

Understanding Privacy Decisions of Homeworkers During Video Conferences

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ABSTRACT

As a result of the COVID-19 pandemic, a lot of people have been forced to work from home. Particularly during video conferences, workers basically invite their colleagues, co-workers and supervisors into their homes, sacrificing portions of their privacy in the process. In this paper, we investigate which home-related and work-related factors are perceived as relevant for privacy. We asked participants to indicate their preferences for videoconferencing settings in various scenarios and also asked about their personal experiences. The results show that power distance plays a role, but that group size and familiarity with other group members are more decisive factors. We discuss implications of our findings in terms of user awareness and the benefits of different context-based default settings for videoconferencing privacy settings.

CCS CONCEPTS

• Security and privacy → Human and societal aspects of security and privacy; • Human-centered computing → Empirical studies in collaborative and social computing.

KEYWORDS

video conferencing, privacy preferences, contextual integrity

ACM Reference Format:

Eelco Herder and Milan Gullit. 2022. Understanding Privacy Decisions of Homeworkers During Video Conferences. In *Adjunct Proceedings of the 30th ACM Conference on User Modeling, Adaptation and Personalization (UMAP '22 Adjunct)*, July 4–7, 2022, Barcelona, Spain. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3511047.3537655>

1 INTRODUCTION

In the Fall of 2019, the world has been introduced to a new virus: COVID-19. As a result of this pandemic, drastic measures have been undertaken globally to adapt to this situation. The goal of these adaptations was to reduce the spread of the pandemic. The downside of these measures is that people worldwide have had to make sacrifices in their personal and professional lives to participate in the measures. On a professional level, one of the first and widely

applied measures is that people who would normally work in an office were now forced to work from home.

This has left the average office worker in a precarious situation. Multiple problems arise with a sudden, unprecedented and mostly unprepared shift to working from home. Firstly, there is the matter of privacy: being able to work from home full-time requires employees to maintain a level of co-operation with coworkers. In most corporations, meetings to discuss a myriad of things are nothing new. However, now that meetings must now all take place online, everyone involved in organizations must have access to a working camera and microphone, at the very least.

Allowing outsiders to gain an inside look in their colleagues' or employees' home lives (albeit not completely) and thus their social lives – including family members – may have serious consequences for the privacy of employees and their families. For instance, microphones and cameras can capture various personal details, without considering that this inadvertently shares details with professional relations where this was unintended.

Videoconferencing software offers various options for adjusting the settings to the expected level of privacy or openness. However, there is not one perfect setting that fits all contexts and all individual preferences: different videoconferencing contexts are expected to require different levels of openness versus privacy protection in order to make participants feel comfortable. For instance, a one-to-one conversation is different from a group meeting, and it probably makes a difference whether a superior is present or not. In different settings, workers may want to – or feel expected to – to turn their cameras on or off, to mute their microphones when not speaking, to select a neutral background (or blur it or choose an artificial background), or even to go to a separate room. Being too protective – or being too open – may lead to unbalanced, uncomfortable or even (socially) awkward situations.

In this paper, we investigate user preferences for privacy settings in different types of professional meetings: one-to-one meetings with a superior, meetings with co-workers or fellow students with or without a superior, meetings with known or unknown peers, and attending or giving a presentation. Inspired by contextual integrity theory, we expected that these different contexts were associated with different norms with respect to privacy and openness, with – as a result – differences in the usage of camera, microphone, blurring and room selection.

We hypothesized that a higher power distance (e.g. presence of a superior) would lead to more protective privacy settings. The results indicate an opposite effect. By contrast, the results show that increases in group size and decreases in familiarity with the group (e.g. presence of unknown people) do lead to more privacy protection.

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UMAP '22 Adjunct, July 4–7, 2022, Barcelona, Spain

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ACM ISBN 978-1-4503-9232-7/22/07...\$15.00

<https://doi.org/10.1145/3511047.3537655>

We interpret the results making use of aforementioned theories and provide implications for default settings and individual privacy preferences. As will become clear, there is no objective good or bad when it comes to privacy: there is only action and consequence, and therefore it is important that users make their own informed choices.

The remainder of this paper is structured as follows. In the next section, we provide theoretical background on contextual privacy, an approach to privacy that involves individual and shared norms and user contexts, on the theory of power distance and its relevance to professional situations, and expectations regarding privacy settings and netiquette in online working and learning situations. The methodology of the study is explained in section 3: survey and scenario design, participant pool and research ethics, and data analysis approach. In section 4, we present the quantitative and qualitative results and discuss power distance, group size and group composition effects. We conclude with a brief discussion and interpretation, followed by conclusions and implications.

