

Article

Science, Technology, & Human Values  
2019, Vol. 44(2) 291-314  
© The Author(s) 2018



Article reuse guidelines:  
[sagepub.com/journals-permissions](http://sagepub.com/journals-permissions)  
DOI: 10.1177/0162243918793711  
[journals.sagepub.com/home/sth](http://journals.sagepub.com/home/sth)



# Ethics from Within: Google Glass, the Collingridge Dilemma, and the Mediated Value of Privacy

Olya Kudina<sup>1</sup>  and Peter-Paul Verbeek<sup>1</sup>

## Abstract

Following the “control dilemma” of Collingridge, influencing technological developments is easy when their implications are not yet manifest, yet once we know these implications, they are difficult to change. This article revisits the Collingridge dilemma in the context of contemporary ethics of technology, when technologies affect both society and the value frameworks we use to evaluate them. Early in its development, we do not know how a technology will affect the value frameworks from which it will be evaluated, while later, when the implications for society and morality are clearer, it is more difficult to guide the development in a desirable direction. Present-day approaches to this dilemma focus on methods to *anticipate* ethical impacts of a technology (“technomoral scenarios”), being too speculative to be reliable, or on ethically *regulating* technological developments (“sociotechnical experiments”), discarding anticipation of the future implications. We present the approach of technological

---

<sup>1</sup>Department of Philosophy, University of Twente, Enschede, the Netherlands

**Corresponding Author:**

Olya Kudina, Department of Philosophy, University of Twente, Drienerlolaan 5, 7522NB Enschede, the Netherlands.  
Email: [olga.kudina@utwente.nl](mailto:olga.kudina@utwente.nl)

mediation as an alternative that focuses on the *dynamics of the interaction* between technologies and human values. By investigating online discussions about Google Glass, we examine how people articulate new meanings of the value of privacy. This study of “morality in the making” allows developing a modest and empirically informed form of anticipation.

### **Keywords**

technological mediation, ethics of technology, Collingridge dilemma, technomoral change, sociotechnical experiments

## **Introduction**

A classical dilemma in the technology studies is the so-called Collingridge (1980) dilemma. When a technology is still at an early stage of development, it is still possible to influence the direction of its development, but we do not know yet how it will affect society. Yet, when the technology has become societally embedded, we do know its implications, but it is very difficult to influence its development. The dilemma is one of the biggest challenges for responsible design and innovation.

Various strategies have been developed to escape it. Some strategies focus on anticipation, or “prospective evaluation” (Grunwald 2009, 1124-25), to get in touch with potential future impacts of a technology at a moment when they can still be addressed in processes of technology development. A good example is the approach of constructive technology assessment. Conceptualizing technology development in evolutionary terms, it approaches innovations as “variations” that are exposed to a “selection environment” of markets, laws, and regulations (Rip, Misa, and Schot 1995), to bring about a “nexus” between variation and selection by anticipating the future implications of technologies during their development. **anticipate and select**

An opposite strategy focuses on regulating the process of innovation rather than anticipating its outcomes. The approach of “sociotechnical experimentation” (van de Poel 2013) is a good example here. Rather than speculatively looking into an uncertain future, van de Poel proposes to accept this uncertainty and to approach innovations as “social experiments” that require ethics to be conducted responsibly. Technologies inevitably change society, and **rather than taming this uncertainty by trying to predict the future**, we should responsibly **regulate innovation processes**.

In this article, we explore a complementary strategy to deal with the Collingridge dilemma. We will do so by focusing on a specific manifestation of the dilemma: the problem of “value dynamism” in the ethics of technology, which entails that technologies often change the value frameworks we use to evaluate them. This situation results in an ethical variant of the Collingridge dilemma: when technologies influence value frameworks, the ethics of technology always seems to be either “too early”—evaluating technologies without knowing how the frameworks of evaluation themselves might change—or “too late”—knowing the ethical impact of a technology but at a moment when the technology has become less prone to change. Or, phrased differently: when we develop technologies on the basis of specific value frameworks, we do not know their social implications yet, but once we know these implications, the technologies might have already changed the value frameworks to evaluate these implications.

This connection between technological innovation and value change has a central place in two contemporary approaches in the ethics of technology: Swierstra’s approach of “technomoral change” and van de Poel’s approach of “sociotechnical experimentation,” which was mentioned above. The technomoral change approach develops scenarios to anticipate how technologies influence moral frameworks, in order to inspire technological practices and policy-making (Swierstra, Stemmerding, and Boenink 2009). The “sociotechnical experimentation” approach takes a radically different direction (van de Poel 2013). As indicated above, it considers anticipation too speculative to be reliable and approaches technological innovations as “social experiments” that need to be conducted responsibly.

However valuable and important these approaches are, they come up short in addressing the ethical variant of the Collingridge dilemma. While the relation between technological innovation and value dynamism is the explicit focus of technomoral scenarios, it only plays a background role in sociotechnical experiments. Yet responsible sociotechnical experiments cannot do without an idea of potential future ethical frameworks regarding technologies, and therefore, it seems to throw out the child with the bathwater by giving up on anticipation at large. At the same time, technomoral scenarios can only offer speculations about the future, while sociotechnical experiments embody a piecemeal approach that allows for regulation without speculation.

To overcome the shortcomings of both approaches, this article develops an alternative way of dealing with technology-induced value dynamism and

the consequent ethical variant of the Collingridge dilemma. This alternative is based upon the approach of “technological mediation,” which investigates how technologies mediate human practices, perceptions, and interpretations. Technological mediation also has a normative dimension: technologies shape moral actions and decisions and influence moral frameworks (Verbeek 2011). With the help of a case study of the “explorer” version of Google Glass (a limited number of test versions of Glass, made available by Google to be used exploratively with the explicit invitation to share one’s experiences online), we will show that the mediation approach overcomes the limitations of both the “technomoral change” and the “sociotechnical experimentation” approach. By studying how people—often implicitly—articulate new meanings of the concept of privacy when discussing this technology online, it becomes possible to develop a modest and empirically informed type of anticipation as an alternative to the weak empirical basis of technomoral scenarios and to the lack of anticipation in sociotechnical experiments.

