Video Conferencing as Programmatic Relations

Conditions, Consequences, and Mediality of Zoom & Co

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Introduction: Programmatic Comes to the Fore

This learning process was as quick as it was unprepared. Before the fight against the Covid 19 pandemic so radically restricted entry into public spaces, few people were aware of what video conferencing was supposed to be or be able to do. The switch to video conferencing in many areas of public and private life since 2020 has had numerous consequences, which were experienced and evaluated quite differently.

This included, for example, the advantage, easily overlooked by a majority, that some barriers now disappeared. This especially advantaged those who, due to different physical conditions, cannot easily enter standardized buildings and means of transport, but could now find other possibilities; those who were previously disabled from or had problems with attending, e.g., theaters, seminar rooms, or discussion events, but might now participate via video conferencing without leaving their own rooms. Architectural barriers disappeared—whereas, depending on equipment and dis/abilities, other barriers remained or emerged, as pointed out by Bieling et.al in this book.

Another and much more frequently publicly emphasized advantage concerns anthropogenic climate change and specifically the energy and CO2 footprint. Numerous trips to business and/or private meetings could be replaced by video conferencing. This positive effect of reduced emissions has been emphasized by many studies, while—which I will come back to—the emissions caused by video conferencing have hardly been investigated (see Faber 2021). International meetings in particular thus became less complicated and cheaper.

The effect I want to address here leads less to a dichotomy of advantages and disadvantages than to questions of the specific mediality of video conferencing. For it was the very speed and emphasized urgency with which video conferencing became established as a new form of meeting in various contexts that provoked questions in this direction. What video conferencing is, how it works and should be practiced, what problems can arise and how they might be solved—these and other questions

about the phenomenon of video conferencing were part of the everyday experience of many people who otherwise do not have to consider the conditions and effects of digital technology in this way (an unexpected contrast to the *it just works* promise).

As video conferencing became accepted as a new standard, the impact of this new normal also became more apparent, bringing conditions to the forefront that otherwise (should) remain in the operational background. Precisely because it was important to get used to new technical conditions as quickly as possible and also because problems in dealing with software and hardware ("my Internet seems to be unstable," "you're muted," "I cannot share my screen," "I'm not a cat,"[1] etc.) and their consequences (like "Zoom fatigue") were part of everyday experience and of public discourse, the connections between technology and aesthetics, between infrastructures and practices became pressing questions not only for researchers. Facing this ultimately calls, as I want to show, for more fundamental questions to be asked.

The experience with services and platforms such as BigBlueButton, Microsoft Teams, Jitsi, Webex, Skype, Google Meet, and especially Zoom enables a new approach to specific conditions that are hidden under buzzwords such as "digital transformation," "digital revolution," "digital life," or "digitality." The phenomenon of video conferencing opens up new opportunities in understanding this larger context of, to put it another way, computerization. The experience of and debates about video conferencing exemplify some of the conditions, processes, and effects that need to be considered when tasks are solved by and through networked computers and their programmable processes. Quite a few questions concerning the complex of digitality intensify here, become addressable and also—this seems to me to be the most remarkable consequence of the spread of video conferencing—perceptible.

It is particularly the (widespread and much-researched) exhaustion known as "Zoom fatigue" that plays a special role in this opportunity for understanding and questioning. Here, as I would like to show, becomes vivid and perceptible what otherwise is mostly assumed to be unnoticed and at best the subject of theoretical debates: the importance of interface processes that reach further and deeper than the presence of user interfaces.

Zoom is undoubtedly the most famous incarnation of this development since 2020, the eponym of the homonymous "fatigue" and the sparkling dummy for popular headlines like "We Live in Zoom Now" (*The New York Times*, 17.03.2020), "The Zoom Boom" (*The Guardian*, 21.05.2020; *BBC News*, 23.10.2020; *World Finance*, 09.02.2021), or "And It Made Zoom" (*die tageszeitung*, 29.04.2020, 13.06.2020, 24.10.2020). That is one reason why I discuss Zoom here as a central example, even though most of

1 This internet meme refers to a viral video in which a lawyer desperately tries to disable a video filter making him look like a talking cat: https://www.youtube.com/watch?v=lGOofzZOyI8.

the questions attached to it arise similarly in other systems. Including the aforementioned "fatigue" that can be observed in the same way with other commercial and open source systems—and therefore makes urgent the question as to why several hours of streaming with, e.g., Netflix or Mubi is considered entertainment but more than 50 minutes (see Gallo 2020) of a video conference seems to be a burden.

