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A Janus-faced matter—The role of user anonymity for communication persuasiveness in online discussions

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ABSTRACT

Employees are increasingly involved in internal corporate discussion processes, often via online platforms. On such platforms, diverse opinions converge and controversial discussions may unfold. Anonymity is assumed to encourage reticent users to speak their mind and to allow for the expression of divergent views, but it has also been found to affect how arguments are received, including perceptions of credibility and, thus, persuasiveness. This paper considers how user anonymity affects communication persuasiveness in online discussions with both identified and anonymous treatment conditions. Drawing upon the elaboration likelihood model of persuasion, we find that anonymity affects persuasiveness via the opposing paths of credibility and involvement

1. Introduction

Small and large firms alike are increasingly operating in new ways to adapt to the changing needs and demands of their workforce. As today's employees demand a higher degree of involvement in terms of when, where, and how they work, participatory elements such as enterprise social software, internal crowdsourcing, and online discussion platforms are being widely adopted [1–5]. This development is in line with the increasing prevalence of computer supported cooperative work (CSCW) [6] and group decision support systems (GDSS) [7], an environment in which success hinges on how employees use such systems. As an important feature of interaction in this regard, users typically decide on how *anonymous* or *identifiable* they wish to appear individually, whereas, in some cases, the stage is set equally for all by the platform provider [8,9]. Anonymity, in this sense, represents a double-edged sword, particularly in an organizational context [10]. On the one hand, it can protect employees' privacy and reduce detrimental side effects within non-anonymous discussions and group decision-making scenarios. For instance, anonymity was found to lead to reduced levels of conformity as well as decreased ownership biases, that is, the tendency of people to evaluate their own information more favorably than that of others [11–13]. Moreover, lower-level, yet knowledgeable, employees may be reluctant to argue against managers or other superiors in a non-anonymous online discussion, leading to fewer expressed opinions [14]. An "option for anonymity" in corporate discussion platforms may thus encourage junior or reticent members, as well as minorities, to participate more actively in debates, bring forward their ideas [15,16], and express hard truths [17,18]. However, anonymity also poses several challenges to the facilitators of online discussions. For instance, anonymous discussions are typically more polarizing [12,19] and sometimes tend to exhibit hoaxes and foul language [7,16,20–23].

Beyond such considerations from the operator's perspective, anonymity can also change the *users'* perceptions, for example in terms of communication persuasiveness, which renders the design variable of anonymity highly relevant for them, too. Anonymity is usually subject to the sender's preference in terms of common factors such as the provision of profile images, names, or other personal references [24–27]. While the literature has mainly considered the effects of anonymity on user behavior in discussions [11,14,28], credibility, and persuasiveness in computer-mediated communication separately [7,29,30], only a few studies have thus far addressed these aspects collectively, investigating how the sender's (i.e., the persuader's) anonymity affects (his or her message's) persuasiveness in online discussions [8,16]. In this paper, we suggest that this effect is mediated by the degree of social presence associated with the sender of message [31], the recipient's involvement, and how the recipient evaluates the sender's credibility [32]. Involvement refers to the extent to which a certain topic is personally relevant and cognitively engaging for an individual [33]. Based on the sender's social cues, choosing to be identifiable represents a self-imposed signal by which to convey credibility [34].

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This paper's main research objective is to investigate gradual opinion change as the main dependent variable in view of different conditions of user representation (anonymous vs. identifiable) in the context of corporate discussion forums. We pose the following overarching research questions:

RQ1. How does anonymity (as compared to identifiability) affect communication persuasiveness in corporate discussion environments?

RQ2. Which role does social presence play in this context?

RQ3. How is the effect of anonymity on communication persuasiveness mediated by perceived user credibility and personal involvement?

To address these questions, we conduct a two-stage, scenario-based online experiment, drawing upon a set of controversial topics from daily media as a basis for discussion. We ask participants to state their opinions on these topics. Several weeks after the initial assessment, participants are re-invited for the second stage of the study, in which they are exposed to different versions of online discussions with comments from fictive colleagues. In these discussions, the interlocutors (i.e., fictive characters) 1) are either represented by profile image and name or remain anonymous and 2) either argue in favor of or against a certain policy. Participants then state their own opinion again. We find anonymity to be a double-edged sword, affecting message persuasiveness in two intricate ways. We find that the effect of anonymity is carried via perceived social presence, which in turn promotes both user credibility and personal involvement. These constructs, however, eventually affect persuasiveness in opposing ways. While higher perceptions of user credibility are associated with more effective persuasion, higher degrees of personal involvement diminish the likelihood of opinion changes. Moreover, we find that these effects also depend on whether users argue for or against a topic.

In this study, we present a scenario-based online experiment design that allows us to trace communication persuasiveness based on *actual opinion changes*, extending existing research by overcoming the common limitation of purely perceptional assessments of persuasion (e.g., "How persuasive is this argument?" or "Would you change your opinion…?"). Moreover, building upon the elaboration likelihood model (ELM) of persuasion and signaling theory, we propose and evaluate a model that offers an explanation for *how specifically* anonymity affects persuasion. We illustrate the role of perceived social presence — a central construct in this regard — as it affects persuasion through both one's own involvement and perceptions of the persuaders' credibility. These two factors highlight the intricacies of anonymity, as personal involvement reduces persuasiveness, while perceived credibility on the part of the persuadee promotes it. Our study hence contributes to extant literature by linking user representation in online platforms to persuasion and well-established theories from computer-mediated communication. In this regard, our study has important theoretical and practical implications for the understanding, design, and use of online discussion platforms.

The remainder of this paper is organized as follows. In Section 2, we outline the theoretical background of our research and, based on the theoretical perspective of the ELM [32] and signaling theory [34], derive our research model and hypotheses. Section 3 presents our methodological approach and study design. We report the results in Section 4 and draw theoretical as well as practical implications, discuss limitations, and outline paths for future work in Section 5. Section 6 concludes this paper.

2. Theoretical background and research model

In the following, we outline the ELM of persuasion and signaling theory, based on which we then develop our research model and hypotheses. First of all, persuasion can be defined as a process in which "communicators try to convince other people to change their attitude or behavior regarding an issue through the transmission of a message, in an atmosphere of free choice" (p. 8) [35]. Features of the source of a message (i.e., the persuader or sender), the message itself, and/or the recipient (i.e., the persuadee) can bring about this change [36].

2.1. Elaboration likelihood model and signaling theory

The elaboration likelihood model (ELM) of persuasion proposes differences in the effectiveness of persuasion depending on how messages are processed by the recipients [32]. While some messages are assumed to be processed via a "central route," enabling careful reasoning and evaluation, other messages are processed via a "peripheral route." When processed through the central route, messages are subject to the recipient's close attention, and arguments need to be logically and factually convincing in order to affect a change of opinion [32,37]. In contrast, when a message is processed through the peripheral route, the recipients pay less attention to its substance but rather rely on heuristics and cues not directly linked to the message's content. Examples of such cues may include the manner of presentation or attributes of the sender [38,39]. It is commonly assumed that persuasion is more likely to be successful when a message is processed through the peripheral route [32,40–44]. The ELM and the closely related heuristic-systemic model (HSM) dominate studies on persuasion research, including those in the stream of persuasive technology [45].

Signaling theory is rooted in evolutionary biology. Two central elements of the theory are *asymmetry of information* (i.e., one party has information about themselves which another party does not have) and the use of signals as an *attempt to elicit certain behaviors or beliefs* in the other party [34]. In the theory's original domain, a signal may, for example, be the development of a magnificent antler by a buck to signal excess resources, physical health, strength, and, hence, mating suitability. Signaling also plays a crucial role in business and economics, where signals convey information about a party in a transaction (e.g., in job applications [34,46] or initial public offerings [47]). In electronic commerce, as well, it is assumed that sellers attempt to use signals to convince potential buyers of their (and their products') quality and trustworthiness — and hence to stimulate purchasing behavior. However, sellers want to sell a product of which only they know that the quality is high (information asymmetry). Buyers lack this information and therefore face uncertainty. While there exist several types of signals (e.g., third party recognition/reviews [48,49] or brands [50]), one type employs a self-commitment strategy, which makes non-compliance costly for the signaler (i.e., the seller). An example of this is warranties. Sellers can credibly signal their products' quality through warranties, since low quality would sooner or later prove costly for the seller. We suggest that this general principle is applicable to persuasive communication.[1] In this sense, a persuader wants to "sell" his or her opinion to the persuadee. In the sense of a self-commitment strategy, linking one's personal identity to a statement may serve as a personal "warranty" for the statement's veracity. Thus, the persuasive effect of posting online may well depend on the author's self-representation, which in turn lies somewhere on the scale from completely anonymous to fully identifiable. In the context of online discussions, attaching one's actual identity (i.e., profile image) to a post can be seen as a self-commitment strategy, as the author allows any false statement to reflect back on him or her personally, potentially resulting in loss of social status and public embarrassment.

