In this dissertation, Olya Kudina investigates the complex interactions between ethics and technology. Center stage to this is the phenomenon of “value dynamism” that explores how technologies co-shape the meaning of values that guide us through our lives and with which we evaluate these same technologies. The dissertation provides an encompassing view on value dynamism and the mediating role of technologies in it through empirical and philosophical investigations, as well as with attention to the larger fields of ethics, design and Technology Assessment.

**THE TECHNOLOGICAL
MEDIATION OF MORALITY:**

VALUE DYNAMISM, AND THE COMPLEX
INTERACTION BETWEEN ETHICS AND TECHNOLOGY

Olya Kudina

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Table of contents

Chapter 1. Probing the relation between technology and morality	15
1.1 Acknowledging the role of technologies in morality	16
1.2 Empirical inquiry into the moral mediation of technologies	20
The current status of empirical postphenomenology	21
Empirical postphenomenology required to study value dynamism	23
Refining research direction	25
1.3 Chapter outline	25
Chapter 2. Testing the assumptions of moral mediation: Google Glass and the value of privacy	31
2.1 The need for a proof of principle	32
2.2 Exploring the technological mediation of privacy in the case of Google Glass	34
Google and Glass: "Back in control of your technology"	35
Reasoning with privacy	38
1) Privacy of communication: "Nail in the coffin of social grace"	38
2) Privacy as limited access to the self: Addressing "GlassHole onslaught"	40
3) Privacy of experience and memories: "Sharing some things [is] fine but why everything?"	41
4) Privacy in the public space: "You should be on your guard"	42
Reflecting on the preliminary study	43
2.3 Conclusions	44
Chapter 3. Conceptual clarification of the moral mediation account	51
3.1 The theoretical assumptions behind the moral mediation account	52
3.2 Exploring the "moral" part in the moral mediation account	53
A preliminary practice-based examination of values	53
Examining values through formal theories	57
Solidifying value perspectives through pragmatism	61
3.3 Exploring the "mediation" part in the moral mediation account	66
Accommodating a relational and dynamic view on values	68
Mediation at different levels and stages of morality	70
Explicitly considering technologies in value dynamism and change	75
3.4 Conclusions	77
Chapter 4. Human appropriation of technologies as a key to moral mediation	81
4.1 Defining appropriation	82
The lens of domestication studies	82
The lens of technological mediation	84

4.2 Turning to the (post)phenomenological origins of appropriation	88
Phenomenological inquiry into interpretation: Gadamer and the hermeneutic circle	88
Relating the hermeneutic circle account to the human appropriation of technologies	91
Accounting for the role of technologies in interpretation	94
Postphenomenological inquiry into interpretation: Ihde and the material hermeneutics	96
Relating the material hermeneutics account to the human appropriation of technologies	99
4.3 Toward a hermeneutic lemniscate as a principle of technologically mediated appropriation	101
4.4 The hermeneutic lemniscate and the value dynamism	105
4.5 Conclusions	108

Chapter 5. Identifying a method for studying the human appropriation of technologies: Interpretative Phenomenological Analysis	113
5.1 Attention to language in examining the appropriation process	114
5.2 Exploring the Conversation Analysis and Discursive Psychology method	116
5.3 Exploring the Interpretative Phenomenological Analysis method	119
The foundation and goals of Interpretative Phenomenological Analysis	119
The analytic process underlying Interpretative Phenomenological Analysis	121
5.4 Inquiring into the fitness of Interpretative Phenomenological Analysis as a method for an appropriation study	125
The methods of Conversation Analysis and Discursive Psychology and Interpretative Phenomenological Analysis in relation to an appropriation study	125
Interpretative Phenomenological Analysis and the lemniscate principle	127
Making Interpretative Phenomenological Analysis into a method for empirical philosophy	128
5.5 Conclusions	131

Chapter 6. Appropriation study of technology-in-use: Google Glass, technology developers and selected remarks on the ethics and practice of design	135
6.1 Re-introducing the Google Glass case study, with attention to the ethics and practice of design	136
6.2 Interpretative Phenomenological Analysis of Google Glass appropriation	139
Study design and limitations	139
Interpretative Phenomenological Analysis findings	142
a. Glass as a misunderstood opportunity: "a bit too early" and "a step too far"	142
b. Glass as a technology of the self	143
c. Glass as a cell phone reference	148
d. Glass as an epitome of the future	150
e. Glass as a privacy controversy: from "disaster" to "overhype"	152

f. Glass as “an open laboratory”	155
g. Glass as a pride of engineering excellence	156
Discussion of Interpretative Phenomenological Analysis findings	158
6.3 Ethics of technology design: Value Sensitive Design and the unaccounted multidimensional nature of values	159
6.4 Conclusions	164

Chapter 7. Appropriation study of technology-in-the-making: Sex selection and the moral significance of emerging technology 169

7.1 Understanding emerging sex selection technology	170
Technological background	172
The ethical debate regarding sex selection technology and how SST+ fits within it	174
Approaching the moral mediation potential of technology-in-the-making	176
7.2 Exploring the moral mediation potential of SST+ through literature	178
Demedicalization of the sex selection practice	179
SST+ as a direct-to-consumer technology	180
The move of the SST+ to an open market	181
Discussion of the findings	183
7.3 Interpretative Phenomenological Analysis of SST+ appropriation	184
Study design and limitations	184
Interpretative Phenomenological Analysis findings	189
a. Understanding good parenthood in the face of SST+: “You have a child, and then you have to do with whatever you get”	189
b. Relating SST+, gender and culture: “A step in a wrong direction”	196
c. Considering the value of liberalism and choice: SST+ as “an aspect of a very liberal society that you as a society would not want”	202
d. Enforcing the trend to perfectionism: “[I]t’s like you have to sketch your entire life”	206
e. Mediating naturalness: “May we really determine everything?”	211
Discussion of Interpretative Phenomenological Analysis findings	215
7.4 Conclusions	219

Chapter 8. Reflection on the moral mediation study and its contribution to the fields of ethics and design 223

8.1 Concluding the two appropriation studies	224
Examining the lemniscate model in the Google Glass case	226
Examining the lemniscate model in the sex selection case	228
Concluding reflections on the Interpretative Phenomenological Analysis method for an appropriation study	229
8.2 Value dynamism and the ethical variant of the Collingridge dilemma	233
Technomoral change	236
Sociotechnical experiments	237
Technological mediation	239
8.3 Dealing with value dynamism in the ethics and design of technologies	242

Mediation approach and ethical Constructive Technology Assessment	242
Mediation approach and Value Sensitive Design	245
8.4 Conclusions	246
References	252

Annexes

ANNEX A	266
ANNEX B	267
ANNEX C	268
Summary	270
Samenvatting	276
Анотація	283
Biography	290

Chapter 1.

**Probing the relation between technology and
morality**

1.1 Acknowledging the role of technologies in morality

Morality has traditionally been associated with human beings, who independently and reflectively determine the right and wrong courses of action. The rise of technologies in the 20th century spurred a shift from an independent to an interdependent view of people and technologies, whereby people both design new technologies and are profoundly influenced by their own creations. The proliferation of genetically modified food has raised concerns about global justice and responsibility, while the norms of food safety and equitable access to this technology have subsequently undergone review. Assisted reproduction technologies have defied previously existing biological horizons, enabling aged, infertile or same-sex couples to have children. This has not only redefined what it means to be human but also fostered novel normative expectations regarding procreative rights and liberties. Pervasive Internet connectivity and digital technologies implicitly and explicitly weave the canvas of our social and private lives, fostering an expectation of constant availability, as well as suggesting who to date, which music to listen to and what to read. Technologies, thus, while being the fruits of human creativity, manifest not merely as neutral tools but also as productive elements in co-shaping how people perceive the world, each other and themselves.

The role of technologies in forming relations between people and the world is the explicit focus of the technological mediation approach. Positioned within the field of postphenomenology, this approach suggests that technologies are not neutral “objects” in the intentional hands of human “subjects.” Rather, they are “mediators” of the relation between people and their environment—technologies mediate human practices and experiences (e.g., Rosenberger and Verbeek, 2015; Verbeek, 2005). Glass office doors enable the expectation of transparency in the professional setting, while simultaneously reducing the value of privacy and internalizing a surveilling gaze within employees. Internet-based communication enables the maintenance of long-distance relationships and allows for flexible, permanently connected work places, while redefining our moral engagement and responsibility. In this dissertation, I will explore in detail the intricate relation between technologies and morality from the angle of the technological mediation approach. More specifically, I wish to inquire how technologies mediate values.

Several authors have written on the ethical dimension of technology, considering how technology embeds values, inspiring human actions and understandings (Parens, 2015); how it fosters moral engagement and relations (Turkle, 2007); and how it can provide moral insights for people (Wallach and Allen, 2009). Moreover, technology can aid in redefining the concepts with which we approach and evaluate it. In a discussion on human

enhancement, Aydin suggests that “What is considered ‘normal’ and ‘healthy’ is redefined in terms of what technologies are able to measure, diagnose, and treat” (2017, pp. 317–318).

Magnani (2007) surpasses this idea and suggests that because people and technologies “fold into” each other, producing hybridized entities, morality in a technological world is a dynamic affair. Morality, according to Magnani, is enacted both by people, in changing technological settings, and by technologies, to which people delegate their actions and which serve as sources of ethical knowledge. For this reason, people do not *observe* morality when dealing with technologies; rather, the techno-human “folding” *produces* and *reinvents* morality to address changing and challenging situations.

While Magnani’s conclusions about the dynamic nature of morality and the active role of technologies within it are persuasive, the rationale behind them is problematic. He argues that because people attribute high value to technologies, people must be considered as “things,” as ethical instruments to construct “moral mediators,” or “entities we can construct in order to bring about certain ethical effects [be it] as beings, objects or structures” (Magnani, 2007, p. 248). Suggesting the instrumental nature of both people and technologies, Magnani does not consider the role of technologies in how we conduct ethics. He emphasizes human–technology opposition while downplaying their interrelation. Although Magnani evaluates technologies ethically, he does not consider the ethics of technologies. In short, while Magnani’s conclusions about technology and morality are intriguing, the presuppositions underlying these conclusions invite further consideration regarding the ethical dimension of technologies.

The technological mediation approach considers the ethical implications of technologies from the premise of technologies as mediators of human–world relations (e.g., 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” (Kudina and Verbeek, 2018). Verbeek (2008), in a study on ultrasound technology, demonstrates that how the image of the fetus appears on the screen has ethical implications for parental deliberation about its future and co-shapes parental responsibilities. By helping to shape moral actions and decisions, technologies mediate morality: prenatal genetic testing mediates moral questions and decisions about childbearing, (semi)autonomous robots mediate the moral experiences of war and CCTV cameras mediate public behavior. Note how, contrary to Magnani’s account, when in use, technologies mediate our (moral) engagement with the world not only some, but all of the time.