Furthermore, Zoom will also serve as a *pars pro toto* example because, in addition to the general questions about video conferencing, I would like to pay particular attention here to its widespread use at universities, which has led to the catchphrase "Zoom University" (*The New York Times*, 17.03.2020; *The Yale Review*, 20.04.2020; *Forbes*, 03.08.2020; *The Guardian*, 06.10.2020; *TechCrunch*, 18.02.2021). Since I am one of those who had to conceive and conduct university teaching via video conferencing (i.e., Zoom & Co) in 2020–22, this article is also partly an experience report: a participatory observation of processes that are described in this book by several authors such as Michell Kalani, Andreas Weich et al., Dontalla Della Ratta, and Maha Bali.

Against this background, I would like to discuss the form of connections and relations that are realized by services like Zoom & Co. as "programmatic." This accentuation underlines the centrality of computer technology along with its property of programmability and therefore seems to me to be particularly important here because the term video conferencing tends to obscure rather than emphasize this. The dependence of the interaction of image and sound (as video) on the interaction of networked computers that generate and distribute and present these signals (as hardware-software interaction) is elementary to the discussion of the phenomenon and mediality of video conferencing and its platformization. As a first step toward this discussion I want to look back at the year 2020.

Retrospection: "Digital Now Holds Us Together"

One of the early effects of the first "Covid-19 lockdown" was that suddenly two new classes appeared. Those considered working and whose work is thus seen and counted (as opposed to all unpaid forms of work) were divided: there were those who continued to "go to work" or would have gone because their jobs had nothing to do with office or information work; and those who were able to stay at home to work in the "home office."

The new class of home-based work, in which large pay gaps of course still exist, grew visibly. More and more were thus wondering what could be done from home, with this home of course being thought of as both a network node and "always on."

It was precisely this new and diverse class of home-based work that garnered increasing praise for "the digital" at the time in Germany. The Corona crisis also proved to previous "digital skeptics" that "digitalization is a gift for mankind" (von Gehlen

2020). Because: "Digital now holds us together." (Rosenfeld 2020). What was held up to the "cultural pessimists and skeptics of progress" (ibid.) in Germany was, unsurprisingly, the blessing of video conferencing.

The since the mid-2010s steadily increasing equation of the term "digital" with online procedures, with Internet-based services, did not refer solely to the understanding of video conferencing (see Distelmeyer 2022, 27–33). But it was particularly noticeable here, especially in the area of schools and universities. "Digital Classes" [Digitalunterricht], translated exemplarily by the *Süddeutsche Zeitung* "for people without school kids," means that children are "schooled over the Internet" (Rühle 2020).

Already in the first weeks of the pandemic, the "boom of videoconferencing as a quotidian media practice" (Volmar et al 2021) was repeatedly associated in this sense with the company called Zoom, which was hardly known before that time, such that "the rise of Zoom came to stand for a 'new normal' of networked, synchronous online sociality" (ibid.). At universities (not only in Germany), Zoom in particular became the popular solution to what has been called "digital teaching" with increasing emphasis since 2020 (see Kronmüller 2021). Just as this company and its "skyrocketing growth during the crisis" became a "household name" (Peng 2020, 3), the notorious tile aesthetic became a symbol of a new platform connectivity.

From "Zoom University" to "Zoom fatigue," as a sign of hope or dread, Zoom represents effects commonly associated with the international proliferation of online meetings. Even those disruptive maneuvers in which meetings are hacked (thanks to Twitter bots, among other things) and participants are subjected to sexist and racist attacks, in particular, have been associated, as "Zoom bombings," with the company (see Young 2021).

At the same time, it was also very specific data protection issues that brought Zoom into the headlines. Thus, the discovery of secret data transfer to Facebook at the end of March 2020, in which information about the users was exchanged through the Zoom app via the automatic connection to the Facebook's Graph API (application programming interface), caused a scandal to which the company reacted within a few days (see Cox 2000). Nevertheless, fundamental questions of data security do not only concern Zoom. In the summer of 2020, Berlin Commissioner for Data Protection and Information (BfDi) Maja Smoltczyk emphasized this with her criticism of leading video conferencing systems such as Microsoft Teams, Skype, Zoom, Google Meet, Cisco WebEx, and GoToMeeting: "Unfortunately, some of the vendors that provide technically mature solutions do not yet meet the data protection requirements" (DPA 2020), whereas open source solutions like Jitsi and BigBlueButton were rated positively.

