

RESEARCH-IN-BRIEF

## Family, friends and taxi drivers in hybrid networks. Integrating the immediate social environment into the Spiral of Silence Theory

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### Abstract

The relative neglect of the immediate social environment is one of the best-known criticisms of the Spiral of Silence Theory (SoS). Due to massive changes in communication technology, especially the advent of social media, the immediate social environment has become even more relevant which has amplified this gap. This paper integrates the immediate social environment into the SoS. The immediate social environment is the aggregate of individual actors whom one interacts with – a mix of strong and weak ties. The immediate social environment is conceptualized as part of a larger ego-centric network of various sources or observers which also includes the mass media. Based on this concept, this paper examines the entire chain of effects – from monitoring the environment via different sources to the willingness to express one's opinion in public in front of different observers. Particular attention is directed to the crosslinks between the immediate social environment and the larger realm of society and mass media. The integration of the immediate social environment serves the goal of further refining the conditions of a relevant social context under which people fear different types of social isolation from different groups and subsequently do or do not express their opinions.

### Keywords

spiral of silence, social environment, online communication, perceived climate of opinion, willingness to speak out, fear of isolation

## 1 Introduction

The Spiral of Silence theory (SoS) by Elisabeth Noelle-Neumann is one of the best-known theories of communication studies (Eilders & Porten-Cheé, 2016; Matthes, Knoll, & Sikorski, 2018; Schulz & Rössler, 2013). It assumes that people – due to fear of social isolation (FSI) – monitor the opinion climate via the mass media and their immediate social environment (ISE). They compare the perceived opinion climate with their personal opinion and if the balance shows that they deviate from the

alleged majority, they fall silent or at least conceal their opinion in public discourse whereas they speak out or disclose their opinion if they are in line with the alleged majority. Their individual behavior subsequently affects other people's perceptions of the opinion climate and then starts a dynamic in which the alleged majority is ever more reinforced while the alleged minority becomes smaller. At the end of the spiral that may result in a change of public opinion.

The theory has received a great deal of attention because it addresses the big



questions in public opinion formation and clearly asserts media effects. The advantages of the SoS also include the fact that it links micro- and macro-level concepts by examining the interrelations between media coverage, the opinion climate and individual opinions and behaviors (Waldherr & Bachl, 2011). Further, the basic mechanism posited by Noelle-Neumann is a very intuitive explanation of how media influence opinion formation without directly convincing people. The theory states that media influence people rather indirectly via the opinion climate which may exert pressure to conform.

Although it must be acknowledged that the SoS offers an intuitively convincing explanation of how media affect opinion formation, it has also attracted a great deal of well-founded criticism. Scholars have doubted that every individual equally underlies FSI, they have questioned whether people can assess a particular distribution in society with a “quasi-statistical sense,” and they have criticized the lack of individual media use data, to name only a few points of criticism (for an overview see Matthes et al., 2018). One of the best-known criticisms of the theory is the relative neglect of reference groups. Although Noelle-Neumann explicitly built the theory on findings of small group research (e.g., Asch, 1951), she assigns very limited relevance to the social context at the meso level (e.g., Matthes et al., 2018; Schulz, 2012; Schulz & Rössler, 2013). She addresses reference groups as sources for monitoring the environment in her writing and sees them as possible influencing factors on public opinion perception and opinion formation, but she states them as less influential than mass media (Noelle-Neumann, 2001, pp. 314–315) and does not elaborate on the reasons thereof. She considers that reference groups and mass media might even point to the same direction and amplify each other, but she fails to see the competition between the sources and does not indicate what happens if they deviate from each other. To Noelle-Neumann, the relative power of reference groups and mass media seems to be not an empirical question, but a clear-cut

case in which the mass media have the dominant effect.

This is underlined by her almost exclusive focus on the mass media. This limitation fails to recognize that individuals are permanently embedded in social relations and constantly interact with people online and offline. Oshagan (1996) was an early prominent example for scholars who have since emphasized the relevance of family and friends over mass media and other individual actors of the anonymous public sphere and have called for a stronger consideration of reference groups, or more generally an individual’s ISE (Matthes et al., 2018; Schulz, 2012; Schulz & Rössler, 2013). However, this is not saying that personal ties always trump media influence. Matthes et al. (2018) point out, that this depends on whether or not ties’ views are considered meaningful. At the end, this is an empirical question.