The postphenomenological contribution to developing the concept of moral mediation is a timely and important one, for it explicitly reveals how technologies co-shape the moral decisions of people. However, I feel it can be further expanded by considering the relation between technologies and values. My aim in this dissertation is to expand the idea of moral mediation and transcend the postphenomenological scholarship to date. Namely, I wish to demonstrate how technologies mediate not only the moral behavior of people (Verbeek, 2008; 2011) but the normative frameworks themselves. I believe that more is at stake with the moral mediation of technologies, something that extends beyond the co-shaping of moral intuitions and the decisions of people. I suggest that beyond mediating the moral habits and behaviors of people, technologies also mediate the infrastructure for moral decision-making, or that technologies mediate the meaning of the value frameworks themselves. The moral mediation account could thus enable the exploration of a continuous development of values related to the sociomaterial contexts in which they are embedded. Throughout this dissertation, I will refer to this phenomenon as “value dynamism” to explore how technologies reveal existing value conceptualizations, thus helping to re-affirm them, shift accents between them, challenge the dominant definitions and enable new value meanings. I thus wish to dig one layer deeper in the technological mediation approach and expand the concept of moral mediation with considerations of value dynamism.

Suggesting that technologies mediate morality does not imply that they define the moral concerns and values for approaching them. Rather, by virtue of their design, foregrounding some options and concealing others, technologies co-shape the (moral) perceptions and actions of people (Ihde, 1993; Verbeek, 2005, 2011). Therefore, technologies themselves do not appear as moral agents; rather, moral agency is distributed among both people and technologies. Moral agency is, as such, a hybrid affair (Verbeek, 2014). Telecare technologies enable physicians to perceive and treat their patients across distances, fostering new configurations of moral engagement and responsibility. Medical imaging technologies guide a physician’s interpretation of a patient’s health, as well as how patients perceive themselves. The ethical implication of this human–technology intertwinement is that technologies also help to shape the moral evaluations and decisions of people (Verbeek 2008, 2011), while, as I wish to add, the ethical frameworks with which we approach technologies co-evolve with these same technologies.

Expanding the idea of moral mediation with that of value dynamism introduces several challenges to the mediation approach as well as to the broader field of the ethics of technology. Concerning the mediation approach, the idea of technologically mediated values highlights the hermeneutic dimension of meaning-making, the interpretation of values in relation to specific technologies. It also stresses the importance of the

interrelation principle between people and their sociomaterial environment and strives to clarify how values fit into that interrelation. To date, postphenomenology has emphasized the role of technologies in co-shaping how people relate to the world. However, when exploring interpretation and meaning-making, it is important to focus not only on specific technologies but also on specific people, with their concerns and sociocultural embedding. Thus, to conceptualize the expanded phenomenon of moral mediation, I must sensitize the mediation approach to the idea of value dynamism and determine how to study its hermeneutic dimension conceptually and empirically.

Apart from introducing challenges to the mediation approach, the idea of moral mediation expanded with value dynamism complicates the broader practice of the ethics of technology, which is traditionally concerned with anticipating the ethical implications of technologies, a complex and challenging problem. Considering how technologies mediate the meaning of values further complicates the practice of ethics. Anticipating the ethical implications of technologies has always been a wicked problem, as articulated by David Collingridge in 1980. On the one hand, we cannot leap over our present shadows to grasp the future implications of technologies while their development trajectory is still flexible. On the other hand, once we know the ethical implications of technologies, they are already deeply entrenched in society and thus very difficult to change. The extent to which I wish to explore the moral mediation of technologies further complicates this dilemma. If we suggest that technologies mediate value frameworks, then how do we still practice the ethics of technology? If the value frameworks that we use to guide the design and evaluation of technologies co-evolve with these same technologies, how do we account for that? Thus, the expansion of the moral mediation idea along the lines of value dynamism presents challenges to the broader field of the ethics of technologies.

In summary, thus far I have established a lacuna in the postphenomenological framework regarding the dynamic nature of values in relation to technologies. I aim to fill this gap by expanding the concept of moral mediation to account for how technologies mediate the meaning of values. Ultimately, I wish to provide a well-rounded answer to the question of how technologies mediate values. This presents, first of all, a theoretical challenge in the technological mediation approach: how do we conceptualize the expanded idea of moral mediation beyond the mediation of moral behaviors and decisions? In parallel, what understandings of values, morality and ethics would account for this idea? Secondly, a challenge for the practice of ethics ensues from suggesting the dynamic nature of values, whereby the meaning of certain values can change in relation to specific technologies.

Continuing with the practical challenge, suggesting *that* technologies mediate morality does not explain *how* they do so. To address this, I must develop and test a method to

empirically study the moral mediation of technologies. While the current section has contextualized the conceptual challenges with regard to the moral mediation approach and value dynamism, the following section focuses on methodological challenges. It specifically explores how to empirically conduct a philosophical analysis of the technological mediation of values while taking both the methodology and theoretical assumptions seriously.

1.2 Empirical inquiry into the moral mediation of technologies

Verbeek suggests (2015) that people attribute technologies with meaning, value and importance while appropriating them. For now, I loosely define appropriation as a process of taking technologies up, making sense of them and fitting them into the interpretative frameworks of people. Echoing Verbeek, I intuit that moral sensibilities and concerns come to the fore while attributing meaning to a new technology or reinterpreting an old one. If this intuition is correct, appropriation can illustrate how, in an encounter with a technology, pre-reflective values surface, making themselves available for re-articulation and reflection. In this dissertation, I will scrutinize this intuition, attempting to understand how technologies mediate values through the process of appropriation. This places focus on the hermeneutic dimension of technological mediation, on how people interpret technologies and the ensuing mediations. More specifically, I will explore the relation between value dynamism and the appropriation process, attempt to capture the technological mediation of morality and examine it both empirically and conceptually. This will allow for both the understanding and study of how technologies mediate values.

The research question itself, namely, how technologies mediate values, requires some clarification, primarily because it draws one's attention to the role of technologies in the mediation process and seems to reduce the visibility of the people who make sense of, use and reframe these mediations. Hence, it is important to highlight the active role of people in the process of the technological mediation of morality.

Throughout the development of the technological mediation approach and the postphenomenological field in general, most of the attention has been on technologies as mediators of the human relation to the world. Admittedly, the role of technologies has always been correlated with people and their sociocultural environment. However, since highlighting the status and role of technologies has been the primary concern, it is understandable that human participation in the mediation process, albeit acknowledged, has been less prominent. This must change when exploring how technologies mediate values, because it is people who make sense of technologies, foregrounding certain moral

concerns. Following Verbeek, "In order to develop a full understanding of processes of mediation, we should not only study 'what things do' (2005) but also how humans give meaning to these mediations—both empirically and conceptually" (Verbeek, 2015, p. 190). Thus, in this study, I will aim to balance the human–technological relation, while also considering the active sociocultural environment.

The goal that I have identified above, namely, to understand and study the technological mediation of values, implies a strong empirical component. How does one empirically identify and philosophically analyze the phenomenon of value dynamism? Verbeek hints at where values can manifest their malleability, namely, in the process of appropriation (2015). Conceptual avenues in this quest are challenging, as demonstrated by the preliminary discussions in the previous section. However, the empirical part also deserves close attention, for, albeit promoting the empirical spirit, postphenomenology in general, and the technological mediation approach in particular, is deemed "not empirical enough" (Aagaard et al., 2018, p. xvii).

The current status of empirical postphenomenology

Postphenomenology studies specific human–technology–world relations, and with that, it combines philosophical analysis and empirical studies. Postphenomenological analysis is empirical in that it studies concrete technologies in embodied human practices. As such, it presents "philosophy 'from' technology" (Verbeek, 2015, p. 190). From its inception, postphenomenology has utilized concrete technological case studies. Ihde, for instance, analyzed, from an auto-ethnographic perspective, cases with acoustic and heart implant technologies, which purportedly made him a cyborg (2002; 2008). He also frequently turned to historic cases of, for instance, cavemen and early painting techniques, as well as reinterpreting history from the viewpoint of material hermeneutics (1990; 2005). Verbeek's ultrasound case study (2008, 2011) became a seminal example within postphenomenology of how technologies can mediate morality by co-shaping the moral choices and behaviors of people. In short, postphenomenological studies explicate, through specific cases, how technologies transform human relations to the world, thus co-shaping (moral) inclinations and actions.

Through case study analysis, Rosenberger also elicited the political dimension of postphenomenology. He analyzed how technologies in the private and public domains have implications beyond the individual user and always embed the scripts of other stakeholders. For instance, Rosenberger (2009) demonstrated how computers and Internet algorithms enable the formation of filter bubbles. The filter bubbles seduce the user to remain within the space of personal or shared opinions, reducing their exposure to alternative viewpoints, which are essential for an informed perspective. The author

(2017) also analyzed the politics of such mundane technologies as benches and trashcans in public places. He highlighted how their design prevents people from sleeping on the street or extracting food from the bins. Such urban technologies draw homeless people away from city centers, creating a perception of having solved the social problem and enhancing a city's image for tourism. With these cases, Rosenberger draws attention to the responsibility of the reflective use of technologies in both the public and private domains.

The 2015 comprehensive volume on postphenomenological research demonstrates the depth and breadth of case study use in postphenomenology (Rosenberger and Verbeek, 2015). The works range from inquiries into what extending the human body through robotic re-embodiment would mean for being human in general and medical practitioners in particular (Besmer, 2015) to analyses of the use of self-tracking technologies when both the "object" and "subject" of tracking are elusive (Van den Eede, 2015). Overall, the volume demonstrates that it is not only possible but desirable to analyze human–technology relations at the phenomenological local level. It also illustrates how to philosophically reflect on how technologies co-shape our daily views, preferences, choices and actions.

However, as Rosenberger and Verbeek (2015) suggest, the use of case studies is left to scholarly interpretation because "There is no strict postphenomenological methodology that scholars should follow" (p. 10). On the one hand, loose methodological guidance invites scholars to experiment with the framework, testing its fitness for a variety of retrospective, current and future-oriented cases. However, it also runs the risk of neglecting the rigor required of empirical investigations. After all, a careful description and justification of the empirical method enhances the credibility and verifiability of a study and also acquaints the reader with its limitations. To this end, Aagaard et al. (2018) aim to lend postphenomenology scholars a safe footing by suggesting several ways in which a study can be "more empirical." According to Aagaard and colleagues (2018), "Postphenomenologists often base their analyses on texts from science journals and magazines or from their own personal life stories. [...] Perhaps [this] has shaped (and restricted) its framework?" (p. xvii). Consequently, the editors of the volume encourage the use of empirical methods from the social sciences to yield new philosophical insights.

This call is most notably represented in four chapters of the volume. In Chapter 3, Aagaard (2018) relies on group observation to study the influence of technologies on attention. In Chapter 5, Secomandi (2018) utilizes interviews, digital ethnography and group observation to understand the effects of self-tracking technologies on intersubjectivity in human–technology relations. In Chapter 8, Blond and Schiölin (2018) ethnographically trace the cultural appropriation of the Silbot robot across South Korea, Finland and Denmark. Finally, in Chapter 12, Hasse (2018) skillfully utilizes participant observation

to suggest how postphenomenology can be elevated from micro-focused one-person analyses to larger scale studies. In contrast to these four contributions, the remaining eight chapters predominantly rely on case study analysis very similar to the type presented in Rosenberger and Verbeek (2015). Although the volume purports to focus on the human side of human–technology–world relations, the contributions are structured around specific technological applications, which inadvertently redirects the attention back to technologies. However, as the editors of the volume remark, they do not intend to formulate an exclusive methodology for postphenomenology. Rather, they want to jumpstart a conversation regarding the use of empirical methods in this field. With my intention to produce a well-rounded study of how technologies mediate values, I aim to contribute to this empirical call in postphenomenology by substantiating and further extending its methodological horizons.

