ depending on the majority and/or faced opinion across different contexts and paradigms.

However, across the current studies, one limitation might be that no clear separation of both prevailing opinions (majority and faced opinion) was made. In Chapter IIa majority and faced opinion and their interaction were considered separately from each other. In Chapter IIb, however, both aspects were already merged, and the majority opinion was only locally present by the increased number of faced interaction partners (instead of a single person). In Chapter III, there was no separation at all, and the majority and faced opinion coincided. Thus, it remains unanswered whom participants imagined having as an interaction partner. Due to the lack of clearly separating both aspects, however, only a tentative assumption can be made about the impact of the prevailing majority compared to faced opinion.

Another potential limitation of our studies might be that similar to many other experiments addressing the SOS claim, we never conducted a real face-to-face discussion and assessed opinion expression in Chapter II only with hypothetical scenarios. This operationalization could limit external validity as well as generalizability in our interactive contexts as a (hypothetical) interaction within a scenario is not the same as real interactions with direct responses from interaction partners. Therefore, we cannot completely rule out that our effects would not hold in a real interactive context with direct responses (e.g., a conversation) or that the interplay of majority and own opinion might not have occurred due to the lack of real interaction partners. However, based on existing literature as well as our findings, it is more likely that the faced opinion rather than the majority opinion is the (more) meaningful aspect determining whether people express their deviant opinion, and this effect has been tested and found in actual face-to-face interactions (e.g., Asch, 1956; Lu et al., 2012; Wittenbaum, 2000). In addition, within a real face-to-face setting, one could vary the climate within the conversation. For instance, whether it is a very explosive and aggressive climate (in which backlash of a confrontation might be more likely) or whether it is a very open and accommodating climate in which other opinions are treated respectfully. In doing so, one could test whether people indeed express their opinions less when they fear a confrontation but also investigate potential facilitating conditions that may increase the likelihood of expressing deviant opinions. Furthermore, different characteristics like status, gender or age would be more present than within a hypothetical interaction. As mentioned in the beginning status differences seem to impact information sharing in groups (Wittenbaum & Bowman, 2005) and thus might also influence opinion expression.

Further, one might argue that our non-interactive and interactive contexts might not be comparable as we addressed different (political vs. non-political) topics. However, also in existing research different topics were used to assess opinion expression (as mentioned in Chapter I). Literature on information sharing in groups, for example, addressed non-political

topics such as finding the best candidate (Stasser & Titus, 2003), whereas literature on the SOS mostly focused on political topics (Glynn et al., 1997; Noelle-Neumann, 2001) and Bassili (2003) captured opinion expression (e.g., response times) on single words. Hence, it seems independent of the used topic of whether (deviant) opinion expression takes place. Accordingly, the different contexts and topics do not diminish our results but provide insights into potential opinion expression in various contexts.

## **Conclusion**

All in all, with the four sets of studies described in Chapters II and III, this dissertation provides a great variety of methods and contexts to address our initial questions 1) whether opinion expression depends on the prevailing (majority or faced) opinion; 2) whether fear of backlash from others is the underlying mechanism to withhold a deviant opinion, and 3) whether deviant (compared to concurrent) opinions are less likely to be expressed in non-interactive contexts.

Based on our findings, the prevailing (majority or faced opinion) opinion seems to have a smaller impact on opinion expression than the existing literature assumed so far. If at all, the faced opinion seems to be more relevant when it comes to opinion expression. Further, a certain fear of backlash from others (fear of a confrontation) seems to explain why people are less likely to express their deviant opinion: According to our findings an opposing and a majority opinion seem to increase fear of a confrontation, and this, in turn, decreases opinion expression. Our results further indicate that a non-interactive context (product evaluation portals) might indeed provide an environment that facilitates to express a deviant opinion. This might be due to less fear of backlash from others.

Across all our studies, it seems that factors such as the fear of backlash from others and whether the conversation is ongoing or would be initiated by an expressed opinion might play a more important role in expressing an opinion than the prevailing opinion (majority and/or

faced) or the given context. People seem to express a deviant opinion especially when it is actual expressed within an ongoing conversation, in and outside of the laboratory.

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## Appendix A

### Summary of the studies mentioned in Chapter IIa using similar material

As mentioned in Chapter IIa, we conducted two further studies in the scope of the dissertation in which we used similar material as in the Experiments of Chapter IIa. However, both studies are not included in the empirical Chapters of the dissertation so far. In the interest of transparency and completeness, I will briefly report both studies here, addressing differences in the methodology used and summarizing the studies' results.

The main difference between these Studies and the Experiments in Chapter IIa is that we tried to manipulate participants' perception of the majority opinion. Therefore, participants read a short manipulation text (an alleged article from a regional newspaper). The article stated that the majority opinion (Study 1:  $N = 212$ ) is either in favor of or against implementing a Veggie Day or (Study 2:  $N = 207$ ) in favor of or against receiving further refugees. By doing so, we aimed to manipulate whether participants believe in holding a minority or majority opinion. From here on, the method was the same as in Experiments 2.1 and 2.2. Participants saw manikins, one stating the (alleged) majority one the (alleged) minority opinion. Participants indicated which statement they agree with more and thus indicated their own opinion about the topic. Then, by using the train scenario to manipulate the faced opinion, participants were confronted either with a passenger stating to be in favor or against the topic. Different than in Experiment 2.2. and 2.3; this statement was always in line with the alleged majority opinion from the manipulation text at the beginning. Depending on which opinion the participants held, they faced an opposing or confirming others' opinion. Afterwards, participants indicated their willingness and likelihood to express their opinion, the perceived backlash from others, which opinion they perceive as the actual majority opinion and answered some demographical questions.

Similar to our Experiments in Chapter IIa, we predicted that people holding an opinion in line with the (alleged) minority opinion express their opinion less when facing an opposing

than when facing a confirming opinion. This effect should be smaller for people holding an opinion in line with the (alleged) majority opinion. In both studies, the hypothesis was not confirmed.

Results of both studies indicate no significant differences in opinion expression between people holding an opinion in line and not in line with the alleged majority opinion when facing an opposing (compared to confirming) others' opinion. In both studies, only a main effect of one's own opinion emerged. The willingness and likelihood to express an opinion increased when participants held an opinion in favor of the topic (Study 1: in favor of a Veggie Day; Study 2: in favor of receiving further refugees). I further tested whether the manipulation text might have impacted one's own opinion. This seemed to be the case in Study 2,  $X^2(1, 207) = 4.75, p = .029$ , but not in Study 1,  $X^2(1, 212) = 0.08, p = .782$ . Hence, the manipulation text seemed to be associated with one's own opinion in Study 2.

We expected that by manipulating the majority opinion, we could influence the perception of participants' status so that they perceive to be in the minority or majority with their opinion, and thus gain a more balanced design. However, some participants indicated that they believe the actual majority opinion is different from what they had read in the manipulation text despite our manipulation. For example, they read a manipulation text that stated the majority is against a Veggie Day but indicated (at the end of the study) that they believe the majority of students are Pro Veggie Day, and thus assumed a different opinion to be the actual majority opinion<sup>18</sup>. Accordingly, our studies do not seem to have succeeded in manipulating the what is perceived as the majority opinion. Therefore, no clear statement can be made about whether participants actually assumed to hold a minority or majority opinion. Our studies merely indicate that manipulating the majority opinion might not be feasible. All in all, our

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<sup>18</sup> Exploratory analyses with the actual perceived majority opinion showed no significant differences in results.

attempt to manipulate the majority opinion by using a text did not work out. Therefore, these studies were not included in the dissertation as an empirical part.

## Appendix B

### B.1 Supplementary information for Chapter IIa

#### B.1.1 Preregistrations and explanation for deviations

##### Overview of preregistered analyses and deviations

It is important to note that the presentation of the Experiments of Chapter IIa does not follow the preregistrations, as those were faulty in parts. I will briefly discuss the major deviations made.

Experiment	Deviation
Experiment 2.1	<p>A 2 (own opinion) x2 (faced opinion) x2 (perceived majority opinion) between-subject design was preregistered. As only <math>N = 2</math> participants indicated that the <i>perceived majority opinion</i> is against receiving further refugees, not all our design cells were filled. Thus, we could not run our analyses for our initially planned 2 x 2 x 2 design. Instead, we run our analyses for the effect of own and faced opinion with the 209 participants whose majority opinion (in favor of further refugees) coincided with the actual majority opinion. Accordingly, the hypothesis was adapted: We sat own opinion in relation to the majority opinion (e.g., holding a minority vs. majority opinion) and carried out an interaction of the faced (opposing vs. confirming) and one's own (minority vs. majority) opinion to test whether minorities behave differently when it comes to expressing an opinion.</p>
Experiment 2.2	<p>We deviated from the preregistered power of <math>f = .25</math> (Experiment 2.1) and <math>f = .166</math> (Experiment 2.2). Instead, we referred to the effect size based on</p>

the results from Experiment 2.1 and adjusted the oversampling ratio of 1 to 4 accordingly in Experiment 2.3.

We preregistered a moderated mediation of one's own and faced opinion via fear on opinion expression. As mentioned in Chapter IIa, no interaction of one's own and faced opinion emerged, and thus a mediation via fear instead of the moderated mediation was conducted.

Experiment 2.1 and 2.2 In both Experiments, we preregistered two separated analyses for the two opinion expression measurements *willingness* and *likelihood*. Due to a strong correlation of both, we standardized measures into an overall *opinion expression* measure.

We further deviate from the preregistration by including participants older than 35 (Experiment 2.1:  $N = 2$ ; Experiment 2.2:  $N = 3$ ) as we also included them for Experiment 2.3. Results do not differ by excluding participants.

Variable labels in the dissertation and preregistrations

<b>Experiment</b>	<b>Label in the dissertation</b>	<b>Label in preregistrations</b>
Experiment 2.1	holding a minority vs. majority opinion	people feel that their opinion is not consistent compared to consistent with the perceived majority opinion
Experiment 2.2	facing an opposing opinion (compare to facing a confirming opinion)	confronted with an opinion that opposes (compared to confirms) one's own
Experiment 2.3	faced opinion	others' opinion

Preregistration for Experiment 2.1

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**1) Have any data been collected for this study already?**

No, no data have been collected for this study yet.

**2) What's the main question being asked or hypothesis being tested in this study?**

RQ: Do minorities behave differently from majorities when it comes to expressing opinions?

Hypotheses:

Based on theorizing and previous findings on the spiral of silence, we predict:

- H1: if people feel, that their opinion is not consistent with the perceived majority opinion, then people are (a) less willing to engage in a conversation (DV1) and voice their opinion with a smaller likelihood (DV2) than people whose opinion is consistent with the perceived majority opinion

**3) Describe the key dependent variable(s) specifying how they will be measured.**

DV1: willingness to start a conversation to get to know the other's point of view (dichotomous)

DV2: likelihood of voicing own opinion

Predictor 1: initial opinion of the participants, which will be assessed on a binary scale

Predictor 2: perceived public opinion

Predictor3: opinion of a fellow passenger in a hypothetical train scenario (opposing or confirming the initial opinion of the participants)

**4) How many and which conditions will participants be assigned to?**

Eight conditions based on:

- participants' initial opinion pro vs. contra receiving refugees in Germany on a binary scale
- Participants' perceived public opinion pro vs. contra receiving refugees in Germany
- whether the participants are confronted with an opposing or confirmatory opinion during a hypothetical train journey by a passenger.

**5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.**

The hypotheses will be tested by using multiple regressions models separately for each DV to see if there is a difference between minorities and majorities regarding (H1a) the willingness to start a conversation and (H1b) the likelihood to voice own opinion. H1a will be tested using a logistic regression. H1b by using a linear regression.

**6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.**

Prerequisites for participation:

- fluent in German (language-sensitive materials)
- age between 18 and 35 years (materials designed for typical undergraduates)
- non-psychology students
- unfamiliar with material

Note that any participant who wishes to withdraw their data will be removed from the data set.

**7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.**

We aim at collecting data of N = 210 participants. We will stop data collection once we have reached 210 complete data sets that meet our exclusion criteria (the study will run online from July 23rd, 2019). This procedure also ensures our desired power (based on G\*power: power of .95, alpha-error probability .05, expected medium effect size:  $f = .25$ ). Due to unclear parameters for a logistic regression, the power analysis for the continuous DV was calculated.

**8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)**

For exploratory purposes we will assess the final opinion at the end of the study as well as the following potential moderators:

- the certainty about the initial opinion
- perceived fear of social isolation
- perceived task characteristics (objectively correct decision regarding the topic?)
- subjective importance to make a right decision in general
- subjective importance of the topic
- subjective communicative self-efficacy

Further following variables will be collected:

- demographical questions (age, gender, language, academic subject),
- whether they are active in the refugee aid

## Preregistration for Experiment 2.2

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### 1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

### 2) What's the main question being asked or hypothesis being tested in this study?

RQ: Do people holding a minority opinion behave differently from people holding a majority opinion when it comes to expressing said opinion?

Hypothesis:

(H1a) The willingness to engage in a conversation (DV1) or (H1b) the likelihood of expressing one's opinion in a conversation (DV2) is lower if one is confronted with an opinion that opposes (compared to confirms) one's own. This effect should be more pronounced if the other person's opinion corresponds to the perceived majority opinion.

(H2) feared confrontation (DV3) mediates the effect predicted in H1, that is a confrontation with an opinion that opposes (compared to confirms) one's own opinion increases feared confrontation and increased feared confrontation, in turn, leads to a lower willingness to engage (DV1) and lower likelihood of expressing one's opinion (DV2) in a conversation.

### 3) Describe the key dependent variable(s) specifying how they will be measured.

DV1: willingness to engage in a conversation to get to know the other's point of view (one dichotomous item)

DV2: likelihood of expressing one's opinion in a conversation (one 7-point scale item)

DV3: feared confrontation (five 7-point scale items)

### 4) How many and which conditions will participants be assigned to?

Four conditions based on:

(a) Factor 1: participants' own opinion about whether a Gender Pay Gap is justified vs. unjustified, which will be assessed on one binary scale (I find the gender pay gap justified vs. I find the gender pay gap unjustified)

(b) Factor 2: whether the participants are confronted with an opinion opposing or confirming their own opinion during a hypothetical train journey with a passenger. (in the form of a short text)

### 5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

The hypotheses H1a and H1b will be tested by using regressions models separately for each DV with the following predictors: participants' opinion, communicator's opinion (both pro vs. contra gender pay gap), and their interaction. H1a will be tested using a logistic regression, H1b by using a linear regression. Hypothesis H2 (moderated mediation) will be tested by using bootstrapping analyses (model 7).

Based on a pretest in the targeted population, we assume that most participants believe that most students do consider a gender pay gap as unjustified (perceived majority opinion). Therefore, we do not expect to have enough observations in cells representing the public opinion justifying a gender pay gap. As a result, we will only look at participants who assume that the majority considers the gender pay gap to be unjustified (see exclusion criteria).