2 THEORETICAL BACKGROUND

In this section, we introduce the theories that inspired and motivated our research. Contextual integrity provides a philosophical background on the interplay of actores, roles, activities, norms and values on privacy settings. Power distance is expected to play a role in privacy decisions during videoconferencing as well, as well as netiquette.

2.1 Contextual Integrity

Contextual integrity is a philosophical approach to privacy first introduced by Nissenbaum in 2004 [11], although the first real structured version of the theory wasn't published until 2010 [12]. The 2004 article highlights the need for a new theoretical approach towards applied privacy. The reasoning behind this new approach was that privacy norms have failed in the past [5, 15].

In her theory on contextual integrity, Nissenbaum calls for new norms regarding privacy: appropriateness and distribution. Norms on appropriateness dictate what information is expected to be known about a certain individual in a certain context; distribution dictates what information is 'allowed' to be spread in a certain context.

The theory in its current form relies upon the existence of roles, norms, activities and values [12]: in a particular context, people play different *roles* (e.g. superior or employee, teacher or student, peer, observer) and consequently perform different *activities* (e.g. teachers would grade students' exams or homework). These actions and practices in different socio-technical groups are associated with particular *norms* that shape the (power) dynamics between certain roles in different contexts. A proper configuration of roles, activities and norms contributes to the achievement or preservation of *values*, sometimes referred to as goals or purposes of the various persons involved. As an example, in an academic context, the purpose of students is to absorb knowledge and gain new insights, in order to enhance their knowledge of the world

The above-mentioned variables change per given society and context. The relation to the rest of the theory is that these variables

need to be defined to determine who does what and who is responsible for what. By identifying these, the correct information norms can be defined, mainly by creating or choosing *appropriate data flows*.

Applied to the context of videoconferencing, this means that during formal meetings, professional communication and face contact should be possible, but that – depending on the setting, as discussed in section 2.3) – only a certain level and certain types of personal details are expected, appreciated or allowed.

2.2 Power Distance

Power distance is one of the concepts in Hofstede's cultural dimensions theory on how a society's values relate to behaviour and choices [6]. Power distance can be described as "the extent to which less powerful members of organizations and institutions accept unequal power distribution". Social groups with a high power distance tend to have a very distant and formal internal culture, which dictates both behaviour and mindset of its members.

In work situations, power distance dictates how formal or informal their relation is, based on their hierarchical position in an organization. Power distance also influences several organizational issues, such as employee participation, job descriptions, communication, decision-making, management control, and organizational structure [8].

2.3 Privacy and Netiquette in Online Video Conferences

Similar to other offline and online work situations, organizations have explicit and implicit expectations regarding their employees during video conferences: some organizations, notably banks, require employees and managers alike to wear proper business attire suited for meetings and other formal occasions [1].

For online communication, the term 'netiquette' (portmanteau for 'net' and 'etiquette') is a relatively new term that has been developing over the last three decades or so, highlighting the strict set of social codes present in online communities. This encapsulates all forms of digital communication, such as text messaging, e-mails, voice chats, video conferences. Forming a netiquette can be quite a challenge, as certain subtle nuances in day-to-day communication, such as body language or intonation in voices, tend to get lost online [14].

During formal work or school video conferences, participants are expected to adhere to both (regular) etiquette and online netiquette rules, which may be or may not be explicitly stated. These rules may conflict: for instance, when users put their camera is on, everyone can see anything they do [13]; in situations where face contact is expected or required, though, users may feel pressure to (over)share parts of their personal lives [9].

3 METHODOLOGY

In this study, we aim to connect the concepts of contextual integrity, power distance and netiquette to actual (intended) settings for video conferences while working from home, in order to extract common practices and user preferences for various work settings. To guide the study, we used the following hypothesis: *In video conferencing*

settings with a high perceived power distance, workers will take more privacy-preserving actions than in low power-distance settings.

We used an exploratory scenario-based approach, using which we collected quantitative data in the form of chosen settings for different video conferencing contexts together with participant-provided explanations and motivations, along with (voluntarily provided) personal stories or anecdotes that were triggered by the given scenarios.

3.1 Scenarios and questionnaire

The scenarios were developed and formulated with typical (white collar) home workers and students in mind, formulated open enough for participants to relate these scenarios to their own work or study situations.

The *first scenario* concerned a meeting with a superior (e.g. boss or teacher): "Imagine the following situation: you're sitting in an online meeting with a work superior. You are both sitting at home. Both of you are using a personal computer with a microphone and webcam connected to the devices." The *second scenario* involved a meeting with co-workers or peer students in two randomly-assigned conditions: with or without a superior. In the *third scenario*, participants were imagined to be in a class or meeting with unknown peers (e.g. colleagues or fellow students).

For all three scenarios, we asked whether the participants would have their camera and/or microphone turned on, whether they would blur their background or would tidy up or go into a separate room, or would take other measures to prevent involuntary intrusion (such as children or pets entering the screen or making noise).