Empirical postphenomenology required to study value dynamism

To understand technologically mediated value dynamism, or morality-in-the-making, requires a strong empirical component that should avoid only being descriptive and "elevat[ing] a single person's self-ethnography to grandiose proportions," as is charged against (post)phenomenological case studies (Mol, 2010, p. 254). Equally, as cautioned by Hämäläinen (2016), empirical philosophy should not directly translate empirical insights to philosophical conclusions but rather be reflective and open of the complex translation process that occurs in between. The study of technologically mediated morality must incorporate these methodological suggestions to produce transparent and critical empirically grounded philosophical study.

The version of empirical postphenomenology that I would like to explore must extend beyond the studies presented both in Rosenberger and Verbeek (2015) and Aagaard et al. (2018). I intend to focus on the human element in the appropriation process, while accounting for its dynamic technological and sociocultural counterparts. This involves combining empirical insights related to individual experiences, embodied concerns and personal sociocultural histories while interpreting them through the lens of the technological mediation approach.

Apart from the challenge of incorporating different theoretical and empirical components, the method for studying the moral mediation of technology must be applicable to a wide range of technologies. In this dissertation, I will explore two different technologies, regarding both their nature and stages of development: the mixed-reality Google Glass goggles and the technology for sex selection on a chip. Both technologies present a fruitful but complex background for an appropriation study to explore the dynamics of involved values. The limited introduction of Google Glass in society did not go smoothly. The

emergence of “Glass-free zones” and a “Glass etiquette” that followed its introduction are examples of the creative appropriation of this technology. These hint at underlying tensions between the values promoted by Glass, such as global connectivity and openness, and those to which people adhere and are not willing to adapt, for instance, privacy. The sex selection chip is an emerging technology that promises to allow parents to choose the sex of their child prior to conception in a safe and cheap manner. I will review its use for non-medical reasons. Most legislative systems forbid sex selection for such reasons, but this does not prevent people from escaping national laws and traveling to the countries that do allow this procedure. Such an appropriation of a sex selection technology (hereafter SST) reflects a conflict between structural and individual levels of appropriation and suggests a potential value conflict. Even this preliminary glance at two cases suggests that understanding how people appropriate a technology and make sense of it in relation to their specific cultural and social settings can reveal how certain values resurface and potentially undergo (re)articulation.

A potential challenge to studying moral mediation in the cases of Google Glass and the sex selection chip could concern the different stages of development that these cases represent. While Google Glass has already had some market exposure and generated different use practices, the sex selection chip is still in the innovation pipeline. However, several earlier (and very different) versions of SST are currently in use, and the new sexing chip (hereafter SST+) already penetrates the minds of people in the form of promises, concerns, fears and hopes. Since such developmental stage differences are commonplace, I will introduce a distinction between the two cases and refer to Google Glass case as a technology-in-use and SST+ as a technology-in-the-making. This distinction can be helpful to test the empirical approach with a present-based and anticipative emphasis. Different stages of market introduction mirror different levels of the projective and practical appropriation of technologies. Technologies-in-the-making rely more on the interpretation of technological promises and concerns coupled with the previous experiences of people, while technologies-in-use also represent practical situations to grapple with. The challenge for empirical philosophical study would be to methodologically explore and uncover the deep hermeneutic dimensions in both of these instances, when technologies are already available but not yet fully present.

In summary, the function of case studies in relation to moral mediation and appropriation will be twofold. Firstly, the case studies will demonstrate to what extent the methodological framework functions and whether the developed empirical method is sufficient to identify and study moral mediation. Secondly, they will help to analyze the moral mediations of

these socially relevant technologies to potentially aid in making informed decisions about their design and use.

Refining research direction

The preliminary theoretical elaborations and intuitions in this chapter allow the substantiation of the research question by formulating a number of sub-questions essential to address it. To reiterate, the primary question I will explore in this dissertation is *How do technologies mediate values?* If I am to systematically study the moral mediation of technologies, I must ask myself several questions. *Firstly*, I must conceptualize the phenomenon of moral mediation. What exactly is meant by “moral” and “mediation” in this regard? What conceptions of morality, ethics and values do they imply? *Secondly*, I must expand the phenomenon of moral mediation in view of the ambition to include appropriation as well. How should I conceptualize the line of appropriation? How should I highlight the hermeneutic dimension of the moral mediation? And how should I do so while bearing in mind the interrelated nature of people, technologies, values and the sociocultural embedding? *Thirdly*, I must develop a methodological framework to study appropriation empirically and systematically. How should I study the dynamic process of meaning-making in relation to specific technologies? *Fourthly*, I must implement the developed approach to study Google Glass and SST+. The empirical philosophical study of these two technologies will investigate the value and limitations of the developed approach. *Finally*, I would like to explore how the expanded moral mediation approach, emphasizing value dynamism in relation to technologies, relates to the broader field of the ethics of technology.

To further elaborate upon the research question and sub-questions, the next section presents the layout of the dissertation, narrating how each of the chapters contributes to solving the conceptual and empirical puzzle of the technological mediation of morality.

1.3 Chapter outline

Chapter 2 presents a preliminary empirical verification of the idea of moral mediation expanded with value dynamism. Before proceeding to thorough conceptual and empirical investigations, I first wish to examine the applicability of the moral mediation concept through a preliminary open empirical exploration. Aided by online comment analysis, I tentatively explore the case of Google Glass and its relation to the value of privacy. The study demonstrates how various dimensions of the value of privacy resurface in relation to Google Glass and the specific practices that it enables. The preliminary study functions not to provide answers but rather to further flesh out the research lines identified in Chapter

¹ Please, note that “SST+” does not imply a better SST but denotes potentially expanded technological features.

1. This first thermometer study assists me to thicken and contextualize the research sub-questions identified in Chapter 1. In parallel, it provides an idea about potential theoretical and empirical challenges in studying moral mediation before plunging into deeper theoretical investigations and thorough empirical case studies.

Chapter 3 clarifies what the terms “moral” and “mediation” mean to understanding moral mediation as expanded with value dynamism. In this, I rely on the pragmatist origins of postphenomenology, specifically, the works of Dewey. The urgent need to turn to pragmatism relates to the need to sensitize the mediation approach to the ideas of value dynamism. Furthermore, turning to pragmatism allows me to present a theory of values that embeds their relational nature within the sociomaterial environment. I first unpack the “moral” part of the mediation, clarifying which concepts of morality, ethics and values it entails. I then unpack the “mediation” part and elaborate upon the need to expand it. I rely on the pragmatist origins of the mediation approach to emphasize the dynamic model of sociomaterial practices and to position values as both enabled by and conditioning these practices. I also trace how the question of technology and values is represented beyond the mediation approach. I primarily focus on the technomoral change approach of Swierstra, which suggests that technologies induce moral change. Discussing the relation between the two approaches allows me to delineate the scope and goals of technological mediation. Ultimately, I define the perspective of the mediation approach on values as relational, dynamic and flexible regarding the human–technology–world practices in which they are embedded. This lays ground to explore the hermeneutic dimension in the mediation approach regarding how values can undergo conceptualization and reinterpretation.

Chapter 4 develops the line of appropriation to understand how people make sense of technologies in a projective and practical manner and how this relates to the technological mediation of morality. I first clarify the concept of appropriation in the mediation approach and compare it to the same concept in the domestication studies. I next develop a hermeneutic lemniscate as a principle of technologically mediated interpretation to understand how people appropriate technologies. I refer to such an integrated process of interpretation as a lemniscate because it resembles a twisted figure-eight shaped curve (∞), consisting of three linking, interrelated components: human, technology and world. With the lemniscate, I extend the hermeneutic dimension of postphenomenology to account for the missing mechanism of circularity between people and the mediated world. To expand postphenomenology, I build upon Gadamer’s circular principle of interpretation. In turn, I argue that Gadamer’s account misses the mediating part of technologies in the hermeneutic circle and thus turn to the material hermeneutics of Ihde that explicitly accounts for it. Combining Gadamer’s and Ihde’s accounts allows me to produce an encompassing account of technologically mediated interpretation, the hermeneutic

lemniscate. Analyzing, through the prism of lemniscate, how people appropriate technologies allows me to see how normative concerns surface when considering specific technologies and how they are (re)articulated. Lemniscate-based appropriation mirrors a relational view on values and highlights the active role of people, technologies and the environment in moral hermeneutics.

Chapter 5 develops a methodological framework to empirically study the process of appropriation and uncover the technological mediation of morality. Spoken language comprises a more easily accessible and more dynamic way to trace technological appropriation than does digital ethnography. Testing the suggestion of Verbeek (2015), I first explore the empirical method of Conversation Analysis for its fitness with the scope and goals of the appropriation study. I suggest that although it can be used to consider the morality of a conversation, it is not well-suited to capture how specific moral sensibilities materialize in an encounter with a specific technology. I next explore the method of Interpretative Phenomenological Analysis (IPA) and suggest that it better fits the sense-making goal of the appropriation study than does Conversation Analysis. Moreover, the IPA method also reflects a focus on situated micro-perspectives and the Gadamerian principle of the hermeneutic circle. I discuss the relation between the hermeneutic lemniscate principle and the IPA method and suggest how the two complement and imply each other. I next apply the theoretical ideas developed in Chapters 2 through 5 to the case studies of Google Glass (Chapter 6) and the prenatal sex selection chip (Chapter 7).

Chapter 6 explores the case of Google Glass as a technology-in-use, one that has already had a brief exposure to the market. As suggested by the exploratory study in Chapter 2, the design choices of placing a camera on top of the glass frame and hiding any notifications about recording fostered serious privacy concerns. In this chapter, I conduct an IPA-based appropriation study of Google Glass by technology developers who were involved in the process of its design, development or deployment. I show how the lemniscate principle guided them to reflect on personal and professional ambitions through actual technological capabilities and societal concerns. The resulting multiple appropriations of Glass reveal a tension between personal and professional values, as well as a tension between their fluid conceptions. I subsequently address the relation between the field of design and the moral mediation account. More specifically, I relate the IPA findings and the theoretical ideas from Chapter 3 regarding the relational nature of values to the approach of Value Sensitive Design (VSD). I suggest how the mediation approach can contextualize the perspective on values in VSD regarding the actual or anticipated practices with technology. Finally, I suggest that an appropriation study can expand the

conceptual and empirical investigations in VSD and make them more receptive to the multidimensional nature of values in design.