Therefore, discussing Zoom means, for many reasons, discussing momentous processes of networking and shifting to platforms. In this context, Zoom offers itself not only as a dazzling and widespread example, but also as a symptomatic space

of experience. In and with Zoom, essential basic structures of what might otherwise remain mythical and abstract as "the digital" can be experienced actively and physically. The new presence of video conferencing is also an emphatic confrontation with conditions of computerization. This was felt not only, but especially, by pupils and students. Many repeatedly reported—"I just looked at screens all day" (Himmelrath et al. 2021, 42)—frustration and loneliness. The study "Young Germans 2021" by social researchers Simon Schnetzer and Klaus Hurrelmann revealed that 53% of respondents between the ages of 14 and 29 experienced a "noticeable deterioration in mental health during the Corona crisis" (Schnetzer, Hurrelmann 2021, 10) and target group analyses show that they also suffer from the fact "that schools and universities have not offered suitable structures for digital teaching" (Schnetzer 2021, 42).

Everyday Experiences: Coming to Terms with "Zoom Fatigue"

The debate about the background of these experiences of frustration—which go far beyond this age group—quickly specified the problem of *looking at screens all day*. For the beginning of the historic heyday of video conferencing was also the beginning of reports of rapid-onset exhaustion, difficulty concentrating, and a strange apathy that reinforces the impression of not really being together. The lack of a sense of mood in a common space seems to make one's own mood even more present; experiences of fatigue, detachment, and isolation.

This phenomenon soon became so omnipresent and much discussed that "Zoom fatigue" became a household name, too—and a popular motif of cartoons about Zoom as a tool of torture and cause for support groups (see Tornoe 2020; Fishburne 2020; Margulies 2020). At the same time, new business ideas emerged with it: To alleviate the symptom that "video conferencing is so exhausting," for example, advertising for the app "mmhmm" initially diagnosed "that people just don't know how to come across as charismatic on video," so the app advertised aesthetic "fuseful" features—"funny and useful at the same time" (see Schwan 2021). Why countermeasures such as this or the presentation form "Immersive View" introduced by Zoom at the end of 2021, which supposes "to reduce fatigue during long class sessions, meetings, or other events" (Akolawala 2021), have little to do with the reasons for fatigue experiences identified so far, is related to the fact that different effects and causes are bundled in the term "Zoom fatigue."

Various contributions from media studies, communication studies, and social sciences, as well as medical and psychological research have dealt with the phenomenon. This includes Geert Lovink's contribution to this book, "Anatomy of Zoom Fatigue," as well as "Neuropsychological Exploration of Zoom Fatigue" (Lee 2020), "Understanding Zoom fatigue" (Nadler 2020), "Nonverbal Overload: A Theoretical Argument for the Causes of Zoom Fatigue" (Bailenson 2021), and "Zoom Exhaustion

& Fatigue Scale" (Fauville et al. 2021), in which four elements are highlighted in summary that "might be responsible for triggering Zoom fatigue" (ibid. 3). These include, according to Géraldine Fauville et al. (ibid.), unusual, sustained eye contact ("being stared at while speaking causes physiological arousal"), the complicated perception and classification of all forms of non-verbal communication ("During video conferences, the complex nature of nonverbal behavior remains while extra effort is needed to send and receive signals."), permanent self-examination ("video conferences participants often see a real time video feed that functions like a mirror"), as well as the lack of movement ("being forced to sit in view of the camera likely hinders movement, increases the amount of effort it takes to communicate").

While this outlines frequently mentioned causes, it is far from all of them listed in the articles available so far. One defining aspect, however, that recurs in all descriptions (and is listed under the second element in Fauville et al.) was summarized by student Gordon Kamer for *Harvard Political Review* like this: "[T]he reason why video calls in general are so pernicious is that the slight artifacts of video conferencing — the lag, the robot voices, et cetera — make us feel even more disconnected than if we never called at all" (Kamer 2020).

This coincides with the picture outlined by psychiatrist Gianpiero Petriglieri for the BBC under the title "The reason Zoom-calls drain your energy": "Our minds are together when our bodies feel we're not" (Jiang 2020). His diagnosis, "we need to work harder to process non-verbal cues like facial expressions, the tone and pitch of the voice, and body language" (ibid.), has been linked by Neta Alexander (2020, 29) to the problem of those slight artifacts: "Technical desynchronization between video and audio breeds a deeper sense of psychological and cognitive desynchronization." Fauville et al. (2020, 3) explain this with the fact that "additional cognitive resources are used to manage technological aspects of a video conference, such as image and audio latency." The desired and promised goal of "synchrony with others" is hard to do, as Randall Collins (2020, 491) points out, "with a screen full of faces, delayed real-time feedback, and lack of full body language."