### 6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Prerequisites for participation:

- fluent in German (language-sensitive materials)
- age between 18 and 35 years (materials designed for typical undergraduates)
- non-psychology students
- unfamiliar with material (concretely: only students who have not yet participated in a study with our train scenario/manikins)
- indicating that the majority of students (perceived majority opinion) consider a gender pay gap to be unjustified

Note that any participant who wishes to withdraw their data will be removed from the data set.

### 7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

Due to unclear parameters for a logistic regression, a power analysis was conducted for the continuous DV (DV2) indicating a desired sample size of  $N = 210$  (based on  $G^*$ power:  $1 - \beta = .95$ ,  $\alpha = .05$ ,  $f = .25$ ). But we expect a smaller effect size for our dichotomous DV (DV1).

Therefore, we aim at collecting data of at least  $N = 210$  participants but will oversample to reach a proper power for both DVs.

We will stop data collection once we have acquired  $N = 350$  complete data sets that meet our inclusion criteria, or when the end of the survey period is reached, and we have reached our minimum desired sample size of  $N = 210$  (the study will run online from October 8th 2019 – October 29th 2019). If none of these criteria will be met by October 29th 2019, we will continue data collection beyond this date until our minimal goal ( $N = 210$ ) is reached.

### 8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

Factor 2 mentioned under (4) will be recoded for our analyses as follows: In case participants are in favor of the gender pay gap, opposing communicators will be recoded as 'other opinion contra gender pay gap' and confirming communicators will be recoded as 'other opinion pro gender pay gap.' Similarly, in case participants are against the gender pay gap, opposing communicators will be recoded as 'other opinion pro gender pay gap' and confirming communicators will be recoded as 'other opinion contra gender pay gap.'

For exploratory purposes we will assess the following potential moderators:

- certainty regarding one's own opinion
- perceived task characteristics ("In my eyes, the Gender Pay Gap is a matter of individual opinion.")
- subjective importance to make a correct decision in general
- subjective importance of the topic
- subjective communicative self-efficacy

Further, we will pre-test further possible topics, which can then be used as topics in future studies. Finally, at the end of this experiment, we will assess demographic variables (age, gender, mother tongue, academic subject)

## Preregistration for Experiment 2.3

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### 1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

### 2) What's the main question being asked or hypothesis being tested in this study?

RQ: Do people holding a minority opinion behave differently from people holding a majority opinion when it comes to engaging in a conversation with people holding an opposing (compared to a confirming) opinion?

Hypotheses:

H1a: When facing others' opinion that opposes (compared to confirms) one's own opinion the willingness to engage in a conversation is lower. This effect should be more pronounced when the communicators' opinion (others' opinion) corresponds to the perceived public majority opinion.

H1b: Perceived fear mediates the effect predicted in H1a. That is, a confrontation with others' opinion that opposes (compared to confirms) one's own opinion increases perceived fear more, and this, in turn, leads to a lower willingness to engage in a conversation with the others.

Hypothesis 2: People who are faced with others' opinion that opposes their own opinion and hold an own opinion that is not in line with the public majority opinion adapt their opinion more to the faced others' opinion in the course of a discussion than people who hold an own opinion that is in line with the majority opinion.

### 3) Describe the key dependent variable(s) specifying how they will be measured.

DV H1a: willingness to engage in a conversation with a group of others of whom eight statements are presented in a randomized order (eight times yes vs. no)

Mediator H1b: perceived fear (assessed via five items on a 7-point scale)

DV H2: opinion regarding the focal topic on a 0-Pro Life to 100-Pro Choice scale after participants read all arguments

### 4) How many and which conditions will participants be assigned to?

Four conditions based on:

(a) Factor 1, identified by means of a pre-screening: participants' own opinion (in line vs. not in line with the perceived and actual majority opinion in the society: Pro Choice) about the focal topic "legalisation of abortion" ("I am Pro Life" vs. "I am Pro Choice").

(b) Factor 2, manipulated: whether participants face others' opinion voiced by three communicators that is in line vs. not in line with participants own opinion.

### 5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

All hypotheses tests will involve the following predictors: own opinion (in line vs. not in line with the majority opinion), others' opinion, and the interaction of these two factors.

Hypothesis H1a will be tested by using a fixed linear (logistic) mixed effects model containing random intercepts for participants, the first trial, and the argument (1-8) and fixed effects for the predictors. To test - in case of an own opinion x others' opinion interaction - whether the predicted pattern is underlying this effect, we will conduct orthogonal contrasts analysis.

Hypothesis H1b will be tested with a moderated mediation model by using PROCESS, Model 7. For this analysis, one willingness-to-engage-in-a-conversation score will be computed (i.e., sum score across all eight trials).

Hypothesis H2 will be tested in a linear multiple regression with the following predictors: own opinion, others' opinion, and their interaction.

### 6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Prerequisites for participation:

- English as a native language (language-sensitive materials)

- Indicating that the majority of people in Great Britain consider Pro Choice as the majority opinion (in line with public opinion poll results by YouGov)

- female sex

Note that any participant who wishes to withdraw their data will be removed from the data set.

Further, women who are currently pregnant and women who were pregnant before will be excluded from the reported analysis if the pattern of results found for them differs significantly from the one found for the rest of the sample, no matter whether this confirms or disconfirms our hypotheses.

### 7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

Based on our earlier studies we expect an effect size of  $f = .166$ . A power analysis with  $G^*$ power ( $1 - \beta = .80$ ,  $\alpha = .05$ ,  $f = .166$ ) indicates that the sample size should at least be  $N = 278$ . However, as we expect a ratio of 1 (Pro Life): 4 (Pro Choice) in the data, we will oversample by 55%, so our desired minimum sample size is  $N = 445$  plus 10% to compensate for our exclusion criteria (total  $N = 490$ ). We will stop data collection once we have reached our minimum desired sample size of  $N = 490$  or when the end of the survey period (March 24th 2020 – March 31st 2020) is reached.

### 8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

For exploratory purposes we will assess the following potential moderators:

- The time participants take to indicate whether they want to engage in a conversation in response to each statement (log-transformed)
- certainty regarding one's own opinion
- subjective communicative self-efficacy
- willingness to talk to the communicators to get to know their point of view
- subjective importance to make a correct estimation in general
- subjective importance of the topic
- when responding to an argument, whether they agree or disagree with it
- at what statement (1 to 8) participants respond for the first time

Finally, at the end of this experiment, we will assess demographic variables (mother tongue, age, highest level of education, academic subject, gender, (current) pregnancy, whether they have children, religious affiliation, field of work/study).

### B.1.2 Additional preregistered analyses for Experiment 2.3

#### Additional preregistered analyses for Experiment 2.3

**Opinion adaption:** For Experiment 2.3, we further preregistered that people who hold a minority opinion (an opinion not in line with the majority opinion) and face an opposing opinion adapt their opinion more to the faced opinion in the course of a discussion than people who hold a majority opinion (an opinion in line with the majority opinion). Higher values on the final opinion scale (0 - *Pro-Life* to 100 - *Pro-Choice*) indicate a stronger tendency towards Pro-Life, lower values towards Pro-Choice.

A linear Model with final opinion as dependent variable and own (majority: -1, minority: 1) and faced opinion (confirming: -1, opposing: 1) as independent variables was carried out. Holding a minority (here: Pro-Life) opinion was related to a higher score on the final opinion scale ( $M = 89.58$ ,  $SD = 17.36$ ), indicating they were more likely to be Pro-Life compared to people holding a majority (here: Pro-Choice) opinion ( $M = 3.89$ ,  $SD = 8.27$ ),  $B = 42.82$ ,  $SE = 0.65$ ,  $t(492) = 66.15$ ,  $p < .005$ , 95%-CI [41.549; 44.093]. No main effect of faced opinion revealed,  $B = -0.87$ ,  $SE = 0.65$ ,  $t(492) = -1.34$ ,  $p = .180$ , 95%-CI [-2.142; 0.402], but a trend for an interaction of both predictors,  $B = -1.13$ ,  $SE = 0.65$ ,  $t(492) = -1.75$ ,  $p = .082$ , 95%-CI [-2.401; 0.142]. Pairwise comparisons revealed a trend for people holding a minority opinion and facing an opposing (compared to confirming) opinion resulted in lower values of the final opinion,  $\Delta M = -4.00$ ,  $SE = 2.40$ , 95%-CI = [-4.357; 0.358]. No significant differences occurred when holding a majority opinion.

In line with our prediction, the results suggest that holding a minority (but not majority) opinion and facing an opposing opinion seems to be linked to a tendency to adapt one's opinion. People holding a minority opinion seem to adapt their opinion more to the faced (majority) opinion in a discussion than people holding a majority opinion.

### **B.1.3 Instructions and main measures for Experiment 2.1**

(original material was in German)

In this section, all critical instructions and manipulations used in Experiment 2.1 are provided in more detail. If the number of items is given, concepts have been assessed for exploratory purposes, but data is not presented in the empirical Chapters.

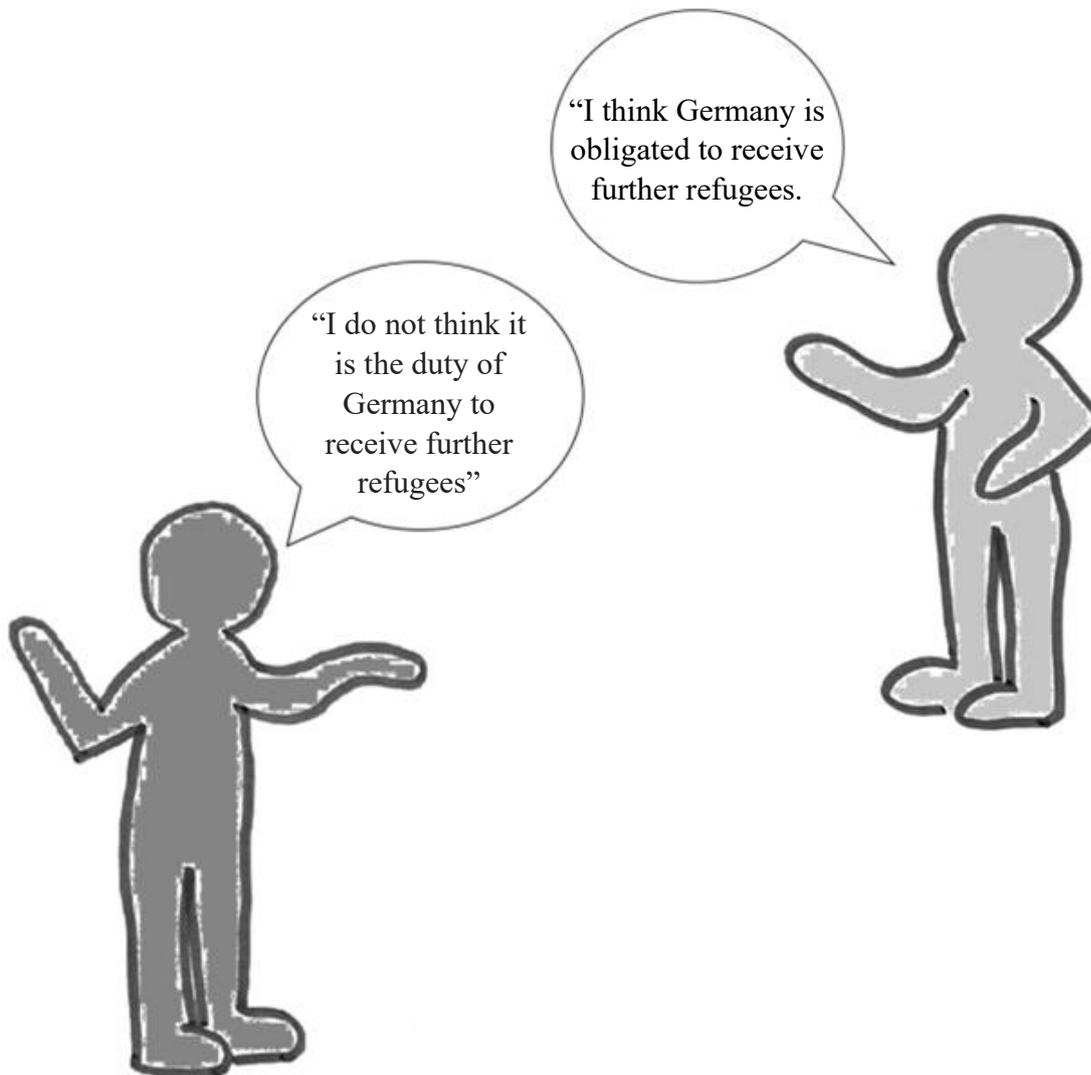
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#### *Complete list of variables assessed in Experiment 2.1:*

- Own opinion about the topic
- Certainty about own opinion (1 item)
- Perception of the majority opinion
- Manipulation of faced opinion with train scenario paradigm (either in favor of or against receiving refugees); The verbatim version (in German) of the manipulation is provided in parentheses, as subtle but essential differences in wording might not be fully captured by the English translations.
- Willingness to express one's own opinion
- Likelihood to express one's own opinion
- Fear of backlash from others
- Self-efficacy (4 items)
- Accuracy (1 item)
- Importance to generally make a right judgment (1 item)
- Importance of the topic (1 item)
- Demographics (mother tongue, gender, age, subject of study, active in refugee aid, number of studies taken, familiarity with this experiment, device used to take experiment)

Assessment of own opinion about the topic

Please read the statements of the two people.



Which person would you agree with? The upper one or the lower one?

(-1 = The upper one [yellow], 1 = The lower one [blue])

Assessment of majority opinion (minority opinion = no further refugees)

What do you think? Is the majority of students in Tübingen in favor of or against receiving further refugees?

- Most are in favor of receiving further refugees. (1)
- One half is in favor, the other half against it. (2)
- Most are against receiving further refugees. (3)

Manipulation of faced opinion with train scenario paradigm

Imagine that you are on a 5-hour long train ride, and in your compartment, there is a student who says:

**[condition in favor of receiving further refugees]**

“I think it is the duty of Germany to receive further refugees. Anyone who is against receiving refugees is simply ignorant; ignorant about the refugees’ situation and, therefore, about any human rights. Simply irresponsible!”

(„Ich finde, es ist die Aufgabe von Deutschland noch weitere Geflüchtete aufzunehmen. Wer sich gegen eine Aufnahme ausspricht, ist einfach ignorant. Ignorant gegenüber der Situation der Geflüchteten und somit auch gegenüber jeglichen Menschenrechten. Einfach unverantwortlich!“)

**[condition against receiving further refugees]**

“I do not think it is the duty of Germany to receive further refugees. Whoever speaks out in favor of receiving refugees is simply ignorant; ignorant about the limits of what is possible and the current situation. Simply irresponsible!”

(„Ich finde nicht, dass es die Aufgabe von Deutschland ist noch weitere Geflüchtete aufzunehmen. Wer sich für eine Aufnahme ausspricht, ist einfach ignorant. Ignorant gegenüber der Grenze des Machbaren und der aktuellen Situation. Einfach unverantwortlich.“)

Assessment of willingness to express one’s own opinion

Would you like to talk to this student to get to know his or her point of view, or would you rather not?