In order to develop our approach, we will first describe the approaches of technomoral change, sociotechnical experimentation, and technological mediation (Dealing with Technological Value Dynamism section). Then, we will present the methodology and our case study on technological mediation and Google Glass (Approaching Google Glass and Privacy section). This will expose the interactions over time between values and technologies and allow us to propose the technological mediation approach as an alternative strategy to deal with the “ethical Collingridge dilemma” (Technological Mediation and the Collingridge Dilemma section).

## **Dealing with Technological Value Dynamism**

Technologies change human values. The introduction of the birth control pill has changed value frameworks regarding sexuality, for instance, because it loosened the connection between sex and reproduction, making room for new valuations of homosexuality (cf. Mol 1997, 8). And the introduction of augmented reality technology such as Google Glass, as we will show in this article, will have an impact on what “privacy” means in our society. How to understand the dynamics of this “technological value dynamism” and how to deal with it in a responsible way? To answer these questions, we will discuss and analyze the approaches of technomoral change and sociotechnical experimentation and contrast them with the approach of technological mediation.

## **Technomoral Change**

The central claim of the technomoral change approach is that normative frameworks are not static but coevolve with technologies (Swierstra, Stemerding, and Boenink 2009). The phenomenon of technomoral change should be seen as an element of the “soft impacts” of technologies: subtle, technology-inflicted shifts in society, such as changes in user practices, responsibilities, and value frameworks. Often, technology assessment methods and policy-making focus on “hard impacts,” such as health risks, environmental security, and economic losses that can be quantified, and often call for yes-or-no answers. In contrast, soft impacts “do not fit well within a techno-scientific discourse [because] they are easily dismissed as romantic, irrational, subjective or vague” (Haen 2015, 21). Yet the fact that they are difficult to trace does not make them less important. For instance, consider the soft impacts of the cell phone. Cell phones enabled people to make phone calls everywhere, experiencing the person we are calling as “closer” than the people who are physically nearby. This has changed the social acceptability of having private telephone conversations in public. Also, the normative expectation has arisen that people are available to connect (and their position to be triangulated) anytime and anywhere.

“Technomoral scenarios” can be used to analyze and anticipate soft impacts (Swierstra, Stemerding, and Boenink 2009; Boenink and Swierstra 2015). A technomoral scenario is a structured way to anticipate soft impacts, based on empirical research and analyses of the current practices that will be affected by new technologies. “Emerging technologies, and the accompanying promises and concerns, can rob moral routines of their self-evident invisibility and turn them into topics for discussion, deliberation, modification, reassertion” (Swierstra and Rip 2007, 6). Such new, problematic situations create frictions and destabilizations: conflicts emerge, values and norms are contested and compete with each other, because they are no longer able to respond adequately to new problems. It is precisely such alternative destabilizations with consequent soft impacts that technomoral scenarios attempt to foreground to trigger critical reflection regarding the introduction of new technologies.

The technomoral scenario method helps anticipate potential social and cultural implications of emerging technologies. It does not yet, however, offer a method to study technomoral change “in the making,” because it does not address the *dynamics* of the interaction between technology and morality itself, but rather its potential *outcomes*. Anticipation of societal impacts can only be an adequate way to deal with the Collingridge dilemma

when it offers a strong basis for making decisions (van de Poel 2016). To accomplish this, as we will further elaborate, we propose the approach of technological mediation, which provides a more solid empirical basis for anticipation to complement the technomoral scenario approach.

### *Sociotechnical Experiments*

An alternative way to deal with the Collingridge dilemma in the ethics of technology has recently been suggested by van de Poel (2011, 2013, 2016), in his approach to technological innovation as “social experiments.” The central observation behind this approach is that we can never adequately predict the societal impact of technological innovations. The wide range of unexpected social impacts of smartphones and the unforeseen risks of the Fukushima nuclear power plant (cf. van de Poel 2011, 287) illustrate this. While technologies have the potential to “seriously impact society, for the good as well as for the bad” (van de Poel 2016, 667), we can hardly predict what these impacts will be. For this reason, according to van de Poel, we need to deal with innovations as “social experiments”: interventions in society, with unknown outcomes. But the unknown character of these outcomes does not make it impossible to deal with them in a responsible way. Just like scientific and medical experiments, we should conduct them responsibly, “minimizing negative and unwanted side effects to make the best of technologies that can greatly improve our lives” (Robaey 2016, 899).

van de Poel explicitly relies on Collingridge to discard the practice of anticipation as a way to foresee technological impacts. For him, anticipation runs “a risk of missing out on important actual social consequences of new technologies and of making us blind to surprises” (van de Poel 2016, 668). While he does acknowledge the value of scenarios for public engagement and deliberation, he questions their value for the responsible introduction of new technologies: **scenarios direct the attention of the public away from real ethical issues and toward unlikely speculative futures** (van de Poel 2016, 670).

**To support a responsible introduction of new technologies**, van de Poel (2011, 2016) **provides an ethical framework for social experiments**, comprising four general moral principles, originating in the field of bioethics: **nonmaleficence, beneficence, respect for autonomy, and justice**. He further specifies these principles into sixteen conditions (van de Poel 2011, 289) that can help experimenters to implement the general principles in practice.

While the approach of sociotechnical experiments offers robust guidelines for responsible social experimentation and encourages forward-looking responsibility, it needs to be augmented with a method to “look forward” in a well-grounded way. By discarding anticipation-oriented and scenario-based approaches, it may lock itself up at the other pole of the Collingridge dilemma. Any ambition to let sociotechnical experiments be more than trial and error requires a good, yet modest, instrument to look forward in a substantial way.

### *Technological Mediation*

The approach of technological mediation offers a third way to deal with the Collingridge dilemma in the ethics of technology. Rather than speculating about the future or conducting responsible social experiments with technology, **it studies the dynamics of technomoral change itself.**

The mediation approach investigates how technologies shape relations between users and their environment. When technologies are used, they typically do not play a role as technological “objects” in interaction with human “subjects”; rather, they are “mediators” of the relation between users and their environment. Technologies in use mediate human practices and experiences (cf. Rosenberger and Verbeek 2015; Verbeek 2005). Medical imaging organizes how doctors interpret the health condition of patients, and how patients experience their own bodies. **Drones make it possible for humans to perceive and act on a distance, creating new forms of moral engagement and moral responsibility of soldiers or police officers** (Elish 2017).