So what is difficult to have in tile format—"trying to make out each other's smiles through the pixelation" (Kamer 2020)—is moreover conveyed under special conditions. The narrow limits of the user interface have a stronger effect the more disturbances appear in them. "The problem is," as summed up the *New York Times*, "the way the video images are digitally encoded and decoded, altered and adjusted, patched and synthesized introduces all kinds of artifacts: blocking, freezing, blurring, jerkiness and out-of-sync audio. These disruptions, some below our conscious awareness, confound perception and scramble subtle social cues. Our brains strain to fill in the gaps and make sense of the disorder, which makes us feel vaguely disturbed, uneasy and tired without quite knowing why" (Murphy 2020).

These aspects of "Zoom fatigue" open up something. They lead to the peculiarity of this media technology, to the conditions of computer interconnections and those

processes that are usually not emphasized and noticed. They can be read like traces, which help—"in the course of using media the medium itself appears 'only' as a trace of its message" (Krämer 2015, 190)—to open up the mediality of video conferencing: What "Zoom fatigue" shows (and is therefore discussed in the debates) are those processes of networks and relations between software and hardware that are otherwise supposed to work imperceptibly and effectively. Their interplay is supposed to surface only in the form promised by the *Zoom Guide*: as the "consistent user interface" and "seamless, real-time interactive experience" (Zoom 2019, 3).

This is where the now widely established and more complex concept of interface becomes important, to which Christian Andersen and Søren Pold also refer in this book. In recent years, media studies have benefited more and more from the hint of software studies that the term interface encompasses much more than just user interfaces (see Fuller, Cramer 2008). Rather, the latter are only a small yet important part of the interface complex, which consists of various levels and processes of interfacing between hardware and hardware, software and hardware, software and software, and between computers and non-computers. Interfaces as such make computers work—on various interrelated levels. They create interconnections thanks to which computers function and operate, are networked with other computers, and are able to establish relationships with humans, other machines, and further parts of the world. In short: Interfaces perform mediation processes both to enable computer work and as part of it (see Distelmeyer 2022, 51–58).

For Zoom's promised "consistent user interface," this has clear consequences. That user interface, the stable tile world of faces and operational images, can only offer something like a "seamless, real-time interactive experience" because and insofar as specific infrastructures and numerous other interface levels mediate (lead and conduct) processes both between computers and between hardware and software.

This insight—the effective dependence of user interface operations on various other interface operations, which need not be equally perceptible—has previously been an insight of disciplines such as software studies, media studies, and app studies (e.g., Fuller, Cramer 2008; Andersen, Pold 2018; Distelmeyer 2018 + 2022; Weltevrede, Jansen 2019). Now this context is, to a certain extent, coming to the fore. It—or more precisely: something of it—becomes physically perceptible and thus, as the reports of experience and debates about the effects of video conferencing vividly demonstrate, turns from an object of reflection into an object of experience: brought up as "Zoom fatigue," "technical desynchronization," "slight artifacts," and "image and audio latency." For the problems described concern both the tile interface of the well-organized vis-à-vis encounters, manifesting effective and indeed ideological models of e.g. users, participation, and communication, as well as malfunctions and delays in the hidden interface processes of data processing and data transfer that run in and between the "protocological" (Galloway 2004, xviii) networked computers.

These disturbances are effects of interfaces between software and hardware, which otherwise do not have to interest us. For a long time they did not matter in the common understanding of the term "interface," which usually denotes our access to and interaction with computers. Humans first. Now—in the mode of disturbance with noticeable physical effects—what is otherwise supposed to work under the radar of human perception comes to the foreground: the dependence of surface effects on those interface processes that run computers and their networks. This is openly addressed as "mechanical malfunctions and networks struggling to handle increased traffic" (Wiederhold 2020, 1), resulting in one of the issues with video conferencing "that online communication, while extremely useful, is not completely synchronous" (ibid.).