Under today’s conditions of online communication, the ISE becomes even more relevant, as we are part of a mesh of the diverse relationships through which we are constantly observed, but also able to observe others (Eilders & Porten-Cheé, 2015). Digitization, and social media in particular, has thus fundamentally changed the meaning, frequency, and tangibility of social interactions in our immediate environment. If the SoS is not to lose its significance in the age of digitalization, it must be adapted accordingly. This is where this paper picks up. We assume that the ISE plays a relevant role for public opinion formation, in particular in the digital age. Analogous to the mass media, it influences all components of the SoS, from monitoring the environment, over opinion climate perceptions to opinion expression. Therefore, we introduce a model, in which the ISE is not only considered as an additional source for opinion climate perceptions (as already implemented in previous research, as mentioned above), but is systematically considered in every sequence of the effects laid out in the SoS and with regard to every interaction with phenomena in the larger realm of society or the anonymous public. The model hence reconceptualizes the relations between mass media use, interper-

sonal communication in the ISE, opinion climate perception and opinion expression in different social contexts. We first take a closer look at the ISE and how online communication has altered the conditions of monitoring others' opinions and expressing one's own opinion. In the next step, we extend the classic model through adding the ISE as a relevant and (for most stages of the process) novel component and discuss the implications of this expansion for the different stages of the effects process. We conclude with an inventory of the advantages of the model and how it advances SoS research and an outlook to future challenges of SoS research in an age of digitized communication.

## 2 The role of the immediate social environment in face-to-face and in online-communication

For the purpose of this paper, the ISE is understood as the aggregate of individuals whom one interacts with directly. Even though many critics of the SoS have claimed that *reference groups* need more consideration (Matthes et al., 2018), we prefer a different term because the term reference groups does not include all relevant actors. We use the concept of the *immediate social environment (ISE)* to explicitly include not only members of a reference group but a wide range of different actors. It seems important to us to involve all these actors since people are permanently embedded into all kinds of relations (Salmon & Kline, 1985; Scherer, 1990): They talk to family, friends, colleagues and neighbors but also encounter people in particular roles such as taxi drivers, hair dressers or service staff from restaurants in their daily routines. All these individual actors together form the ISE which thus consists of both, members of reference groups, by which we mean members of primary groups (such as family and friends) and members of secondary groups (such as colleagues or acquaintances) as well as complete strangers whom we meet only once in our everyday lives (such as a conversation partner in a train or in

a bar) – online and offline. An actor belongs to the ISE only if she is identifiable for the individual, but the individual is, by implication, also identifiable for the actor. Interaction in the ISE can be both two-sided and one-sided – for example, when we only observe actors from our ISE and interpret their behavior. Noelle-Neumann's railway test, in which a person meets strangers on the train, depicts a possible situation in this ISE. Through the ISE, we integrate all individual actors who are apart from the mass media focused on by Noelle-Neumann – members of reference groups as well as loose contacts. The concept of ISE excludes all mass media relationships, parasocial relationships, one-sided follower relationships (e.g., fans, politicians), and collective actors.

The loose contacts in the ISE pose a theoretical problem, since on the one hand they belong to the personal sources of environmental observation, which Noelle-Neumann considers rather unimportant, and on the other hand they represent to a certain extent the social climate of opinion in society. We have to admit that loose contacts and reference groups play different roles in different phases of SoS-process. We will discuss this later in greater detail.