(0 - rather not engage in a conversation, 1 - would like to engage in a conversation)

Assessment of likelihood to express one's own opinion

In this situation, how likely is it that you would express your own opinion towards the topic?

(1 = Very unlikely, 7 very likely)

Assessment of fear of backlash from others

If you imagine yourself in the situation described, how much do you agree with the following statements?

- I have the feeling that I can express my opinion regarding receiving further refugees freely and openly.
- I have the feeling that the other person is trying to understand my point of view.
- I'm afraid a conversation on the topic of "receiving refugees" will lead to an aggressive discussion
- I'm afraid that if I express my opinion, the conversation will become uncomfortable.
- I'm afraid that I am alone with my opinion on the topic of "receiving refugees"

(1 = Completely disagree, 7 = Completely agree)

### **B.1.4 Instructions and main measures for Experiment 2.2**

(original material was in German)

In this section, all critical instructions and manipulations used in Experiment 2.2 are provided in more detail. If the number of items is given, concepts have been assessed for exploratory purposes, but data is not presented in the empirical Chapters.

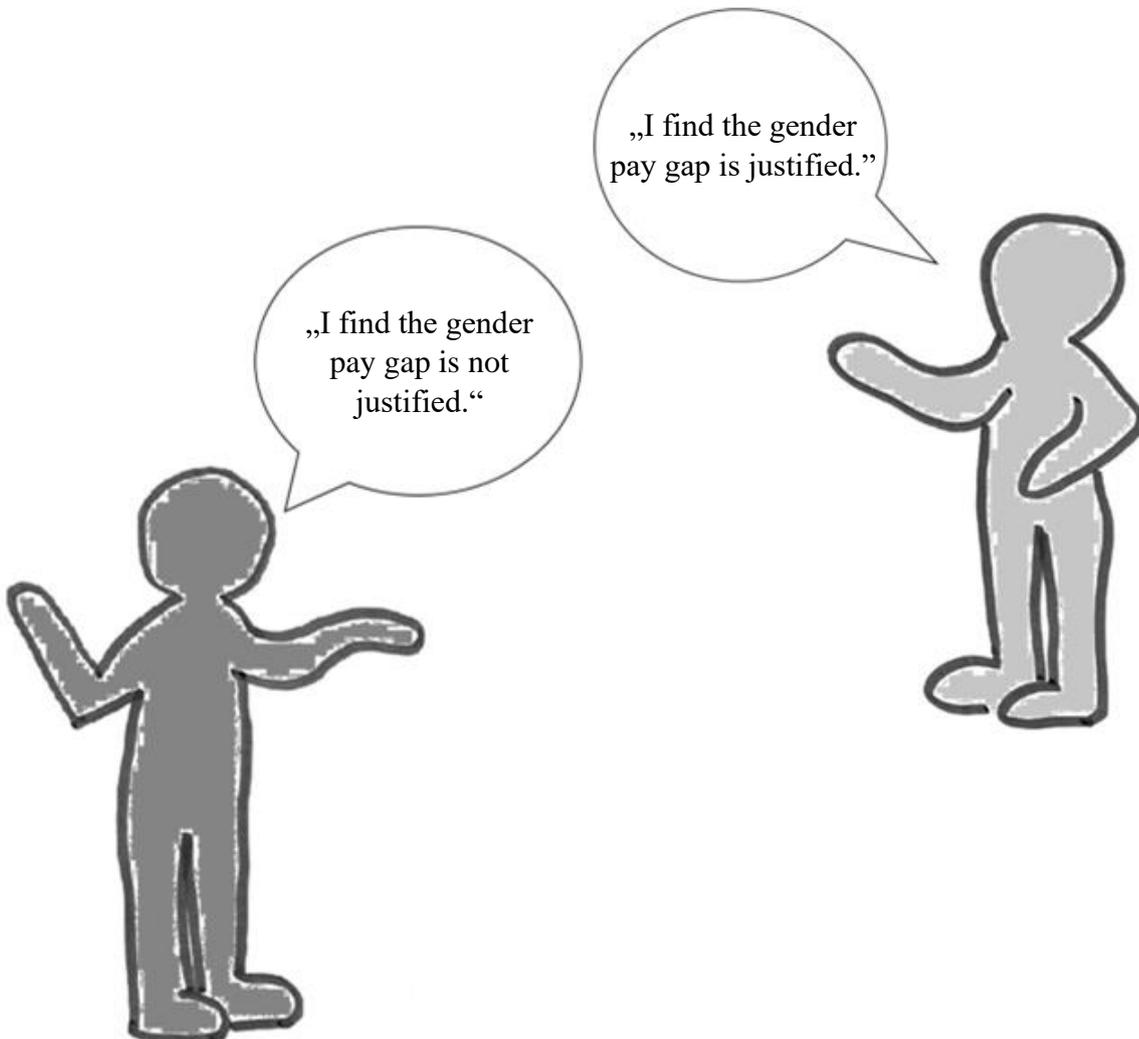
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#### *Complete list of variables assessed in Experiment 2.2:*

- Own opinion about the topic
- Certainty about own opinion (1 item)
- Perception of the majority opinion
- Manipulation of faced opinion with a train scenario paradigm (either justifying or not justifying a Gender Pay Gap); The verbatim version (in German) of the manipulation is provided in parentheses, as subtle but essential differences in wording might not be fully captured by the English translations.
- Willingness to express one's own opinion (see Experiment 2.1)
- Likelihood to express one's own opinion (see Experiment 2.1)
- Fear of backlash from others
- Self-efficacy (see Experiment 2.1)
- Accuracy (see Experiment 2.1)
- Importance to generally make a right judgment (see Experiment 2.1)
- Importance of the topic (see Experiment 2.1)
- Demographics (mother tongue, gender, age, subject of study, number of studies taken, familiarity with this experiment, device used to take experiment)

Assessment of own opinion about the topic

Please read the statements of the two people.



Which person would you agree with? The upper one or the lower one?

(1 = The upper one [yellow], -1 = The lower one [blue])

Assessment of majority opinion (minority opinion = gender pay gap is justified)

What do you think? Does the majority of students in Tübingen perceive the gender pay gap as justified or not justified?

- Most perceive the gender pay gap as justified. (1)
- One half perceives it as justified; the other half as not justified. (2)
- Most perceive the gender pay gap as not justified. (3)

Manipulation of faced opinion with train scenario paradigm

Imagine that you are on a 5-hour long train ride, and in your compartment, there is a student who says:

**[condition not justifying a gender pay gap]**

“I do not believe that the gender pay gap is justified in any way. Those who accept the gender pay gap are simply irrational. Women are disadvantaged by the low payment because they now have at least the same qualifications as men and perform at least as much!”

("Ich finde, dass der Gender Pay Gap in keiner Weise gerechtfertigt ist. Wer den Gender Pay Gap akzeptiert, ist einfach irrational. Frauen werden durch die geringe Bezahlung benachteiligt, denn sie weisen inzwischen mindestens die gleiche Qualifikation auf wie Männer und leisten mindestens genauso viel!")

**[condition justifying a gender pay gap]**

“I think the gender pay gap is justified. Those who express themselves against a gender pay gap are simply ignorant. There are differences between men and women in terms of qualifications, jobs, and the industries they work in. To demand equal pay for men and women is simply irrational!”

(„Ich finde, der Gender Pay Gap ist gerechtfertigt. Wer sich gegen einen Gender Pay Gap ausspricht, ist einfach ignorant. Es gibt nun mal Unterschiede zwischen Männern und Frauen in der Qualifikation, den ausgeübten Tätigkeiten und Branche, in der sie arbeiten. Die gleiche Bezahlung von Männern und Frauen zu verlangen ist einfach irrational!“)

Assessment of fear of backlash from others

*If you imagine yourself in the situation described, how much do you agree with the following statements?*

- *I have the feeling that I can express my opinion regarding the gender pay gap freely and openly.*
- *I have the feeling that the other person is trying to understand my point of view.*
- *I'm afraid a conversation on the topic of the gender pay gap will result in an aggressive discussion.*
- *I'm afraid that if I express my opinion, the conversation will become uncomfortable.*
- *I'm afraid that I am alone with my opinion on the topic of a gender pay gap.*

(1 = Completely disagree, 7 = Completely agree)

### **B.1.5 Instructions and main measures for Experiment 2.3**

(original material was in English)

In this section, all critical instructions and manipulations used in Experiment 2.3 are provided. If the number of items is given, concepts have been assessed for exploratory purposes, but data is not presented in the empirical Chapters.

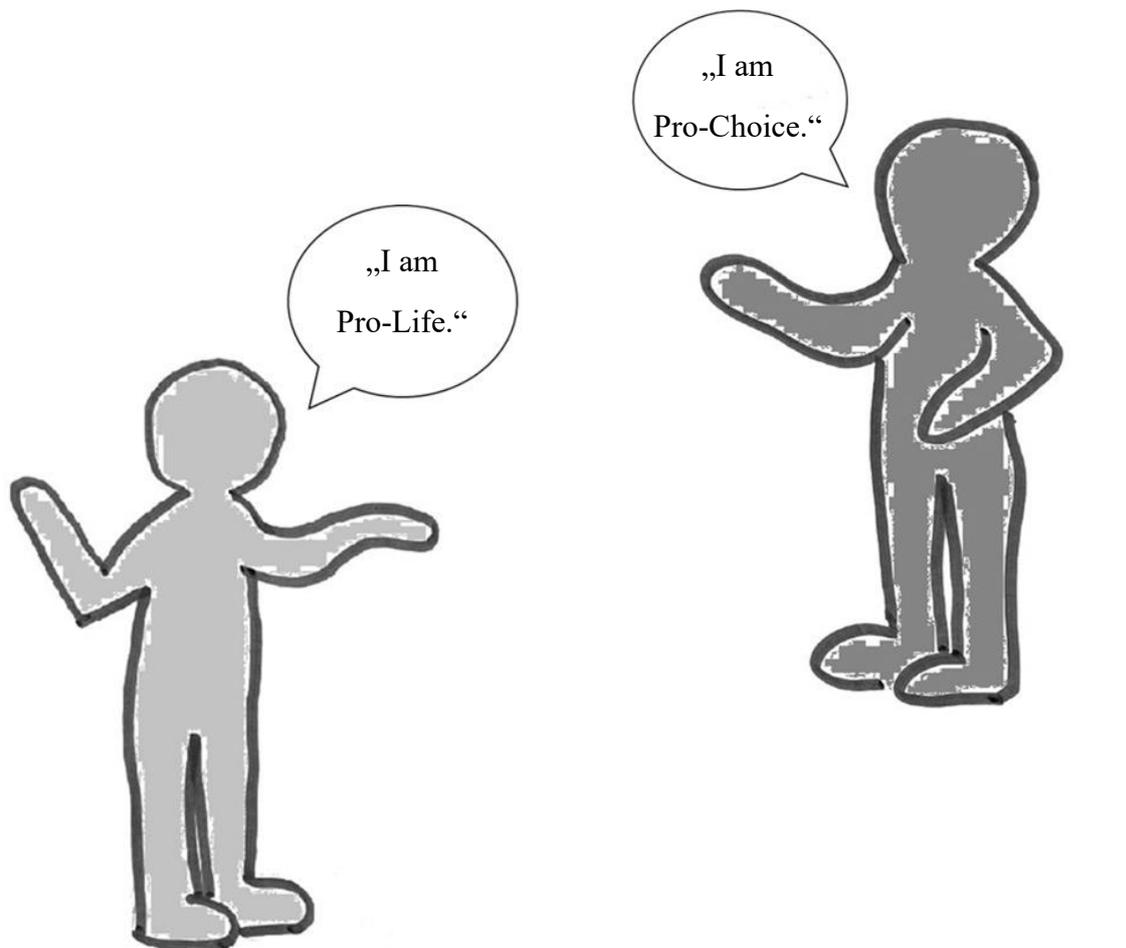
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#### *Complete list of variables assessed in Experiment 2.3:*

- Own opinion about the topic
- Certainty about own opinion (1 item)
- Perception of the majority opinion
- Certainty about the perception of the majority opinion (1 item)
- Manipulation of faced opinion with train scenario paradigm (either Pro-Choice or Pro-Life)
- Readiness to respond
- Type of opinion expression (only when participants decided to respond; 1 item)
- Fear of backlash from others
- Self-efficacy (see Experiment 2.1)
- Willingness to express one's own opinion (see Experiment 2.1)
- Importance to generally make a right judgment (see Experiment 2.1)
- Importance of the topic (see Experiment 2.1)
- Final opinion about the topic (1 item)
- Demographics (*native language, age, level of education, experimenting psychology, gender, ever been pregnant, currently pregnant, any children, religion, work field, used device, location*)

Assessment of own opinion about the topic

Please read the statements of the two people.



Which of these two people would you rather agree with? The upper one or the lower one?

(-1 = the upper one [Pro-Choice], 1 = the lower one [Pro-Life])

Assessment of majority opinion (minority opinion = Pro-Life)

What do you think is the majority of the Great Britain population (England, Wales, Scotland)

Pro-Choice or Pro-Life?

- The majority of the population of Great Britain is Pro-Choice. (1)
- The majority of the population of Great Britain is Pro-Life. (2)

Manipulation of faced opinion with train scenario paradigm

*All arguments (1 to 8) were randomized. After each argument, participants were asked whether they want to respond (see “readiness to respond”) and how they want to respond to what they read (“type of opinion expression”).*

Imagine you have a **five-hour train ride** ahead of you, and there are three people in your compartment expressing their opinion about the (il)legalization of abortion. All three people express their opinion for **Pro-Choice/Pro-Life**. The conversation is divided into different sections. We are interested in whether you would like to express your opinion in this situation for each section.

Therefore, after each section, you have the opportunity to respond to what has been said to indicate your readiness to respond. Afterwards, you have the opportunity to agree or disagree with what had been said. Please decide as quickly as possible after each section of the conversation whether you would respond. If you do not wish to express your opinion in this situation, please continue with the experiment.

**[condition Pro-Choice]**

*Argument Pro-Choice 1*

Speaker 1: An abortion should be legal when a woman’s mental health is endangered. To have an unwanted child comes along with mental strain and causes a lot of stress.

*Argument Pro-Choice 2*

Speaker 2: Adoption is not an alternative to abortion. Adoption still requires women to carry a baby to term and then give birth, both of which are also inherently dangerous under some circumstances.

*Argument Pro-Choice 3*

Speaker 3: Teenagers who are pregnant are often shunned and ashamed of their pregnancy, and when they become mothers, they have grim prospects for the future. For example, they are much more likely to leave school or receive inadequate prenatal care.

*Argument Pro-Choice 4*

Speaker 1: Even if the preborn has an inherent right to live, this right is superseded by the mothers' right to autonomy. Banning abortion violates a woman's right to control her own body.

*Argument Pro-Choice 5*

Speaker 2: Nearly all abortions take place in the first trimester when a fetus is supported by the placenta and cannot exist outside the mothers' womb. As such, the fetus cannot be regarded as a separate entity.