2.2. Research model and hypotheses development

We apply and incorporate these theoretical approaches within a structured research model, as depicted in Fig. 1. Our starting point is

[1] In fact, the English language illustrates this analogy of (electronic) commerce and persuasion quite well, as reflected by expressions such as "I'm not buying that," or "to sell an argument."

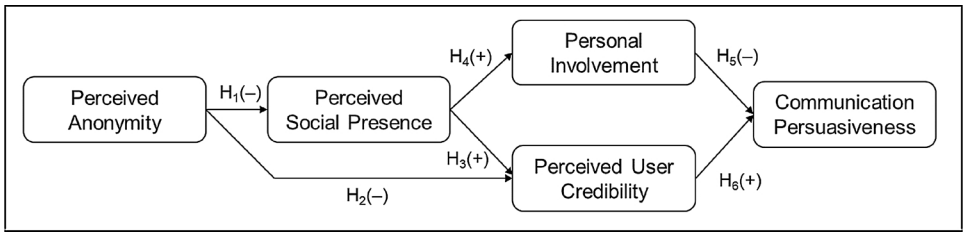

Fig. 1. Research Model.

Table 1
Context-specific construct definitions.

Construct	Context-specific definition	Source
Perceived Anonymity	Perception of how well a user's identity is concealed and cannot be tracked back to his or her actual person.	[56]
Perceived Social Presence	Perception of a personal, sociable, and sensitive human contact as conveyed through the online discussion forum.	[57]
Perceived User Credibility	Degree of trustworthiness and expertise attributed to the originator of an online comment.	[55]
Personal Involvement	Perception of how involving an online discussion is, i.e. how well the user refers to and engages with it personally.	[37]
Communication Persuasiveness	This construct represents the main dependent variable and is operationalized as the absolute difference between stated agreement before and after treatment exposure, i.e. in t = 1 and t = 2 (both measured on 11-point Likert scales).	–

perceived anonymity (i.e., the recipient's inability to identify the sender [51]), which, we suggest, affects persuasion in two ways. First, anonymity is associated with a lack of social presence, as typical social cues such as faces or names are absent in anonymous communication [31]. Consequently, non-anonymous communication is associated with a higher degree of social presence than anonymous communication, which renders the conveyed content more interesting and engaging to the recipients [33]. This, in turn, activates more elaborate mechanisms of reasoning on the part of the recipient, which, according to the ELM, *impedes* persuasion. Second, non-anonymity (and thus, social presence) can also be interpreted from a signaling perspective, where the sender's willingness to be held accountable for their statements serves as a signal of credibility, which should *promote* persuasion [52–55]. All constructs and sources are provided and defined for the context of our study in Table 1. We develop our research hypotheses in the following subsections.

2.3. The impact of perceived anonymity on perceived social presence and perceived user credibility (H_1 and H_2)

Anonymity is derived from the Greek word *anonymia*, referring to "namelessness." In the specific context of online discussions, we relate anonymity to privacy, confidentiality, and secrecy, viewing it as "one polar value of a broad dimension of identifiability versus non-identifiability" [58]. Due to the lack of social cues such as faces or names in anonymous communication, it is associated with lower perceptions of social presence than non-anonymous communication [31]. The perception of social presence depends on intimacy and immediacy [59,60]. While intimacy is related to shared interests, conversation, physical proximity, and eye contact [61], immediacy can be established through verbal and nonverbal cues [60]. It is arguably more difficult to evoke feelings of intimacy and immediacy through computer-mediated communication than through real-life interaction, particularly in the absence of the social cues by which to identify and relate to one's counterpart.

Several studies support this reasoning. Teubner et al. [25], for instance, found user anonymity to be a negative driver of social presence in peer-to-peer interactions. Social presence can also be infused using socially evocative descriptions and pictures [57]. Displaying images of human faces and (seemingly) personal texts has been shown to have a positive effect on perceived social presence in e-commerce [12,62–64]. Under conditions of anonymity, such elements simply do not exist. With regard to online discussions, therefore, we suggest that user anonymity (as compared to non-anonymity) reduces perceptions of social presence.

H_1. *Higher levels of perceived anonymity have a negative effect on perceived social presence.*

In line with previous research, we refer to perceived user credibility as the level of trustworthiness and expertise associated with a user [53–55,65]. In their seminal paper, Hovland et al. [66] investigated persuasive communication by asking "Who says what to whom with what effect?" Users in anonymous communication scenarios can answer the "what" part easily, as they are able to examine message's content. Nonetheless, the sender (i.e., the "who") remains concealed. In this regard, Cialdini [67] found that messages are more persuasive if communicated by a trusted authority who holds relevant expertise. Similarly, several other studies found that source identification can be of great value for the perception of credibility, and that besides its effect on social presence, anonymity tends to reduce credibility [29,30,68,69]. This effect can be attributed to the concept of signaling, whereby a message's sender establishes a strong signal of credibility by attaching their personal identity to the message [48]. In this case, making false claims or statements could backfire and result, for instance, in public embarrassment or loss of social status [70]. However, source identification is inconceivable in anonymous communication. This line of thought is consistent with results from e-commerce research on user reviews, where information from identified sources was found to be more useful and credible [27,41,71,72]. In the context of group support systems also, anonymity was found to reduce perceived user credibility [73].

One popular explanation for this is connected to the halo effect, according to which the evaluation of a specific attribute of another person (e.g., attractiveness) can drive the evaluation of other, unrelated attributes [74,75]. In this regard, people make assumptions regarding personality traits, trustworthiness, and competence based on the appearance of others [76–79]. Thus, if a message is communicated together with a pleasant profile photo, its recipients are likely to judge the message as being more credible and socially close [8,27]. This effect is most likely amplified by the positive selectivity one expects in the process of choosing online profile pictures.[2] If, however, such visual clues are missing, anonymity may have negative effects on credibility since users cannot form impressions [29] — and the mere fact that someone deliberately chooses to not upload a photo may be interpreted

[2] Wu et al. [147], for instance, found that Facebook users choose profile pictures that make them look more attractive. It is conceivable that some profile photos may have a detrimental effect on message persuasiveness, if, for instance, the depicted person appears unreliable or unpleasant. Given that in virtually all online platforms, users upload a photo of their own choice, this representation can be expected to be biased in a complimentary, favorable way.

as an indication that this person does not want to be held liable for their claim.

H_2. *Higher levels of perceived anonymity have a negative effect on perceived user credibility.*

2.4. The impact of perceived social presence on perceived user credibility and personal involvement (H_3 and H_4)

Beyond the direct impact of anonymity, we suggest that perceived user credibility is affected by perceived social presence. In the literature on electronic commerce, it is argued that social presence promotes trust by developing personal, sociable, and human feelings among the interacting parties [57,62,80]. Moreover, if a high degree of social presence is conveyed through a website, users tend to judge the service provider as being of great integrity. Specifically, Hassanein and Head [62] showed that social presence on websites is driven by displaying socially rich descriptions and pictures, that is, by representations not even of actual users but by stock imagery. In a study on C2C e-commerce, Jones and Leonard [81] argued that information regarding personal beliefs provides valuable social cues that drive trustworthiness. Moreover, Zhaoa et al. [70] found that social presence also encourages readers of online reviews to trust the reviewers. As trustworthiness has been recognized as one of the key components of perceived user credibility [e.g.,54,55], we contend that this principle extends to online discussions. We hypothesize

H_3. *Higher levels of perceived social presence have a positive effect on perceived user credibility.*

Personal involvement describes the level of personal relevance of a certain discussed topic and the recipient's associated degree of cognitive engagement [33]. Research on persuasion has also referred to this construct as issue involvement [33] or outcome-relevant involvement [82]. As social presence highlights the existence and active role of another human, and hence the possibility of two-way communication, it becomes socially more important to form and express one's own opinion about a given subject if others discuss it [38]. We contend that personal involvement is affected by the heuristic of social proof, i.e., regarding the actions of others as clues for what could be an appropriate or beneficial action to take for oneself [67]. From an evolutionary stance, whenever we observe other humans gathering, we tend to assume underlying circumstances that could also benefit us, for example, the distribution of prey or the availability of fresh water — crucial factors for survival. The social proof mechanism is especially effective under conditions of uncertainty. For instance, Rao et al. [83] demonstrated that Wall Street analysts use social proof heuristics when following the investment decisions of their peers. Despite poor returns, the analysts adapted their investment decisions according to what others found important and therefore began investing in otherwise irrelevant stocks. Similar effects were found in the context of prosocial donations, marketing, and various forms of interpersonal communication [84–86]. Thus, observing others considering a certain matter can prompt individuals to consider and elaborate on it as well. In the context of online discussion, the presence of others is associated with perceived social presence, which may drive increased personal involvement in the topic or discussion at hand.