The fourth and fifth scenarios were about participants giving a presentation while sharing their own screens. In *scenario 4*, the users gave a presentation to their co-workers or fellow students, in *scenario 5* the presentation was targeted at strangers (such as new customers or when giving a guest lecture). For these situations, we asked the participants about their camera and room settings, whether they quickly checked their (virtual) desktop for personal information, whether they closed any running applications or browser tabs.

All questions were formulated as open questions, which could be answered with a simple 'yes' or 'no' (or 'it depends'), but the text boxes invited participants to further motivate or explain their choices. We derived the (binary) video conferencing settings and choices by systematically interpreting the open answers in the data analysis phase. Each scenario ended with a text box with the question whether the participants had a personal story or anecdote to share.

3.2 Participant Pool and Research Ethics

Given the exploratory character of the study and the time required to complete the survey, participants were recruited via snowball sampling, mainly by directly inviting fellow students, friends, colleagues and relatives and asking them, after participation, to forward the invitation link to others who have worked or studied from home and who might be willing to participate. No demographic data or other personal data were collected, in order to keep the time required to participate within limits, and because we were only

interested in differences between usage contexts – and the variety of reasons for these differences – and not in individual differences or preferences.

To ensure that maximum privacy of all participants is harboured at all times during the process of partaking and publishing the survey and its corresponding results, no personal information that could lead to any of the participants being identified was gathered. The survey has been tested a priori by several individuals and their feedback regarding the survey, including ethical dilemmas and comments, have been considered before the survey was published.

3.3 Data analysis

As expected and hoped for, most participants did provide quite extensive answers, motivations and explanations, which gave us a very rich corpus of textual data with details and information to help us understand the reasons behind individual choices [2].

In a process of constant comparison, the data was manually segmented, analyzed and determined until no new theories can be formed. This process is done in four stages: *exploration*, the discovery of concepts; *specification*, the development of the concepts; *reduction*, determining the core concepts; *integration*, developing the final theory. The main toolkit used for segmenting the data was Atlas.ti¹.

The first part of the process was *open coding*: every answer given by the respondents has been given a few codes, depending on the answer. For example, on the question "Would you use any screen blurring software in this scenario?", a respondent replied "No, I don't mind showing a bit of character during video meeting". This answer has been given the codes 'low power distance' and 'no screen blur software'. This has been done for all answers given by all respondents. After all the codes have been assigned, the analysis was done by counting all instances of the assigned codes and measuring statistics of all of the results. For example: 13 out of 37 respondents used screen blur software in a 1-on-1 setting (scenario 1), while the other 24 did not. A full overview of the statistical results will be given in the result section.

The next step of the analysis process was *axial coding*, in which all codes were grouped. All of the open codes were assigned to axial groups with a common denominator – for example all instances of low and high power distance were grouped under their respective axial codes. The list of axial codes created in this part of the process is as follows:

- *High power distance*: among peers, among superiors, among strangers.
- *Low power distance*: among peers, among superiors, among strangers.
- *Blurring*: yes, no.
- *Microphone*: on, off.
- Screen sharing or presentation preparation.
- Room preparation.
- *Separate room*: yes, no.

The last step in this process is selective coding, which can be described as 'looking for connections between the categories to make sense of what is happening' [2]. The result is a landscape of code groups that needed to be linked.

¹<https://atlasti.com/>

N=37 Video Conference Setting	Scenario									
	1		2		3		4		5	
Answer	Y	N	Y	N	Y	N	Y	N	Y	N
Camera on	36	1	29	8	7	30				
Microphone on	21	16	17	19	5	32				
Background blur	13	24	16	21	10	26				
Separate room	13	24	14	23	9	27				
Intrusion prevention	25	12	25	12	23	14				
Pres: Screen preparation							27	10	34	3
Pres: Room preparation							27	10	34	3
Pres: Close apps/tabs							28	9	31	6

Table 1: Summary of video conference settings in the five different scenarios: 1. With superior - 2. With peers - 3. Meeting/Class - 4. Presentation for peers - 5. Presentation for strangers.

4 RESULTS

After concluding the survey and removing sets of answers that were deemed incomplete or not reliable, 37 complete sets of responses were left to perform analysis on. In total, the participants provided 608 answers of various length. The Axial codes were applied by making code groups based on common denominators. This has led to the formation of twenty Axial codes, eighteen of which that can be linked to all existing 608 answers.

4.1 Quantitative results

Although the nature of the study has previously been mentioned as qualitative, doing quantitative analysis can help us understand the data better. Table 1 provides a summary of the video conferencing settings in each scenario.