Chapter 7 analyzes the case of a prenatal sex selection chip, SST+, as a technology-in-the-making. SST+ is still in the development pipeline and primarily exists in the form of promises, concerns, fears and ethical debates. Thus, it is not a typical case for an IPA-based appropriation study because no practical experience with its use yet exists. However, as argued in Chapter 4, appropriation is as much a projective experience as a practical one. I inquire how the new material configurations of SST+ could alter its societal appropriation, if at all. Based on a literature study and existing sex selection practices, I first explore the moral mediation potential of SST+. This allows me to ground and substantiate the anticipatory appropriation study of SST+, whereby I explore how people in the Netherlands make sense of this technology. I pay specific attention to methodological reflection when designing this IPA study and analyzing how SST+ mediates the moral views of people. I argue that a forward-looking appropriation study can also help to identify value dynamism regarding emerging technologies. When exposed to the idea of SST+, participants revealed the values of good parenthood, liberalism, naturalness and others, referring to them from within both the cultural environment of the Netherlands and global embedding. As a result, the participants often reconsidered their views on SST+, challenging or reaffirming their moral commitments. Although this may be a time-consuming and challenging endeavor, such an appropriation study can be helpful for the more informed use of and decision-making on technologies.

Finally, **Chapter 8** reflects on the conceptual and empirical findings of the expanded moral mediation approach. The first line of conclusions focuses on the micro-level of empirical data to determine how the lemniscate principle, coupled with the IPA method, allows the study of technological appropriation and value dynamism. I suggest that regardless of its time- and effort-consuming nature, the IPA method helps to trace the lemniscate principle of interpretation, revealing how different values surface, undergo re-articulation and make space for new value meanings. The second line of conclusions relates the findings to the broader field of ethics. I reintroduce the ethical variant of the Collingridge dilemma, briefly explained in Chapter 1, and relate the mediation approach to the existing philosophical approaches that deal with value dynamism: the sociotechnical experimentation approach of Van de Poel (2013) and the technomoral change approach of Swierstra (2013). I demonstrate how the mediation approach complements these two approaches and offers a way to move beyond the dilemma in an empirically and philosophically grounded manner.

Finally, I relate the conceptual and empirical findings back to the field of technology ethics and design. I suggest that the findings can help bring the mediation approach closer to its ambitions in policy contribution in a form of ethical Constructive Technology Assessment (CTA), briefly discussed in Chapter 3 (Kiran, Oudshoorn and Verbeek, 2015). They could also further its intricate interrelation with the technomoral change approach. With relation to design, I suggest that the appropriation study could practically augment the VSD stages of conceptual and empirical investigations and conceptually expand and substantiate its philosophical understanding of values. Throughout this chapter, I also discuss the potential challenges of applying the appropriation study and sketch further research avenues.

Chapter 2.

Testing the assumptions of moral mediation:
Google Glass and the value of privacy

2.1 The need for a proof of principle

In Chapter 1, I introduced the intuition that such a phenomenon as moral mediation exists, along with different research lines that must be addressed to empirically investigate and philosophically analyze it. Namely, I suggested that the concept of moral mediation must be defined so as to incorporate ideas about value dynamism and the hermeneutics of appropriating technologies. Also, I defined the need for a method to empirically study moral mediation to make it available for reflection and philosophical scrutiny. Before pursuing these goals, I first wish to examine the applicability of the idea of moral mediation in a tentative open empirical exploration, which will help me to further flesh out the research lines and develop an idea about potential theoretical and empirical challenges.

Based on the theoretical exposition in Chapter 1 and intensified by observations from daily life, my intuition is that technologies do indeed affect the meaning of values. However, before plunging into deeper theoretical investigations and thorough empirical case studies, I would like to have a proof of principle, a first thermometer to determine whether the idea of moral mediation works. To do so, I conduct a preliminary exploration of the use of Google Glass to understand to what extent a phenomenon such as moral mediation could exist in relation to this technology. I suggest that the mediation approach can do more than it has to date in the ethics of technology, beyond demonstrating that technologies mediate morality by co-shaping the situations of moral choice. I think it is also possible to determine how the mediation approach reveals the dynamism in the meaning of values themselves. Such an expanded moral mediation account not only involves technologies having ethical implications, steering ethical behavior; it is also about technologies mediating the value frameworks. A tentative empirical exploration will allow me to verify whether this occurs.

I refer to Google Glass as an example at this preliminary test stage because in 2015 (at the inception of this dissertation), Google Glass provoked much discussion, both in the media and in everyday life, regarding the value and meaning of privacy. The first working version of Glass had no way to notify surrounding people that its user was taking pictures or recording video. In Europe, in the context of the then still emerging General Data Protection Regulation, privacy in the case of Google Glass, just as in many other technology-related matters, was discussed predominantly with the goal of protecting the data of citizens. This almost automatically framed all privacy discussions around the control of information. However, informed by users of various digital technologies and professional discussions with colleagues, I have realized that privacy comes in many flavors.

I was inspired primarily by the example of stickers over laptop webcams and microphones, an often self-imposed creative solution in the name of privacy to prevent the malicious interception of video and audio channels. I sensed that such a creative appropriation of technology could reveal much about the meaning of privacy both in general and in relation to specific technologies, as well as about the roles and responsibilities of their users. More specifically, understanding how people think about their gadgets, foresee engagement with them (projective appropriation) and go about using them (practical appropriation) can demonstrate what people value. Moreover, such an understanding can show how a technology can confront people's values, forcing them to find creative roundabouts to preserve that which is valuable, give it up or forge an alternative. If tiny cameras on everyday devices such as laptops and tablets can spur privacy-related discussions and initiatives, then, so I thought, an innovative technology such as Google Glass that puts cameras on people's faces and allows recording without notice would also spark value-laden discussions.

My presupposition was that also in the case of Google Glass, multiple meanings of privacy could exist. This inspired me to conduct a preliminary empirical exploration of moral mediation, namely, how Google Glass could mediate privacy. Such an exploration would not serve as a case study analysis, where the collected data has a thorough methodological grounding and is explained through a certain theoretical prism to yield conclusions. Rather, I envisioned the opposite: I wished to observe the phenomenon of moral mediation, with a mix of methodologies in mind, and determine which questions and challenges arise in relation to it. It is in this sense that the exploratory study that follows is not a classical case study: instead of receiving answers to preset questions, I want to understand what questions I *should* ask to address the phenomenon of moral mediation.

Inspired by the webcam stickers example, I concluded that most interesting observations originate in the daily life of people. However, in the beginning of 2015, Google Glass was not a widespread technology and was available only to a few people (predominantly in the US) ready to pay a large sum to test it. This presented a practical challenge to my preliminary empirical exploration, if I wanted to talk to people in real life. Already in 2015, however, the ability to discuss anything online with anyone anywhere on the globe was widespread. Particularly regarding new technologies, the online video platform YouTube has frequently been used for reviewing new gadgets and receiving quick, diverse reactions from audiences in the form of comments. I decided that for an open empirical testbed, a digital ethnographic study of YouTube comments, coupled with the technological mediation analysis, could be a pragmatic method to shed light on the idea of moral mediation.

Regardless of the exploratory nature of the study, the step from intuition into practice nonetheless requires respect for the participants of the study and a transparent manner of conducting the investigation. The following section presents the setup of the study and describes the study itself in more detail to demonstrate how Google Glass implicitly co-defined the value of privacy.

2.2 Exploring the technological mediation of privacy in the case of Google Glass²

Although mixed-reality goggles are not yet widespread, privacy-related concerns about them already exist. When Google introduced Glass in 2013, some businesses declared their spaces 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 attempting to make sense of privacy in the digital age (e.g., Regan, 2002; Solove, 2002). The technology had a thorny path to the market: Google withdrew Glass for redesign in 2015, and in 2017 it introduced an updated device for enterprise use, continuing the work on Glass for mass consumers (Levy, 2017). However, mixed-reality glasses such as HoloLens (Microsoft Corporation, 2015) and Spectacles (2017) by Snap (formerly Snapchat) have recently entered the market, differing from Glass in intended uses but resembling it in having 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 point out privacy in the presence of these technologies. This makes Glass a fitting example to my pursuits of empirically exploring the mediating potential of technologies regarding existing values.

The fact that Glass is still in the stage of (re)development while its first versions are simultaneously discussed online offers a unique possibility to study how the privacy implications of this technology are being articulated *in practice*. In an empirical study of online discussions, I investigate how the notion of privacy used for the moral evaluation of Glass is implicitly redefined in interactions 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 information control and management

(e.g., European Parliament, 2002; Google, 2013), a unified generic meaning of privacy has not been developed. Historical analyses demonstrate how the introduction of new technologies has gradually changed the meaning and practice of privacy (e.g., Mayer-Schönberger, 2009; Shapiro, 1998; Solove, 2002). Moreover, Steijn and Vedder (2015) have demonstrated how conceptions of privacy vary among different age groups: because the concerns and vulnerabilities of people differ in every life stage, the young and the elderly have different interpretations of privacy.

To study people’s experiences and practices with Glass, I build upon the ethnographic method of Mol (2002), whereby different practicalities enact different configurations of what value means. Mol calls this ontological multiplicity the “body multiple.” In this empirical exploration, I wish 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 and meaningfully engage with them, I follow this technology through the practices it produces. To do this, I investigate a YouTube video on how to use Google Glass and, more specifically, the manner in which people reflect on Glass in view of their lives and understanding of privacy.

Google and Glass: “Back in control of your technology”

Because corporate discourse co-shapes users’ perception of technologies, I 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), which one can achieve through instant search and updates, picture/video recording (even on the blink of an eye, literally [Google, 2015]) and sharing information. Everything captured with Glass is accessible at any time 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 primary principle behind Glass’s security and privacy policy (Google, 2013), which highlights that although all Glass recordings are automatically backed up in Google Cloud, it is the user who decides with whom to share them. Concerning non-users, Google built in “explicit signals” to notify people nearby when Glass is recording, through screen illumination, a red light and the use of voice commands, and called on the best judgment of Glass users when recording (Google, 2015). However, data protection authorities worldwide criticized the insufficiency of these signals, as well as the lack of technical information available regarding how Google handles the data collected by Glass (Office of the Privacy Commissioner of Canada 2013).

² This subsection appeared in the following article: Kudina, O., and P.-P. Verbeek. (2018). Ethics from within: Google Glass, the Collingridge dilemma, and the mediated value of privacy. *Science, Technology, & Human Values*. <https://doi.org/10.1177/0162243918793711>.

In 2014, Google introduced an “etiquette” guide for Glass Explorers, the first test users of Glass, designed to clarify appropriate usage, consisting of a short list of “do’s and don’ts” to help Explorers adopt “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 requesting permission from people when recording them, highlighting that Glass does not differ 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 apply rules regarding smartphone cameras to Glass. According to the etiquette guidelines, “Breaking the rules or being rude will not get businesses excited about Glass and will ruin it for other Explorers” (ibid.). Google’s Glass etiquette essentially suggested adapting the conventional social rules to Glass. For instance, a notable “don’t” was “[Don’t] Glass-out,” arguing against focusing on Glass for extended periods of time and for adjusting to social situations, even if this requires taking Glass off. The etiquette guidelines attempted to address an emerging pattern of socially contested behavior by Glass wearers and trust the better judgement of Explorers, asking them to “use common sense” (Google, 2014).

Users and media agencies preempted Google’s initiative. I examined the first of a kind of Glass etiquette by Mashable, an online technology-review platform. A 1 min 46 sec video depicts in a satirical manner why some refer to Glass users as “Glassholes” and how to avoid being one (Mashable, 2013). Provocative scenarios present 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 interesting object of study for the preliminary empirical exploration of technologically mediated morality. The video went viral after its release on May 16, 2013, generating 1,434,719 views and 2,064 comments, all of which have been processed for this study.