This “mediation approach” has implications for the ethics of technology (cf. Verbeek 2011). If **ethics is about the question of “how to act” and “how to live,”** and **technologies help to shape our actions and the ways we live our lives,** then **technologies are “actively” taking part in ethics.** By helping to shape moral actions and decisions, technologies mediate morality: **ultrasound imaging mediates moral questions and decisions about abortion, just as drones mediate moral experiences of soldiers, and smartphones mediate the etiquette of restaurant and classroom behavior.** This phenomenon of moral *mediation* should not be mistaken for a form of moral *agency*. Rather than claiming that technologies have moral agency, **the approach of technological mediation claims that moral agency is a hybrid affair, involving both humans and technologies** (Verbeek 2014).

Because of their common focus on the interaction between technology and morality, the approach of moral mediation has close affinity with the

technomoral change approach. But while the approach of technomoral change takes the connection between technological and moral developments as a given and aims to anticipate future moral change in relation to technological innovations, the mediation approach makes it possible to study actual processes of technomoral change in practice, at the phenomenological microlevel that, ultimately, forms the basis of macrolevel technomoral developments.

This is exactly where the moral mediation approach can provide a way out of the dilemma that emerged in our discussion above: the dilemma of either making anticipation too speculative (the risk of the technomoral change approach) or giving up on anticipation too much (the risk of the sociotechnical experimentation approach). Because of its focus on the microlevel of human–technology relations, applying the approach of technological mediation to early versions of a technology makes it possible to study how moral frameworks develop in interaction with technological developments.

In what follows, we will show how this can be done by investigating normative discussions about a technology at the point of being widely introduced: Google Glass. This technology offers a unique possibility to study moral mediation in practice, since it was “at the threshold of society,” with the early version appearing in 2013 and the updated one reentering the market in 2017. Without having been introduced at a large scale yet, some people have had the opportunity to explore its possibilities (e.g., in the Google Glass Explorer program); while the central properties and affordances of this technology are made available online via video clips on YouTube. The comments posted by viewers of these videos allow us to study how people implicitly articulate conceptions of the value of privacy in relation to the anticipated mediating roles Google Glass might have in their daily lives and practices.

## Approaching Google Glass and Privacy

Even though mixed-reality goggles are not yet widespread, there are already signs of privacy-related concerns about them. When Google introduced Glass in 2013, some businesses declared their space a “Glass-free zone,” concerned that the embedded video camera compromised their clients’ privacy. Glass augments human perception by providing an additional layer of information that blurs the boundary between the public and the private in new ways. In doing so, it further challenges the already messy endeavor of trying to make sense of privacy in the digital age (cf. Steeves and Regan

2014; Solove 2002). The technology had a thorny path to the market: Google withdrew Glass for redesign in 2015, and in 2017 introduced an updated device for enterprise use, continuing the work on Glass for the mass consumers (Levy 2017). However, mixed-reality glasses, such as HoloLens (Microsoft Corporation 2015) and Spectacles (Snap Inc. 2017), recently entered the market, differing from Glass in the intended uses but resembling it by having the embedded cameras. This keeps the privacy discussion regarding Google Glass relevant: before technologies similar to Glass become widespread, it is necessary to understand why people call on privacy in their presence.

The fact that Glass is still in a stage of (re)development, while its first versions are discussed online, offers a unique possibility to study how the privacy implications of this technology are articulated *in practice*. In an empirical study of online discussions, we investigated how the notion of privacy used for the moral evaluation of Glass is implicitly redefined in interaction with the anticipated and actual mediating roles of this technology in human experiences and practices.

The value of privacy frequently appears in public debate and policy-making, but despite its dominant legal and corporate definition as control of information (cf. European Parliament 2002; Google 2013), privacy has not developed a unified generic meaning. Historical analyses demonstrate how the introduction of new technologies has gradually changed the meaning and practice of privacy (cf. Mayer-Schönberger 2009; Solove 2002). Moreover, Steijn and Vedder (2015) showed how the conceptions of privacy vary among different age groups: because the concerns and vulnerabilities of people are different in every life stage, young and elderly people have different interpretations of privacy.

To study people's experiences and practices with Glass, we build upon the ethnographic method of Mol (2002), which considers human values as embedded in practices that enable or contradict them. Different practicalities enact different configurations of what value means. Mol calls this ontological multiplicity the "body multiple." In this paper, we want to connect this multiplicity to the mediating roles of technologies: how are specific accounts of privacy articulated in connection to the specific ways in which technologies co-shape practices and experiences? To understand the privacy implications of Glass, we will examine the practices it produces. To do this, we will investigate a video on how to use Google Glass and, more specifically, the way people reflect on Glass in view of their lives and understandings of privacy.

## *Google and Glass: “Back in Control of Your Technology”*

Because corporate discourse co-shapes users’ perception of their technologies, we will first examine how Google positioned Glass and how it discussed privacy. According to Glass’s website, “Our vision behind Glass is to put you back in control of your technology” (Wayback Machine 2015). One can achieve this by instant search and updates, picture/video recording (started even by blinking [Google 2015]), and sharing information. Everything captured with Glass is accessible anytime due to continuous synchronization with Google Cloud. Google envisions Glass users as proactive individuals in control of their lives, activities, and information.

Being in control of information is also the main principle behind Glass’s security and privacy policy (Google 2013). It highlights that even though all Glass recordings are automatically backed up in Google Cloud, it is the user who decides with whom to share them. Concerning the nonusers, Google built in “explicit signals” to notify when Glass is recording: illuminating the screen, red light, and using voice commands; and called on the best judgment of Glass users when recording (Google 2015). However, data protection authorities worldwide criticized the insufficiency of those signals, along with the lack of technical information regarding how Google handles the data collected by Glass (Office of the Privacy Commissioner of Canada 2013).