All relationships in the ISE are located on a continuum of high and low salience which consists of different dimensions. For the sake of simplicity, when introducing the components of our model, we distinguish at this point only between the two well-known types put forward by Mark Granovetter and taken up by SoS-scholars (e.g., Schulz & Rössler, 2013). Close relationships with more frequent or more meaningful interactions, typically family and friends, may be considered as strong ties (Granovetter, 1973) and as such represent relevant others who may exert strong conformity pressure (Cialdini & Goldstein, 2004). In a comprehensive meta-analysis of 66 studies on the SoS, Matthes et al. (2018) proved the tie strength to be a highly relevant moderator of the opinion climate perception: A minority perception, regardless of whether this perception related to society or close relationships, had a stronger

silencing effect when the target of opinion expression were close relationships than strangers (Matthes et al., 2018, p. 20). This contradicts the media-centered assumptions by Noelle-Neumann (2001), who saw the anonymous public – conveyed via consonant mass media – as key factor.

Weak ties are likely to exert less pressure due to the different nature of social sanctions. Sanctions by weak ties may be more frequent because people are more likely to disagree with distant than with close relationships, but they may be perceived as less severe because there is not so much at stake (Matthes et al., 2018). Weak ties nevertheless play an important role in the SoS concerning the opinion climate perception. Noelle-Neumann (2001) already hinted at this when she introduced reference groups as an additional source (beyond mass media) from which people may infer the opinion climate. Weak ties particularly come into focus in investigating interpersonal communication in media effects research. In accordance with the idea of a multi-step-flow of information (Lazarsfeld, Berelson, & Gaudet, 1968), weak ties serve as conveyors of information into a social system. Thereby they not only contribute to the diffusion of news from the media to the citizens and between different interpersonal contexts, they also ensure diversity (Klinger, 2018), and this can be highly significant in terms of the perception of the climate of opinion in society. Just like mass media they carry information from the world outside into people's individual contexts of close relationships.

Under conditions of digitization, the ISE has become particularly relevant. Today, we are embedded in a net of different online-relations which allows us to permanently monitor others. However, at the same time we can be observed by others (Eilders & Porten-Cheé, 2015). This may be an intentional effort if we keep in touch with strong and weak ties via text, pictures, likes and shares on social media, or it may be an unintentional consequence of leaving social media traces as byproduct of online communication. Because communication is much easier online and bridges large distances, the online-version of the

immediate environment might not always be, but can in principle be larger than the offline-version. Expressing deviant opinions in the ISE online may then have more, but possibly less severe social consequences: It reaches more people but this most likely applies to weak ties in particular because close ties cannot become ever more. There is a limit in the number of strong ties, we really can handle. It also has to be kept in mind that deviant opinions online are very persistent due to the digital format and very easy to detect. However, all this might be overridden by anonymity (Eilders & Porten-Cheé, 2016), so after all, the overall threat of social sanctions might not differ much from the offline context.

For findings of online communication in the ISE on opinion climate perceptions, we have to turn to scattered studies from different research traditions. Research on the effects of popularity cues, e.g., has developed into a relevant strand. Through popularity cues, such as likes and shares, but also user comments, we can easily monitor the others (Porten-Cheé, Haßler, Jost, Eilders, & Maurer, 2018). While there is inconclusive evidence on the effects of statistical cues such as likes (Porten-Cheé et al., 2018; Porten-Cheé & Eilders, 2020), user comments have frequently been shown to affect opinion climate perceptions (Neubaum & Krämer, 2018; Zerback & Fawzi, 2017). The effect is often explained with regard to heuristic processing. It is argued that very few opinions from the ISE (online) are used as an indicator for a larger unit such as a segment of society or even society as a whole. This inference is not always correct, but it is a widely used heuristic shortcut (Eilders & Porten-Cheé, 2015).

Most findings on effects on opinion climate perception apply to comments on news sites. The respective studies of online comment sections typically assess how comments by strangers influence subsequent users' perceptions of the opinion climate in society. The findings on user comments by strangers do not allow for straight-forward conclusions on the role of communication in the ISE online for opinion climate perceptions. However, the connection between user comments and

the ISE seems obvious. People from the ISE, for example friends or family members, but also looser contacts such as acquaintances, also post comments. These comments are displayed to individuals particularly frequently, e.g., due to algorithms in social networks, and will also have an impact on the individual. Characteristics such as the strength of the relationship, the attributed competence or trust can significantly influence the perception here.