*Argument Pro-Choice 6*

Speaker 3: An unwanted child will certainly not have a good life and often grows up without much love and affection. It's better to abort a child than for it to live as an unwanted child.

*Argument Pro-Choice 7*

Speaker 1: It is undeniably a fact that women will seek abortions nonetheless even when they're illegal. If we end abortion, we'll go back to thousands of women dying from back-alley abortions.

*Argument Pro-Choice 8*

Speaker 2: Pregnancy can occur even with responsible contraceptive use. Only a few women who have abortions do not use any form of birth control, and that is due more to individual carelessness than to the availability of abortion.

**[condition Pro-Life]***Argument Pro-Life 1*

Speaker 1: Even a nonviable, undeveloped human life is sacred and must be protected by the government. Thus, abortion should not be legal at any time or week of pregnancy.

*Argument Pro-Life 2*

Speaker 2: While it is certainly true that a woman's body is greatly affected by a pregnancy, it is not true that abortion is just about doing something with her body. Abortion does not remove some part of the woman's body; it destroys the body of a separate individual.

*Argument Pro-Life 3*

Speaker 3: Aborting a child just because the wife or family cannot afford it financially or can't provide for the child is simply not reasonable or proportionate.

*Argument Pro-Life 4*

Speaker 1: To have an abortion when the woman's mental health is at risk is contradictory. After all, an abortion causes intense psychological pain and stress. Thus, this can't justify an abortion.

*Argument Pro-Life 5*

Speaker 2: *Adoption is a viable alternative to abortion and accomplishes the same result. And with a lot of families wanting to adopt a child, there is no such thing as an unwanted child.*

*Argument Pro-Life 6*

Speaker 3: Abortions are dangerous. Not only can a lot of things go wrong during an abortion, but an abortion also can result in medical complications later in life; the risk of ectopic pregnancies doubles and the chance of a miscarriage and pelvic inflammatory disease also increases.

*Argument Pro-Life 7*

Speaker 1: Those who choose abortions are often minors or young women with insufficient life experience to understand fully what they are doing. And many of these women have feelings of regret and guilt after an abortion.

*Argument Pro-Life 8*

Speaker 2: If a woman is willing to have unprotected sex, she's knowingly taking the risk of getting pregnant and should be responsible for her actions.

*Readiness to respond*

After each argument (1 to 8), participants were asked whether they would respond to the argument they saw.

- Would you respond to what has been said?

(0 = no, 1 = yes)

*Assessment of fear of backlash from others*

- In this situation, I could freely and openly state my opinion regarding Pro-Life/Pro-Choice.
- It feels like the other people are trying to understand my point.
- I fear that a conversation about Pro-Life/Pro-Choice would lead to an aggressive discussion.
- I fear that it would be an unpleasant conversation if I would say my opinion.
- I fear that I would be alone regarding my opinion about Pro-Life/Pro-Choice.

(1 = completely disagree, 7 = completely agree)

## **B.2 Supplementary information for Chapter IIb**

### **B.2.1 Preregistrations and explanation for deviations**

#### *Overview of preregistered analyses and deviations*

For both Experiments, we preregistered alternative hypotheses, which are also plausible based on the existing literature and have already been raised and received some consideration in the dissertation. However, I did not discuss or analyze these alternative hypotheses in detail due to the extensive evidence for the main hypothesis and to decrease the storyline's complexity.

<b>Experiment</b>	<b>Deviation</b>
Experiment 2.4 and 2.5	We preregistered that when facing an opposing opinion, people holding an opinion shared by the minority (holding a minority opinion) express themselves less, after a longer delay, and later in a conversation than people holding a majority opinion. However, only a local minority/majority was given due to the faced interaction partners, who always held the same opinion (Experiment 2.4: facing two people; Experiment 2.5: facing three people). No actual majority opinion towards the topic existed. Accordingly, we focused on the main effect of faced opinion (whether participant faced an opposing or confirming opinion) on the respective dependent variables. This also applies to the hypothesis on opinion adaptation (H2).
Experiment 2.4	We further deviated from our preregistration for Experiment 2.4 as we used for H1c the first response and not the last response to the conversation. Otherwise, we would have had an inverted Poisson distribution which would have made interpreting the results difficult.

Multi-level analyses were conducted for H1a-H1c and a linear model for H2 due to the nature of data instead of ANOVAs. For H2, the wording is a bit clumsy. We used the label “being in the minority or majority” but defined this as participants are allocated to either hear a discussion that is contrary to their opinion (minority) or equal (majority). Hence, in the labels of Chapter IIa, this would be the main effect of faced opinion. We adapted our analyses accordingly.

Experiment 2.5 We conducted the same analyses as in Experiment 2.3 and 2.4 for H2 (opinion adaption) and not a General linear model due to consistency. As in Experiment 2.3 and 2.4, we ran the analysis with the predictor faced opinion (confirming vs. opposing) compared to the preregistered factor status condition (minority vs. majority) due to the previously mentioned aspects.

*Variable labels in the dissertation and preregistrations*

<b>Experiment</b>	<b>Label in the dissertation</b>	<b>Label in preregistrations</b>
Experiment 2.4	opinion	attitude
and 2.5	express	speak

## Preregistration for Experiment 2.4

Created: 06/04/2018 11:00 AM (PT)

Shared: 04/08/2021 12:48 AM (PT)

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This pre-registration is not yet public. This anonymized copy (without author names) was created by the author(s) to use during peer-review. A non-anonymized version (containing author names) will become publicly available only if an author makes it public. Until that happens the contents of this pre-registration are confidential.

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### 1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

### 2) What's the main question being asked or hypothesis being tested in this study?

RQ: Do minorities behave differently from majorities when it comes to expressing opinions?

Based on theorizing and findings on the spiral of silence, one could predict:

- Hypothesis 1a: When being confronted with the opposite attitude, people holding an attitude shared by a minority speak (a) less often (DV1), (b) with a longer delay (DV2), and (c) later in the conversation about their attitude (DV3) than people holding a majority attitude.
- Hypothesis 2a: People holding a minority attitude adapt their opinions more to opposing opinions (DV4) than majorities in the course of a discussion.

Based on the assumption that deviating opinions contribute more new information one could alternatively predict:

- Hypothesis 1b: People holding an attitude shared by a minority speak (a) more often, (b) with a shorter delay, and (c) earlier in the conversation about their attitude than people holding a majority attitude.
- Hypothesis 2b: People holding a minority attitude adapt their opinions less to opposing opinions than majorities in the course of a discussion.

### 3) Describe the key dependent variable(s) specifying how they will be measured.

DV1: Whether the participants react to what has been said or not by pressing a button

DV2: Time duration till participants react after they heard an argument

DV3: Time/amount of arguments participants heard till they stop to react

DV4: change of initial position after they heard all arguments

Predictor1: initial opinion of the participants, which will be asked on a 10-point scale (1-5 pro implementation of a Veggie Day, 6-10 against the implementation of a Veggie Day)

Predictor2: Being in the majority or minority (participants are randomly allocated to either hear a discussion that is contrary to their opinion (minority) or equal (majority))

### 4) How many and which conditions will participants be assigned to?

Four between-participant conditions: based on (a) the assessed variable initial opinion pro or contra the implementation of a veggie day in the canteens 2 (initial opinion: pro/contra veggie Day) and (b) being confronted with the same or an opposition position in a recorded conversation 2 (arguments in the discussion: majority or minority position)

### 5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

The hypotheses will be tested using F-tests (ANOVA: fixed effects, special, main effects and interactions) separately for each of the four dependent variables.

### 6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Prerequisites for participation:

- fluent in German (language-sensitive materials)
- age between 18 and 35 years (materials designed for typical undergraduates)
- non-psychology students (reduce demand effects)
- not suspicious of hypotheses (reduce demand effects)

Note that any participants who wish to withdraw their data will be deleted before analysis.

### 7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

Due to the hypothesis we aiming at  $N = 171$  (based on  $G^*$ power: power of .90, alpha-error probability .05, expected medium effect size:  $f = .25$ , based on conjecture, power = .90). We will recruit as many participants as possible (at least  $N = 171$ ) to compensate for drop-outs. The study will run in the lab from 5th of June 2018 on (2 weeks planned).

### 8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

- For exploratory purposes we assessed the following variables: the certainty about the initial and concluding opinion, whether participants put forward further arguments, perceived fear of social isolation, task characteristics (objectively right vs. attitude), subjective importance of topic and right decisions and communicative self-efficacy
- exploratory analyses to test whether effects are moderated or altered by the above mentioned exploratory variables
- Participants will per default listen to a discussion of speakers of the same gender. If they indicate a gender different from male or female, they will be assigned female speakers.

Preregistration for Experiment 2.5

Created: 01/18/2019 01:25 AM (PT)

Shared: 04/08/2021 12:49 AM (PT)

This pre-registration is not yet public. This anonymized copy (without author names) was created by the author(s) to use during peer-review.  
A non-anonymized version (containing author names) will become publicly available only if an author makes it public. Until that happens the contents of this pre-registration are confidential.

**1) Have any data been collected for this study already?**

No, no data have been collected for this study yet.

**2) What's the main question being asked or hypothesis being tested in this study?**

RQ: Do minorities behave differently from majorities when it comes to expressing opinions?

Based on theorizing and findings on the spiral of silence, one should predict:

- Hypothesis 1a: When being confronted with the opposite attitude, people holding a minority attitude speak (i) less often (DV1), (ii) with a longer delay (DV2), and (iii) later in the conversation about their attitude (DV3) than people holding a majority attitude.
- Hypothesis 2a: People holding a minority attitude adapt their opinions more to opposing opinions (DV4) than people holding a majority attitude in the course of a discussion.

Based on the assumption that deviating opinions have a higher informative value one could alternatively predict:

- Hypothesis 1b: People holding a minority attitude speak (i) more often, (ii) with a shorter delay, and (iii) earlier in the conversation about their attitude than people holding a majority attitude.
- Hypothesis 2b: People holding a minority attitude adapt their opinions less to opposing opinions than people holding a majority attitude in the course of a discussion.

**3) Describe the key dependent variable(s) specifying how they will be measured.**

DV1: Whether the participants react to what has been said or not by pressing a button

DV2: Response times of those reactions.

DV3: Number of arguments participants heard when they react for the first time

DV4: Change of initial position after they heard all arguments

(Main) Predictor: Minority versus majority status (see point 4).

Predictor2: initial opinion of the participants, which will be asked on a 10-point scale

**4) How many and which conditions will participants be assigned to?**

Four between-participant conditions: based on

- participants' initial opinion pro or contra the implementation of a Veggie Day (10-point-scale: 1-5 pro implementation of a Veggie Day, 6-10 against the implementation of a Veggie Day)
- being in the minority vs. majority with one's opinion (participants listen to a discussion between three people that share the same or hold the opposite opinion)

**5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.**

The hypotheses will be tested using multilevel analyses (unless indicated otherwise) for each of the four dependent variables.

Models addressing hypotheses 1i and 1ii contain random intercepts for participants, the first trial (we assume that the reaction on this trial may be different to the other trials, because participants need to get used to the paradigm) and for the true argument (arguments may vary slightly in length) and fixed effects for the predictors. Reaction times will be log transformed to correct for skewed distribution.

Hypothesis 1iii will be tested by using a General Linear Model (due to an assumed Poisson distribution of the dependent variable). If no Poisson distribution of the data is obtained, identical multilevel analyses as in hypotheses 1i and 1ii will be conducted.

For Hypothesis 2 we specify random intercepts for participants. The factors status condition (minority vs. majority), attitude expressed in the discussion and phase/period will be treated as fixed effects.

**6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.**

- fluent in German (language-sensitive materials)
- age between 18 and 35 years (materials designed for typical undergraduates)
- non-psychology students
- not suspicious of hypotheses (reduce demand effects)

Note that any participant who wishes to withdraw their data will be removed from the data set.

**7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.**

We aim at collecting data of  $N = 200$  participants. We will stop data collection once we have reached 200 participants or when the end of the survey period is reached (the study will run in the lab from January 21 - February 1 2019). This procedure also ensures our desired power (based on  $G^*$ power: power of .90, alpha-error probability .05, expected medium effect size:  $f = .25$ , based on conjecture, power = .90;  $N = 171$ ).

**8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)**

- For exploratory purposes we will assess the following variables (moderators): the certainty about the initial and final opinion, whether participants want to put forward further arguments, perceived fear of social isolation, perceived task characteristics (objectively correct decision regarding the topic?), subjective importance to make a right decision in general of the topic as well as subjective communicative self-efficacy.
- Per default, participants will listen to a discussion of speakers of the same gender. If they indicate a gender different from male or female, they will be assigned female speakers.
- To check whether it makes a difference whether participants believe they already know the material (e.g. from other studies), this is collected for exploratory analysis.

## B.2.2 Additional preregistered analyses for Experiment 2.4 and 2.5

### Additional preregistered analyses for Experiment 2.4

**Opinion adaption:** We preregistered that people holding a minority opinion adapt their opinion more to opposing opinions in a discussion than people holding a majority opinion. As mentioned in the overview of preregistered analyses and deviations, the minority/majority opinion was only given by the group of faced interaction partners. We further defined a minority as facing an opposing opinion within the situation. Hence, we focused on whether people adapt their opinion more to the heard opinion when facing an opposing than confirming others' opinion. Initial and final opinion were assessed on a 10-point-scale. Lower values on the final opinion scale indicated a stronger tendency towards being against and higher values a stronger tendency to favor implementing a Veggie Day. *Initial opinion* was recoded to a two-level scale. Responses from 1 to 5 were coded as in favor (1), and responses from 6 to 10 as against (-1) a Veggie Day.

To test our assumption, we ran a linear Model as in Experiment 2.3 with the final opinion as dependent variable and own opinion (against: -1, in favor: 1) and faced opinion (confirming: -1, opposing: 1) as independent variables. A main effect of own opinion emerged,  $B = 2.48$ ,  $SE = 0.18$ ,  $t(174) = 13.95$ ,  $p < .005$ , 95%-CI [2.127; 2.827], indicating that people who hold an opinion in favor of a Veggie Day indicated higher values on the final opinion scale (thus, indicated to be in favor of a Veggie Day after they heard the arguments;  $M = 8.35$ ,  $SD = 2.30$ ), compared to people who held an own opinion against the implementation of a Veggie Day ( $M = 3.32$ ,  $SD = 2.46$ ). The main effect of faced opinion was marginal,  $B = 0.35$ ,  $SE = 0.18$ ,  $t(174) = 1.96$ ,  $p = .052$ , 95%-CI [-0.002; 0.698], showing a trend that people who faced an opposing opinion indicated higher final opinion values ( $M = 6.29$ ,  $SD = 3.40$ ) than people who faced a confirming opinion ( $M = 5.12$ ,  $SD = 3.45$ ). However, the interaction of both predictors was not significant,  $B = -0.29$ ,  $SE = 0.18$ ,  $t(174) = -1.63$ ,  $p = .105$ , 95%-CI [-0.639; 0.061]. For descriptive statistics for Experiment 2.4 and 2.5 on *final opinion* see Table A.