In 2014, Google introduced an “etiquette” for Glass Explorers designed to clarify its appropriate use. It consisted of a short list of “do’s and don’ts” to help Explorers adopt the “collective wisdom” (Google 2014) regarding using the device in social settings. Some of the “do’s” suggested sharing captured experiences on social networks and interacting with Glass via voice. One notable suggestion was asking for permission of people when recording them, highlighting that Glass is no different from a smartphone regarding a camera use. This suggestion was reiterated in the “don’ts” as “[Don’t] be creepy or rude” (aka, a “Glasshole”; Google 2014), asking Explorers to respect the privacy of others and to apply the rules regarding smartphone cameras to Glass. According to the etiquette, “Breaking the rules or being rude will not get businesses excited about Glass and will ruin it for other Explorers” (Google 2014). Google’s Glass etiquette asked adapting the conventional social rules to Glass. For instance, a notable “don’t” was “[Don’t] Glass-out,” arguing against continuously focusing on Glass and to adjust to social situations, even if this means taking Glass off. The etiquette attempted to address an emerging pattern of socially contested behavior of Glass wearers and trust the better judgment of Explorers, asking them to “use common sense” (Google 2014).

Users and media agencies preceded Google's initiative. We examined the first of a kind Glass etiquette by Mashable (2013), an online technology-review platform. A 1-minute-46-second video depicts in a satirical way why some refer to Glass users as "Glassholes" and how to avoid being one. Provocative scenarios present the inappropriate uses of Glass—during a date or in the toilet, consulting search engines during conversations, and so on. The video engages viewers in reflection, thus presenting an interest for the research. The video went viral since its release on May 16, 2013, generating 1,434,785 views and 2,064 comments, all processed for this work.

YouTube, a social network website with user-generated video content, invites an open discussion of the content and any topic provoked by it (Chenail 2011). Even though videos are staged interactions to which commenters react, free choice of language, style, and expression allow commenters to engage on their own terms. Virtual ethnography requires following ethical guidelines identical to those of non-Internet-mediated research. Besides obtaining approval from the ethics committee for this study, we followed recommendations of Markham and Buchanan (2012) and Hewson and Buchanan (2013) on responsible Internet research. The public nature of YouTube comments did not require registration to access them. We anonymized the names of the commenters (e.g., *Commenter 1*) and removed any identifying information, such as date, time, and location of posting. The original spelling stands.

We collected the comments manually and analyzed them using MS Word. Focusing on the comments concerned with Glass-related uses and discarding promotional statements, incomprehensible symbols and short expressions (e.g., "+Like") allowed us to narrow the original 2,064 comments<sup>1</sup> to 96, which formed the base for an in-depth analysis. We used coding and thematic analysis to approach the data systematically. This allowed us to explore how commenters use contingent normative evaluations on Glass, particularly concerning the value of privacy, and how the commenters positioned the privacy discussions in their environment and in relation to Google. To qualify for a theme, a shared matter of concern had to appear in at least ten separate instances. Our study also presents idiographic sensibility by equally considering relevant single comments not fitting overarching patterns and comments that can be thematized (Smith, Flowers, and Larkin 2009, 37-39).

The complex narrative of the comments and our idiographic commitment enabled us to arrive at rich findings, deepening an understanding of how people appropriate new technologies such as Glass. The qualitative

study of YouTube comments provides a snapshot of privacy discussions in relation to Glass, indicating certain situated trends in privacy formulations. As such, the results of this research do not pretend to be representative and rather have an explorative nature, providing a suggestive illustration of the way people reason with new technologies.

Below, we will first present and critically reflect on the multiple interpretations of privacy that emerged in YouTube discussions. In interpreting the YouTube narrative about Glass, we will examine the nature of the practices that commenters describe, the main issues at stake, and the values at play. Then, we will inquire why and how privacy is important for that practice, and how people perceive and envision specific mediations of privacy by Glass. Based on that, we will make an inventory of the ways in which the value of privacy was implicitly articulated and defined.

### *Reasoning with Privacy*

We first explore how and in which context the commenters refer to privacy. A major privacy-related discussion through all the comments concerned a fear that Google cooperates with international government structures to collect, store, analyze, and share large amounts of private information of Glass users and of any bystanders in their recordings.

Excerpt 1

*Commenter 1*

- 1 You must be stupid to buy this. Putting your whole life and privacy
- 2 in the hands of a personal data-hungry company like Google.

*Commenter 2* in reply to *Commenter 1*

- 3 Get used to it, Facebook, and even YouTube has your private information
- 4 (Google is YouTube). If you're really that paranoid then don't do a half job,
- 5 abandon the internet completely.

This excerpt illustrates how privacy appears as a black-and-white argument to either use Glass and accept the supposed loss of privacy or abandon using it in order to preserve privacy. Privacy consequences of Glass are presented as self-evident, undeniable, and that no one can mitigate. Thus, the context fueling privacy discussions about Glass concerned the lack of transparency on how Google aggregates and manages the data collected by Glass.

The analysis of sociomaterial practices as presented by commenters online revealed a rich and complex narrative about privacy as a value. Commenters discussed privacy as a limited access to the self ("Addressing the GlassHole onslaught"), privacy of personhood, privacy of communication, privacy in

public places (“You should be on guard!”), and privacy in relation to experience and memories, identity building, activity, and control of information (“The end of privacy as we know it”). Below, for matters of space, we present four of these privacy conceptions, accompanied by a mediation analysis.

### *Privacy of communication: “Nail in the Coffin of Social Grace”*

Excerpt 2

*Commenter 3*

1 Wearable Internet is certainly the future, and probably the nail in the coffin of social grace.

*Commenter 4*

2 Not everyone is okay with the idea of a camera constantly being pointed at his or her face. . . .

3 In fact wearing Google Glass on a date should be a definite no-no as they can you date feel

4 uncomfortable and uncertain about what is going on behind that device.

*Commenter 5*

5 [W]ho wants to guess if you are really paying attention or reading a text.