Furthermore, Fortin and Dholakia [87] found strong effects of social presence on the involvement of consumers who were exposed to web-based advertisements. Similar effects may occur in online discussions. In this regard, observing the statements and opinions of one's peers enhances feelings of personal involvement by making a subject more salient and present. Prior research has also considered the role of social presence in the related field of e-learning, where the social presence of teachers and non-anonymity of learners both promote learning success [88,89], usually associated with increased levels of receptivity. In a broader sense, people are arguably more motivated to get involved with a topic when people close to them are involved in that same topic. Thus, we hypothesize

H_4. *Higher levels of perceived social presence have a positive effect on personal involvement.*

2.5. The impact of personal involvement on communication persuasiveness (H_5)

As people derive personal relevance based on social proof heuristics, a topic becomes more relevant for them if others deem it to be relevant. This, we suggest, motivates a more thorough analysis of the arguments exchanged [38]. However, a more active (internal) consideration is associated with a decreased likelihood of persuasion based on the arguments of others (i.e., external sources). This is in line with predictions of the ELM [32]. Empirically, opinion change is often less pronounced in such cases, as individuals examine arguments more closely and critically [40,90], also calling to mind their own previously formed views and opinions more vividly.

Supporting this notion, scholars in communication science have found that highly involving, and thus mentally engaging, topics inhibit persuasion [33,91,92]. That is, if individuals believe that a given topic holds great personal relevance, they tend to have strong opinions on it, which leads to a high probability of conflicting messages being rejected [33]. Personal involvement, in other words, invigorates one's own prior experiences, assumptions, and beliefs in connection with a certain topic, which reinforces existing opinions. This effect might be further amplified when people have a strong, preconceived opinion, as they tend to assess arguments more critically, even skeptically, than those who have not formed an opinion beforehand [38]. Sherif et al.'s [93] social judgment theory pins down this effect as an extended latitude of rejection. Petty et al. [37] found that the content of message becomes more important than source characteristics when people are highly involved — and vice versa. Consequently, our fifth hypothesis states

H_5. *Higher levels of personal involvement have a negative effect on communication persuasiveness.*

2.6. The impact of perceived user credibility on communication persuasiveness (H_6)

While high involvement, as suggested by the ELM, leads to processing along the central route, the existence of social cues as heuristics can trigger peripheral processing. The sender's perceived credibility might serve as such a cue. Under this condition, perceived user credibility can be expected to have a positive effect on persuasiveness. In an extensive meta-study, Pornpitakpan [54] found that sources viewed as having high credibility were consistently considered more persuasive than those with low credibility. Communication science also provides support for this reasoning based on credible information sources [69,94–96]. Similarly, Cialdini [67] cited authority in the form of expertise as one of the main principles of persuasion. He argues that in an age of information overload, a person perceived as an expert offers a helpful shortcut for information processing [97]. Hence, people may simply apply such peripheral heuristics to assess a message. This line of thought is also largely consistent with findings from social psychology and exemplifies the concept of dual process models of thought [98,99], suggesting that people make analytical, logical, and rule-based decisions with a comparatively high mental effort in some situations, while relying on diverse, often affective and subconscious procedures in others. Moreover, this notion supports the idea of halo effects that influence credibility and, essentially, message persuasiveness. Research on persuasive technologies, too, refers to trustworthiness, expertise, and authority as principles for a credible and thus more persuasive system design [100]. In summary, credible users can be characterized as more persuasive than less credible users. We suggest that this effect

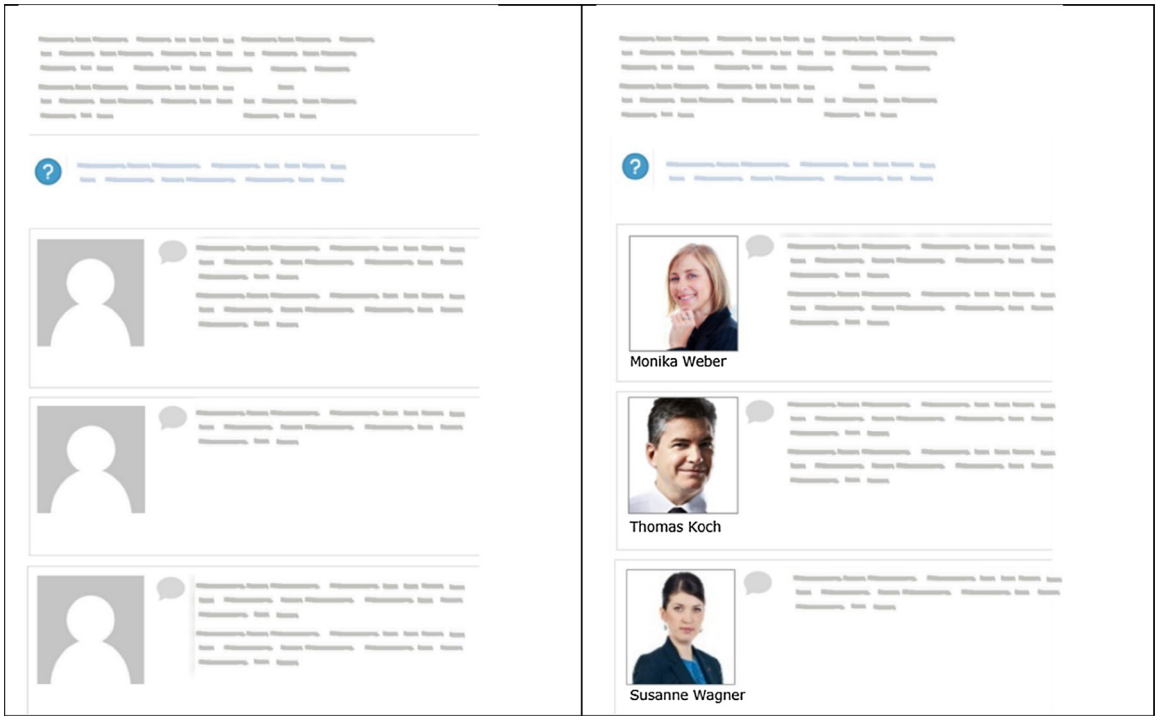

Fig. 2. Schematic view of screens in the anonymous (left) and identifiable (right) treatments.

extends to the messages originating from these users. Our last hypothesis therefore reads

H_6. *Higher levels of perceived user credibility have a positive effect on communication persuasiveness.*

Additionally, argument direction, i.e., whether an argument is formulated in favor or against a given question — may serve as an important control variable here. Haines and Mann [101] suggested that group influence will already be pronounced by the simple act of having others communicating their opinions. Moreover, we expect that opinion change follows the direction of the arguments a subject was exposed to [102].

In light of these various considerations, we suggest that the effect of user anonymity on communication persuasiveness is strongly connected to the concept of social presence. This factor, however, represents a double-edged sword. While we expect a higher degree of social presence to positively affect (message) persuasiveness via higher levels of (sender) credibility, it also activates (recipient) involvement with the topic in question, which in turn hinders persuasion. From an ex-ante perspective, it is not evident which of the two paths will prevail. Moreover, in order to understand the process of persuasion, research on persuasive technologies emphasizes the need to examine the roles of the persuader, persuadee, message, channel, and the broader context [100]. In other words, we need to consider why, where, and how persuasion takes place.