Additional preregistered analyses for Experiment 2.5

**Opinion adaption:** As in Experiment 2.4, we similarly preregistered that people holding a minority opinion adapt their opinion more to opposing opinions than people holding a majority opinion in the course of a discussion. Since the faced interaction partners specified whether one had a minority or majority opinion, we conducted our analysis in the same way as for Experiment 2.4, with final opinion as dependent variable and own opinion (against: -1, in favor: 1) and faced opinion (confirming: -1, opposing: 1) as predictors. Again, higher values on the final opinion scale indicated a stronger tendency towards being in favor of implementing a Veggie Day.

Results revealed a main effect of own opinion,  $B = 2.35$ ,  $SE = 0.18$ ,  $t(184) = 13.01$ ,  $p < .005$ , 95%-CI [1.995; 2.708]. People who hold an opinion in favor of a Veggie Day indicated higher values on the final opinion scale (and thus, a stronger tendency in favor of a Veggie Day;  $M = 7.96$ ,  $SD = 2.60$ ) compared to people who held an own opinion against a Veggie Day ( $M = 3.17$ ,  $SD = 2.31$ ). No main effect of faced opinion emerged,  $B = 0.22$ ,  $SE = 0.18$ ,  $t(184) = 1.23$ ,  $p = .220$ , 95%-CI [-0.134; 0.579], but a significant interaction of own and faced opinion,  $B = -0.71$ ,  $SE = 0.18$ ,  $t(184) = -3.95$ ,  $p < .001$ , 95%-CI [-1.071; -0.358]. Pairwise comparisons revealed that people who initially favored the implementation of a Veggie Day and faced an opposing (compared to confirming) opinion were less strongly in favor after the conversation (i.e., indicated lower values of the final opinion),  $\Delta M = -0.49$ ,  $SE = 0.22$ , 95%-CI = [-0.933; -0.052]. Similarly, people who were against the implementation of a Veggie Day and faced an opposing (compared to confirming) opinion indicated a stronger tendency to favor a Veggie Day after the conversation,  $\Delta M = 0.94$ ,  $SE = 0.28$ , 95%-CI = [0.376; 1.498]. Accordingly, as assumed, people facing an opposing opinion seem to adapt their opinion more to the faced opinion compared to people who faced a confirming opinion.

Table A

*Means and (Standard Deviations) for final opinion for Experiments 2.4 and 2.5*

Own opinion	Against		In favor	
	Confirming	Opposing	Confirming	Opposing
Faced opinion	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>
Experiment 2.4				
Final opinion	2.75 (1.88)	4.02 (2.91)	8.28 (2.34)	8.40 (2.29)
Experiment 2.5				
Final opinion	2.31 (1.54)	4.18 (2.65)	8.44 (2.24)	7.46 (2.86)

### **B.2.3 Instructions and main measures for Experiment 2.4**

(original material was in German)

In this section, all critical instructions and manipulations used in Experiment 2.4 are provided in more detail. If the number of items is given, concepts have been assessed for exploratory purposes, but data is not presented in the empirical Chapters.

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#### Complete list of variables assessed in Experiment 2.4:

- *Own opinion about the topic among filler items*
- *Certainty about own opinion (1 item)*
- Demographics (3 items: age, gender, *mother tongue*)
- Manipulation of faced opinion with multi-level paradigm (either in favor or against implementing a Veggie Day); The verbatim (in German) version of the arguments is provided in parentheses, as subtle but essential differences in wording might not be fully captured by the English translations.
- Readiness to respond
- Type of opinion expression (only when participants decided to respond; 1 item)
- Importance of the topic (1 item)
- Importance to generally make a right judgment (1 item)
- *Accuracy (2 items)*
- Fear of backlash from others
- Final opinion about the topic (1 item)
- Certainty about final opinion (1 item)
- The perception of the majority opinion among students (1 item)
- Certainty about the perception of the majority opinion among students (1 item)
- Self-efficacy (7 items)

- Demographics (*age, gender, mother tongue, subject of study, familiarity with experiment, number of studies taken*)

Assessment of own opinion about the topic among filler items

In the first part of the study set, we want to learn more about students' opinions and views at the University of Tübingen on specific social and general topics. Please note that there are no right or wrong answers; we are only interested in your honest assessment.

Please indicate to what extent you agree with the following statement.

*(A 10-point scale was presented with the following two anchors:)*

1 - The canteen should offer only vegetarian and vegan food and no meat on certain days (Veggie Day), 10 - The canteen should not introduce a fixed meat-free day (Veggie Day). There should always be a meat option to choose from.

Manipulation of faced opinion with multi-level-paradigm (either in favor or against an implementation of a Veggie Day)

*(Instructions for „in favor” and „against” were similar apart from minor alterations. These are marked bold.)*

In the following, we ask you to listen to a conversation between two people. Please put on the headsets provided. The situation is as follows: You are at a party of friends from university. You have been standing in the kitchen with two other people from the party for some time. One of the two people brings up the implementation of Veggie Day in canteens, and a conversation develops. Both express **opposition to/advocacy for** the implementation of a Veggie Day.

The conversation consists of an exchange of different contributions. As with any conversation, at the end of it, you have the opportunity to comment on what has been said or to continue listening.

Please press the space bar if you would express an opinion on what has been said in this situation. If you do not wish to express an opinion and want to continue listening, please wait until the next person takes the floor. We want to emphasize that there is no right or wrong in your decision to express or not to express your opinion. Please decide as soon as possible whether you want to express your opinion or not.

### **[pre-taped arguments against an implementation of a Veggie Day]**

(Arguments were presented in randomized order except for Argument 1 which was always presented first)

#### *Argument 1 against a Veggie Day*

Speaker 1: “Hey, have you also heard that Veggie Day is to be implemented in the Tübingen canteens? What do you think about it? Well, as far as I’m concerned, I think that having a larger and more diverse offer is not bad in itself. But first, we should do something good for our fellow human beings, then for the environment! Instead of a regular Veggie Day, priority should be given to introducing regular offerings for people with diabetes and people with food intolerances. Vegetarian food has always been a choice, but dishes like this are not!”

(“Hey, habt ihr auch schon gehört, dass der Veggie Day in den Tübinger Mensen eingeführt werden soll? Was haltet ihr denn so davon? Also ich für meinen Teil finde, dass...ein größeres und vielfältigeres Angebot zu haben, an sich ja nicht schlecht ist. Aber zuerst sollten wir unseren Mitmenschen etwas Gutes tun, dann der Umwelt! Statt eines regelmäßigen Veggie-Days sollte die Einführung regelmäßiger Angebote für Diabetiker und Menschen mit Lebensmittelunverträglichkeiten Priorität haben. Vegetarisches Essen steht schon immer zur Wahl, aber solche Gerichte nicht!“)

*Argument 2 against a Veggie Day*

Speaker 2: “Of course, meat from factory farming contains antibiotics and such. But that is an argument for buying meat from species-appropriate or organic animal husbandry and for doing without mass-produced goods, and not for introducing a Veggie Day.”

(“Klar enthält Fleisch aus Massentierhaltung Antibiotika und so was. Aber das ist doch ein Argument dafür, Fleisch aus artgerechter oder biologischer Tierhaltung zu kaufen und auf Massenware zu verzichten und nicht einen Veggie-Day einzuführen.“)

*Argument 3 against a Veggie Day*

Speaker 1: “Of course, too much meat consumption is not good for the environment, but the alternatives are not necessarily either. What is sustainable about importing soy products and trendy superfoods from overseas? In any case, it is much more sustainable to buy regional meat than soy products.”

(“Klar ist zu hoher Fleischkonsum nicht gut für die Umwelt, aber die Alternativen sind es auch nicht unbedingt. Was soll denn am Import von Soja-Produkten und modischem Superfood aus Übersee nachhaltig sein? Da ist es auf jeden Fall viel nachhaltiger, regionales Fleisch einzukaufen, als Soja-Produkte.“)

*Argument 4 against a Veggie Day*

Speaker 2: “Of course, high meat consumption is not good for the environment, but vegetarian food is no better! Regional organic cultivation of vegetables and soy is so expensive and time-consuming that the canteen would buy only cheap imported food anyway, which in turn wouldn't have a positive environmental effect.”

(“Natürlich ist ein hoher Fleischkonsum nicht gut für die Umwelt, aber vegetarische Ernährung ist da auch nicht besser! Regionaler Bio-Anbau von Gemüse und Soja ist so teuer

und aufwendig, dass die Mensa sowieso nur importierte Lebensmittel billig einkaufen würde, was wiederum keinen positiven Umwelteffekt hätte.“)

*Argument 5 against a Veggie Day*

Speaker 1: “Exactly, and it is nice that the university canteen tries to make students aware of the effects of our consumption on the environment. However, students should learn to live independently and take responsibility for their actions. If they are told how to eat, they will never grow up and learn to reflect on their behavior and form their own opinions about meat consumption and environmental issues.”

(“Ganz genau und es ist ja schön, dass die Uni-Mensa versucht, Studierende die Auswirkungen unseres Konsums auf die Umwelt bewusst zu machen. Allerdings sollten gerade Studierende lernen, eigenständig zu leben und selbst Verantwortung für ihre Handlungen zu tragen. Schreibt man ihnen vor, wie sie sich zu ernähren haben, werden sie niemals erwachsen und lernen nicht, ihr eigenes Verhalten zu reflektieren und sich selbst eine Meinung zum Fleischkonsum und zu Umweltthemen überhaupt zu bilden.“)

*Argument 6 against a Veggie Day*

Speaker 2: “I think the idea of a Veggie Day is bullshit. Let everyone decide for themselves what they eat and what they don’t. If a measure is imposed, it tends to lead to dissatisfaction and rejection, even if it is well-intentioned. But I am also generally not a friend of state paternalism. Mature and hopefully enlightened citizens can be trusted to think and make decisions. To constantly dictate to people is definitely not a healthy understanding of freedom and liberality.”

(“Ich finde, die Idee eines Veggie Days ist Schwachsinn. Soll doch jeder selbst entscheiden, was er isst und was nicht. Wenn eine Maßnahme aufgezwungen wird, führt das eher zu Unzufriedenheit und Ablehnung, auch wenn sie eigentlich gut gemeint ist. Ich bin aber

auch allgemein kein Freund der staatlichen Bevormundung. Mündigen und hoffentlich aufgeklärten Bürgern darf man ruhig etwas Denken und Entscheiden zutrauen. Menschen ständig Vorschriften zu machen, ist definitiv kein gesundes Verständnis von Freiheit und Liberalität.“)

*Argument 7 against a Veggie Day*

Speaker 1: “In my estimation, it is also not negligible that vegan and partly vegetarian food is much more expensive than meat. All meat substitutes come from far away or are quite hip at the moment, so Mensa prices would have to get higher. However, I don’t see spending more money on my lunch.”

(„Meiner Einschätzung nach ist es auch nicht zu vernachlässigen, dass veganes und teilweise auch vegetarisches Essen viel teurer ist als Fleisch. Sämtliche Fleisch-Ersatzprodukte kommen von weit her oder sind momentan ziemlich hip, sodass die Mensa-Preise höher werden müssten. Ich sehe allerdings nicht ein, mehr Geld für mein Mittagessen auszugeben.“)

*Argument 8 against a Veggie Day*

Speaker 2: “Absolutely. I’m right there with you. Constantly telling people what to do is not a healthy understanding of freedom and liberality. If I don’t want to contribute to environmental protection, then I don’t do it. No one can tell me to eat something against my will! Politics should not interfere with my eating habits.”

(„Absolut. Da bin ich voll bei dir. Menschen ständig Vorschriften zu machen, ist kein gesundes Verständnis von Freiheit und Liberalität. Wenn ich meinen Beitrag zum Umweltschutz nicht leisten will, dann lasse ich es. Mir kann doch keiner vorschreiben, etwas gegen meinen Willen zu essen! Die Politik sollte sich nicht in meine Essgewohnheiten einmischen.“)

*Argument 9 against a Veggie Day*

Speaker 1: “Of course, people should be made aware that excessive meat consumption is bad for the environment. However, an enforced Veggie Day could polarize and lead to resentment towards vegetarians or the vegetarian lifestyle. Thus, a Veggie Day would be rather counterproductive.”

(“Natürlich sollte man den Menschen klar machen, dass übermäßiger Fleisch-Konsum schlecht für die Umwelt ist. Ein erzwungener Veggie-Day könnte allerdings polarisieren und zu Unmut gegenüber Vegetariern bzw. der vegetarischen Lebensweise führen. Somit wäre ein Veggie-Day also eher kontraproduktiv.“)

*Argument 10 against a Veggie Day*

Speaker 2: “In addition to this aspect, it must also be mentioned that it almost sounds as if a single meatless meal per week would make a difference. I find that ridiculous because privately meat is still on the menu for all German students. So, a Veggie Day would just be a drop in the bucket!”

(“Neben diesem Punkt muss auch noch gesagt werden, dass es ja fast schon so klingt, als würde eine einzelne fleischlose Mahlzeit pro Woche etwas bewirken. Ich finde das lächerlich, weil privat dann immer noch bei allen deutschen Studierenden Fleisch auf dem Speiseplan steht. Ein Veggie-Day wäre also ein Tropfen auf dem heißen Stein!“)

*Argument 11 against a Veggie Day*

Speaker 1: “Of course, one can introduce a Veggie Day. However, I believe the implementation of a Veggie Day would be financially bad for canteens. Fewer students would surely come to eat on that day of the week and prefer to eat outside, where they can still get what they want.”

(“Natürlich kann man einfach einen Veggie-Day einführen, allerdings glaube ich wäre die Einführung eines Veggie-Days finanziell schlecht für die Mensa. Es würden an diesem

Wochentag sicher weniger Studierende zum Essen kommen und lieber außerhalb essen, wo sie noch bekommen, was sie wollen.“)

*Argument 12 against a Veggie Day*

Speaker 2: “Indeed! But what I also find important is that many students consciously eat less meat anyway and take the dishes from the vegetarian offer in the refectory. Therefore, introducing a measure like Veggie Day is completely unnecessary.”

(“Genau! Was ich aber auch noch wichtig finde ist, dass ein Großteil der Studierenden sowieso bewusst weniger Fleisch isst und in der Mensa die Gerichte aus dem vegetarischen Angebot nimmt. Eine Maßnahme wie den Veggie Day einzuführen ist daher vollkommen unnötig.“)

**[pre-taped arguments in favor of an implementation of a Veggie Day]**

*Argument 1 in favor of a Veggie Day*

Speaker 1: “Hey, have you also heard that a Veggie Day is to be implemented in the Tübingen canteens? What do you think about it? Well, I think that many students, regarding liberality and freedom of choice, insist on their right to eat meat is all well and good but at the expense of animals? This also supports factory farming, in which sometimes 100,000 animals are kept on a farm. Simply a cheek!”