6 You will be more interested in icons floating across your field of vision than talking one on one.

7 Recording me talk? Taking photos? Who knows what you’re doing.

*Commenter 6*

8 There is absolutely etiquette for glass. Im from a big city [ . . . ] where individuality thrives

9 but here in the good 'ole south [ . . . ] conservatism goes a long way.

10 That being said, I have vigilantly conscious when and where to wear glass.

11 There is an evolving glass etiquette as we speak.

Excerpt 2 suggests that Glass can mediate a set of practices related to everyday communication. The commenters appropriate Glass as an element of suspicion during interpersonal communication, leaving the other party “to guess if you are really paying attention” (line 5); and even framing Glass as “the nail in the coffin of social grace” (line 1). Excerpt 2 represents a widespread assumption that Glass users would violate tacit social norms. However, as *Commenter 6* suggests, social etiquettes coevolve with the introduction of new technologies, confronting existing norms of behavior with new technological practices. Nonetheless, cultural and social landscapes are fundamental in navigating new technologies, or as *Commenter 6* put it, “I [am] vigilantly conscious when and where to wear glass” (lines 10-11).

Privacy and attention are necessary conditions to foster interpersonal relations and express identity appropriate to a certain social context (Solove 2002). As Excerpt 2 indicates, Glass challenges these conditions by presenting an ability to be constantly watched without knowing whether you are being recorded and by leaving the interlocutor guessing what the Glass user is really doing. The design of Glass both suggests conducting several social activities simultaneously and co-shapes how a user can achieve that. Glass is positioned above the user’s right eye, in direct field of vision, “to

cater to *microinteractions*, allowing the wearer to utilize technology while not being taken out of the moment" (Firstenberg and Salas 2014, 11). However, using Glass requires focus on the screen, frequent visual notifications, and navigational aural cues, besides interaction via voice commands and by tapping the device. In practice, this requires Glass wearers to often concentrate on and interact with the device itself, which complicates interaction with other people (Honan 2013; Koelle, Kranx, and Moller 2015).

Overall, Excerpt 2 suggests a transformative effect of Glass on communication practices because it mediates attention and focus, values constitutive for the privacy of communication. Following one *commenter*, human norms of interaction coevolve with new technologies, suggesting that with time, Glass can not only mediate what such norms are but also what meaningful communication is.

### *Privacy as limited access to the self: Addressing "GlassHole onslaught"*

Excerpt 3

*Commenter 7*

- 1 I'm sorry, those who pull these kinds of stunts would more than likely get their snotbox busted
- 2 by someone who isn't cool with it. Google glass with caution. I'm just sayin'.

*Commenter 8*

- 3 I don't want to be in the sauna at the gym & have some GlassHole walk in.
- 4 I remember how irritating it felt in 1990 when some self-important person with
- 5 a Motorola Brick would decide to call someone while waiting in line at the grocery.
- 6 The GlassHole onslaught: 50× as intrusive.

*Commenter 9*

- 7 If you point those things at me or a member of my family and record footage for the NSA
- 8 you will find those glasses shoved up your glasshole.

In Excerpt 3, Glass appears as a mediating boundary object between what commenters consider private even in the most public places and what is violated when the device is introduced. *Commenter 8* worries about Glass users violating his bodily privacy and sense of dignity, illustrated by the retrospective cell phone example (lines 4-6). Endorsing a contextual use of Glass (Steeves and Regan 2014), she or he engages in a negotiation of the public-private spheres with Glass as an active boundary object. Curiously, by recalling own feelings about someone using a phone in public, *Commenter 8* depicts how human understanding of appropriate behavior changed with introduction of cellphones, or more generally, how technologies mediate moral frameworks. The perceived mediation of Glass concerns an undesirable intrusion into certain spaces. Anticipating public backlash concerning Glass, *Commenter 7* similarly suggests using it proportionally to the

context (line 2), not specifying what such Glass etiquette would entail. Comments here show how the introduction of Glass potentially destabilizes existing norms and how deliberation and comparison help to reflect on this. Other commenters, represented by *Commenter 9*, suggested less formative ways to reason with Glass. Some understand Glass as a direct threat to privacy and security of themselves and their loved ones (lines 7-8), threatening its users with sabotage and physical injury.

Excerpt 3 displays an intricate web of values in relation to Glass, such as proportionality, fairness, responsibility to protect the loved ones, justice, and accountability. Together, they conjure an understanding of privacy as desire for a limited access to the self and indicate its multidimensional nature.

*Privacy of experience and memories: “Sharing some things [is] fine but why everything?”*

Excerpt 4

*Commenter 10*

1 How about going dirtbiking . . . and \*not\* showing it to the entire internet? Just enjoy your life.

*Commenter 11*

2 God I hope Glass Fails . . . Does anyone remember or value real experience? Or memories? . . .

3 [S]haring some things are fine but why everything? . . .

Presented with an option to easily record the surroundings through Glass, coupled with Google encouraging users to post their experiences online, Glass users share recordings of their most mundane to the most exciting experiences. Although it is one's choice whether to watch such videos, the multitude of Glass recordings online and the nudging design of the media platforms to motivate continuous viewing of these videos (e.g., a default option to “autoplay” next clip) intensify human curiosity and diffuse the criteria for decision-making.

Excerpt 4 suggests that the privacy of remembering and, mirroring the concern, the privacy of forgetting are at stake with Glass. Extensive sharing of personal content online frustrates *Commenters 10* and *11* because they believe it devalues personal experiences (line 2) and prevents one from enjoying the present (line 1). We interpret their frustration as a desire to reclaim the right to have good memories. Mayer-Schönberger (2009) endorses the right to be forgotten in the digital age as a legal mechanism of dealing with the mediating impact of online sharing and storing practices. He discusses a case of a teacher who was fired because of the images on her Facebook page portraying her with alcoholic beverages. This example illustrates the repercussions of the collision “when actions that are normatively

appropriate in one context are revealed to members of another audience where norms are different" (Blank, Bolsover, and Dubois 2014, 6). However, the human ability to forget, mediated by the immeasurable capacity of the Internet to remember, coupled with diverse self-representation online enabled by Glass, presents a favorable background for such conflicting situations.