YouTube, a social network website with user-generated video content, invites open discussions about content and any topic provoked by it (Chenail, 2011). Although videos are staged interactions to which commenters react, the free choice of language, style and expression allows commenters to engage on their own terms (Veen et al., 2011). This empirical exploration purports to be a form of digital ethnography, while not pretending to be a classical case study. As such, it still requires following ethical guidelines. Besides obtaining approval from the Ethics Committee at the University of Twente for this study, I have followed the recommendations of Markham and Buchanan (2012) and Hewson and Buchanan (2013) on ethical decision-making in Internet research. The public nature of YouTube comments does not require registration to access them. I anonymized the

names of the commenters (e.g., *Commenter 1*) and removed any identifying information, such as the date, time or location of posting. The original spelling stands.

I collected the comments manually and analyzed them using MS Word. Focusing on comments concerned with Glass-related uses, while discarding promotional statements, incomprehensible symbols and short expressions (e.g., “+Like”), allowed me to narrow the original 2,064 comments³ to 96, which formed the basis of an in-depth analysis. I used coding and thematic analysis as the elements of discourse analysis (Fairclough, 2013) and grounded theory (Charmaz, 2006) to analyze the narrative of the commenters and approach the data systematically. This allowed 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 as a theme, a shared matter of concern must appear in at least ten separate instances. This explorative study also presents idiographic sensibility by considering equally relevant both single comments not fitting overarching patterns and comments that can be thematized (Smiths, Flowers and Larkin, 2009, pp. 37–39).

The complex narrative of the comments and my idiographic commitment has enabled me to produce rich findings, deepening an understanding of how people appropriate new technologies such as Glass. The qualitative study of YouTube comments provides a snapshot into privacy discussions in relation to Glass, indicating certain trends in privacy formulation “at one place in time” (Potts, 2015). As such, the results of this study do not pretend to be representative but rather are of an explorative nature. Therefore, I invite readers to approach the study as a suggestive illustration of how people reason with new technologies.

Below, I first present and critically reflect upon the multiple interpretations of privacy that emerged in the YouTube discussions. In interpreting the YouTube narrative about Glass, I examine the nature of the practices that commenters describe, the primary issues at stake and the values at play. I then inquire into why and how privacy is important for each practice and how people perceive and envision specific mediations of privacy by Glass. Finally, I make an inventory of the ways in which the value of privacy is implicitly articulated and defined.

³ 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 589. A possible explanation could be a recently enhanced filtering policy of YouTube, where human and AI-based assistants remove the content (also comments) containing spam, hate speech, etc. (<https://support.google.com/youtube/topic/2676378?hl=en>). Many of the original comments indeed contained spam and hate speech, which I filtered manually. The 96 comments taken for a close analysis remain intact on the site as of 04.28.2018.

Reasoning with privacy

I first explore how and in which contexts commenters refer to privacy. A significant privacy-related discussion present throughout the comments concerned the 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 to preserve privacy. The privacy consequences of Glass are presented as self-evident, undeniable and impossible to mitigate. Thus, the context within which the privacy discussion involving Glass emerged concerned the lack of transparency on how Google aggregates and treats 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"), the privacy of personhood, the privacy of communication, privacy in public places ("You should be on guard!") as well as privacy in relation to experience and memories, identity building, activity and the control of information ("The end of privacy as we know it"). Below, due to space limitations, I present four of these privacy conceptions, accompanied by a mediation analysis.

1) 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
- 7 one on one. 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) or "[t]aking photos" (line 7), and even framing Glass as "the nail in the coffin of social grace" (line 1). Excerpt 2 represents the widespread assumption that Glass users will violate tacit social norms. However, as *Commenter 6* suggests, social etiquette co-evolves 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" (line 10).

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 the possibility of being constantly watched without knowing whether you are being recorded and by forcing the interlocutor to guess what the Glass user is really doing. The design of Glass both suggests certain use practices (i.e., conducting several social activities simultaneously) and co-shapes how users can achieve them. Glass is positioned above the user's right eye, in the 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, p. 11). However, using Glass requires concentration on the screen and close attention to frequent visual notifications and navigational aural cues, in addition to interaction via voice commands and by tapping the device. In practice, this requires Glass wearers to often focus on and interact with the device itself, which complicates interactions 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 co-evolve with new technologies, suggesting that with time, Glass will not only mediate what such norms are but also what meaningful communication constitutes.

2) 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
- 2 busted 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: 50x 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 inherently 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 the involved sense of dignity, illustrated by the retrospective cell phone example (lines 4–6). Providing recognition of a contextual use of Glass (Steeves and Regan, 2014), s/he engages in a negotiation of the public–private spheres with Glass as an active boundary object. Curiously, by relating to his or her own feelings about someone using a phone in public, *Commenter 8* depicts how human understanding of appropriate behavior has changed with the 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 the video-recording Glass, *Commenter 7* similarly suggests using Glass proportionally to the context (line 2) without specifying what such Glass etiquette would entail. Comments here demonstrate how the introduction of Glass potentially destabilizes existing norms and how to reflect upon this through deliberation and comparison. Other commenters, represented by *Commenter 9*, suggested less formative ways to reason with Glass. Some understand Glass as a direct threat to the 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 the desire for a limited access to the self and indicate the multidimensional nature of privacy.

3) 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?
- 2 Just enjoy your life.

Commenter 11

- 3 God I hope Glass Fails....Does anyone remember or value real experience?
- 4 Or memories?... [S]haring some things are fine but why everything?...

Presented with an option to easily record one's surroundings through Glass, coupled with Google's encouragement of users to post their experiences online, Glass users share recordings of their most mundane to most exciting experiences. Although it is one's choice whether to watch such videos, the multitude of Glass recordings online and the behavior-mediating design of the media platforms presenting these videos (e.g., activated by the default option to “autoplay” the 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. Frustrated with the extensive sharing of personal content online, *Commenters 10* and *11* believe that a frequent sharing of personal experiences prevents one from enjoying the present (line 2) and takes a toll on the value of such experiences (line 3). I interpret their frustration as a desire to reclaim the right to form 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 the case of a teacher who was fired because of images on her Facebook page portraying her with alcoholic beverages. This example illustrates the repercussions of a 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, p. 6). However, the human ability to forget, mediated by the immeasurable capacity of the Internet to remember and coupled with diverse self-representation online enabled by Glass, presents a favorable background for conflict-laden situations.

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

4) 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 - universal behavior
- 9 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 the commenters in this excerpt, Glass mediates the value of trust in bystanders and enhances the curiosity of bystanders by enabling users to—randomly or not—record them and use the recordings upon one's best judgement. Commenters appropriate Glass as an abuse of privacy in public, be it in 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 anticipation joins the fears of Google cooperating with governments and law enforcement for the purpose of policing (line 1). The shared assumption is that no room for anonymity exists 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 the development and representation of the self in public. What distinguishes Glass from public CCTV surveillance is that with

CCTV, due security cause is necessary to focus on single individuals and recorded data is managed respecting the legal requirements of intent and proportionality (Taylor, 2002). While recording with smartphones does not manifest intentions of the users, 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 11)—mirrors the conclusions of Koelle, Kranz and Möller (2015), suggesting that in the 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 the public space and the nature of such expectations in the age of recording devices. Regardless of open and shared aspects of the public space, an expectation of privacy is inherent to it as an enabling condition to contextual self-development and disclosure (Roessler and Mokrosinska, 2013). Such privacy as civil inattention highlights the social dimension of privacy, “when respect and reserve are displayed towards others” (ibid., 782). Similarly, Tonkiss (2003) suggests that an ethics of indifference is a necessary condition for coexistence in the public space, stemming from “‘side-by-side’ relations of anonymity” (298) and an ethics of “look[ing] past a face” (301). Privacy as civil inattention, which enables sociality and representation in public, hinges on the civil indifference of others, the condition that according to Excerpt 5, Google Glass removes.

Reflecting on the preliminary study

The mediation analysis of the YouTube comments above demonstrates how value dynamism has accompanied the introduction of Glass. In particular, this 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 the expectation of privacy in public places. The 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, nor 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.

Personal stories in the comment threads demonstrate multiplicity of what privacy means in the specific practices enabled by Glass. For instance, the same set of issues, such as the questionable trustworthiness of Glass users' behavior or uncertainty regarding the

boundary between public and private, fosters different practices that, depending on the context, conjure up different understandings of privacy and why people appeal to it. At the same time, it is interesting to see how YouTube commenters perceive privacy as primarily related to surveillance concerns rather than explore its local meaning. This could be explained by promotional activities by Google to amplify the outdoor use of the device and its sharing practices. By identifying specific issues that become heightened with the introduction of Glass, such as personal freedom and well-being regarding the questionable behavior of Glass users, commenters shape the understanding of privacy that is meant to safeguard these practices. This study thus illustrates not only *that* but also *how* sociomaterial practices influence how people interpret privacy in the context of Glass appropriation.

Lastly, this preliminary empirical exploration suggests that people approach privacy not as an ephemeral entity but rather as something that originates and becomes embedded in specific sociotechnical practices. It showcases how people, confronted with Glass, expose the tacit understandings of privacy they previously possessed, review them and contest the suggested definition of privacy as the control of information, thus allowing new value interpretations that work in the Glass-enabled practices. Viewed from the angle of values as related to practices, the value of privacy appears as an appeal, a working solution to the new situations that Glass enables, revealing different dimensions according to the situation at hand and the specific concerns of various individuals. The value of privacy, as traced and analyzed in this preliminary investigation, is not static but dynamic. On the one hand, it is generic and sufficiently universal to cover a multitude of different practices, and on the other, flexible enough to reveal corresponding dimensions sensitive to the exigencies of specific situations. The technological mediation approach has allowed an exploration of several facets of the value of privacy, mediated by Glass, while being grounded in specific human practices and concerns.

2.3 Conclusions

This chapter has presented a preliminary empirical investigation of the moral mediation of technologies through the example of Google Glass and privacy. I envisioned such an exploration as a thermometer to test an intuition about moral mediation (that it is possible to observe it empirically), which could help to direct a further conceptual and empirical exploration. In parallel, I wanted to understand the potential challenges that could surface in exploring the moral mediation of technologies to eventually produce a theoretically and empirically thorough way to do so. With these ideas in mind, I intended to briefly

explore the case of Google Glass, leaving a thorough conceptual and empirical case study to a later stage and a different purpose (please refer to Chapter 6).

This preliminary exploratory study of Google Glass has shown that what people mean with the value of privacy changes in relation to this technology. A connection does indeed exist between technologies and values, whereby values are not stable backgrounds but are flexible and responsive to the sociotechnical practice at hand. Such empirical observations, however preliminary, push the boundaries of the moral mediation account further, for they show that moral mediation includes this dynamism in the value frameworks. More specifically, the preliminary study of Google Glass illustrates a challenge to explain how value dynamism occurs, both conceptually and empirically. If we agree that such a phenomenon as value dynamism, as seen in studying online discussions about Google Glass, does indeed exist, then how do we conceptualize it? What does it imply for value theory? What does it imply for moral mediation and appropriation?