Mediality and Platformization: Rules, Materilities, and Flow of Data

The experience and discourse of "Zoom fatigue" thus demonstrates, or at least gives a tangible indication, that online meetings are not just about video conversations. They are not just a (tele)presence through sound and image, but are characterized by a specific mediality. Since the 1990s, the concept of mediality has served media studies to describe both the general characteristics of media as an elementary dimension of life and culture and the specific qualities of concrete media and media constellations (see Hickethier 2003, 25–32, Krämer 2015 and Bergermann 2016, 434–436). "Mediality," as Sybille Krämer (1998, 15) has put it, "expresses the fact that our relation to the world, and thus all our activities and experiences with a world-opening—rather than simply world-constructing—function, are shaped by the possibilities for distinction that media open up and the limitations they impose in doing so." In video conferencing, this medial qualities prove to be deeply dependent on the protocological networking of computers and their running programs, realized through embedded models and by diverse interface processes and materialities.

In order for the tile interfaces to become productive and to provide the shared video streams, software-software interfaces, among other things, ensure that computers connect to each other at all and exchange data according to the rules of the Internet protocols. Software-software interfaces form the basis for every service we expect from the Internet; and at the same time they also open the doors for the criticized violations of data protection. Rules of engagement: Every human exchange here—and thus also with Zoom & Co—is always only possible thanks to and through data exchange, and software-software interfaces in the form of application programming interfaces (APIs) allow programs to interact, which makes the use of apps that correspond with each other so effective and "seamless" and is the reason behind the Zoom-Facebook data flow discovered in March 2020. Jean-Christophe Plantin, Carl Lagoze, Paul Edwards, and Christian Sandviget (2018, 303) illustrated

this key role of APIs using the example of Facebook as follows: "APIs permit other programs to 'plug in,' in order to exchange data or perform other functions; unlike electrical sockets, however, APIs create a two-way flow of data. In the language of infrastructure studies, an API is a gateway, permitting other systems to interact with Facebook to form a seamlessly interactive network."

For this border-crossing flow of data, for this traffic, hardware interfaces are always needed, interfaces between those processing machines for which arm-thick submarine cables form the profoundly material connections of the Internet. Power consumption of the computers connected in this way, which has already been an issue in streaming (see Marks 2020), is therefore also becoming a topic here. As Grant Faber points out, many studies have shown "that emissions from virtual meetings are far lower than those generated by in-person meetings, but there can still be a considerable impact from conducting such conferences that ought to be measured and mitigated over time" (Faber 2021, 13).

According to a study published in 2021 by Purdue University, Yale University, and MIT, significant CO2 emissions and water consumption can be reduced by 96% by not using the camera: "If one were to have 15 1-hour meetings a week, their monthly carbon footprint would be 9.4 kg CO2e. Simply turning off the video, however, would reduce the monthly emissions to 377 g CO2e" (Obringer et al. 2021, 3). And by proposing "a modifiable framework for systematically measuring the emissions attributable" to video conferencing (with the use of, among others, "participant computers, Internet energy intensity, network data transfer, server power ratings"), Grant Faber (2021, 1) simultaneously illuminates multiple programmatic conditions and dependencies that are part of the distinctiveness—the mediality—of video conferencing.

What the experience and discussion of "Zoom fatigue" as well as resource and energy consumption thus point to is anything but a purely technical, a purely practical, a purely social, or a purely energetic phenomenon. Rather, it is the combination of these factors (supplemented by political and aesthetic ones) that constitutes the mediality of video conferencing—that is, the peculiarity of the mediation taking place. This proves the dependence of video conferencing on functioning infrastructures, on "sociotechnical systems that are designed and configured to support the distribution of audiovisual signal traffic" (Parks, Starosielski 2015, 4). These dependencies include both deeply (and often latent) material formations, as well as running effective processes that are also ideological in that they act out and habitualize certain models concerning people, machines, and (their) interaction.

In order to further outline these dependencies, it seems important to me to remember that it is computers that make video conferencing possible—the technology that, by contrast with others, is distinguished by the fact that it is programmable. This is the reason for its status as a general-purpose machine: What computers accomplish, they accomplish both by virtue of their programmability and through the

concrete execution of the specific programs. Computers become productive *because* they are programmable and *by* executing programs.

As a terminological strategy to keep this significant aspect in mind, I would like to propose the attribute *programmatic* here. In this sense, all forms and utilizations of computing can be understood as programmatic and thus all encounters via Zoom, Microsoft Teams, BigBlueButton, and similar services as programmatic relations. What becomes possible on Zoom & Co is only possible under the conditions of the respective software and the hardware processing it—a circumstance that connects the debates about "Zoom fatigue," emissions, data protection, and the responsibility of institutions (e.g., universities) and can also be experienced, as I would like to show in conclusion, in the concrete handling of Zoom by way of example. Thus *programmatic* here refers both to the significance of programmability as a characteristic of computer technology and to the trend-setting dimension of these relations of Zoom & Co, which bring fundamental questions of digitality before our eyes and ears.