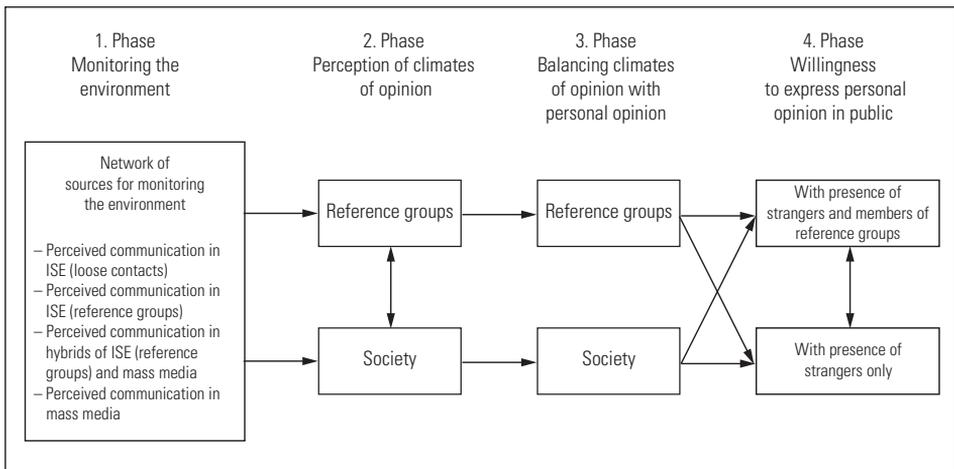
### 3 Integrating the immediate social environment into the SoS model

In the context of SoS, the ISE is important for several reasons. To understand this, we divided the process into four different phases: Monitoring the environment, perception of climates of opinion, balancing climates of opinion and willingness to express personal opinion in public (Figure 1).

In the first phase the ISE, reference groups as well as loose contacts, may serve as potential sources for monitoring the opinion climate in the society – in addition, in concert with or instead of the mass media. In order to conceptualize the wealth of weak and strong ties in a feasible model, we propose to depict all sources as a network of relations in the first phase

(Scherer, Eilders, Scheper, & Gerads, 2021). This includes the ISE, the traditional mass media, and a third type: hybrid sources. The idea that environmental monitoring can be differentiated into mass media sources as well as sources in the ISE can already be found in Noelle-Neumann’s first formulation of the SoS when she says that both mass media and the social environment are used for environmental monitoring. All sources presumably differ in terms of their influence on perceptions of the climate of opinion. Mass media sources might be perceived as more representative of society and therefore have a stronger influence on perceptions of society than sources in the ISE. Sources in the ISE can be further divided into reference groups as sources and loose encounters as sources according to our definition of the ISE. The influence of reference groups as sources of environmental observation is likely to differ from mass media sources and loose encounter sources because of the strength of relationships and prevailing trust. But also, loose encounters as part of the ISE are likely to be used to monitor the environment, because conversation on the train will also have an effect on my perception of the climate of opinion, although this may not be as strong as the influence of the mass media or reference groups.

Figure 1: Model of influences on the sequence of effects in the SoS



Hybrid sources are characterized by a merge of mass media and personal sources. In most cases, a media item is embedded into a personal message. That means a person shares a media story with other people who encounter it as a source of information. In essence, this is not a new phenomenon. An example would be someone cutting out an article from a newspaper and giving it to a friend to read. What may have been a rare occurrence in the past is now an integral part of social media because connecting to other people often includes sharing media items via social media. This communication practice has implications for the interpretation of the media message. Posting mass media items on Facebook, e.g., inevitably means adding personal information to the item in the recipient's perception, even without having commented on the article. It may be assumed that if someone comes across a media item herself, it will have a different effect on her perception of the climate of opinion and persuasive power of the item than if her best friend brings it to her attention. In processing the media item, the recipient will use her knowledge of her friend's political leaning and her point of view. This is likely to shape the interpretation of the item and subsequently its effects. This marks an important aspect of the convergence of mass and interpersonal communication and underlines that we need to investigate three different types of sources with their respective implications for possible effects, personal and media sources as well as hybrid sources.