Considering the empirical method, how can one more closely study the interaction between technological mediations and the meaning of values in a methodologically thorough intertwining of empirical and philosophical analysis? As the Google Glass study succinctly illustrates, there is a deep hermeneutic dimension both at the level of commenters making sense of Google Glass and of analysis, where I as a researcher interpret the interpretations of the commenters. Moreover, the value of privacy is not always explicitly mentioned by the commenters; rather, I interpret certain situations through the prism of privacy based on the accompanying concerns and context. In short, the method to study the moral mediation and appropriation of technologies should account for the dynamics of the interpretation on different levels, including the role of researcher. Finally, demonstrating how the meaning of the value of privacy co-evolves with Google Glass begs the question of how to still do the ethics of technology when the values that guide people in design and evaluation change in relation to the discussed technologies.

As the reader may notice, these questions mirror the research lines defined in the preliminary theoretical exploration of Chapter 1: expanding the moral mediation account with value dynamism, developing an account of appropriation, designing and implementing a research methodology to study moral mediation empirically and correlating the findings with the broader field of the ethics of technology. The empirical investigation of Google Glass serves as proof of principle that one can study and analyze the phenomenon of moral mediation, while also helping to substantiate and better focus the research lines, as it grounds them in the messy reality of exploring moral mediation, albeit in a tentative manner, and without a guiding methodology.

The preliminary investigation of Google Glass and privacy, coupled with the theoretical explorations in Chapter 1, suggests that several theoretical assumptions must be clarified to construct an account of moral mediation. In what follows, I must (1) unpack the concept of moral mediation to understand what exactly is meant by “moral” and “mediation” in relation to technologically mediated value dynamism and (2) develop a thorough methodology to empirically scrutinize it.

To understand the phenomenon of moral mediation, I must first explain precisely what “moral” represents when considering technologically mediated values. I must elaborate a theory of values both sympathetic to the ideas of dynamism and interrelation with the surrounding environment and coherent with the assumptions of moral mediation. This is a challenging task for the ethics of technology, dominated as it is by traditional accounts of values, whereby polarized camps of objectivism/relativism have equally complicated relationships with the idea of value change, albeit for different reasons. To achieve this, I will rely on the pragmatist scholarship of Dewey to address the embeddedness of human–technology relations in sociotechnical practices, emphasizing the mutual interdependence and dynamism of all counterparts. Remarkably, the pragmatist dimension of technological mediation has remained underexposed in postphenomenology. I thus aim to return it to the light and expand its original role, particularly regarding the technological mediation of morality. In short, the first step to developing a moral mediation account concerns addressing the question of values in technologically mediated practices and explaining their sensitivity and ability to respond to dynamic sociomaterial contexts (Chapter 3).

The flipside of the moral mediation coin concerns the “mediation” part. The Google Glass and privacy example presents a different dimension of moral mediation as compared to, for example, the ultrasound example in Verbeek’s *Moralizing Technology* (2011). Whereas in the latter case, the ultrasound mediated the situation of moral choice by co-shaping the moral perceptions of people, in the case of Google Glass, the technology mediated what people mean by the value of privacy and how it changes per context and use practice. Thus, it involved technologies changing not the moral decisions and behavior of people but the very infrastructure of morality by co-shaping the meaning of values. The Google Glass example highlights the hermeneutic dimension of the mediation approach and thus the prominence of the appropriation theme in exploring the moral mediation of technologies. I must zoom in on appropriation, the hermeneutic dimension of mediation, not only the technological mediation itself. The hermeneutic dimension of mediation must become more concrete to explore value dynamism, and elaborating how people appropriate technologies can help to achieve this. It is during appropriation, in the sense-making of people regarding specific technologies and fitting them in the accumulated interpretation schemes, that values, too, undergo (re)interpretation. Thus,

to understand how technologies mediate values, I must develop an appropriation line in the moral mediation of technologies to make its hermeneutic dimension available for both conceptual (Chapter 4) and empirical (Chapter 5) exploration.

While the theoretical elaborations in Chapter 1 suggest the necessity of a consistent empirical method to study moral mediation, the Google Glass case vividly illustrates this need. As demonstrated in the online discussion analysis, producing a nuanced view of how values undergo reconceptualization in an encounter with technologies requires a new method of conducting empirical philosophy. From here stems the importance of having a well-rounded empirical methodology, one that captures both the theoretical and empirical hermeneutic process of value interpretation. As demonstrated in the comment analysis, existing qualitative accounts, such as discourse analysis and content analysis, with elements of grounded theory, allow the understanding of what commenters say at a given time. In the study of the YouTube comments, these methods provide a glimpse into how people appropriate and bestow meaning upon Google Glass. However, this barely scratches the surface of interpretation, excluding deeper meaning-making connections in relation to the individual lifeworld of the participants as well the researcher’s involvement in this. Particularly considering the need identified above to highlight the hermeneutic dimension of value making, an empirical method to examine moral mediation must exceed the immediate content and consider not only *what* people say but also *how* they do so (Chapter 5).

In parallel, the exploratory empirical study conducted in this chapter reflects only a fraction of possible moral deliberation regarding new technologies. The study was limited by the static nature of the YouTube comments (once captured for analysis), concealing much of the meaning-making process leading to the writing of these comments, and presenting only its solidified expression in text. Intuitively, it would be worthwhile to explore how people make sense of new technologies in their conversations, or rather, in their lived dynamic language, rather than through textual interaction. Moreover, text comments are not always available, nor are the developing versions of technologies, as with the Explorer version of Glass. It is safe to conclude that the empirical study I aim for must exceed the static interactions at a single point in time offered by online comments analysis. Although it served its role of establishing a preliminary reality check suggesting that moral mediation indeed exists well, in-depth interviews would better reflect the nuanced nature of value interpretation in relation to different case studies (Chapters 6 and 7).

Finally, this empirical exploratory study, however preliminary, has demonstrated that it is possible to observe and scrutinize the process of value dynamism in relation to specific technologies. These preliminary empirical findings indicate that there could be a way to

bridge the expanded concept of moral mediation and the larger field of ethics through a thorough, empirically philosophical study. Technologically mediated value dynamism questions the background assumptions in the practice of doing ethics, primarily regarding how to design and evaluate technologies while these same technologies co-shape values as the guiding design and evaluative standards. The Google Glass and privacy study by no means presents an exhaustive empirical and philosophical manner to do so, but it does suggest that it might be possible. To understand the intricate interrelation between value dynamism and the ethics of technology would require several steps. Firstly, I would need to analyze the field of ethics of technology to understand which other accounts deal with the phenomenon of technologically induced value dynamism (Chapters 3 and 8). Secondly, I would need to develop a thorough methodological manner to conduct the required sort of empirical philosophy to study value dynamism (Chapters 5, 6 and 7). Finally, I would need to explore to what extent the expanded moral mediation account, coupled with an empirical method, can supplement existing approaches in the ethics of technology to address value dynamism (Chapter 8).

Thus, the preliminary empirical exploration of moral mediation has not only helped to establish that technologies indeed mediate values but also to substantiate further research directions and hint at potential challenges. Accompanying and intensifying the theoretical elaborations in a previous chapter, this study indicates the need for a conceptually thorough way to think of value dynamism, human appropriation of technologies, and a methodologically guided empirical study of how technologies mediate values. I proceed to such elaborations in the chapters that follow, beginning with theoretical elaborations on the moral mediation account (Chapter 3) and the nature of technological appropriation (Chapter 4), followed by the quest for finding a fitting method to study moral mediation through technological appropriation (Chapter 5).

Chapter 3.

**Conceptual clarification of the moral mediation
account**

3.1 The theoretical assumptions behind the moral mediation account

As outlined in the previous chapters, I wish to explain how technologies mediate values. To do this, I must expand the moral mediation account to include ideas about value dynamism. This chapter explores the question of how to theorize the phenomenon of moral mediation so that it accommodates such ideas. Postphenomenology scholars emphasize the ethical dimension of technologies by highlighting the link between technological design and the ensuing perceptions and behaviors of people (e.g., Van den Eede, 2015; Rosenberger, 2017; Wellner, 2015). The moral significance of technologies received explicit attention in Verbeek's moral mediation account (2011), which argues that by co-shaping the moral intuitions and perceptions of people, situations of moral choice and habits, technologies mediate morality. However, as I suggest in Chapter 1, co-shaping the moral perceptions and actions of people is only one facet of the technological mediation of morality. Technologies also mediate the value frameworks, whereby values both guide people in decision-making (about technologies) and appear to be mediated by these same technologies. As the preliminary Google Glass study in Chapter 2 indicates, different sociomaterial practices enable different manifestations of the same value, suggesting the existence of value flexibility and openness to revision. My object of study is this technologically mediated value dynamism, or how technologies mediate values.

This chapter builds toward a systematic theoretical understanding of moral mediation, as expanded with value dynamism. To this end, I define what the terms "moral" and "mediation" mean, and thus I will clarify the background assumptions and conceptual frameworks underpinning the moral mediation account, as expanded by the ideas of value dynamics. Returning to the pragmatist origins of postphenomenology, specifically the works of Dewey, aids me in my conceptual pursuits. On the one hand, a pragmatism lens helps to explain the multidimensional nature of values, their openness to revision and their intrinsic relation to sociomaterial practices. On the other hand, the turn to pragmatism allows me to expand the moral mediation account with the ideas of value dynamism by deepening its understanding of interrelational ontology. As such, a pragmatism angle enables me to explain how the mediation approach is a special bridge between technologies and values. I argue that understanding the moral mediation of technologies requires embracing the pragmatist origins of mediation more explicitly than postphenomenology currently does. The steps above will ultimately allow me to produce a comprehensive and encompassing understanding of moral mediation, as expanded with value dynamism.

This dualistic exploration guides the chapter's structure accordingly. In Section 3.2, I explore the "moral" part of the moral mediation account. What is meant by "values"

in the technological mediation of morality? How does the mediation perspective relate to the formal theories of values? How can the pragmatism of Dewey help me to solidify a perspective on values in relation to my previous questions? To be clear, asking these questions does not presuppose an analytic exercise to dissect values as to their origin, nature and character, arguing for one position or another. Nonetheless, the inquiry in this chapter bears some resemblance to an analytic exercise, necessary to elucidate the position and ambition of the technological mediation approach as I understand them. Turning to Dewey and exploring formal value theories allows me to identify values in the technological mediation approach as not fixed but dynamic, open to revision and sensitive to the sociomaterial context.

I subsequently provide a conception of "mediation" that accommodates value malleability and dynamism (Section 3.3). To do this, I highlight the pragmatism foundation in the mediation approach that endorses value dynamism and hints at how to explore it. In addition, I review other philosophical views on value dynamism to identify what the mediation concept can learn from them (e.g., Coeckelbergh, 2012; Swierstra and Rip, 2007; Walzer, 1994; Swierstra, Stemerding and Boenink, 2009). This will allow me to view technologies as mediators of moral routines *within* human-technology-world relations, challenging or stabilizing the existing moral understandings and enabling the new ones. I also clarify the scope of "ethics" and "morality" in the mediation approach, as expanded with value dynamism. Furthermore, I briefly relate the technological mediation approach with the technomoral change approach of Swierstra (2011), as one that also explicitly elicits the co-shaping of technology and morality and builds on the pragmatist approach. Correlating the two approaches will allow me to clarify the scope and goals of the technological mediation approach and its distinct take on value dynamism. The concluding reflections (Section 3.4) set the stage to develop a conceptually coherent and empirically systematic study of how technologies mediate values in the chapters that follow.