(„Hey, habt ihr auch schon gehört, dass der Veggie Day in den Tübinger Mensen eingeführt werden soll? Was haltet ihr denn so davon? Also ich für meinen Teil finde ja, dass viele Studierende, mit Verweis auf Liberalität und Entscheidungsfreiheit, auf ihr Recht pochen Fleisch zu essen ist schön und gut aber das auf Kosten von Tieren? Dadurch wird ja auch die Massentierhaltung unterstützt, bei der Teils 100.000 Tiere in einem Betrieb gehalten werden. Einfach eine Frechheit!“)

*Argument 2 in favor of a Veggie Day*

Speaker 2: “I agree with you. But I would like to add something. From our tradition alone, it is not normal to eat meat every day. For example, among Christians, Friday was originally meat-free. Of course, it is difficult to justify such a thing by traditions. I simply mean that there can be different reasons to introduce a meat-free day.”

(„Das sehe ich auch so. Aber ich würde gerne noch etwas ergänzen. Allein schon von unserer Tradition her ist es nicht normal, dass jeden Tag Fleisch gegessen wird. Zum Beispiel war bei den Christen der Freitag eigentlich fleischfrei. Es ist natürlich schwierig sowas über Traditionen zu rechtfertigen. Ich mein einfach, dass es verschiedene Gründe geben kann einen fleischfreien Tag einzuführen.“)

*Argument 3 in favor of a Veggie Day*

Speaker 1: “It is much more important that it is morally unjustifiable to consume meat from factory farming. If no meat dishes are offered on certain days, it is simply morally better.”

(“Viel wichtiger ist, dass es moralisch nicht zu verantworten ist, das Fleisch aus Massentierhaltungen konsumiert wird. Wenn an bestimmten Tagen kein Fleischgericht angeboten wird, ist das moralisch einfach besser.“)

*Argument 4 in favor of a Veggie Day*

Speaker 2: “You must not forget that just because other measures - such as information boards - might make more sense, it doesn't mean that a Veggie Day is pointless. The more measures, the higher the hoped-for effect. So, a Veggie Day is just a start and should be introduced in any case.”

(“Du darfst auch nicht vergessen, dass nur weil andere Maßnahmen – wie Infotafeln – vielleicht sinnvoller sind, das nicht heißt, dass der Veggie Day unsinnig ist. Denn je mehr

Maßnahmen, desto höher wird der erhoffte Effekt. Der Veggie Day ist also nur ein Anfang und sollte auf jeden Fall eingeführt werden.“)

*Argument 5 in favor of a Veggie Day*

Speaker 1: “One should also consider that people nowadays eat way too much meat anyway. You should eat meat no more than three times a week. That is beneficial for your health. Unfortunately, many people simply don’t seem to admit that their meat consumption is too high, so perhaps they need to be taken by the hand a little.”

(“Es gibt auch noch zu bedenken, dass Menschen heutzutage eh viel zu viel Fleisch essen. Man sollte höchstens dreimal die Woche Fleisch essen. Das ist förderlich für die Gesundheit. Leider wollen viele ihren zu hohen Fleischkonsum auch einfach nicht einsehen, da müssen sie vielleicht ein wenig an der Hand genommen werden.“)

*Argument 6 in favor of a Veggie Day*

Speaker 2: “Absolutely, and only if one tries many different vegetarian dishes, one gets an impression of how it is to live without meat at all. It is not so difficult, at least not for single meals. That’s why I think a Veggie Day makes quite a sense.”

(“Genau, und erst wenn man mal viele verschiedene vegetarische Gerichte probiert, bekommt man überhaupt erst einen Eindruck davon, wie es ist ohne Fleisch zu leben. Nämlich gar nicht so schwierig, zumindest für einzelne Mahlzeiten. Daher finde ich einen Veggie Day durchaus sinnvoll.“)

*Argument 7 in favor of a Veggie Day*

Speaker 1: “I think a Veggie Day is great. The canteen can act as a role model on this topic and spread a healthier and more sustainable diet among students. One almost has to demand that

from university institutions, especially at the University of Tübingen, which puts a lot of emphasis on sustainability.”

(“Einen Veggie Day finde ich echt klasse. Die Mensa hat die Möglichkeit, bei diesem Thema als Vorbild zu agieren und unter den Studierenden eine gesündere und nachhaltige Ernährung zu verbreiten. Das muss man ja fast schon von den universitären Einrichtungen verlangen, vor allem an der Tübinger Uni, die sehr viel auf das Thema Nachhaltigkeit gibt.“)

#### *Argument 8 in favor of a Veggie Day*

Speaker 2: “Of course, many students eat meat several times a week, but if they would do at least one meal without meat, it would already help them. After all, lower meat consumption goes hand in hand with lower obesity. So a Veggie Day would be a great start.”

(“Klar essen viele Studierende mehrmals pro Woche Fleisch aber wenn sie wenigstens eine Mahlzeit darauf verzichten würden, wäre ihnen ja schon geholfen. Immerhin geht ein geringerer Fleischkonsum mit einer geringeren Fettleibigkeit einher. So ein Veggie Day wäre daher ein toller Anfang.“)

#### *Argument 9 in favor of a Veggie Day*

Speaker 1: “I absolutely agree with you. Besides, the number of vegetarian or vegan students is increasing, so it’s only fair that they get a day a week where they can choose from more than one dish. All meat-eaters have many more options. I don’t think that this can be in the spirit of an active student community.”

(„Absolut, da bin ich voll bei Dir. Noch dazu wird die Anzahl der sich vegetarisch oder vegan ernährenden Mitstudierenden immer größer, da ist es nur fair, wenn die auch einen Tag in der Woche bekommen, an dem sie mehr als ein Gericht zur Auswahl haben. Alle Fleischessenden haben da ja viel mehr Möglichkeiten. Ich finde nicht, dass das im Sinne einer funktionierenden Studierendengemeinschaft sein kann.“)

*Argument 10 in favor of a Veggie Day*

Speaker 2: “Not to forget, even well-respected institutions, like the German society for nutrition, recommend for some time now to nourish oneself predominantly vegetarian. If a Veggie Day is introduced, people will start to look into the subject. Maybe they even come across studies on the subject and are convinced by science to eat less meat.”

(“Nicht zu vergessen ist, dass sogar renommierte Institutionen, wie die Deutsche Gesellschaft für Ernährung seit einiger Zeit empfehlen, sich vorwiegend pflanzlich zu ernähren. Wenn ein Veggie Day eingeführt wird fangen die Leute an sich mit dem Thema zu beschäftigen. Vielleicht stoßen sie so sogar auf Studien dazu und lassen sich von der Wissenschaft überzeugen, sich fleischärmer zu ernähren.“)

*Argument 11 in favor of a Veggie Day*

Speaker 1: “How can someone be against a Veggie Day? Surely canteens buy their meat from factory farming. Do we have the right to treat animals like this? If many large buyers of meat from factory farming would buy less, then finally there would perhaps be a positive development in this area. This is absolutely important! How can people close their eyes to something like this!”

(“Wie kann man nur gegen einen Veggie Day sein. Mensen kaufen ihr Fleisch doch bestimmt aus Massentierhaltung. Haben wir das Recht Tiere so zu behandeln? Würden viele große Abnehmer von Fleisch aus Massentierhaltung weniger einkaufen, dann gäbe es in diesem Bereich vielleicht endlich eine positive Entwicklung. Das ist doch total wichtig! Wie können die Leute vor so etwas nur die Augen verschließen!“)

*Argument 12 in favor of a Veggie Day*

Speaker 2: “Yes, of course, all people have the right to eat meat but please not to such an extent that global warming is significantly increased. Animals are responsible for almost 4% of the

climate-damaging gases that are produced in Germany every year. These are the hard facts, and many of these gases are produced by factory farming.”

(“Ja natürlich haben alle Menschen das recht Fleisch zu essen aber dann bitte nicht in so einem Ausmaß, dass die Klimaerwärmung deutlich vorangetrieben wird. Tiere sind nun mal für knapp 4% der klimaschädlichen Gase, die in Deutschland jährlich entstehen verantwortlich. Das sind die harten Fakten, und viele dieser Gase entstehen gerade in der Massentierhaltung.“)

### Readiness to respond

After each argument (1 to 12), participants were asked whether they would respond to the argument they heard.

- Would you respond to what has been said?

(0 = no, 1 = yes)

### Assessment of fear of backlash from others

- How strongly did you feel that you would be excluded if you speak up in the conversation?
- How strongly did you feel to be able to express your opinion freely?
- How strongly did you feel that you were in the minority with your opinion?<sup>19</sup>

(1 = not strongly at all, 7 = very strongly)

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<sup>19</sup> Analyses without this item do not change results significantly.

### **B.2.4 Instructions and main measures for Experiment 2.5**

(original material was in German)

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Complete list of variables assessed in this Experiment:

- Demographics (4 items: *mother tongue* age, field of study, gender)
- *Own opinion about the topic*
- *Certainty about own opinion (1 item)*
- Manipulation of faced opinion with multi-level-paradigm (either in favor or against an implementation of a Veggie Day; for arguments, see Experiment 2.4)
- Readiness to respond (see Experiment 2.4)
- Type of opinion expression (only when participants decided to respond; 1 item)
- Fear of backlash from others
- Final opinion about the topic (1 item)
- Certainty about final opinion (1 item)
- The perception of the majority opinion among students (1 item)
- Certainty about the perception of the majority opinion among students (1 item)
- Importance of the topic (1 item)
- Importance to generally make a right judgment (1 item)
- *Accuracy (2 items)*
- Self-efficacy (7 items)

*Assessment of own opinion about the topic*

Please indicate to what extent you agree with the following statement.

*(A 10-point scale was presented with the following two anchors:)*

1 - The canteen should offer only vegetarian and vegan food and no meat on certain days (Veggie Day), 10 - The canteen should not introduce a fixed meat-free day (Veggie Day). There should always be a meat option to choose from.

*Manipulation of faced opinion with multi-level-paradigm (either in favor or against an implementation of a Veggie Day)*

(Instructions for „in favor” and „against” were similar apart from minor alterations. These are marked bold.)

In the following part of the experiment, we ask you to listen to a conversation between three people. Please put on the headsets provided. The three persons are participants who have already taken part in a previous session and who will take part in a later study. In the previous study, the participants expressed their opinion about implementing a Veggie Day and formulated arguments for their respective position.

All three participants spoke **in favor of/against** an implementation of a Veggie Day. The resulting conversation was recorded and will be played back to you in a moment. This conversation is divided into different sections. After each section, you have the opportunity to respond to what was said by pressing a button.

At the end of this study part, we will record your opinion on the implementation of Veggie Day. We will then play your recordings to the three former participants you will hear in the following conversation. Please indicate after each part of the conversation whether you want to comment on what was said within your (following) recordings and thus let the other three participants

know about it. If you're going to comment on what was said, press the space bar. In the recording at the end, you will then be asked to comment on precisely these arguments.

Furthermore, we would like to invite you to enter a face-to-face dialogue with the three other participants in a follow-up study and directly discuss implementing a Veggie Day in Tübingen's canteens.

In the following, we ask you to listen to the conversation of the former participants. If you want to comment on what was said later, please press the space bar. Then you can indicate whether you disagree or agree with what was said. Please wait until the speakers have finished and you are asked whether you want to respond. Please decide as quickly as possible whether you wish to respond to the segment of the conversation or not. If you do not want to express an opinion, please wait until the next part of the conversation continues automatically. This takes a few seconds. Please put on the headsets provided at this point at the latest.

*Pre-taped arguments (in favor and against an implementation of a Veggie Day) were identical as in Experiment 2.4. For detailed arguments, see Experiment 2.4 (p.163-173). The only thing that varied was the number of speakers. In the following, it is stated which speaker brought forward which argument.*

**[pre-taped arguments against an implementation of a Veggie Day]**

Speaker 1: Argument 1, 3, 7, and 9 against a Veggie Day

Speaker 2: Argument 4, 8, 10, and 12 against a Veggie Day

Speaker 3: Argument 2, 5, 6, and 11 against a Veggie Day

**[pre-taped arguments in favor of an implementation of a Veggie Day]**

Speaker 1: Argument 1, 7, 9, and 11 in favor of a Veggie Day

Speaker 2: Argument 2, 4, 10, and 12 in favor of a Veggie Day

Speaker 3: Argument 3, 5, 6, and 8 in favor of a Veggie Day

*Assessment of fear of backlash from others*

- I feel I can express my opinion freely and openly in a subsequent discussion with these participants.
- I have the feeling that the other participants will accept me.
- I have the feeling that the other participants are interested in my position.
- *I fear that the other participants will reject me in a discussion.*
- *I have the feeling that the other participants share my opinion.*
- *I fear that the other participants will not take my opinion seriously.*
- *I feel like I would get a chance to speak in a discussion with these participants.*
- *I fear that the other participants will ignore my opinion.*
- *I am afraid that the other participants will not listen to me.*
- *I fear that I will be alone in this discussion group with my opinion.*

*(1 = do not agree at all, 7 = absolutely agree)*

## Appendix C

**Note:** No preregistration was made for Study 3.3.

### C.1 Supplementary information for Chapter IIIa

#### C.1.1 Preregistrations and explanation for deviations

##### Overview of preregistered analyses and deviations

Experiment	Deviation
Experiment 3.1	We deviate from the preregistration as in the analyses we report an interaction of own opinion and the overall rating instead of the preregistered main effect of <i>faced overall rating</i> . Faced overall rating, however, would be a combination of own opinion and overall rating, for instance, whether one faces an overall rating in line vs. not in line with one's own opinion. Hence, both analyses imply the same comparison of cells.

##### Variable labels in the dissertation and preregistrations

Experiment	Label in the dissertation	Label in preregistrations
Experiment 3.1	faced overall rating	holding a minority opinion vs. holding a majority opinion
Experiment 3.2	overall rating in line vs. not in line with one's own opinion	majority agrees/disagrees with the own opinion

Preregistration for Experiment 3.1

Created: 05/13/2019 08:15 AM (PT)

Shared: 04/08/2021 01:11 AM (PT)

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This pre-registration is not yet public. This anonymized copy (without author names) was created by the author(s) to use during peer-review. A non-anonymized version (containing author names) will become publicly available only if an author makes it public. Until that happens the contents of this pre-registration are confidential.

---

**1) Have any data been collected for this study already?**

No, no data have been collected for this study yet.

**2) What's the main question being asked or hypothesis being tested in this study?**

RQ: How does the contribution of written reviews differ depending on whether people hold a similar (vs. an opposing) opinion compared to the majority of customers when evaluating a product?

Two predictions can be derived based on previous study results and theoretical rationales:

- Hypothesis 1: Holding a minority opinion renders the contribution of a review less likely than holding a majority opinion.
- Hypothesis 2: Participants being in the minority with their opinion will write shorter (fewer words) contributions (reviews) than participants being in the majority

**3) Describe the key dependent variable(s) specifying how they will be measured.**

DV1: Whether (or not) participants write comments about a product in a text box that they are not required to fill out  
 DV2: length of the text (wordcount)

**4) How many and which conditions will participants be assigned to?**

Four conditions based on:

- (a) whether participants see a rating distribution confirming vs. disconfirming their opinion and therefore placing them in the minority or majority
- (b) whether they have rated the product positively or negatively

**5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.**

The hypotheses will be tested by using mixed ANOVAs separately for each DV to see if there is a difference between minorities and majorities regarding (H1) the contribution of reviews and (H2) a mean difference in the review length according the word count.