A network approach allows us to cope with the complexity of the different sources. We conceptualize a network that encompasses all types of sources as equal parts of one single model. The network is constituted through communicative relationships between the sources and an individual who uses them. This type of structure is referred to as ego-centered network (Pfenning, 2019, p. 211). It consists of alteri, represented through the sources, which are centered around an ego, who monitors the sources to assess the opinion climate.

In the second phase the ISE plays a role in perception of relevant opinion climates. These are the climate of opinion in society and the climate of opinion in the reference groups. We have to handle the two types of actors in the ISE in different manners. People surely build a perception of the climate of opinion regarding their reference groups (Schulz & Rössler, 2013). We think there is no specific climate of opinion in regard to loose contacts, because they cannot be understood as an integrated social group, but only as a part of the society as a whole.

As shown in Figure 1, all sources could affect the perceptions of the reference groups and the perceptions of society. Rather, due to heuristic processing, the effects cross the lines of the realms: The mass media may also affect the perceived opinion climate in the reference groups, and the ISE may affect the perceived opinion climate in society. Our reasoning that individuals can distinguish different opinion climate perceptions – in our case, an opinion climate in reference groups and an opinion climate in society – leads back to considerations and empirical findings by Yun and Park (2011) as well as Eilders and Porten-Chée (2015). Yun and Park (2011) show that individuals can distinguish an offline opinion climate perception, an online opinion climate perception, and an opinion climate perception in a specific forum. Eilders and Porten-Chée (2015) assume that different opinion climate perceptions exist within different communication spaces, but are possibly transferred to the higher-level public opinion as a heuristic shortcut. This is exactly where we start and want to investigate the question whether different perceptions of the climate of opinion emerge and to what extent they are interrelated, i.e., whether or not one perception is transferred to the other (Eilders & Porten-Chée, 2015; Schulz & Rössler, 2013).

There is no perceived opinion climate of the loose contacts. Consequently, in the third phase there will not be a balancing with loose contacts but the reference groups and society. The individual will only understand herself as part of the majority

or minority in her reference groups and in society. The model shows how individuals use mass media sources, personal sources from their ISE (members of the reference group as well as loose encounters / strangers as part of the ISE) as well as hybrid sources in order to monitor the opinion climate in different social contexts. They subsequently balance their personal opinion with the respective perceived opinion climates in their reference groups and in the larger realm of society to decide if they are in the majority or minority. Depending on the balancing, an individual will express his or her opinion in the presence of observers of their reference groups or only strangers that may represent the larger society in the sense of an anonymous public sphere.

In the fourth phase, these perceptions of the climates of opinion, respectively the balancing of whether one is in the majority or minority, impact a certain behavior against which social sanctions take effect: the expression of opinion in public situations. The members of the ISE turn into observers who may exert pressure to conform and thus also serve as instance of social control. With regard to the conformity pressure perceived from weak and strong ties, individuals may fear social isolation if they express dissenting opinions and subsequently refrain from disclosing their opinion in the ISE. The ISE is where the SoS actually happens. We have shown above that the railway test developed by Noelle-Neumann simulates a situation in the ISE. In the ISE, the SoS unfolds its effect on the individual. The mass media can play a role only indirectly by influencing perceptions of the opinion climates.

Moreover, only if we consider the ISE can we understand the spiral processes that have given the theory its name. If we assume that people fall into silence, then this will only have societal consequences if it is also perceived in society. In this case, the effects of the spiral of silence would result in a change in the perception of the climate of opinion by many people, which could lead to an increase in the pressure of the climate of opinion on the dissenters, who would increasingly

fall into silence and thus set the spiral in motion. But this perception can only happen in the ISE, because the mass media do not report on these more or less everyday processes. Therefore, these effects cannot be explained by the reporting of the mass media, or only if we assume that the media also fall into silence against the pressure of opinion. But this is not a hypothesis that we find in the SoS.

Since the SoS is about public opinion expression, and public always includes the presence of strangers (Noelle-Neumann, 1974), only situations are relevant in which strangers are present. If only people who belong to reference groups are involved, it would no longer be a matter of public but private opinion expression. An example of a public situation with the presence of reference groups would be an opinion expression on social networks, where, if the privacy settings are set accordingly, both reference groups as well as strangers, are able to see the expressed opinion.