The question of which software should actually be licensed (i.e., rented as a service) in order to meet the requirement to switch to "digital teaching," for example, is so sensitive precisely because each program has its own conditions. Binding regulations: As Wendy Chun has shown, Lawrence Lessig's famous slogan "Code is Law" falls short here. Because code—as long as it runs on computers and is not bypassed or reprogrammed—is both law and its uncontradicted enforcement. Programs are execution commands; they run. Code is "better than law," it is "an inhumanly perfect 'performative' uttered by no one" (Chun 2006, 66). That is why the computer scientist Seda Gürses asks one of the most important questions of higher education policies on this issue: What if universities invest in public infrastructure instead of software licenses? (see Gürses 2020)

In Germany, for example, where usually multi-million euro licensing solutions are the rule, this possibility is demonstrated by the exceptions of some universities that host free software on their own servers. For example, for a "data protection respecting" solution with BigBlueButton, the University of Applied Sciences Darmstadt "has even developed its own extension and documentation tailored for universities" (Kronmüller 2021). In summer 2021 the University of Marburg announced that it would offer BigBlueButton as a "federated service" of the German Research Network (DFN) and "thus also make it available to other universities" (Scheid 2021, 47).

However, the dependence on a contractor such as Zoom Video Communications Inc. for whose services German universities paid an estimated 6.4 million euros in 2020 (see Kronmüller 2021) is not limited to the licensed software alone. At the same time, this implies a much broader and, for platforms, symptomatic dependence—because Zoom provides its services with the help of subcontractors who ensure that the data transfer, which is controlled by the software, can be processed as smoothly as possible. In April 2020, Eric Yuan, CEO and founder of Zoom Video

Communications, himself explained the important role that server hosting and cloud service providers such as Oracle and especially Amazon Web Services (AWS) played in Zoom's service and the skyrocketing growth during the crisis already cited. "During this pandemic crisis," Yuan was quoted, "every day is a new record" and "our own existing data center[s] really cannot handle this traffic" (Judge 2020), which is why AWS brought thousands of new servers online for Zoom every day: "Amazon really offered great support to us. Andy and his team offered tons of server size, and every night added 5,000 to 6,000 servers … a lot of servers to help us worldwide" (ibid.).

It is clearly stated here that the licensing and use of Zoom is by no means limited to Zoom's service and processes. Zoom is more than a software or self-contained service. Rather, Zoom exemplifies the ramified conditional structure of platforms and is an illuminating example of the elusive complexity that platform studies address. Since the mid-2010s, they have been focusing on various interdependencies, technical and social contexts, and new economic models, discussing key features of platforms such as "programmability, affordances and constraints, connection of heterogeneous actors, and accessibility of data and logic through application programming interfaces (APIs)" (Plantin et al. 2018, 294). What connects this concept of platform with the concept of infrastructure, which has also been receiving new attention since the mid-2010s, is the interest in processes and materialities, in effective concepts and ongoing procedures that are not identical with what becomes visible or perceptible in the results of these structures: "Both infrastructure and platform refer to structures that underlie or support something more salient" (ibid.).

For this reason of underlying structures and supporting processes, it is important to understand and discuss video conferencing both as (basically) programmatic relations as well as "platformized" (Plantin et al. 2018, 301). This platformization can be seen on the one hand in the abundance of apps enlisted in the "Zoom App Marketplace" that allows for compatibility with "the Zoom platform" to "leverage Zoom within your daily workflows" (Zoom 2021b). On the other hand, this programmatic connection of heterogeneous actors is also expressed in the business relation with AWS—the leading example of a cloud platform, the importance of which for data extraction is that "its rental model enables it to constantly collect data" (Srnicek 2017, 63). For the promise of video conferencing to be fulfilled on the surface of the user interfaces, the interaction of shared image and sound (as video) is not only based on the interaction of networked computers but furthermore on the programmatic interaction of heterogeneous actors who create a platformized effectivity and business model, as Kim Albrecht has shown in his reflections and visualization in this book. Against this background, it would actually be more appropriate to speak of *video/platform conferencing*.