**6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.**

- fluent in German
- no hearing aid
- non-psychology students
- age: 35 years or younger

Note that any participants who wish to withdraw their data after debriefing will be deleted before analysis.

**7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.**

We aim at collecting data of  $N = 199$  (power of .80, alpha-error probability .05, expected medium effect size:  $f = .20$ ). Data collection will stop after this goal is reached or when the end of the survey period is reached (the study will run in the lab from 20th May – 31st May 2019).

**8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)**

For exploratory purposes we will assess the overall rating after participants had the opportunity to contribute reviews.

Further following variables will be collected:

- demographical questions (age, gender),
- whether participants have already written a review before and why they have done it,
- whether they own those headphones by themselves and
- whether they have a hearing aid.

Preregistration for Experiment 3.2

Created: 11/18/2019 02:30 AM (PT)

Shared: 04/08/2021 01:12 AM (PT)

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This pre-registration is not yet public. This anonymized copy (without author names) was created by the author(s) to use during peer-review. A non-anonymized version (containing author names) will become publicly available only if an author makes it public. Until that happens the contents of this pre-registration are confidential.

---

**1) Have any data been collected for this study already?**

No, no data have been collected for this study yet.

**2) What's the main question being asked or hypothesis being tested in this study?**

RQ: How does the contribution of written reviews differ depending on whether people hold a similar (vs. an opposing) opinion compared to the majority when evaluating a product?

Hypothesis:

(H1a) The likelihood to contribute a review (DV1) and (H1b) the number of words a review contains (DV2) is smaller when the majority disagrees with the own opinion about a product than when the majority agrees with the opinion (i.e., an interaction of own opinion (positive vs. negative) and others' opinion (positive vs. negative)).

**3) Describe the key dependent variable(s) specifying how they will be measured.**

DV1: whether or not participants write a review into a textbox. It will be coded as 1 (participants contributed a review) and 0 (they did not contribute a review)

DV2: Number of words the review contains in case participants contributed one (wordcount)

**4) How many and which conditions will participants be assigned to?**

Four conditions based on:

- (a) Participants' own opinion of the headset as negative (indicated by a rating of 1-2) or positive (indicated by a rating of 3-4)
- (b) The distribution ratings: majority positive vs. majority negative.

**5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.**

The hypotheses will be tested by using regression models separately for each DV with the following predictors: participants' opinion (positive vs. negative opinion about the headphones), majority opinion (positive vs. negative opinion about the headphones), and their interaction. H1a will be tested using a logistic regression, H1b by using a linear regression. Wordcount will be log transformed to correct for a skewed distribution.

**6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.**

Prerequisites for participation:

- fluent in German (language-sensitive materials)
- no hearing aid, Hearing impairment or red-green weakness
- non-psychology students
- age: 35 years or younger
- unfamiliar with material (concretely: only students who have not yet participated in a study using similar material)
- Note that any participants who wish to withdraw their data after debriefing will be deleted before analysis.

**7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.**

Due to unclear parameters for a logistic regression, power analysis was conducted for the DV2 (wordcount): desired sample size of  $N = 199$  (based on  $G^*$ power:  $1 - \beta = .80$ , alpha-error probability  $.05$ , expected medium effect size:  $f = .20$ ). Data collection will stop after this goal is reached or when the end of the survey period is reached (the study will run in the lab from 25th November – 06st December 2019).

**8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)**

For exploratory purposes we will assess participants' product ratings once again at the end of the study as well as the time, participants spend on writing the review.

Further following variables will be collected:

- whether participants have already written a review online before participating in the study and why they have done it,
- whether they own the product evaluated in the study
- whether they have a hearing aid, a hearing impairment or a red-green-weakness, and
- whether they already participated in a similar study in which they were asked to test and rate the same product.

Further, we will pre-test further possible topics for upcoming studies. Finally, at the end of this experiment, we will assess demographic variables (age, gender, mother tongue, academic subject).

## C.1.2 Instructions and main measures for Experiment 3.1

(original material was in German)

In this section, all critical instructions and manipulations used in Experiment 3.1 are provided in more detail. If the number of items is given, concepts have been assessed for exploratory purposes, but data is not presented in the empirical Chapters.

### Complete list of variables assessed in Experiment 3.1:

- Own opinion about the headset
- Manipulation of presented overall rating (in form of a distribution)
- Likelihood to contribute a review and review length
- Final opinion about the headset (1 item)
- General willingness and reasons to write reviews on real evaluation portals (2 items)
- Demographics (age, field of study, gender, mother tongue, hearing aid, own headset themselves)

### Introduction and Setting of the Experiment

In this study, we want to determine which headsets are best for listening to audio files or videos in our laboratory. Therefore, we are looking for new headsets that are well suited for this purpose. In the following, we'll ask you to test and rate a headset. Please put on the headset now.

#### **Here you can see a section of customer reviews from the Internet**

The craft and quality make a good impression. The wearing comfort is also okay. The headset does not become uncomfortable even after long phone calls. There is also nothing pressing. The headset is also very light

The headset is very delicate overall and very comfortable to wear. I find the cable absolutely sufficient. however, the sound is often too quiet and too muffled.

Unfortunately, you can still hear all the ambient noise, not a bit of noise canceling. Overall, the cables are also very annoying, which leads to a real cable tangle when using it.

The headphones are lightweight and comfortable to wear. Unfortunately, the headphones had a slightly loose connection on the left side initially, but that was perhaps only on mine. The sound is really great!

The headphones' artistry looks very cheap, and I often had the feeling that they could break at any moment. Unfortunately, the sound quality is not very good either, so I am very dissatisfied with the headset.

The sound quality of the headphones is okay. Unfortunately, what bothered me a lot was the very poor wearing comfort - the headphones were constantly pressing, so I could not keep them on for a long time.

I have had a few headsets in use; this one has been the best USB headset yet. The voice quality is quite sufficient, and the sound is also appealing.

The headphones make a well-made impression and seem to be very robust. The wearing comfort is pleasant. Only the cable length was not always sufficient for my needs.

The microphone arm is only adjustable in height, so it cannot be bent and easily break off. However, it is well suited for listening to music.

*(The verbatim version (in German) of the setting is provided, as subtle but essential differences in wording might not be fully captured)*

Hier sehen Sie einen Ausschnitt der Kundenbewertungen aus dem Internet.

Die Verarbeitung und Qualität machen einen guten Eindruck. Der Tragekomfort ist auch in Ordnung. Selbst nach längeren Telefonaten wird das Headset nicht unbequem. Es drückt auch nichts. Das Headset ist zudem sehr leicht

Die Kopfhörer sind leicht und bequem zu tragen. Leider hatte der Kopfhörer am Anfang einen leichten Wackelkontakt auf der linken Seite, aber lag vielleicht auch nur an meinem. Der Ton ist aber wirklich klasse!

Ich habe schon einige Headsets in Benutzung gehabt, dieses war das bislang beste USB-Set überhaupt. Die Sprachqualität ist völlig ausreichend und der Klang ist ansprechend.

Das Headset ist sehr filigran im Gesamten und sehr angenehm im Tragekomfort. Ich finde das Kabel absolut ausreichend. Allerdings ist der Sound oft zu leise und zu dumpf.

Die Verarbeitung der Kopfhörer wirkt sehr billig und ich hatte öfter das Gefühl, dass sie jeden Moment zerbrechen könnten. Leider ist auch die Tonqualität nicht besonders gut, weswegen ich sehr unzufrieden mit dem Headset bin.

Der Kopfhörer macht einen gut verarbeiteten Eindruck und scheint sehr robust zu sein. Der Tragekomfort ist angenehm, lediglich die Kabellänge war für meine Bedürfnisse nicht immer ausreichend.

Leider kann man weiterhin alle Umgebungsgeräusche hören, von Schallisolation keine Spur! Insgesamt sind auch die vielen Kabel sehr störend, was bei der Benutzung zu einem regelrechten Kabelsalat führt.

Die Soundqualität der Kopfhörer ist in Ordnung. Was mich aber leider sehr gestört hat, war der sehr geringe Tragekomfort – ständig drückten die Kopfhörer, sodass ich sie nicht lange am Stück aufbehalten konnte.

Der Microfon-Arm ist nur in der Höhe verstellbar, er lässt sich also nicht biegen und kann leicht abbrechen. Zum Musik hören aber gut geeignet.

Weiter

*Four different audio files (spoken words, noise, beep tones, and music) were presented to test the headset*

### Assessment of own opinion about the headset

Please provide an overall rating for the headsets.

*(1 = very bad, 4 = very good)<sup>20</sup>*

1  
sehr schlecht



2



3



4  
sehr gut



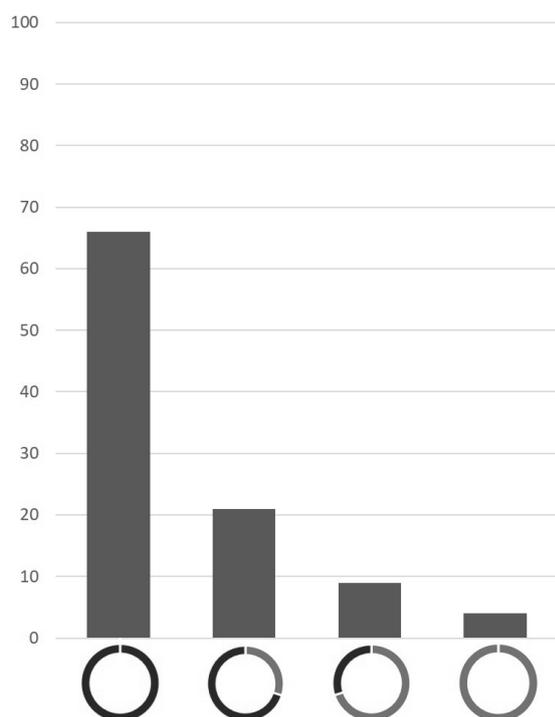
Weiter

<sup>20</sup> Colour legend: dark grey = proportion of red, light grey = proportion of green; "very bad" circle was completely red, a "very good" circle completely green

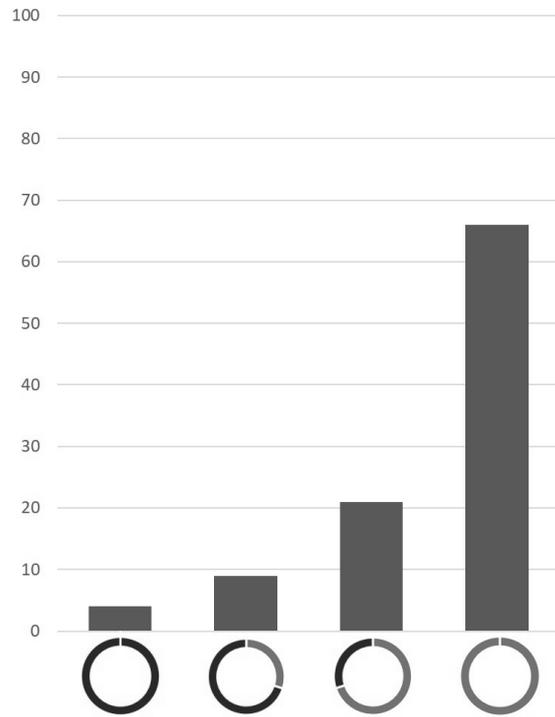
Manipulation of presented overall rating (in form of a distribution)<sup>21</sup>

Thank you for your overall rating. In the following you can see how other costumers have rated the headset.

**[Negative overall rating]**



**[Positive overall rating]**



Likelihood to contribute a review and review length

Is there anything else you want to tell us about the headset?

(open text field)

Gibt es noch etwas, was Sie uns im Bezug auf die Bewertung der Kopfhörer mitteilen möchten?

<sup>21</sup> Colour legend: dark grey = proportion of red, light grey = proportion of green; "very bad" circle was completely red, a "very good" circle completely green Weiter



### C.1.3 Instructions and main measures for Experiment 3.2

(original material was in German)

In this section, all critical instructions and manipulations used in Experiment 3.2 are provided in more detail. If the number of items is given, concepts have been assessed for exploratory purposes, but data is not presented in the empirical Chapters.

---

#### Complete list of variables assessed in Experiment 3.2:

- Own opinion about the headset
- Manipulation of presented overall rating (in the form of a distribution)
- Likelihood to contribute a review and review length
- Final opinion about the headset (1 item)
- General willingness and reasons to write reviews on real evaluation portals (2 items)
- Pre-test of seven possible topics for potential upcoming studies (14 items)
- Demographics (age, field of study, gender, mother tongue, hearing aid, hearing impairment, red-green colorblindness, own headset themselves, participated in former Experiment)

#### Assessment of own opinion about the headset

Please provide an overall rating for the headsets.

(1 = very bad, 4 = very good)<sup>22</sup>

1  
sehr schlecht



2



3



4  
sehr gut



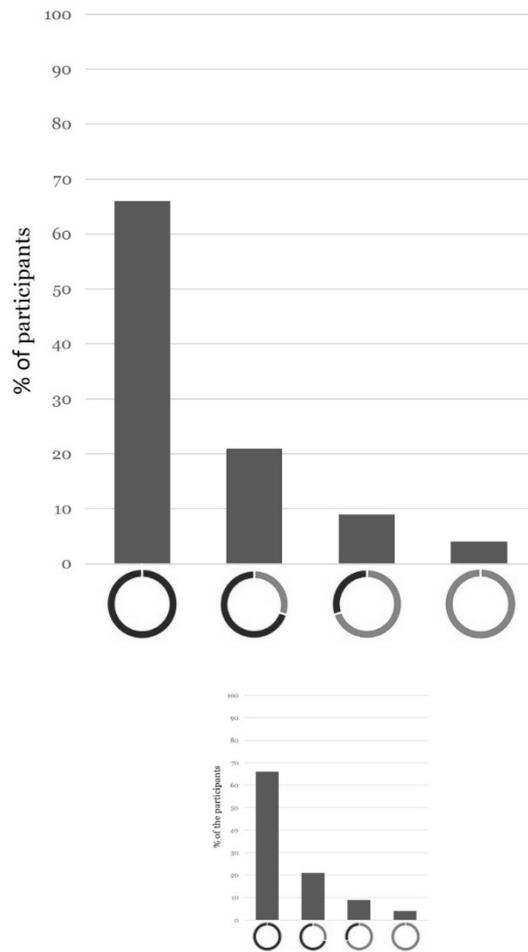
---

<sup>22</sup> Colour legend: dark grey = proportion of red, light grey = proportion of green; "very bad" circle was completely red, a "very good" circle completely green

Manipulation of presented overall rating (in the form of a distribution)<sup>23</sup>

**[Negative overall rating]**

Thank you for your overall rating. In the graphic below, you can see how other participants have rated the headsets so far.