Overall, the commenters in the excerpt discuss the overexposure on the Internet that Glass enables. This allowed us to discern privacy in the context of experience and memories, with the accompanying interplay of values such as proportionality, balance, appropriateness, and choice, as well as remembering, forgetting, and balancing normative expectations.

### *Privacy in the public space: “You Should be on Your Guard”*

Excerpt 5

*Commenter 12*

- 1 These will end up being abused by the police and government so damn much,
- 2 the end of privacy as we know it. Plus everything you do and say will be recorded
- 3 in public places now, its scary to even think about.

*Commenter 13*

- 4 . . . this should be prohibited . . . every[one] can take pictures and videos from me,
- 5 everywhere in the public space.

*Commenter 14* in reply to *Commenter 13*

- 6 Because there is an expectation of privacy out in public right?

*Commenter 15*

- 7 Lack of privacy comes in many flavors . . .
- 8 There's the—oncoming tidal wave of CCTVs in public spaces—
- 9 universal behavior of anyone with a phone feeling that it's OK to take pictures wherever—
- 10 [ . . . ] So now we have people who can take your picture while non-surreptitiously
- 11 (you should be on your guard when addressing someone you don't know
- 12 who is wearing Glass) facing you.

Following commenters in this excerpt, Glass mediates the value of trust in the bystanders and intensifies curiosity of bystanders by enabling to record them and use the recording as one sees fit. Commenters appropriate Glass as an abuse of privacy in public, be it with dystopic undertones—"the end of privacy as we know it" (line 2); or with irony—"Because there is an expectation of privacy out in public right?" (line 6). Such anticipations join the fears of Google cooperating with various agencies for policing purposes (line 1). The shared assumption is that there is no room for anonymity where Glass monitors, inspects, and singles out.

Highlighting disclosed observation practices that Glass enables, *Commenter 15* lamented the "[l]ack of privacy" (line 7). The ambiguity as to the

purpose, extent, and context of recording with Glass challenges the practices of development and representation of the self in public. What distinguishes Glass from CCTV surveillance is lack of due security cause to focus on single individuals and lack of assurance that the recorded data will be managed respecting the legal requirements of intent and proportionality (Taylor 2002). While recording with smartphones does not manifest the intent, it does make the action of recording visible and/or audible. Glass users, however, neither visibly nor audibly manifest their intentions. The warning of *Commenter 15*—"You should be on your guard" (line 12)—mirrors the conclusions of Koelle, Kranz, and Möller (2015), suggesting that in absence of any signals, people assume they are being recorded when faced with devices such as Glass.

Excerpt 5 represents deliberations on the expectation of privacy in public in the age of recording devices. Regardless of the open and shared nature, an expectation of privacy is inherent to the public space as an enabling condition for contextual self-development and disclosure (Roessler and Mokrosinska 2013). Defined as civil inattention, such privacy foregrounds the social dimension of indifference, "when respect and reserve are displayed towards others" (Roessler and Mokrosinska 2013, 782). Privacy as civil inattention, enabling sociality and representation in public, hinges on civil indifference of others, the condition that according to Excerpt 5, Google Glass removes.

### *Reflecting on the Technological Mediation of Privacy in Case of Google Glass*

The mediation analysis of the YouTube comments above demonstrates how value dynamism accompanies the introduction of Glass. In particular, the study tentatively illustrates how the introduction of Glass might mediate the social practice of communication, the responsibility and proportionality of using Glass in public and private encounters, and the relation of Glass to memory making and to maintaining expectation of privacy in public places. Our study suggests how people anticipate the mediating role of Glass in their daily experiences and practices, and how in connection to this, specific articulations of privacy become visible. The technological mediation approach does not provide generalizing predictions on the possible societal or normative impact of Google Glass; neither does it apply static normative conceptions to approach the device. **Rather, it draws on specific human practices and experiences to identify how the introduction of Glass might fit or conflict with them, enabling the (re-)articulation of normative concerns.**

## Technological Mediation and the Collingridge Dilemma

This study of the dynamics of technological mediation and appropriation surrounding a technology “at the threshold of society” opens a new way of addressing the moral dimension of technology. It provides a way out of the ethical variant of the Collingridge dilemma, which says that at an early stage of development, we do not yet know how a technology will affect the value frameworks from which it will be evaluated in the future, while at a later stage, its implications for society and morality are clearer, but it is more difficult to guide the development in a desirable direction.

Complementing the approaches of technomoral change and sociotechnical experiments, the technological mediation approach shows that there is indeed an empirically informed way to anticipate the impact of technology on value frameworks, which moves both beyond the somewhat speculative character of the technomoral scenario approach and the rejection of anticipation by the sociotechnical experiments approach.

One could argue that the mediation approach is very close to the technomoral change approach since both reveal how technologies can affect moral frameworks. The mediation approach goes further than scenario writing, though: its focus on the mediating role of technologies in human–world relations enables it to develop detailed analyses of the implications of technologies for the practices, perceptions, and frameworks of users. One could also argue that Glass Explorers and YouTube commenters are in fact participating in (and even conducting) a sociotechnical experiment, with little sense of direction and no guidance, transforming the societal and normative canvas along the way. Yet, drawing on Verbeek (2010), if we were to conduct this social experiment deliberately and sensibly, aiming to develop meaningful relations with such experimental technologies, we would also need to include well-informed anticipations of the ways in which they help to shape human existence and condition moral frameworks. With the value of privacy as an illustration, we have shown how the mediation approach makes this possible.

The technological mediation approach, then, offers a way to understand how people engage or foresee engagement with technologies: how technologies impact or could impact their daily lives, the concerns that come to the surface, and how in parallel a specific understanding of privacy is being invented and reinvented in interaction with Glass. If we are to engage with new technologies in a responsible way, technological mediation could be part of a learning process. The mediation approach makes it possible to

anticipate and critically reflect on the ways technologies mediate human practices, experiences, and value frameworks. When used in settings where technologies are being discussed or experimented with just before they are introduced on a large scale, the mediation approach makes it possible to anticipate the normative implications of technology in an empirically informed way.