3. Study design

As our research paradigm, we use a two-stage scenario-based experiment to investigate how people (i.e., persuadees) change their opinion based on different visual representations of persuaders [103]. Since this study is situated in the field of business communication, and online platforms in particular, we create a scenario using a fictive company's online discussion forum, in which (fictive) characters (representing colleagues) share arguments in favor of or against different corporate decision possibilities. Participants are asked to assume the role of an employee utilizing this corporate online forum. Addressing our main research questions, we manipulate the degree to which the fictive users are represented as either anonymous or identifiable. First, participants are introduced to the general topic: some background information on that topic is provided and the two conflicting paths of action the company may take are presented. The participants then get to see and read the other users' arguments in the form of written posts in this forum. In the last step, participants state their opinion on the matter under discussion (i.e., their level of agreement with the proposed corporate strategy). A meaningful assessment of communication persuasiveness is difficult, if not impossible, in a static approach. To gauge such an effect, it is crucial to measure the difference in a user's stated opinion before and after treatment exposure [104]. We thus employed a two-stage design, which we explain further in the following.

3.1. Stage 1: initial assessment of opinions

In the first stage of the experiment, participants were exposed to a set of (at least somewhat) controversial topics of public debate, on the basis of which their company was thinking about deriving strategic decisions. These topics covered matters such as minimum wage, regulation of crowd funding platforms, divestment from fossil fuel, extra-occupational study support, work-on-holidays rules, and CEO/worker pay ratios. For each topic, participants read a short text describing the matter at hand. The texts developed two contrary positions and ended with a clear-cut question as to whether or not the fictional company should implement or support this specific policy (e.g., follow a divestment strategy, publish data on pay ratios, and so on). Participants were then asked to state their agreement with the described policy on an 11-point Likert scale, ranging from 1 (strongly disagree) to 11 (strongly agree).

3.2. Stage 2: post-treatment assessment of opinions

In the second stage, several weeks later, all respondents from the first stage were invited back. In contrast to the first phase, they now entered a (semi-fictional) discussion forum in which they were

presented with the written posts of fellow employees expressing their opinions on varying topics, as described above (a sketch of this is depicted in Fig. 2). After being exposed to the treatment manipulation (either anonymous or identifiable user representation), participants were asked to indicate their agreement (again on an 11-point Likert scale) with the same statement as in the first stage of the experiment. Moreover, participants also indicated their perceptions of social presence, anonymity, user credibility, and personal involvement regarding the displayed discussion, users, topics, and arguments. Moreover, we surveyed the participants' gender and age as control variables.

Importantly, participants did not know that they would be invited a second time when they participated in the first stage, nor could they (technically) access their initial answers after submitting them. While we cannot fully preclude the possibility that participants were able to recall their initial assessment from memory, it is rather unlikely that they were able to consciously replicate their initial agreement scores, for example, in an attempt to appear consistent. Following Oinas-Kukkonen and Harjumaa [100], the overall context of persuasion and its core elements can be defined as follows: Fictive colleagues (*persuaders*) seek to influence our study's participants (*persuadees*) by means of posts (*messages*) in a corporate discussion forum (*channel*). This design hence tests the effect not of a *central* but of a *peripheral* persuasive element.

3.3. Treatment design

Our main treatment dimension (i.e., user representation) is varied using a between-subjects design. Each participant is assigned to only one treatment condition at random. The respective authors of the posts are either represented by a gray avatar and no name (anonymous) or a photograph along with a name (identified). This is depicted in Fig. 2. As a secondary dimension, we varied argument direction (pro vs. contra), which refers to whether the presented posts argued in favor of or against the policy proposition raised in the discussion. Note that all displayed arguments associated with a discussion were either in favor of or against the proposal under consideration.

3.4. Stimulus material

For the first stage of the experiment, we retrieved articles from a popular German weekly newspaper's website. In order to replicate a corporate decision scenario, we re-framed them as business strategy propositions (e.g., "Should our company follow a fossil fuel divestment strategy?" or "Should crowd-funding platforms be subject to government supervision?"). Second, we extracted several comments from the discussion sections of the online articles — arguing both for and against the proposition. These comments were revised and harmonized in language and tone. Also, grammatical and spelling errors were corrected to avoid unwanted influence [27,105] (available on request).

In the "anonymous" treatment, users were represented by a default image sketching the shape of a head in white on a gray background (see Fig. 2, left-hand side). No names were displayed. In the "identified" treatment, users were represented by a profile picture and full name. All profile pictures were obtained from a stock photo provider. Their appearance is limited to smiling, middle-aged Caucasian men and women in business attire (see Fig. 2, right-hand side). We varied the displayed pictures to represent male and female users equally. Names are based on combinations of the most common first and last names in German-speaking countries, excluding the top three examples in each category to avoid overly artificial impressions.[3]

[3] The set of last names included Weber, Wagner, Fischer, Becker, Koch, Neumann, Bauer, and Schäfer, whereas Müller, Meyer, and Schulze were omitted. The set of female first names included Monika, Susanne, Karin, and Claudia. The set of male first names included Thomas, Stefan, Andreas, and Michael.

3.5. Measurements

While in the first stage (evaluation of baseline opinions), we assessed the extent of user agreement with the different corporate policies, the second stage was much more comprehensive. Whenever possible, and to ensure content validity, we use previously validated scales and adapt them to the context of this study. Perceived anonymity was adapted from Sosik et al. [56]. Perceived social presence was adapted from Gefen and Straub [57]. Perceived user credibility was adapted from Schlosser [55]. Personal involvement was adapted from Petty et al. [37]. All constructs were operationalized by items with 7-point Likert scales. A list of all constructs and measurement items is provided in Table A1 in the Appendix. In line with how these constructs are used in the literature in general, and in the reference studies in particular, these measurements are reflective in nature.

As a means of limiting potential common method bias and to allow for sufficient gradation, the participants' level of agreement was assessed on 11-point Likert scales (as in the first stage of the experiment). We approximate communication persuasiveness as the *difference* in a participant's stated agreement levels between the first and second stages of the experiment, i.e., as the implicit *change of opinion* before and after exposure to the treatment conditions [104]. For analysis, we computed a single dependent variable per participant (i.e., focusing on one topic), capturing the difference in the level of agreement observed before and after treatment exposure.

3.6. Procedure

Participants were recruited via email from a pool of registered volunteers at (blinded for review). Participation was incentivized by a gift card lottery among all subjects who completed the experiment. In the first stage, a total of 1600 participants were invited and 583 completed this first assessment. We then invited those 583 participants to the second stage of the experiment, which was conducted 4 weeks after the first stage was closed. Of these, a total of 337 completed the second stage. Overall, 242 were male (72%) and 95 were female (28%). The age of the study participants ranged from 18 to 31 years, with a mean of 23.3 years and a standard deviation of 2.68 years.

4. Results

4.1. Manipulation checks

As a first step, we analyze the general data structure. Specifically, we consider how the stated agreement levels in stages 1 and 2 differ and whether there exists a correlation. In fact, agreement before and after exposure to the stimulus material is correlated, that is, subjects did not change their opinion at random (Pearson correlation, $r = 0.424$; $p < .001$). Next, we consider whether the visual representations of the persuaders in the different treatment conditions (i.e., anonymous or identified) were actually perceived as different by the participants. This step is important as it allows us to relate the effect of the endogenous construct of perceived anonymity back to the exogenous treatment manipulation. In fact, perceived anonymity in the anonymous treatment (mean = 5.70) was significantly higher than that in the identified treatment (mean = 2.81; unpaired T-test; $T = 20.08$; $p < .001$; see also Fig. 3, left-hand side). In line with the results from this *t*-test, a correlation of the binary treatment variable with perceived anonymity yields a correlation coefficient of $r = 0.75$ ($p < .001$). Hence, the binary treatment variable alone accounts for $r^2 = 0.56$ of the variance in perceived anonymity.