This (infra-)structure of video conferencing as programmatic and platformized relations is therefore also very important for questions of politics. This becomes

vivid in the area of data protection already mentioned: "When a university uses a video conferencing system," explains political scientist and information scientist Sven Hirsch, Data Protection Officer (DPO) of the Potsdam University of Applied Sciences, "the university is responsible for the contractor that is hired and also responsible for any subcontractors" (Hirsch 2021). However, how the flow and exchange of data can be monitored in accordance with legal requirements remains an open question: "As a data protection officer, I can know next to nothing about the path of the data, have virtually no way to control it. There are also no interfaces, no visualizations to see the data flow. It's legally provided and contracted that we can control the contractor, but practically unfeasible so far" (ibid.).

How to reconcile opportunities for access and privacy remains a central question that confronts institutions and individuals alike with problems hard to solve. A telling example for incompatibility was given by a video conference of the network "Dis-/Abilities and Digital Media" in spring 2021. Fitting with the theme of the conference, "Assistance—On the History of Assistive Ensembles," consideration was given to adding a closed caption feature to the session for accessibility. However, online services of transcription software such as Otter and Rev were rejected by the responsible universities. Such third-party applications use voice data that is transferred to the US; there, it is processed (saved) and then returned as closed captions to the video conference meeting. "The main problem," explains co-organizer Robert Stock, "was Terms of Service of the apps claiming exclusive rights to the processed user content,"[2] what was considered a violation of the EU's General Data Protection Regulation (GDRP). Thus, how the GDRP could conflict with the UN Convention on the Rights of Persons with Disabilities (to remove obstacles and barriers to accessibility) here, as Robert Stock emphasizes, makes the programmatic conditions of video conferencing only more apparent—video, sound and image, are here first and foremost (and also in the legal sense) data that are processed by software according to certain rules and thus link questions about, for example, human practices with those about the practices of platforms.

Programmatic Aesthetics: Tiles, Hosts, and Participants

On various levels that are difficult to oversee, the new presence of video conferencing massively confronts what is particularly crucial in digital technology and its diverse manifestations: the programmability of procedures and circumstances. On this basis of programmability runs what is bindingly given and at the same time can always become different.

2 Robert Stock, private email exchange with author after the workshop "Video Conferencing: Practices, Politics, Aesthetics," March 11, 2022.

Based on this, new defaults can be created and running systems can be interfered with, systems can be hacked, and new safeguards can be put in place. For example, in April 2020, Zoom Video Communications Inc. responded to the "Zoom bombing" issues by announcing new software defaults for password entry and automatic "waiting rooms." And on the same basis of programmatic flexibility, other forms of "interface mise-en-scène" (Distelmeyer 2018) can always be created and replaced. The presentation of user interfaces can easily change as Microsoft Teams has shown with "Together Mode"—"In a conceived scene setting [like a cinema, a curved outside amphitheater or a boardroom table], participants have seats with video streams" (Microsoft 2021)—followed by Zoom with its "Immersive View" of similarly staged seating arrangement, including a kitchen, an art gallery, a classroom, or a ski lift: "Immersive View allows hosts to arrange video participants and webinar panelists into a single virtual background, bringing people together into one scene to connect and collaborate in a cohesive virtual meeting space" (Zoom 2021a).

Hence, this special, programmatic characteristic of digital technology is nothing that inevitably eludes us in the sense of a "black box." Rather, it can also be observed and experienced concretely. The notorious tile aesthetic of Zoom is a good example of that.

Only what the program has provided can be done here. When it comes to active participation, I can, for example, activate my microphone and raise my voice, raise a virtual hand, set emojis, write a comment in the chat, or share my screen. Commanding and complying: As always in dealing with user interfaces, as always in programmatic circumstances, programming has provided and predefined what is possible and how (see Distelmeyer 2022, 62–70). But what is special here (and similarly with BigBlueButton) is that these interface options vary depending on the status of use.

The leading authority of a Zoom meeting, called "Host," has different and more possibilities than the category "Participant." Yet these interface options are not only different and thus an expression of programmatic flexibility. They can also limit and determine the possibilities as a "Participant." Depending on the presetting of modes like "Meeting" or "Webinar," a "Participant" can, for example, be muted by the "Host" (both individually and via the "Mute All" button) or could be "Put in Waiting Room." Other ways to act as a "Host" by clicking/commanding a "Participant" are specified with buttons like "Make Host," "Allow Record," "Lower Hand," "Rename," and "Remove." In turn, a "Participant" does not have these options in relation to the "Host" or other "Participants." It seems as if Jean Baudrillard's (2003, 281) old definition, "power belongs to the one who can give and cannot be repaid," is given a new embodiment here.