The fact that Google introduced an explicit “explorer” stage in the development of Glass offered a unique possibility to do this, but making a mediation analysis does not depend on the availability of developer versions of a new technology. Discussions such as the ones we studied on YouTube regarding Glass can also be organized around test versions of new technologies or even around technological promises. Stimulating people to imagine and evaluate potential use practices at a moment a technology in development is just mature enough to be imagined offers a basis to study how normative frameworks develop in interaction with technologies. Rather than being “too late”—able to see the implications but without room to change the social role of the technology—or “too early”—able to intervene but without having clarity about the societal implications—this approach seems to be positioned “just in time.” It offers an empirically based form of anticipation on the impact of technology on society, including its implications for value frameworks.

## Conclusion

By studying online discussions about the “explorer” version of Google Glass, we have developed a way out of the ethical variant of the Collingridge dilemma. By investigating how a technology “at the threshold of society” affects the normative frameworks with which we evaluate these very technologies, we provided an alternative to the options of either knowing the ethical impact of a technology but having to accept it is very hard to change the direction of its development or still being able to change the technology but not being able to anticipate its impact. Augmenting the technomoral scenario approach, which speculates about potential futures surrounding new technologies, and the sociotechnical experimentation approach, which replaces anticipation with responsible experimentation, the technological mediation approach provides an empirically informed form of anticipation.

We have traced the dynamics of the value of privacy as a complex interplay between technological mediation and human appropriation, showing how Glass might mediate the practices and experiences of (potential)

users, and how these users implicitly define specific notions of privacy when anticipating these mediations. Conducting such a microfocused phenomenological study of the experiences and practices around this technology made it possible to investigate normative developments in interaction with a technology on the verge of being introduced in society. The privacy “body multiple” resulting from this is multidimensional, contingent, and rarely fits the dominant legal and corporate formulation of privacy as control of information. In fact, it is more about lack of control and how people develop ways to deal with that.

Therefore, the technological mediation framework developed in this article to study normative transformations in relation to emerging technologies contributes not only to the theoretical discussion on value dynamism and the Collingridge dilemma but also has the potential to facilitate ethical discussions about technologies. It makes visible that the values used to evaluate technologies are not independent from these technologies but rather are co-constituted by them. A better understanding of these dynamic human-value-technology entanglements can substantially contribute to a more responsible design and use of technologies.

### **Acknowledgments**

The authors would like to thank two anonymous reviewers and the editorial staff of *STHV* for their inspiring feedback on earlier versions of this article, which was invaluable contribution to the further development of its central ideas.

### **Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### **Funding**

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The research was funded by the Netherlands Organisation for Scientific Research (NWO) under the research program “Theorizing Technological Mediation: Toward an Empirical-Philosophical Theory of Technology” with project number 277-20-006.

### **ORCID iD**

Olya Kudina  <http://orcid.org/0000-0001-5374-1687>

## Note

1. In April–June 2014, during the empirical stage for this study, the number of comments below the video was 2,064. However, during the review of this study in 2018, the number of comments below the same video decreased to 588. A possible explanation could be a recently enhanced filtering policy of YouTube, where human and artificial intelligence–based assistants remove the content (also comments) containing spam, hate speech, and so on (<https://support.google.com/youtube/topic/2676378?hl=en>). Many of the original comments indeed contained spam and hate speech, which we filtered manually. The ninety-six comments taken for a close analysis remain intact on the site as of April 28, 2018.

## References

- Blank, Grant, Gillian Bolsover, and Elizabeth Dubois. 2014. “A New Privacy Paradox: Young People and Privacy on Social Network Sites.” Paper presented at the Annual Meeting of the American Sociological Association, San Francisco, CA, August 17.
- Boenink, Marianne, and Tsjalling Swierstra. 2015. “Technomoral Scenarios.” Paper presented at the workshop What’s Next in Socio-Technical Intervention Approaches? University of Twente, Enschede, the Netherlands, June 22-23.
- Chenail, Ronald J. 2011. “YouTube as a Qualitative Research Asset: Reviewing User Generated Videos as Learning Resources.” *The Qualitative Report* 16 (1): 229-35.
- Collingridge, David. 1980. *The Social Control of Technology*. New York: St. Martin’s Press.
- Elish, Madeleine C. 2017. “Remote Split: A History of US Drone Operations and the Distributed Labor of War.” *Science, Technology, & Human Values* 42 (6): 1100-31.
- European Parliament. 2002. *Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 Concerning the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sector*. European Union, Belgium: European Parliament, Council of the European Union.
- Firstenberg, Allen, and Jason Salas. 2014. *Designing and Developing for Google Glass*. Sebastopol, CA: O'Reilly Media.
- Google. 2013. “Glass Security & Privacy.” Accessed December 22, 2016. <https://sites.google.com/site/glasscomms/faqs#GlassSecurity&Privacy>.
- Google. 2014. “Explorers. Do’s and Don’ts.” Accessed May 14, 2018. <https://sites.google.com/site/glasscomms/glass-explorers>.
- Google. 2015. “Wink.” Accessed December 22, 2016. <https://support.google.com/glass/answer/4347178?hl=en>.