From scenario 1, it can be observed that almost every respondent (except for one) uses the camera in one-on-one meetings with a superior. This makes sense, as looking at a person you are having a one-on-one conversation with helps with clarity in communication [4]. A majority of respondents (65%) did not use screen blurring software and almost half did not bother to use a separate room, which is in stark contrast with scenarios 2 and 3.

In scenario 2, where the settings changed to a group meeting with peers (with or without superior), more respondents turned off their camera or microphone, and more people used screen blur and/or separate rooms. This indicates that this scenario invoked more privacy protecting behavior.

The trend towards more privacy protecting behavior is even clearer in scenario 3, the meeting or classroom situation. Only the use of separate rooms remains stable, presumably because turning the camera off removes the need to do so.

The presentation scenarios show a clear trend towards more privacy-preserving measures when presenting to unknown people (scenario 5) than when presenting to known peers (scenario 4).

Note that this quantitative overview is meant to illustrate overall trends, as a basis for the qualitative analysis and interpretation in the remainder of this paper. For this reason, no statistical tests for significance have been performed.

4.2 Qualitative analysis and interpretation

As discussed in section 3.3, the codes derived from the participants' answers concerned – apart from the actual video conferencing parameters - codes related to (perceived) power distance, not only distance to superiors, but also distances felt between colleagues, fellow students or peers. These observations are discussed in this section.

4.3 Power distance effects

We already observed an increase in privacy-protecting settings between scenario 1 (one-to-one with superior) and scenario 2 (group of peers, with or without superior). In scenario 2, the presence of a superior did not have an effect on the choice of privacy settings.

Even though one would expect that the presence of a superior would create a high power-distance situation, calling for caution and more formal behavior, 21 out of 37 actually indicated to open up more towards their boss or teacher and their responses did not contain a reference that was labeled as power-distance related in the coding process. In situations that were perceived (and labeled) as high power distance, *professionalism* was mentioned as a reason: “*This would always be recommended as in a corporate setting you represent something. Either yourself to your boss or your company to a client.*” (#22) - “*I like keeping my professional and personal lives separate.*” (#26).

4.4 Group size and group composition effects

Out of 37 respondents, 30 participants applied measures to increase their privacy when the group size increased - from one-to-one meetings (scenario 1) to meetings with peers (scenario 2), and from meetings with peers to classroom situations (scenario 3). This means that when more people attended, more respondents used measures like screen blur and/or separate rooms.

In addition, the differences in video conference settings between scenario 4 and 5 showed more privacy protection measures when unknown people were present. However, only a modest 7 out of 37 participants (19%) explicitly indicated that they adjusted their privacy settings when the group size changes. This signifies that users automatically adjust their settings to a more protective configuration; by contrast, participant responses indicate that keeping all

channels open is a conscious, deliberated choice: “*I don’t mind showing a bit of character*” (#17). One respondent deliberately refused to keep religious items out of sight.

5 DISCUSSION AND INTERPRETATION

Perhaps one of the most surprising observations is that (perceived) vertical power distance to superiors usually did not lead to more formal, privacy-preserving settings; instead, participants often even relaxed their video conferencing settings when speaking with their superior. A probable explanation is that in modern-day working environments factors like job satisfaction are considered important; lower power distances have been observed to directly impact employees in a positive manner [10]. Lower power distance environments empower employees to speak up for themselves more and guarantee a safer working environment, which in turn creates team cohesion.

By contrast, group size and (un)familiarity with group members did have an impact on perceived (horizontal power) distance and consequently generally led to stricter privacy settings for the video conferencing system. Some notable exceptions were academic teaching settings in which teachers explicitly asked students to keep their camera turned on, in order to keep the classroom active and engaged [3, 7].

6 CONCLUSIONS AND IMPLICATIONS

In this study, we investigated which privacy settings are used during video conferences while working or studying from home. We observed that users indeed chose different settings for different types of meetings: particularly, larger group sizes and presence of unknown people during a meeting typically led to more strict privacy settings, such as turning off the camera, muting the microphone, blurring the background or choosing a proper background or room. By contrast, for one-to-one meetings with superiors, users usually preferred more open, more intimate settings.

We think it is important that users are aware of these mutual preferences and expectations, in order to choose suitable settings for different meeting contexts. There are practical implications for video conferencing systems as well: popular videoconferencing platforms such as Zoom and Teams have default settings that apply to all meetings. As our study has shown that preferences and expectations for settings differ per type of meeting, it would make sense to offer different default settings, depending on group size and group composition.

Knowing in advance the type of meeting and the associated settings would also help in shaping participants’ expectations when entering a meeting, preventing technical or social faux pas. For instance, as many home workers probably have experienced more than once, in larger group meetings and during presentations, it would make sense to enter the video conference with the microphone muted. In addition, it would allow users to prepare their room or presentation settings accordingly well in advance.

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