4.2. Overall effects

We now turn to the overall effects of the treatment variables (cause) on the main dependent variable, i.e., opinion change (effect). For the

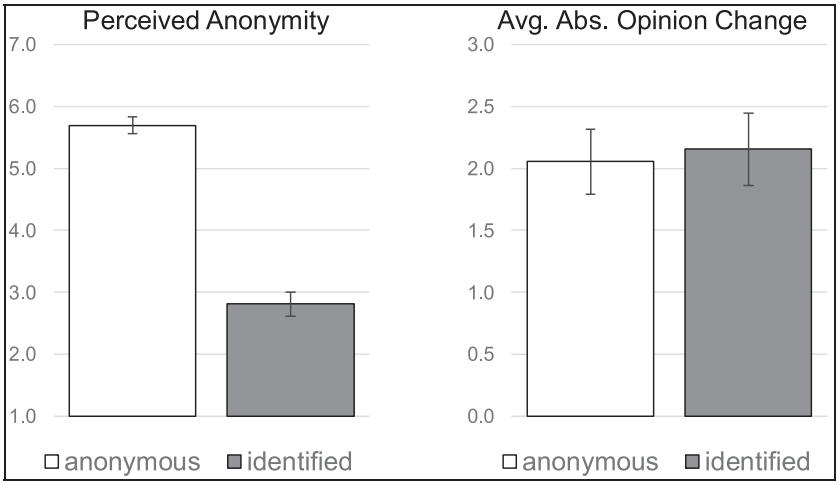

Fig. 3. Perceived anonymity and average absolute opinion change by user representation (anonymous, identified) (error bars indicate 90% confidence intervals).

presented study design with data collection at two points in time, a panel design approach comes to mind. Since, however, all independent variables are either equal at both instants of data collection or only exist in the second, we focus on explaining how the auxiliary dependent variable (i.e., agreement) changes from t = 1 to t = 2 directly. Moreover, our main interest is not so much in explaining the *absolute* scores for someone's agreement at t = 1 and t = 2, but rather in explaining the *difference* between these scores before and after exposure to the specific treatment condition. On an individual level, communication persuasiveness is thus operationalized as the difference between the stated levels of agreement in the first and second stages of the experiment (both assessed on 11-point Likert scales).

Note that simply summing up across all participants of the anonymous/identified conditions would not be meaningful since this would involve both pro and contra conditions (where we expect a positive delta for the pro condition and a negative delta for the contra, which would effectively cancel each other out). We thus consider *absolute* opinion change (Fig. 3, right-hand side). This analysis suggests that the deltas do not significantly differ for the two distinct treatment groups, i.e., between participants presented with anonymous and identified persuader representation. Since there are different users in different treatment conditions (between-subjects design), we use an independent samples *t*-test for this first statistical assessment of the treatment effect ($mean_A = 2.05$; $mean_I = 2.16$; unpaired *t*-test; $T = 0.42$; $p = .337$).

This leads us to consider actual (i.e., non-absolute) opinion changes, necessitating a differentiation of argument direction (pro or contra). In fact, looking at the differences between the first and second stages with respect to both user representation *and* argument direction yields a more insightful picture.

First, for each of these 2 × 2 = 4 conditions, we compare the participants' stated agreement before and after being exposed to the stimulus material. The results of these comparisons are summarized in Table 2. Since we now compare the participants' stated agreement levels at two points of time while the participants remain the same, this analysis demands the use of *paired* tests. Importantly, we observe

Table 2
Average stated agreement by user representation and argument direction (based on 11-point Likert scales), differences, and significance levels (paired-sample *t*-tests; *** $p < .001$; * $p < .05$; $^{+}$ $p < .10$).

User Representation	Argument Direction	Before	After	Difference (sig.)
Identified	Pro	7.560	8.560	+1.000***
	Contra	8.146	6.444	−1.704***
Anonymous	Pro	8.163	8.620	+.457+
	Contra	7.912	6.725	−1.187*

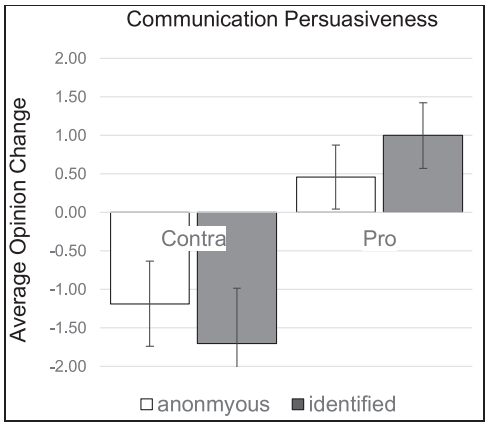

Fig. 4. Average opinion change by user representation (anonymous, identified) and argument direction (contra, pro) (error bars indicate 90% confidence intervals).

significant (or marginally significant) changes in all conditions. As expected, opinion changes are positive for supporting and negative for opposing arguments. Moreover, differences are generally larger for the identified than for the anonymous conditions. Fig. 4 depicts average opinion changes for each treatment condition.

4.3. Model evaluation (H_1–H_6)

After this first general assessment of the focus variables, we now consider *how* specifically the effects of anonymous versus identified user representation on persuasiveness are conveyed — as theorized in the research model. The model was validated using Partial Least Squares (PLS), conducted in SmartPLS 3.0 [106]. PLS-SEM was chosen for the approach's broad scope and flexibility of theory and practice [107], as well as its flexibility with regard to handling binary variables (e.g., anonymity/identity, control variables) and single-item variables (e.g., opinion change) without any additional requirements or constraints [108–110]. Note that for sufficiently large datasets (i.e., 250 or more observations), the results obtained by PLS-SEM and CB-SEM tend to be similar [108].

With regard to the requirements of sample size, G* power analysis suggests that for our model, a sample size of n = 145 is sufficient to detect minimum R^2 values of 10% with a 1% probability of error (statistical power: 80%; maximum number of predictors for any construct: 2 in the main model, 3 in the complementary mediation analysis; [108,111,112]). With 337 observations, our dataset should thus be

Table 3
Construct Descriptives, Reliability Measures, and Correlations.

	Descriptives		CR	Cronbach's α	AVE	R^2	Q^2	Correlation Matrix				
	Mean	SD						PA	PSP	PUC	PI	CP
PA	4.377	1.930	0.932	0.896	0.820	–	–	**0.906**				
PSP	4.349	1.183	0.834	0.709	0.626	0.012	0.006	−**0**.108	**0.791**			
PUC	4.980	0.808	0.796	0.621	0.566	0.129	0.064	−**0**.065	0.359	**0.752**		
PI	4.458	1.364	0.887	0.809	0.726	0.122	0.083	−**0**.054	0.350	0.254	**0.852**	
CP	2.101	2.195	–	–	–	0.074	0.033	0.025	−**0**.098	0.123	−**0**.138	–

Note: diagonal elements contain the square root of AVE (average variance extracted) for each construct. PA = Perceived Anonymity; PSP = Perceived Social Presence; PUC = Perceived User Credibility; PI = Personal Involvement; CP = Communication Persuasiveness.

large enough to detect existing effects with sufficient certainty — and therefore to allow for a robust interpretation of our findings, particularly in view of non-significant effects.

Table 3 provides all construct descriptives, reliability measures, and correlation coefficients. Construct reliability (Cronbach's alpha, > 0.70; Composite Reliability > 0.70) was established [113,114]. Note that Cronbach's alpha of perceived user credibility falls slightly below this conventional threshold. In this regard, Cronbach's alpha has been criticized as being a lower — that is, rather too conservative — bound and hence prone to underestimating true reliability [115]. Also, psychometric studies generally conclude that "[Cronbach's] alpha underestimates the true reliability of a measure that is not tau equivalent" (p. 344) [116]. Since the construct's Composite Reliability score (0.796) suggests validity, and as all other measures of PUC are inconspicuous, this sole threshold violation appears acceptable and we assume that, overall, construct reliability is not an issue. Next, convergent validity was established (Average Variance Extracted, AVE > 0.50 for all constructs). In terms of discriminant validity, the square root of all AVE values was larger than those of any correlation between that construct and any other construct [117]. Moreover, item loadings on their respective constructs are larger than on any other construct (Table 4; [118]). Recent research recommends the heterotrait-monotrait (HTMT) ratio as a rigorous criterion for discriminant validity [119]. HTMT analysis revealed that all values were below the suggested threshold of 0.90 (in fact, the largest value was 0.504 for PSP/PUC). Also, inference-based testing revealed that none of the 95% confidence intervals for HTMT ratios included the value of 1 (in fact, the largest upper bound was 0.651). This suggests that all constructs are empirically distinct. In terms of overall model fit, the standardized root mean square residual (SRMR) is 0.066, which is above the conservative threshold of 0.05 (as suggested by Byrne [120]). However, as recent studies show that even correctly specified models can yield SRMR values of 0.06 and higher, it is admissible to use a less strict threshold value of 0.08, implying acceptable overall model fit [121–123].