When it comes to public opinion expression and the integration of the ISE, two situations seem particularly relevant to us. One is a situation where a person is alone with strangers, so the classic situation from the SoS, and the other is a situation where members of a reference group, e.g., friends or acquaintances, are also present. In the first case, the person cannot expect positive or negative sanctions (e.g., prestige or social isolation) from the reference groups. In the second case, however, she or he does. In the first situation – strangers only – the societal climate of opinion is possibly more relevant, because it gives us a hint how these strangers may react to my opinion. In the second situation not only the societal climate of opinion is relevant but also the climate of opinion in the reference groups. But it is plausible that also in the first situation the climate of opinion in the relevant reference groups can have some relevance, because people want to behave consistently and contradictory behavior in these situations would create a situation of cognitive dissonance. We know that if people see themselves as minority in society, they are unlikely to express their opinion in front of strang-

ers (who belong to this society). But it is unclear whether they would express their opinion in the presence of strangers and members of their reference group. Sanctions might be more painful there, but after all, deviance in the reference groups, in particular among strong ties, might be compensated through further social interaction and explanations later on (Matthes et al., 2018). The diagonal effect from the perceived opinion climate in the reference groups on the willingness to express one's opinion when only strangers are present, may be explained through the concept of social support (Gottlieb & Bergen, 2010; Hall & Wellman, 1985; Lu & Hampton, 2017): If people feel sufficient support for their opinions through their close relationships, they are more likely to express allegedly deviant opinions in society. The conditions under which this is likely to happen, however, still have to be specified. Finally, the willingness to express one's opinion in one realm may influence the willingness in the other realm.

The relative influence of the individual sources or observers is a complex matter due to the multitude of relations in the network. The perceived opinions of sources and observers might all point to the same direction, thereby possibly reinforcing each other and adding to the conformity pressure which might subsequently restrict the willingness to express dissenting opinions. However, they can also be contradictory and thus fail to guide opinion expression to stay free of dissent. With regard to the features of the complete network, we expect parameters such as the degree of conflict and the particular pattern of this conflict (e.g., between people or between media sources, between interpersonal and media sources), to affect perceptions and behaviors. With regard to the individual elements of the network, we expect characteristics of sources or observers (such as tie strength, trust, assigned competence, perceived distance to one's own political attitude as well as the fact that a source or observer seems particularly typical for a certain group) to affect perceptions and behaviors. Both network features and features of individ-

ual sources or observers are associated with many assumptions about possible effects, which cannot be further elaborated in this format. FSI is mentioned here as a representative example to illustrate that these features shape the perceived pressure to conform and thereby moderate the effects of the sources and observers. It is best suited for this purpose because it not only represents the most-studied factor in SoS-research, but also serves as an umbrella explanation for the mode of effects of the network and its elements.

#### 4 Conclusion

Starting from the well-known criticism that Noelle-Neumann failed to consider reference groups as relevant factor for processes of opinion formation, we introduced a model, which overcomes this shortcoming. It reconceptualizes reference groups as part of the concept of the ISE that encompasses members of reference groups as well as (relative) strangers. The ISE consists of strong or weak ties when monitoring the opinion climate and deciding whether or not to express one's opinion. The ISE is introduced as part of a larger network of various sources or observers – in network terms “alteri” linked to an “ego.” Of course, the larger network also includes the mass media as a relevant source for monitoring the opinion climate. The mass media may however also develop influence as a reference in interpersonal communication. We suggested the term “hybrid sources” to cover settings where people from the ISE share a mass media item, thereby e.g., lending credibility or shattering it.

The links between ego and the various alteri are communicative relationships, such as conversations, media use, or interaction via social media. The idea of a network illustrates very well that we consider “family and friends” and other individuals from the ISE, mass media and hybrid sources as equally important factors. Modeling these different types of sources on equal footing and turning their relative effects on perception and behavior into an

empirical question is the key innovation in the present extension of the theory.