3.2 Exploring the "moral" part in the moral mediation account

A preliminary practice-based examination of values

Before I proceed to the reflections of values and morality against formal ethical theories, I wish to return to the preliminary open empirical study of Google Glass. This example is an instance of an expanded account of the moral mediation of technologies, where technologies co-shape moral actions and perceptions while also mediating the meaning of the involved norms and values. I wish to determine what one can infer about values

in relation to technologies from this open study and which avenues of exploration it can open.

As the reader remembers, the study demonstrated how, against the formal definition of privacy as the control of information, several different understandings of privacy emerged in relation to Google Glass. New practical uses of Glass invited commenters on YouTube to reveal their usually dormant moral views and ideas, reflecting on their own actions or those of others and also anticipating potential new situations with Glass. The study also illustrated how the usually abstract moral values (such as privacy, responsibility, respect, etc.) that guide and inform us in daily behavior require contextualization and substantiation in view of new technologies. Google Glass introduced several new complex issues for people to consider. The study also indicates how multiple practical and moral concerns materialize in discussions about new technologies. The Glass example reveals how a seemingly neutral technology, in the form of conventional glasses, if *only* equipped with a camera and connected to Internet, acts as a catalyst for ethical reflection and decision-making. Consider how Glass-free zones and different methods to sabotage the device (and sometimes threaten its owners) emerged in response to Glass's introduction. In short, the Glass study indicates how technology can rob moral routines of their self-evidence. It invites people to foreground their normative assumptions and review or update them in light of the novel situation and material context that a new technology creates. Technology is far from neutral, for it mediates both the moral behaviors and the moral infrastructure for decision-making, the conceptions of the values themselves.

Analyzing the Glass example provides a first glance at the dynamics of value. Privacy as a value first appears in discussions implicitly, as an abstract guideline to orient people in their daily non-problematic activities. Consider how the commenters continuously assumed that they are entitled to privacy, as a form of protection, to shield their activities, their identity and their families from outside interference. Such normative assumptions regarding privacy resurfaced and were destabilized with Glass's introduction of a camera, Google's legacy and the emergence of the Glasshole phenomenon. Consequently, several manifestations of privacy became visible under the same abstract guiding value. As such, values present themselves not only as guiding actions but also as having emerged from complex situations for situated individuals. Thus, values cannot remain abstract but require the specification and attribution of meaning, even at the cost of reworking the habitual and previously functional sense.

In short, with regard to values, the open exploratory study in Chapter 2 suggests that the concrete substantiation of values in a practical sociomaterial situation is often conflicting and manifest in more than one way, although the abstract ideal can be the same (Mol,

2002). This means that values require a reflection process to clarify their meaning and determine the course of action (Swierstra et al., 2009). Values appear not as isolated from the surrounding social and material situation but as both embedded in it and co-constituting it. In other words, values, through this study, emerge as relational to the social and material counterparts of the given practice, as both the manner to achieve the practice and its practical outcome (Verbeek, 2011). In this section, I wish to provide a definition of values, considering the mediating role of technologies in co-shaping their formulation and interpretation.

In the moral mediation account of Verbeek (2011), in exploring how technologies mediate moral perceptions and actions, values were regarded as a technological impact, a consequence of technological mediation. Their role as moral infrastructure entangled with human-world experiences, both conditioning and being a product of technological mediation, was not considered. Both the case study of Glass and the preliminary conceptual reflections above suggest regarding values through a lens of sociomaterial practices. The turn to such practices has been recently gaining strength in Science and Technology Studies (STS) and the philosophy of technology (e.g., Mol, 2002; Suchman, 2007; Latour, 2005), because it emphasizes "the constitutive entanglement of the social and the material in everyday [...] life" (Orlikowski, 2007, p. 1438). The practice lens offers the opportunity to view people as inextricably related to technologies in the practices that the two enact together in the larger social and cultural environment. Moreover, the practice approach "encourages us to regard the ethical problem as the question of creating and taking care of social routines, not as a question of the just, but of the 'good' life as it is expressed in certain body/understanding/things complexes" (Reckwitz, 2002, p. 259). Thus, adopting the approach of sociomaterial practices invites the expansion of ethics from traditional interhuman relations to include also relations with technologies (ibid.).

A practice lens is not alien to the technological mediation approach, which positions technologies within concrete human-world relations and practices. I suggest the application of a lens of sociomaterial practices to clarify the role and character of values in mediation. A practice-based approach belongs to the theoretical foundation of postphenomenology, drawing its origins from pragmatism. I suggest that making the pragmatist roots in the mediation approach more explicit can help to clarify the nature and role of values with regard to human-technology-world relations.

Ihde (2009) identifies postphenomenology as building on pragmatism (primarily after Dewey), phenomenology and the philosophy of technology. Pragmatism grants postphenomenology a reliance on the dynamic and interrelated environmental model of human experiences. According to Ihde, the pragmatism of Dewey avoids the subject/

object distinction by framing human experiences as relational environments, embedded in concrete material and social settings (Ihde, 2009). Ihde compares Dewey's pragmatism to Husserl's phenomenology and contends that that, while Husserl adopted the early modern "subject-object," "internal-external" vocabulary⁴, Dewey avoided it by beginning with embedded practices and experiences (2009, pp. 9-10). According to Ihde, pragmatism relieves phenomenology of the subject/object vocabulary because its reliance on experience "short-circuits the 'subject/object' detour derived from Descartes—or [...] Locke—and points much more directly to something like a lifeworld analysis" (p. 11). Ihde considers it "a way to avoid the problems and misunderstandings of phenomenology as a subjectivist philosophy, sometimes taken as antiscientific, locked into idealism or solipsism" (2009, p. 23).

Another important feature that Ihde identified in Dewey's pragmatism and integrated into postphenomenology is "interrelational ontology"⁵, whereby "the human experienter is to be found ontologically related to an environment or a world, but the interrelation is such that both are transformed within this relationality" (2009, p. 23). With relation to values, interrelational ontology could explain how values respond to fluid sociomaterial environments and could themselves be dynamic and flexible, as in the Glass and privacy example. I suggest more closely examining Dewey's environmental model of human experiences in relation to values. A pragmatist stance toward values as *values-in-practices* could account for their dynamic relational nature within the human-technology-world ensemble and hint at how technologies mediate values.

According to what I have suggested above, values preliminary emerge as relational, dynamic and embedded in lived practices. To scrutinize my hypothesis, I next position these preliminary value considerations against existing formal ethical theories on values and the pragmatist scholarship of Dewey. I explore how different value ideas correspond

to the pillars of technological mediation as a profoundly relational, phenomenological and experience-bound approach to empirical philosophy.

Examining values through formal theories

The normative component in the technological mediation of morality is the values that technologies mediate. The concept of value has formed the foundation of many diverging accounts throughout the history of philosophy. Not surprisingly, although the formal aspects of value suggest some unity in grasping its meaning, concrete substantiation varies greatly.

Dictionaries and formal theories of value provide a historical consensus point of departure for a further elaboration on values. Definitions of value greatly vary per discipline. I consider those definitions of value primarily related to the fields of philosophy and sociology, discarding the economic definitions of value related to price and monetary benefit. According to the Encyclopedia of Philosophy, values denote a worth of something and that which it "ought to be" (Frankena, 1967, p. 637). The Oxford Dictionary of *Philosophy* provides a broader definition of value as an aspect of a phenomenon included in decision-making, "a *consideration in influencing choice* and guiding oneself and others" (Blackburn, 1996, p. 390). These definitions concern value as a noun, something to which one can apply qualitative terms, such as "*good, desirable or worthwhile*," and that covers "all kinds of rightness, obligation, virtue, beauty, truth, and holiness" (Frankena, 1967, p. 637). Value as a verb concerns the practice of *perceiving and attributing value*, which frequently—but not necessarily—involves comparison and reflection, with the terms "to value," "valuing" and "valuation" reflecting this meaning (ibid.).

The Oxford Dictionary of Sociology adds to these definitions a consideration of the nature of value, defining it as "strong, semi-permanent, underlying, and sometimes inexplicit dispositions" (Scott and Marshall, 2009). Such a sociological definition invites considering another discussion regarding values, namely, the nature of their relation to that which is valued. Some consider that values are *intrinsic* properties that showcase the inherent worth of a phenomenon and thereby are independent from the liking, beliefs and preferences of those engaged in valuation. Plato is one of the notable philosophers who endorse the view of values as intrinsic goodness. Such philosophers are sometimes called intuitionists to denote that appreciating an intrinsic value requires some sort of intuition, "a special sort of awareness or thought process to detect it" ("Value," 2005, p. 941). By this token, value is a non-derivative property, "an indefinable non-natural or nonempirical quality or property different from all other descriptive or factual ones" (Frankena, 1967, p. 640). In connection to this, value considered as an intrinsic nonempirical property of a phenomenon is linked

⁴ As Ihde also notes, Husserl inherited this vocabulary from Descartes and all his work on reductions attempted to invert the distinctions implied in the early modern "subject-object," "internal-external" vocabulary (2009, pp. 9-10). In view of this, Husserlian phenomenology, that Ihde deems as one of the defining for the larger field of phenomenology, propagated the use of this dualistic vocabulary, at least in the early stages of the field's development. Dewey's use of the environmental model of experiences and practices avoids this problem.

⁵ To be sure, Ihde (2009) identified what can be called "interrelational ontology" in both Dewey's pragmatism and classical phenomenology. Primarily in Husserl, Ihde suggests that interrelational ontology comes out in the notion of intentionality, consciousness of something, where "[t]echnologies occupy the 'of' and not just be some object domain," mediating the meaning of consciousness itself (Ihde, 2009, p. 23). To reiterate, the interrelational ontology that Ihde identifies in Dewey rather concerns the environmental interrelational model of human experiences and practices with their material and social embedding. In this model, all counterparts are entangled, interdependent and co-produce one another. The distinct feature of Dewey's interrelational ontology is that values, too, belong to his environmental model of experiences and practices.

to an *objective* account of values that is independent of human perception and is thus a matter of fact.

Others posit that values are *relational* properties of a phenomenon, whereby the phenomenon derives its value from being valuable for achieving certain ends, valuable *as* something *for* someone. Alternatively, but also within the relational account, values may not be perceived as properties of a phenomenon but as “a matter of the loving regard we pay to things” (“Value,” 2005, p. 941). Aristotle, a notable representative of the relational account of values, considered the phenomenon of value only inasmuch as it is an object of desire or interest (Frankena, 1967, p. 638). Because the relational account places an emphasis in the constitution of a value on extrinsic features, on those who have the cherishing regard toward it, it may be referred to as “*subjective*.” As opposed to the objective account, which regards values as a matter of fact, a subjective account may be “a product of the mind of the judging subject” (“Value, aesthetic,” 2005, p. 941). Paraphrasing a famous saying, “Value is in the eyes of the beholder.” However, it is misleading to dismiss the relational account of values based on its assumed subjective nature. As the saying indicates, to be of value, a phenomenon must both possess worth defined as valuable and “the eye of the beholder” that brings it into existence.