Table 4
Item Loadings and Cross Loadings.

Construct	Item	PA	PSP	PUC	PI
PA	PA1	**0.862**	−0.090	−0.029	−0.053
	PA2	**0.945**	−0.121	−0.092	−0.064
	PA3	**0.907**	−0.060	−0.026	−0.010
PSP	PSP1	−0.022	**0.735**	0.192	0.243
	PSP2	−0.130	**0.836**	0.259	0.268
	PSP3	−0.090	**.800**	0.365	0.308
PUC	PUC1	−0.030	0.327	**0.804**	0.192
	PUC2	−0.072	0.209	**0.716**	0.165
	PUC3	−0.054	0.256	**0.733**	0.214
PI	PI1	−0.022	0.252	0.252	**0.728**
	PI2	−0.047	0.293	0.293	**0.891**
	PI3	−0.062	0.341	0.341	**0.924**

4.4. Structural model and hypotheses testing

The structural model was evaluated based on PLS bootstrapping (5000 samples, no sign changes, complete bias-corrected and accelerated bootstrapping, two-tailed hypotheses testing). The path coefficients and significance levels are provided in Fig. 5. As can be seen, except one, all of the hypothesized effects were supported by the data. First, perceived anonymity has a marginal and negative effect on perceived social presence (H_1, $\beta = -0.108$, $p < .10$), whereas we do not observe a significant direct effect of perceived anonymity on perceived user credibility (H_2, $\beta = -0.027$, n.s.). Thus, the effect of perceived anonymity on perceived user credibility is fully mediated through the construct of perceived social presence. However, perceived user credibility is driven by perceived social presence (H_3, $\beta = 0.356$, $p < .001$), as is personal involvement (H_4, $\beta = 0.350$, $p < .001$). Lastly, communication persuasiveness emerges as the product of these two competing paths, where personal involvement has a negative effect (H_5, $\beta = -0.141$, $p < .05$) and perceived user credibility has a positive effect on communication persuasiveness (H_6, $\beta = 0.169$, $p < .001$), both originating in perceived social presence. As we illustrate in Appendix B, the (direct) effect of perceived social presence on communication persuasiveness is fully mediated through these two opposed paths.

As summarized in Table 3, the associated R^2 values are comparatively low, in particular those of communication persuasiveness and perceived social presence. This may be the case for two reasons. First, communication persuasiveness was assessed on a different scale than all other constructs in our research model (i.e., absolute difference vs. 7-point Likert scales). This (actually desirable) absence of a "common method" bias may well contribute to this result. Second, prior research has established that various aspects influence perceived social presence, including the specific appearance of a person and the semantic tone and sentiment of a message [12,57,124]. These criteria were, however, beyond the scope of our study. Overall, the effect sizes obtained in the model are consistent with the results of previous research in the social sciences [125]. The Stone-Geisser criterion (Q^2) was used to evaluate the structural model. As can be seen in Table 3, all Q^2 measures exceeded the threshold of 0, thus meeting the criterion for predictive validity, that is, how well observed variables are reconstructed by the model [108,126–128]. Table 5 summarizes all hypotheses, path coefficients, significance values, f^2, and HTMT values, as well as the conclusions we derive from these observations. As can be seen from this, the effect sizes of the significant paths can be situated between "small" and almost "medium" for H_3 and H_4 [108].

Control variable analysis shows that neither participants' age nor gender exerts a significant effect on communication persuasiveness. Moreover, controlling for argument direction (positive/negative) shows that absolute opinion changes are slightly less pronounced for pro-arguments. Importantly, when including/excluding these controls, none of the hypothesized path relations changes in magnitude, sign, or significance. Moreover, comparison across topics also yields highly similar path coefficients. Given the relative sample imbalance of female (28%)

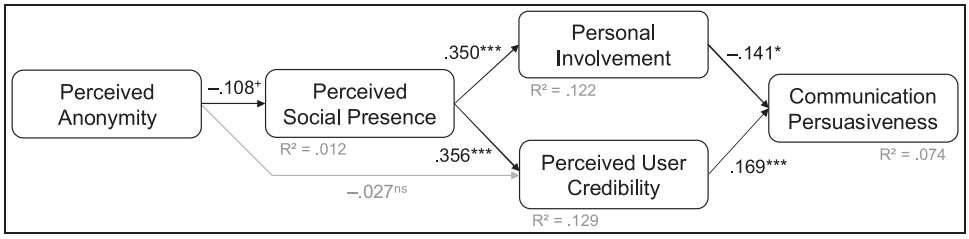

Fig. 5. Hypotheses Evaluation (*** $p < .001$; ** $p < .01$; * $p < .05$; control variables: gender, age, argument direction).

Table 5
Summary of path hypothesized relationships.

Hypothesis	Path		Coef.	Sig	f^2	HTMT	Conclusion
H_1 (−)	PA	⟶ PSP	−0.108	+	0.012	0.012	Weakly supported
H_2 (−)	PA	⟶ PUC	−0.027	n.s.	0.001	0.083	Rejected
H_3 (+)	PSP	⟶ PUC	0.350	***	0.144	0.504	Supported
H_4 (+)	PSP	⟶ PI	0.356	***	0.139	0.450	Supported
H_5 (−)	PI	⟶ CP	−0.141	*	0.019	0.143	Supported
H_6 (+)	PUC	⟶ CP	0.169	***	0.028	0.157	Supported

and male (72%) participants, we conducted an additional multi-group analysis (MGA) to explore these groups' differences in greater detail (i.e., not only considering gender effects on *constructs* but also on *relations between them*) [129]. This MGA reveals that there are no significant path differences between male and female participants. Overall, control variable analysis suggests that, although exhibiting generally low effect sizes and explained variance, the findings and conclusions derived from this study are robust.

5. Discussion

In this paper, we investigated the effect of user anonymity on communication persuasiveness in a corporate discussion setting through the lens of the ELM and signaling theory. We systematically varied user representation and showed that perceived anonymity affects communication persuasiveness via the two opposing paths of personal involvement and perceived user credibility. Although higher involvement markedly *reduced* persuasiveness, higher credibility had a positive effect. In the following, we will examine our results in view of the underlying research model — in particular, signaling theory and the ELM — as well as the broader implications for research on persuasion and lessons for practitioners.

5.1. Theoretical implications

To a large extent, prior research has either hailed anonymity for its potential to protect reticent users and to bring hard truths to light [15,17,18] or has warned that anonymous discussions could lead to greater polarization and uninhibited language [7,21–23]. In contrast, only a few studies have investigated the effect of anonymity on message persuasiveness [8,16]. By conflating the constructs of perceived social presence, perceived user credibility, and personal involvement, we were able to illustrate the intricate effects of anonymity on persuasion in an online context. In effect, our study enhances the current understanding of how user anonymity affects communication persuasiveness. Although our findings suggest rather weak effects and low degrees of explained variance overall, the observed directions and tendencies are in line with research on the link between anonymity and perceptions of social presence [25,57,62,80].

Regarding the effect of social presence on persuasiveness, our findings suggest a more complex interplay between these factors than has usually been indicated by earlier findings. We find that higher levels of social presence promote credibility, which in turn drives persuasion [32,54,67]. Perceived social presence, however, seems to play a dual role since it also promotes the persuadees' personal involvement, which in turn inhibits persuasion by involving them in the topic, as arguments are examined with more mental effort and care [40,90]. The ELM assumes that involvement leads to processing via the central route, while credibility activates the peripheral route of information processing. We find that the ELM, in this sense, presents an inherent tension whereby the effects of personal involvement and perceived user credibility might cancel each other out. Note that our results are inconclusive with regard to this possibility. However, the notion that central and peripheral information processing occur in parallel is supported by research on persuasive technologies [36]. Furthermore, the Heuristic-Systematic Model (HSM), another well-known dual process model in persuasion research, also supports the assumption of parallel processing [130].