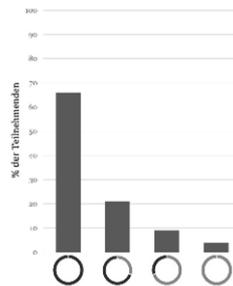


Here you can see an excerpt of the evaluations of the previous participants.

- |  |  |   |
|--|--|---|
| <p><input type="radio"/> <b>Unfortunately I can't commend</b><br/>In my eyes the headphones are not suitable for the lab. You feel like you are working in a call center. With these headphones you don't even need to</p> | <p><input type="radio"/> <b>Not worth their money</b></p>    | <p><input type="radio"/> <b>I can not recommend</b></p>     |
| <p><input type="radio"/> <b>Totally wrong decision</b></p>   | <p><input type="radio"/> <b>Quite alright</b></p>            | <p><input type="radio"/> <b>Unpleasant and unusable</b></p> |
| <p><input type="radio"/> <b>Good is something else</b></p>   | <p><input type="radio"/> <b>Please other headphones!</b></p> | <p><input type="radio"/> <b>Difficult device</b></p>        |

<sup>23</sup> Colour legend: dark grey = proportion of red, light grey = proportion of green; "very bad" circle was completely red, a "very good" circle completely green

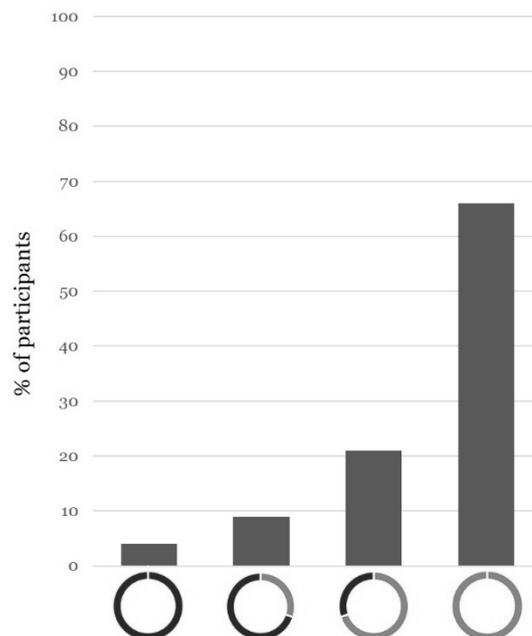
(*verbatim version*)

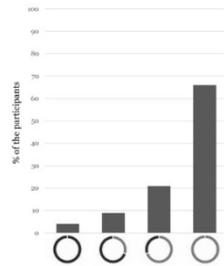


Hier sehen Sie einen Ausschnitt der Bewertungen der bisherigen Teilnehmer.

<p><b>Muss leider abraten</b> Die Kopfhörer sind in meinen Augen nicht für das Labor geeignet. Man fühlt sich als würde man im Call-Center arbeiten. Man braucht bei den Kopfhörern nicht mal zu</p>	<p><b>Taugen für mich nicht</b></p>	<p><b>Kann ich nicht empfehlen</b></p>
<p><b>Totale Fehlentscheidung</b></p>	<p><b>Voll in Ordnung</b></p>	<p><b>Unangenehm und untauglich</b></p>
<p><b>Gut ist was anderes</b></p>	<p><b>Bitte andere Kopfhörer!</b></p>	<p><b>Schwieriges Gerät</b></p>

[Positive overall rating]

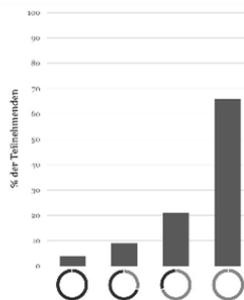




Here you can see an excerpt of the evaluations of the previous participants.

<input type="radio"/> <b>I am thrilled</b> In such studies, they often give you technical junk, but these headphones are mega good! I've really tried to find a point of criticism, but	<input type="radio"/> <b>Really solid headphones!</b> [Redacted]	<input type="radio"/> <b>Just ingenious!</b> [Redacted]
<input type="radio"/> <b>Definitely a recommendation</b> [Redacted]	<input type="radio"/> <b>Just fine!</b> [Redacted]	<input type="radio"/> <b>I find them pretty awesome</b> [Redacted]
<input type="radio"/> <b>Good is something else</b> [Redacted]	<input type="radio"/> <b>Really great device</b> [Redacted]	<input type="radio"/> <b>Suits for me!</b> [Redacted]

(*verbatim version*)



Hier sehen Sie einen Ausschnitt der Bewertungen der bisherigen Teilnehmer.

<input type="radio"/> <b>Ich bin begeistert</b> Man krieg bei so Studien ja oft technischen Schrott vorgesetzt, aber die Kopfhörer sind echt mega gut! Ich hab echt versucht einen Kritikpunkt zu finden, aber	<input type="radio"/> <b>Richtig starke Kopfhörer!</b> [Redacted]	<input type="radio"/> <b>Einfach genial!</b> [Redacted]
<input type="radio"/> <b>Absolute Weiterempfehlung</b> [Redacted]	<input type="radio"/> <b>Voll in Ordnung</b> [Redacted]	<input type="radio"/> <b>Finde sie ziemlich super</b> [Redacted]
<input type="radio"/> <b>Gut ist was anderes</b> [Redacted]	<input type="radio"/> <b>Wirklich tolles Gerät</b> [Redacted]	<input type="radio"/> <b>Taugt mir eigentlich!</b> [Redacted]

*Likelihood to contribute a review and review length*

If you want to write your own review, you have the opportunity to do so here.

(open text field)

**Wenn Sie eine eigene Bewertung schreiben wollen, haben Sie hier die Möglichkeit dazu**

**Hier können Sie einen Titel für Ihre Bewertung einfügen**

**Weiter**

## **C.2 Supplementary information for Chapter IIIb**

**Note:** No preregistration was made for Study 3.3.

### **C.2.1 Sampling procedure**

#### *Sampling procedure*

Products from different categories (e.g., toys, household items, or sports equipment) were searched on Amazon.de. We looked for products (e.g., bathroom scale) that was within each category rated as very bad, neutral or very good. Products were included when we found a bad, neutral or good rated product of the same category in order to exclude the possibility that ratings vary depending on product category. Further conditions for inclusion were that the product had already been reviewed and had recently (max 6 months ago) received a review so we could assume that these products still exist and are displayed on Amazon for consumers.

### **C.2.2 Complete list of variables assessed in Study 3.3**

#### *Complete list of variables assessed in Study 3.3*

- Type of product e.g. necklace, bathroom scale, trampoline, model car
- corresponding link to the product on Amazon.de
- total number of ratings at each point in time (t0-t11)
- mean rating at each point in time (t0-t11)
- percentage of ratings for each of the five categories at each point in time (t0-t11)
- newly contributed and displayed German reviews from one point in time to another (e.g., t0 to t1; manually counted) for each of the five categories
- a comment section after each point in time to note peculiarities, irregularities or other conspicuous circumstances (e.g., product or website no longer available)

## Appendix D

### List of abbreviations

<b>Abbreviation</b>	<b>Written out</b>
SOS	Spiral of Silence
MSE	Minority Slowness Effect

## Summary

Sharing opinions, especially those that are not mainstream (e.g., deviant opinions), is of enormous value: deviant opinions can influence situations, enhance decisions or even initiate social change. The question of whether opinions are expressed depends among others on the prevailing opinion of others. Some literature suggests that opinions not in line with the prevailing majority opinion in society (e.g., a minority opinion) are expressed less (Glynn et al., 1997; Noelle-Neumann, 2001) due to fear of backlash from others (Ho & McLeod, 2008; Neubaum & Krämer, 2018). Another research strand found an even larger but similar effect: The likelihood of expressing one's own opinion decreases when facing interaction partners opposing this opinion (Asch, 1956; Stasser, 1992; Wittenbaum & Bowman, 2005). This is amplified when expressing opinions in public and not private (Kelman, 2017; Maass & Clark, 1983). Last but not least, however, there is also literature that found the meaningful effect that deviant opinions are expressed more likely (Hornsey et al., 2003; Porten-Cheé & Eilders, 2015).

So far, research lacked to combine the two strands of research which found a lower likelihood to speak when deviating from the prevailing opinion. As a result, it remains unclear whether deviant opinions are (not) expressed only in potentially conflictual interactions, or whether it is in fact the majority opinion that matters. It also remains unclear in previous research whether deviant expressions of opinion are influenced by different contexts. Or more precisely, whether opinion expression in non-interactive contexts without direct responses from others (e.g., evaluation portals) also decreases the likelihood of expressing deviant opinions.

This dissertation, therefore, aimed to provide insight into different and heterogeneous paradigms and contexts (e.g., conversations, rating portals) in which the two relevant aspects of prevailing opinion (majority opinion and confronted opinion) on opinion expression have been investigated. To increase the external validity of the results, the expression of opinion inside and outside the laboratory was examined for this purpose. A total of eight studies with  $N_{\text{total}} = 1870$  were conducted for this purpose.

---

In line with previous research, the present results indicate that the majority opinion is not as relevant as the faced opinion. Further, more fear of a confrontation was perceived when one's opinion was not in line with the prevailing opinion (e.g., holding a minority or opposing opinion) and this, in turn, diminished opinion expression. Moreover, based on the findings, it can be assumed that other aspects like an ongoing conversation or the lack of fear of backlash from others might increase the likelihood of expressing a (deviant) opinion. This yields in relevant aspects that should be considered in future research.

## Deutsche Zusammenfassung

Das Teilen von Meinungen, insbesondere von solchen, die nicht dem Mainstream entsprechen (z. B. abweichende Meinungen), ist von enormer Wichtigkeit: abweichende Meinungen können ursächlich zur Modifikation, Veränderung, oder Neuorientierung beispielsweise politischer, sozialer, ökonomischer, ökologischer oder wertorientierter Prozesse oder Zielvorgaben, beitragen.

Die Frage, ob und wie Meinungen generiert und geäußert werden, ist Gegenstand mannigfacher Untersuchungen. Wie und ob Meinungen geäußert werden, hängt laut bestehender Forschung zum einen von der Mehrheitsmeinung der Gesellschaft ab. Ein Teil der Literatur legt nahe, dass Meinungen, die nicht mit der Mehrheitsmeinung übereinstimmen (z. B. eine Minderheitenmeinung; Glynn et al., 1997; Noelle-Neumann, 2001), aus Angst vor negativen Reaktionen weniger geäußert werden (Ho & McLeod, 2008; Neubaum & Krämer, 2018b).

Eine anderer Forschungsstrang zeigt einen ähnlichen aber größeren Effekt: Demnach sinkt die Wahrscheinlichkeit, eine eigene Meinung zu äußern, wenn man Interaktionspartnern gegenübersteht, die diese Meinung ablehnen (Asch, 1956; Stasser, 1992; Wittenbaum & Bowman, 2005). Verstärkt wird dies bei öffentlichen (im Vergleich zu privaten) Meinungsäußerungen (Kelman, 2017; Maass & Clark, 1983). Nicht zuletzt gibt es auch Forschung, die den bedeutsamen Effekt gefunden hat, dass abweichende (im Vergleich zu konsistenten) Meinungen sogar wahrscheinlicher geäußert werden (Hornsey et al., 2003; Porten-Cheé & Eilders, 2015).

Bislang fehlte es in bisheriger Forschung jedoch an einer Kombination der beider Forschungsstränge, die weniger Redebereitschaft bei abweichender Meinung fand. Dadurch bleibt unklar, ob abweichende Meinungen beispielsweise nur in potenziell konfliktreichen Interaktionen (nicht) äußern oder es in der Tat auf die wahrgenommene Mehrheitsmeinung ankommt. Es bleibt in der bisherigen Forschung ebenfalls unklar, ob abweichender

Meinungsäußerungen durch unterschiedliche Kontexte beeinflusst werden. Anders formuliert geht es u.a. um die Frage, ob eine Meinungsäußerung in „nicht-interaktiven Kontexten“ (d.h. ohne direkte Reaktionen - z. B. in Form von Bewertungsportalen) auch die Wahrscheinlichkeit zu abweichenden Meinungsäußerungen verringern.

Ziel der vorliegenden Arbeit ist, einen Einblick in verschiedene und heterogene Paradigmen und Kontexte (z.B. Gespräche, Bewertungsportale) zu geben, in denen die beiden relevanten Aspekte der vorherrschenden Meinung (Mehrheitsmeinung und konfrontierte Meinung) auf die Meinungsäußerung untersucht wurden. Um die externe Validität der Ergebnisse zu erhöhen, wurde dazu auch die tatsächliche Meinungsäußerung innerhalb und außerhalb des Labors erfasst. Insgesamt wurden hierzu acht Studien mit  $N_{\text{total}} = 1870$  durchgeführt.

In Übereinstimmung mit der bisherigen Forschung zeigen die vorliegenden Ergebnisse, dass die Bedeutung der Mehrheitsmeinung nicht so relevant ist wie die einer konfrontierten Meinung: Es wurde eine größere Angst vor einer Konfrontation wahrgenommen, wenn die eigene Meinung nicht mit der vorherrschenden Meinung (der Mehrheit oder der Interaktionspartner) übereinstimmte. Dies verringerte wiederum die Meinungsäußerung.

Darüber hinaus kann aufgrund der Ergebnisse davon ausgegangen werden, dass zudem durch andere Aspekte (z.B. eine laufende Konversation oder die fehlende Angst vor negativen Reaktionen anderer) die Wahrscheinlichkeit eine (abweichende) Meinung zu äußern erhöht wird. Daraus ergeben sich relevante Aspekte, die in der zukünftigen Forschung berücksichtigt werden sollten.

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## Eidesstattliche Erklärung

„Ich erkläre hiermit, dass ich die zur Promotion eingereichte Arbeit mit dem Titel: *I disagree with you – Should I say something? The impact of the prevailing opinion on opinion expression* selbständig verfasst, nur die angegebenen Quellen und Hilfsmittel benutzt und wörtlich oder inhaltlich übernommene Stellen (alternativ: Zitate) als solche gekennzeichnet habe. Ich erkläre, dass ich die Anteile gemeinschaftlicher Arbeit im Rahmen der Dissertation an entsprechender Stelle (s. Verteilungstabellen) gekennzeichnet habe. Ich erkläre, dass die Richtlinien zur Sicherung guter wissenschaftlicher Praxis der Universität Tübingen (Beschluss des Senats vom 25.5.2000) beachtet wurden. Ich versichere an Eides statt, dass diese Angaben wahr sind und dass ich nichts verschwiegen habe. Mir ist bekannt, dass die falsche Abgabe einer Versicherung an Eides statt mit Freiheitsstrafe bis zu drei Jahren oder mit Geldstrafe bestraft wird.“

Tübingen, den \_\_\_\_\_

\_\_\_\_\_  
(Birka Zapf)