- Grunwald, Armin. 2009. "Technology Assessment: Concepts and Methods." In *Philosophy of Technology and Engineering Sciences*, edited by Anthonie Meijers, 1103-46. Amsterdam, the Netherlands: North Holland.
- Haen, Dirk. 2015. "The Politics of Good Food. Why Food Engineers and Citizen-consumers Are Talking at Cross-purposes." PhD diss., University of Maastricht, Maastricht, the Netherlands.
- Hewson, Claire, and Tom Buchanan, eds. 2013. *Ethics Guidelines for Internet-mediated Research*. Leicester, UK: The British Psychological Society.
- Honan, Mat. 2013. "I, Glasshole: My Year with Google Glass." *Wired*, June 3. Accessed March 26, 2018. <https://www.wired.com/2013/12/glasshole>.
- Koelle, Marion, Matthias Kranz, and Andreas Möller. 2015. "Don't Look at me that Way! Understanding User Attitudes towards Data Glasses Usage." Proceedings of the 17th International Conference on Human-Computer Interaction with Mobile Devices and Services, pp. 362-72, ACM. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.697.1049&rep=rep1&type=pdf>.
- Levy, Steven. 2017. "Google Glass 2.0 Is a Startling Second Act." *Wired*, July 18. Accessed October 25, 2017. <https://www.wired.com/story/google-glass-2-is-here>.
- Markham, Annette, and Elizabeth Buchanan, eds. 2012. "Ethical Decision-making and Internet Research (Version 2.0)." Association of Internet Research. Accessed December 22, 2016. <http://aoir.org/reports/ethics2.pdf>.
- Mashable. 2013. "Google Glass: Don't Be a Glasshole." *YouTube.com*. Accessed December 22, 2016. <https://www.youtube.com/watch?v=FlfZ9FNC99k>.
- Mayer-Schönberger, Viktor. 2009. *Delete: The Virtue of Forgetting in the Digital Age*. Princeton, NJ: Princeton University Press.
- Microsoft Corporation. 2015. "HoloLens." Accessed May 14, 2018. <http://www.microsoft.com/microsoft-hololens/en-us>.
- Mol, Annemarie. 1997. *Wat is Kiezen? Een Empirisch-Filosofische Verkenning* (Inaugural Lecture). Enschede, the Netherlands: University of Twente.
- Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice*. Durham, NC: Duke University Press.
- Office of the Privacy Commissioner of Canada. 2013. "Data Protection Authorities Urge Google to Address Google Glass Concerns." Accessed May 2, 2018. [https://www.priv.gc.ca/en/opc-news/news-and-announcements/2013/nr-c\\_130618/](https://www.priv.gc.ca/en/opc-news/news-and-announcements/2013/nr-c_130618/).
- Rip, Arie, Thomas J. Misa, and Johan Schot. 1995. "Constructive Technology Assessment: A New Paradigm for Managing Technology in Society." In *Managing Technology in Society*, edited by Arie Rip, Thomas J. Misa, and Johan Schot, 1-14. London, UK: Pinter.

- Robaey, Zoë. 2016. "Gone with the Wind: Conceiving of Moral Responsibility in the Case of GMO Contamination." *Science and Engineering Ethics* 22 (3): 889-906.
- Roessler, Beate, and Dorota Mokrosinska. 2013. "Privacy and Social Interaction." *Philosophy & Social Criticism* 39 (8): 771-91.
- Rosenberger, Robert, and Peter-Paul Verbeek, eds. 2015. *Postphenomenological Investigations: Essays on Human-technology Relations*. London, UK: Lexington Books.
- Smith, Jonathan A., Flowers, Paul, and Michael Larkin. 2009. *Interpretative Phenomenological Analysis: Theory, Method and Research*. London, UK: Sage.
- Snap Inc. 2017. "Spectacles." Accessed May 14, 2018. <https://www.spectacles.com>.
- Solove, Daniel J. 2002. "Conceptualizing Privacy." *California Law Review* 90 (4): 1087-155.
- Steeves, Valerie, and Priscilla Regan. 2014. "Young People Online and the Social Value of Privacy." *Journal of Information, Communication and Ethics in Society* 12 (4): 298-313.
- Steijn, Wouter M., and Anton Vedder. 2015. "Privacy under Construction: A Developmental Perspective on Privacy Perception." *Science, Technology, & Human Values* 40 (4): 1-23.
- Swierstra, Tsjalling, and Arie Rip. 2007. "Nano-ethics as NEST-ethics: Patterns of Moral Argumentation about New and Emerging Science and Technology." *NanoEthics* 1 (1): 3-20.
- Swierstra, Tsjalling, Dirk Stemerding, and Marianne Boenink. 2009. "Exploring Techno-moral Change: The Case of the Obesitypill." In *Evaluating New Technologies*, edited by Paul Sollie and Marcus Duwell, 119-38. Dordrecht, the Netherlands: Springer.
- Taylor, Nick. 2002. "State Surveillance and the Right to Privacy." *Surveillance & Society* 1 (1): 66-85.
- van de Poel, Ibo. 2011. "Nuclear Energy as a Social Experiment." *Ethics, Policy & Environment* 14 (3): 285-90.
- van de Poel, Ibo. 2013. "Why New Technologies should be Conceived as Social Experiments." *Ethics, Policy & Environment* 16 (3): 352-55.
- van de Poel, Ibo. 2016. "An Ethical Framework for Evaluating Experimental Technology." *Science and Engineering Ethics* 22 (3): 667-86.
- Verbeek, Peter-Paul. 2005. *What Things Do: Philosophical Reflections on Technology, Agency, and Design*. Pennsylvania: The Pennsylvania State University Press.
- Verbeek, Peter-Paul. 2010. "Accompanying Technology: Philosophy of Technology after the Ethical Turn." *Techné: Research in Philosophy and Technology* 14 (1): 49-54.

- Verbeek, Peter-Paul. 2011. *Moralizing Technology: Understanding and Designing the Morality of Things*. Chicago, IL: University of Chicago Press.
- Verbeek, Peter-Paul. 2014. "Some Misunderstandings about the Moral Significance of Technology." In *The Moral Status of Technical Artefacts*, edited by Peter Kroes and Peter-Paul Verbeek, 75-88. Dordrecht, the Netherlands: Springer.
- Wayback Machine. 2015. "Glass. What It Does." *The Internet Archive*. Accessed May 14, 2018. <https://web.archive.org/web/20150115191209/https://www.google.com/glass/start/what-it-does/>.

## Author Biographies

**Olya Kudina** is a PhD candidate in philosophy of technology at the University of Twente, the Netherlands. In her dissertation, she conceptually and empirically explores the way technologies mediate human norms and values. Her research interests relate to ethics of technology, (post)phenomenology, hermeneutics, and bioethics.

**Peter-Paul Verbeek** is a professor of philosophy of technology and scientific codirector of the DesignLab at the University of Twente, the Netherlands, and honorary professor of technoanthropology at Aalborg University, Denmark. His research focuses on human–technology relations and their social and cultural implications, in relation to philosophical theory, ethical reflection, and practices of design and innovation.