With regard to personal involvement, one may differentiate between *issue* involvement and *response* involvement. While issue involvement refers to the relevance of a message to the recipient (which is what the ELM is based on), response involvement refers to persuadees' anticipation of being judged for their attitudes by their audience. Johnson and Eagly [82] refer to response involvement as "impression-relevant" involvement, highlighting that recipients expect their behavior to reveal nothing (low involvement) or very much (high involvement) about themselves [131]. Based on these varied conceptions of involvement, the effects on persuasiveness may unfold differently. Petty et al. [37] proposed that high *issue* involvement exerts a negative effect on message persuasiveness. Our findings are in line with this reasoning. However, the effect of response involvement on persuasiveness strongly depends on the recipients' impressions of what an audience with certain social expectations [132,133] would expect to hear from them [82]. As participants were assured that their responses would remain anonymous, there is no reason to believe that our experimental design could lead participants to think that the opinion they express would reveal something about them, as they did not have any audience. Thus, our study focuses solely on issue involvement.

In view of the role of identifiability as a signal, our results suggest that its effect on perceived user credibility is fully carried through the perception of social presence with no distinct implications in terms of credibility beyond those already associated with the perception of social presence. This actually goes against our conception of non-anonymity as a signal. Note that PSP can also be induced by other means that, all else being equal, do not affect anonymity. For instance, this may include voice or animated rather than still images [12,62–64]. A possible explanation for the lack of a signaling effect may be the way the stimulus material was presented. In the study's design, all users were either represented as anonymous or identifiable. This may have conveyed the impression that user representation on the platform followed a fixed setting with no freedom of choice. This notion of agency, however, may be important since a signal needs to reflect an active choice in order to be seen as such. Presumably, a signal's effect also hinges on "standing out" in some respect, i.e., not being one of many (or almost all) but rather being one of few (contrasted against a larger group). Despite our findings, we argue that signaling theory *can* be applied in the context of persuasive communication because choosing to be identifiable can serve as a signal of personal commitment and

reflect a willingness to be held liable for one's statements.

One further aspect to consider is that our experiment yielded relatively low effect sizes. One potential explanation for this is related to the participants' motivation and ability. According to Fogg's Behavior Model (FBM), people need to be sufficiently motivated and have sufficient ability to perform a certain target behavior — in the present case, express their opinion [134]. However, as we deal with the rather artificial setting of a corporate discussion forum, participants may not actually feel the urge to do so. Moreover, as the topics at hand were arguably complex, the participants' ability to process the presented information may have been low. Oinas-Kukkonen and Harjumaa [100] support this view as they emphasize that the context in which persuasion occurs is crucial. They suggest that one must understand the roles of persuader, persuadee, message, channel, and the broader context. In particular, they argue that *use context* (i.e., online experiment) and *user context* (i.e., student sample) are important factors to be taken into account. Since these driving forces are much more pronounced in a "real-world" setting, we suggest that our results may underestimate the actual impact of variations in user representation on communication persuasiveness.

5.2. Practical implications

What does all this mean for users within online discussions, as well as for platform operators? Besides the discussed theoretical considerations, we now shall embed our study in the current state of research and public debates regarding online discussions.

Arguably, anonymity as a property of online communication must be considered a double-edged sword. Anonymity is closely related to social presence, which has a negative effect on persuasiveness through personal involvement and a positive effect through user credibility. When considering only the later relation and looking at recent developments in online discussions, the negative effect of lacking credibility on persuasiveness is not surprising. As users increasingly encounter "fake news" spread by dubious or partisan organizations, hoaxes or hate comments disseminated by so-called trolls (i.e., users that aim only to distort discussions [135]), or even the work of social bots [136], they may become increasingly reluctant to trust anonymous sources they cannot verify. In this sense, it may be a good sign that people discriminate and judge based on a message's source. However, the link between social presence and persuasiveness through personal involvement goes against the grain somewhat in terms of contemporary web design, which strives for socially rich online environments and discussion forums [137,138]. While it might be beneficial for the organizers of corporate discussions to involve their employees, visual richness may actually impair constructive debates. In the context of corporate online discussions, the effect of anonymity on social presence might even be welcomed, since anonymity "separates" the person from the argument [139]. In corporate debates, this may increase the focus on the actual propositions rather than personal favoritism or animosities toward individuals. In view of employee participation through social software [12,16,21], there is another aspect to consider. In many countries, employers are legally required to grant the option of anonymity when it comes to intra-firm participation projects. In many cases, reticent employees or new staff with no or little reputation may profit from this veil of protection and power diffusion, and as a consequence, valuable arguments may be brought forward that would otherwise have remained unheard [15,16].

In other contexts, users may want to show their colors and identify themselves in order to lend credibility and weight to their statements — a relationship which has previously been observed in the domain of consumer reviews [71]. This could also help to protect discussions from foul language and intentionally deceptive comments [16,20–22]. Alternatively, platform facilitators may force all users to remain anonymous, either throughout the entire forum or in threads on sensitive issues. This could prevent the interpretation of anonymity as a signal of low credibility. Although many arguments can be made in favor of avoiding anonymous discussions, it is important to emphasize that the long-term effects of anonymity have been found to be positive. For instance, groups were found to form social norms when social identities became more salient over time [71,140].

5.3. Limitations and future work

Our study must be seen in view of several limitations. First, participants in our experiment were students prompted to envision themselves in a corporate discussion scenario. Although many participants were majoring in Economics or Information Systems, and many are likely to have gained work experience, the effects might be different in real corporate settings where stakes are higher and the interlocutors might know each other in person. We suggest that the impact of user representation would most likely be even more pronounced when based on actual rather than fictive user profiles. Moreover, the studied sample contains more male than female participants. Note, however, that there is no indication of gender-specific effects. This aspect may represent a cue for future work, as prior research has found that women are usually more persuadable than men [141,142] and also that women are "more sensitive to nonverbal communication and more affected by its absence in computer-mediated communication" [143][143](p. 405).

Furthermore, we acknowledge that the measured constructs in this study yield low R-squared values and that the effect sizes are rather small. With respect to the factor of perceived social presence, it must be said that it is based only on the single construct of perceived user anonymity. While we find significant and consistent effects via this approach, other factors appear to cause variance, too. With regard to communication persuasiveness, its low R-squared value is presumably due to a methodological break. While all other constructs are assessed on self-reported Likert scales, communication persuasiveness emerges inherently as the difference between the participants' stated levels of agreement in stages 1 and 2, that is, in a much more involuntary way. Participants were not *asked* how much they shifted their opinion — but this shift was gauged as the result of two assessments at different points of time. This lack of a common method, which we consider a strength of our approach, may well be the cause of this lower overall R-squared value.

There exist several promising paths for future research. First, it is worth exploring the study design with different topics, as well as in other cultural backgrounds. We conducted this study with predominantly German students. However, participants from countries with different work ethics and characteristics might act differently [22,144,145]. Second, in our design, all users were either anonymous or identifiable in a given experiment session. Future work may consider utilizing mixed groups in this regard, which would certainly be closer to what is observable in reality. Moreover, scenario descriptions may want to emphasize that user representation was chosen freely by the (fictive) interlocutors in order to provide some suggestion of agency and hence strengthen the associated perceptions. In the same vein, in our design, all of the three comments were either pro or contra with regard to the matter at hand. While this study is limited to a general business and corporate context (i.e., CEO/worker pay ratio, work-on-holidays rules, financial regulation) with similar results across topics, a worthwhile path for future work would be to investigate topics of a completely different, potentially more polarizing flavor (e.g., personal opinions on politics). Such discussions will typically be much more controversial, and it would be of great interest to see how argument direction and anonymity interact in fully mixed designs. Note that such designs are naturally much more complex, both in terms of experimental setup and effect analysis.

Moreover, since we tested the effect of a *peripheral* persuasive element, which is usually associated with labile attitude changes, future work may explore the long-term effects of such stimuli. Complementary features to mitigate the detrimental effects of anonymity on credibility

should also be considered. For instance, badges indicating one's level of expertise might represent an effective means by which to establish credibility, even in the absence of any explicit social identification [2,146].