Our integration of the ISE into the architecture of the SoS concerns the entire sequence of effects posited in the SoS. First, we conceptualized the ISE as one of several sources for monitoring the opinion climate. Second, we not only included the effect of perceived opinion climate in the reference groups into the theory by modeling its effect on speaking out in that same realm. We also introduced cross-links between the realms of the reference groups and society – namely cross-cutting diagonal effects from sources on perceptions and from perceptions to behaviors in particular social contexts. Third, we considered mutual influences between the realms within the same effect sequence thereby allowing for misperceptions or false attributions. Fourth, we have made it clear that only the inclusion of the ISE can explain the dynamics of the processes of public opinion assumed by the SoS.

Because digitization has triggered the increase in significance of the ISE through the idea of being permanently connected to relevant others, it represents the very basis of our considerations. Our model does particular justice to the conditions under which opinion formation takes place in digitized environments. This includes the convergence of interpersonal and mass media communication on social media platforms in general and the fusion of both in the shape of hybrid sources in particular. Due to their capacity to carry the individual characteristics of a person from the ISE (such as competence or credibility) onto the mass media item, we consider hybrid sources as highly relevant factors in monitoring the environment. Identifying the particularly effective personal characteristics and determining the relative power of personal and media elements in hybrid sources for shaping opinion climate perceptions and opinion formation is among the most important research desiderata for the future.

Finally, it is also worth considering the ISE with regard to the most prominent SoS effect: Whether one speaks or remains silent depends on the respective social

context. Noelle-Neumann predominantly referred to situations with strangers, when she posited that people would be unlikely to express dissenting opinions due to FSI. It is the anonymous public, where she saw FSI to occur. If we assume that people, when they discuss controversial issues, are mostly in the company of people they know, we need to expand the social context to include the reference groups. Our model hence considers all sorts of settings, ranging from the anonymous public to small groups of friends and family – with the respective differences in FSI. This is not only more realistic; it also contributes to a better understanding of the conditions under which people fear different types of social isolation from different social entities and subsequently do or do not express their opinions.

The differentiation between the ISE and mass media also links to the much-debated blurring of boundaries between private and public communication that has developed with the advent of social media (e.g., Papacharissi, 2010). With the introduction of the ISE into the SoS, it will become increasingly important to investigate how the private and the public sphere converge and how this relates to the prevalence of weak and strong ties of the ISE. Recent studies on semi-public spheres (e.g., Klinger, 2018) assign a key role to weak ties as they represent bridges between close relationships and the outside and diverse world. Not only that semi-public spheres allow individuals to monitor strangers beyond their private networks and below the radar of mass media. They also allow communicating with these strangers. This especially concerns closed groups on messenger apps such as WhatsApp or Telegram. In these semi-public spheres, where participants have to follow the corporate rules of social media platforms, but do not have to care about democratic principles, radicalization of social movements is likely to take place.

Of course, our contribution can only represent a first step toward integrating the ISE into the SoS. Nevertheless, our model (Figure 1) provides an opportunity to empirically test important questions and hy-

potheses about the role of the ISE within the SoS. Just to name a few, in the context of environmental monitoring, we can gather precise insights into the importance of mass media communication, interpersonal communication as well as their intermingling. Methodologically, this could be implemented through a diary study. There are also some interesting starting points with regard to the perceptions of the climates of opinion. For instance, we first need to clarify whether opinion climate perceptions can be distinguished between society and reference groups and to what extent they are interrelated. Furthermore, we can test how the different sources of environmental observations affect these perceptions. In this way, differentiated statements can be made about the extent to which mass media has an influence not only on perceptions of society but also on perceptions of reference groups, but sources in the ISE possibly also on the perceptions about society. With regard to the willingness to speak out, we can gather insights into how this is influenced by minority perceptions in reference groups and in society and what role the target of opinion expression plays. For example, if an individual perceives himself to be in the minority of society but in the majority of a reference group and members of this reference group are present when expressing an opinion, then it could be assumed that an individual expresses his or her opinion despite the minority perception in society. In order to test the complex mediation model in its entirety and to be able to make statements about causalities, we propose a panel study with an integrated diary, as already mentioned above.

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### Conflict of interests

The authors declare no conflict of interests.

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