Even more, the possibilities of the "host" do not even appear as buttons in the user interface of the "participant," which emphasizes an aesthetic dimension of the

mediality of video conferencing platforms: "The" aesthetics and "the" user interface of platforms like Zoom do not exist at all—rather, there are different variants that differ depending on status and default settings and are subject to change. In other words, "the" aesthetics and "the" user interface of platforms like Zoom are also programmatic, subject to the power and flexibility of programming that opens up certain spaces for action and invites negotiation processes. This difference leads to a particular, built-in imbalance and incidentally complicates "walkthrough" analyses of apps and their user interfaces (see Light, Burgess, and Duguay 2018).

The question of power that arises here online (and is answered via interface actions) naturally also concerns seminar rooms and lecture halls. As little as these (partly transfigured) locations were and are hierarchy-free spaces, the romantic "digital vs. analog" dichotomy is misleading. Rather, it is important to ask what specific conditions of power (and also of disruption) are actually at work here. This makes it all the more relevant what goes on and what goes missing in the interface mise-en-scène of Zoom & Co.

The classic frontal seating, for example, which in a lecture hall makes it clear right from the start who is to be in charge, does not have to be communicated in this way on Zoom. In the tile grid of the "Gallery" view, at least, we are all the same, no spacing, tile size, or the like emphasizes who is "Host" here. The same is true for those seats in the "Kitchen," in the "Art Gallery," or in the "Boardroom," which can be taken/ allocated in Zoom's "Immersive View." The (thus) invisible leading authority shows up differently. It is experienced by "Participants," e.g., when they try to use the "Share Screen" button, and stopped by a dialog box that only allows the option to be confirmed with "Ok": "Host disabled participant screen sharing."

The authority of the "Host," which no "Participant" can assume on his own initiative when storming the teacher's desk, proves itself in the process. It becomes apparent when interface options are denied, settings are undone, or a "Participant"—the host moves in mysterious ways—suddenly finds himself as a "Co-Host" or in the "waiting room" that Neta Alexander (2020, 25) has discussed as a "timely metaphor for corona-capitalism." Unlike seminar rooms and lecture halls (*code is better than law*), on Zoom any rule can become an unspoken condition of existence. Also, power acts programmatically here. What Søren Pold has called the "Zoomoptikon" (Pold 2021) also aims at this context of programmatic relations: it aims at the power imbalance that lies in the uncertainty of what exactly is being captured and thus part of a data transfer and economy whose concrete processes remain hidden.

These special power relations—that on Zoom & Co in the (tile) space of the user interfaces no hierarchy has to be expressed, while it always already works on the level of programmatic determination—have consequences. For precisely because the question of power is based on programmability, it is also to be decided at this level. Practices of hacking, data abuse, and also "Zoom bombing" tell about it. This

increases the relevance of the political question of which institutions work with which software and which platform (in which jurisdiction).

Conclusion: People and Platforms Under Pressure

Video conferencing poses many familiar questions anew. The fact that these questions arise with noticeable urgency under the impression of the COVID19 pandemic marks a special historical situation at the beginning of the 2020s. The reason for this could be very simple: Perhaps the programmatic conditions of computerization and all its (interface) effects become so clear and perceptible here because of the obvious and nearly inevitable comparison with what video conferencing platforms are supposed to replace. The sudden compensation of all possible meeting spaces and forms by hardware, software, and platforms puts not only the people under pressure, but also the hardware, software, and platforms.

This creates attention for those traces that the medial conditions leave in video conferencing. Thus the truism becomes more tangible that such platformized and programmatic relations are first and foremost regulated relations in and among computers, before they thereby (thanks to camera, microphone, monitor, touch screen, etc.) bring people into relations. Spatial boundaries between people are overcome by using interface processes between computers whose formulaic nature, decentralized networking, and hard determination logic are also communicated—at least to a certain extent—at the level of human interaction.

At the same time, the experiences with Zoom & Co and the various contributions to this book show that the concrete forms of dealing with this technology are far from technically determined. Rather, it turns out to be important to look for possibilities (and their limits) to deal with it creatively. How our forms and practices of meetings and reconciling human/planetary needs and technical affordances will evolve remains open. It depends in no small part on what we learn from the beginning of the 2020s.

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