6. Conclusion

In this study, we investigated the effect of user anonymity on communication persuasiveness in corporate online discussion forums through the lens of the ELM and signaling theory, building on perceived social presence, perceived user credibility, and personal involvement. Our main research objective was to analyze how different forms of user representation (anonymous vs. identified) lead to opinion changes. To this end, we developed a research model, which we evaluated using a scenario-based, two-stage online experiment with 337 participants. We find that anonymity per se did not directly drive persuasiveness in one direction or the other (RQ1). Interestingly, however, we show that for understanding the role of user representation in online discussions, an assessment of the users' perceptions of social presence is essential. In particular, social presence is instrumental in affecting communication persuasiveness via personal involvement and perceived user credibility, both of which are positively affected by social presence (RQ2). While involvement markedly *reduces* persuasiveness, credibility exerts a positive impact (RQ3), effectively nullifying the user representation's overall influence. Importantly, as social presence is responsible both for attributing credibility to unknown users as well as for fostering personal involvement, our study highlights the considerable importance of investigating the role of social presence as it applies to the design of information systems in general and online communication in particular [25,56,74,82].

By demonstrating that anonymity alters user perception of messages, we shed light on the intricacies of user representation in corporate discussion settings. Extending previous research, we measure opinion changes by means of a two-stage approach with a time lag of several weeks, in each stage assessing participants' level of agreement with corporate policy proposals. Our study is one of the few studies that measure actual opinion change with a time delay of more than a week [39], whereas many other studies on computer-mediated communication measure opinion shifts directly, utilizing only one experiment [38,40]. Our study hence contributes to persuasion research and studies on the effect of user anonymity by linking (online) user representation to the behavioral pattern of opinion change and well-established theories from computer-mediated communication. Demonstrating the intricacies of anonymous communication, we echo prior research in questioning whether the potential to encourage the participation of reticent employees by protecting their identity is worth the potential negative side effects of anonymous user representation [7,16]. In view of an increasing corporate desire to involve employees in a better way and hence tap into their capacities, this study sheds new light on the role of online user representation. Overall, our results inform both the facilitators and participants of online discussions in which the goal is to hear, gauge, or weigh the pros and cons of all sides and — ultimately — persuade a majority to follow a joint strategy. Our findings confirm that the pivotal construct of perceived social presence is strongly affected by how users are represented in online discussions. Both users and organizers of online discussions should hence be aware of how to design for and position themselves on the spectrum between anonymity and identifiability.

Appendix A. Measurement Items

All but the dependent variable (communication persuasiveness, operationalized by "opinion change," that is, the difference between stated agreement in t = 1 and t = 2) are measured as reflective variables (perceived social presence, perceived user credibility, personal involvement, perceived anonymity). Drawing on [148], we discern that indicators do not represent the defining characteristics of the construct but rather some (of many more possible) manifestations. Changes in the constructs are hence expected to affect the indicators. Indicators share a common theme and are conceptualized in a purposeful redundant manner. Eliminating an indicator is hence not expected to alter the conceptual domain of the construct. For all used constructs the following properties hold: i) causality flows from the construct to the indicators and not vice versa (e.g., "With regard to this discussion, I have a sense of sociability." Hence, the discussion does not convey a high degree of social presence because a participant perceives a sense of sociability (social presence can in fact have other roots) but rather: If the discussion in fact conveys social presence, this will affect the participant's perception of sociality. The same reasoning holds for the other constructs alike); ii) The indicators are in fact interchangeable (please see Table A1. The items of all constructs vary semantically only in terms of few verbs or adjective, which have synonymous meaning: for instance, "sociability/human sensitivity/human"; "can't identify/appear anonymous/identity is hidden"); iii) Based on the argument on interchangeability, we can expect that the items will covary with each other. In fact, the reliability measures suggest that there occur high levels of correlation between items.

Table A1
Constructs and items.

Construct	Item	Adapted from
Perceived Anonymity (PA)	I can't identify the discussion participants. The discussion participants appear anonymous. The identity of the discussion participants is hidden.	Sosik et al. [56]
Perceived Social Presence (PSP)	With regard to this discussion, I have a sense of sociability. With regard to this discussion, I have a feeling of human sensitivity. I have the feeling that the participants in this discussion are human.	Gefen and Straub [57]
Perceived User Credibility (PUC)	The discussion participants are credible. The discussion participants are knowledgeable. The discussion participants are reliable.	Schlosser [55]
Personal Involvement (PI)	The topic of the discussion interests me personally. The subject of the discussion concerns me personally. The topic in the discussion is personally relevant to me.	Petty et al. [37]
Communication Persuasiveness (PI)	*This construct represents the main dependent variable and is operationalized as the absolute difference between stated agreement in t = 1 and t = 2 (both measured on 11-point Likert scales).*	–

Note: The constructs PA, PSP, PUC, and PI are reflective and are measured on 7-point Likert scales.

Appendix B. Mediation Analysis

Since our main theoretical argumentation puts forward a dual, partly contradicting effect from perceived social presence (PSP) on communication persuasiveness (CP) through personal involvement (PI) and perceived user credibility (PUC), a mediation analysis in fact helps to better understand the full picture. Adding an additional path from PSP to CP shows that there occurs no significant direct effect ($b = -0.071$, $p = .259$), while both effects from personal involvement ($b = -0.133$, $p < .05$) and perceived user credibility ($b = 0.196$, $p < .001$) remain stable in sign, magnitude, and significance. Thus, there occurs full mediation, where specifically, the effect of PSP on CP is fully carried through the paths via personal involvement and perceived user credibility (Fig. B1).

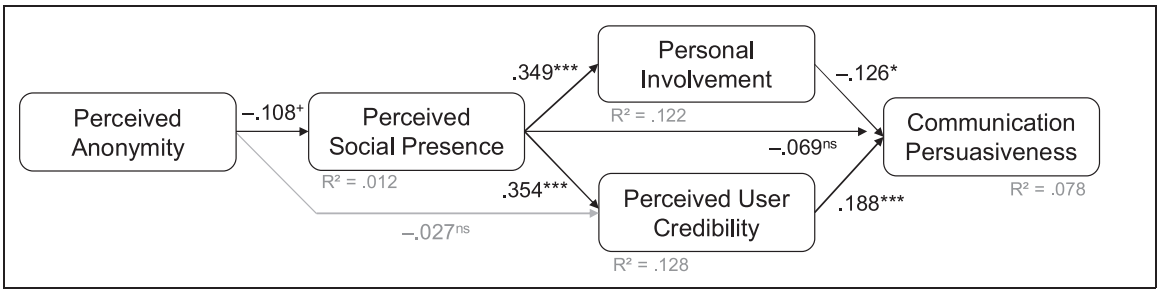

Fig. B1. Additional mediation analysis ($^{+}\ p < .10$; $^{*}\ p < .05$; $^{**}\ p < .01$; $^{***}\ p < .001$; control variables: gender, age, argument direction).

Appendix C. Stimulus material

Fig. C1

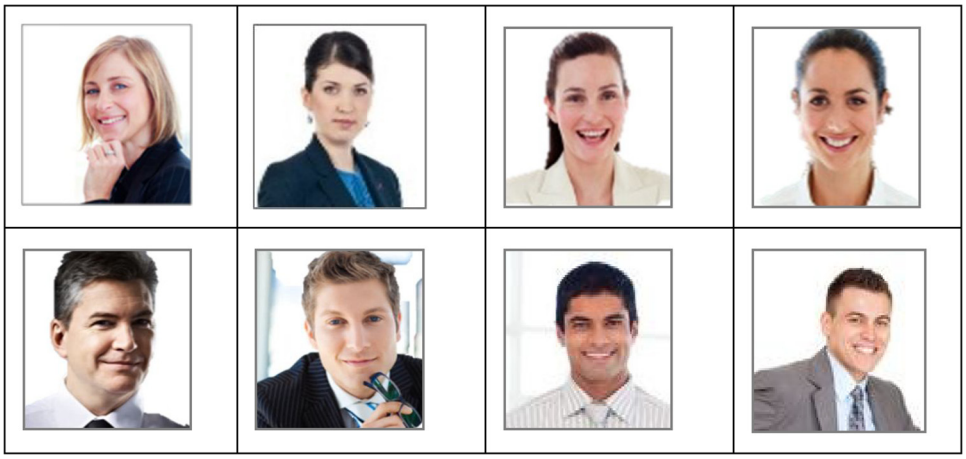

Fig. C1. Stimulus material: User images.

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