Other positions attempt to present a middle ground between the objectivist and subjectivist perspectives regarding the source of value, for instance, the *rationalist* (Van de Poel, 2009b), who positions the origin of value in *human rationality*. While the charge against subjectivists is that they may confuse value with human preference and desire, that against objectivists is that they entirely divorce value from it. In this sense, the rationalist position is the middle ground between the two:

It restores the connection between human desires and values, which is lost in objectivism but strives to avoid confusing value with preference by claiming that things are valuable not just because people prefer them but because rational beings have sufficient practical reason to pursue them (Van de Poel, 2009b, p. 976).

However, if one more closely examines the assumptions of the rationalists, their inevitable proximity to the objectivist perspective becomes evident. By attributing primacy to human rationality, in being able to identify and act on certain values, the claim is essentially that all rational human beings can identify and choose what is valuable. But what is it that makes the phenomena stand out to them as valuable? Something must exist in the phenomena themselves that all critical reasonable people perceive as valuable. This position closely approaches the objectivist’s thesis concerning the inherently valuable properties of the phenomena.

Van de Poel (2009b), acknowledging the shortcomings of the three positions above, suggests a “mildly rationalist” perspective on values that avoids the extremes of both objectivism and subjectivism. This position is only mildly rational in suggesting that “values should be distinguished from preferences but not completely divorced from human desire, interest, interpretation and meaning-giving” (p. 976); at the same time, it does not adhere to one specific view on the source of values.

Another philosophical position that attempts to reason with the opposing value dichotomies of objective/rational and subjective/empirical is the experimental empiricism of John Dewey (1930). Rather than focusing on the question of value definition, Dewey is instead concerned with *value formation*. Dewey, who famously declared that “[t]he separation of warm emotion and cool intelligence is the great moral tragedy” (1922, p. 258) and attempted to reconcile the two in his moral philosophy, was greatly inspired by the thought of Aristotle. On the one hand, he vehemently opposed the conception of values as eternal, final, universal and rational, which, according to Dewey, would detach them from the conflicting lived experiences of people and defy the idea of values as orientation in action. On the other hand, he also criticized the empirical approach to values because it denigrates the status of values to mere preferences and subjective enjoyments. According to Dewey,

Without the introduction of operational thinking, we oscillate between a theory that, in order to save the objectivity of judgements of values, isolates them from experience and nature, and a theory that, in order to save their concrete and human significance, reduces them to mere statements about our own feelings (Dewey, 1930, p. 263).

Contrary to the above positions, the nature and source of values appear to Dewey as “experimental empiricism.” According to this approach, value derives its guiding character and meaning from the connection to particular situations and the reflective judgement upon it. This is what makes values “the fruit of intelligently directed activity” (1930, p. 272). For Dewey, values are “based upon concern with facts and deriving guidance from knowledge of them” (1922, p. 12). As practical judgements and orientations in concrete experiences and practices, they are both empirical and regulative (1930, pp. 256-269).

What particularly distinguishes Dewey’s account of values is its inherent intertwinement of values with lived practices. To better understand the process of value formation, Dewey suggests moving away from a theory of values and toward a *theory of valuation* (1939), which implies studying concrete practical situations that specify a given value. Because of the integral intertwinement of values and the practices in which they are embedded, Dewey defines values not as normative ends but as “ends-in-view” (1922), which are not

objective and universal fixed finalities, closed off or isolated. Rather, values as ends-in-view denote hypotheses and aims that both guide the present action and are tested by it, adjusting in their dynamism to the exigencies of reflection, choice and effort. A conception of values as “ends-in-view,” or “endless ends” (1922, p. 232), suggests that every new practical constellation can enable new ends as both means and regulative guidelines.

In addition, a practice-oriented take on values allows Dewey to account both for the universal and particularistic conceptions of value. Values as “ends-in-view” assume a default general position from which reflection can proceed, contextualizing it per given situation, exists. Dewey emphasizes this hermeneutic relation between a universal and a contextualized meaning of values with an example of a patient visiting a doctor. An abstract idea of health always guides the doctor during examination, but his patient’s medical history, condition and supporting factors determine health as the end-in-view:

[The doctor] forms his general idea of health as an end and a good (value) for the patient on the ground of what his techniques of examination have shown to be the troubles from which patients suffer and the means by which they are overcome. There is no need to deny that a general and abstract conception of health finally develops. But it is the outcome of a great number of definite, empirical inquiries, not an a priori preconditioning “standard” for carrying on inquiries (Dewey, 1939, p. 46).

Defining what health means for a particular patient requires possessing an abstract notion of health, just as understanding multiple dimensions of value in a specific setting requires an abstract formulation of that value. Such abstract assumptions are often widespread, lending themselves to the process of valuation as useful starting points. However, they point only to what may be at stake, because new concerns and practical exigencies necessarily arise in the course of their valuation as new ends-in-view.

In summary, the dictionary definitions and moral theories of value can be useful to illustrate how the formal interpretations of value have developed over time, conflicted with and aligned with each other. I think that both the dictionaries and value theories provide the time- and experience-proven faceting of the gems they present values to be. However, to get to the messy unpolished core of values, one must cut and facet the stone oneself. This is possible only when implementing the value definitions and verifying them within practical situations; otherwise, the dictionary definitions and moral theories remain detached from reality. They can theoretically guide one in abstract terms but can only rarely be applied in dilemmatic situations. The pragmatist definition of values as lived in human experiences, shaping and co-shaped by the sociomaterial surrounding, is better suited to deal with the complexity of daily life. How would it correlate with the mediation

approach, particularly regarding explaining how technologies mediate values? To answer this question, I further elaborate upon the scholarship of Dewey, which also allows me to substantiate the larger philosophical ambitions of the technological mediation approach.

Solidifying value perspectives through pragmatism

Discussing the nature and source of values illuminates the variety and complexity of perspectives on the issue. I do not intend to define which position is the right one, but instead, I wish to correlate existing perspectives on values with the approach of technological mediation. When one discusses technology mediating values, what is meant by “value?” Furthermore, what type of moral philosophy would this imply? I suggest that the pragmatist philosophy of Dewey is very similar in spirit and method to the technological mediation approach, and as such, examining it more closely can help to expand its moral dimension.

Relationality is a core principle upon which the mediation approach and pragmatism coincide. Dewey posits that a phenomenon inevitably possesses intrinsic irreducible qualities that condition its existence. However, conceived only in these terms, it is subject only to existence, but not presence, or being. *Being is a relational experience* that necessitates knowing, denoting, describing and feeling. Just as Heidegger, Merleau-Ponty and Gadamer later asserted from the phenomenological standpoint, Dewey, in his pragmatic inquiry in the early 1920s, suggested that all activity acquires meaning in relation to the surrounding counterparts, be it people or specific technologies. According to him,

[E]xperiences of contact with objects and their qualities give meaning, character, to an otherwise fluid, unconscious activity. We find out what seeing means by the objects that are seen. They constitute the significance of visual activity that would otherwise remain blank. [...] [Activity] acquires a content or [...] meanings only in static termini, what it comes to rest in [...] [T]he object is that which objects (Dewey, 1922, p. 191).

Ihde integrated the idea of interrelational ontology from pragmatism to present it in the mediation approach, with regard to the co-constitution of people and technologies (2009, pp. 10-11, 23). I suggest further extending it to values in human–technology–world relations.

Dewey can help clarify the specific subjectivity implied in a relational conception of values (1929; 1930). Commenting on the status of values in nature, he distinguishes between the immediacy of existence and the actual presence of phenomena (such as values). In

relation to the discussion of values above, it mirrors the debate between values conceived as intrinsic or relational:

[The] irreducible, infinitely plural, undefinable and indescribable qualities [a] thing must *have* in order to be, and in order to be capable of becoming the subject of relations and a theme of discourse. [...] Description [...] [is] index to a starting point and road which if taken may lead to a direct and ineffable presence. To the empirical thinker, [...] nature has its finalities as well as its relationships (Dewey, 1929, pp. 85-86, original emphasis).

In the same manner, Dewey positions values in relation to environing factors by suggesting that “[u]ntil the integrity of morals with human nature and of both with the environment is recognized, we shall be deprived of the aid of past experience to cope with the most acute and deep problems of life” (1922, pp. 12-13).

I find Dewey’s ideas important because they can help the moral mediation account to avoid the potential relativism charge. As Pitt notes, as soon as a philosophical account endorses ideas of value dynamism and change, a “standard worry” emerges: “Aren’t we doomed to relativism?” (2014, p. 92). One could argue that suggesting that technologies mediate values implies that values are subject to individual preferential interpretation, or that both everything and nothing is of value. From there, it is only one step to nihilistic ideas about possessing no morality at all, no moral rules or contracts. I believe these relativist worries should not be easily dismissed, but at the same time, they are not warranted when value dynamism is concerned. Following the pragmatist spirit, it is short-sighted to dismiss the relational conception of values as relativistic because this presupposes a qualitative empirical basis. Dismissing the relational perspective on values and the ensuing value dynamism would mean rising above the lived and felt world of uncertainty and conflict and reducing values to the isolated space of the universal and objective, but at the same time, the indescribable and unknowable (Dewey, 1930, p. 278). Perceived, felt and lived values manifest in the relation of people with their environment, both cultural and material. Different sociomaterial constellations can enact different manifestations of the same value. An expanded moral mediation approach does suggest that values are embedded in sociomaterial practices, which explains their dynamic and interrelated nature. However, it does not introduce an “anything goes” approach regarding values but rather emphasizes a developmental aspect of values.

In a similar vein, I consider the mediation approach as assuming a bridging position between objectivist and subjectivist accounts of values. What sets this approach apart from Dewey’s pragmatism is its explicit foregrounding of the material dimension of

mediation. On the one hand, the mediation approach understands values as relational properties, enabled and manifested in the experiences of people, in their relations with sociomaterial environment. On the other hand, it avoids the subjectivist–objectivist divide by acknowledging that values are neither mere subjective preferences of people nor simply static matters of fact. Rather, in the mediation approach, values appear as a lively and complex matter of concern, interest and care, as opposed to a matter of fact (Latour, 2004, 2008; De la Bellacasa, 2011; Dussauge et al., 2015). Explicitly acknowledging the role of technologies in co-shaping values and moral concerns organically expands the relational considerations of values, introduced by Aristotle and further developed by Dewey, and adds a novel and specific concern regarding the role of technologies in enacting and realizing values (Verbeek, 2011). This offers new avenues for the relational approach with regard to technologies.

By the same token, the mediation approach also opens new modes of inquiry for itself, suggesting that it combines empirical knowledge of technologically mediated human practices with systematic philosophical analysis (Verbeek, 2011). In his time, Dewey propelled moral philosophy that does not shy away from the messy lived human experiences but incorporates them as the basis for philosophical inquiry. Verbeek challenged philosophical practice by suggesting that it should account for the mediating role of technologies in moral affairs. Understanding Dewey’s scholarship on reflective inquiry can be instructive for understanding the challenge Verbeek introduces.

For Dewey, the empirical world of qualitative values and rational knowledge need each other to live intelligent, reflective lives: “Our affections, when they are enlightened by understanding, are organs by which we enter into the meaning of the natural world” (1930, p. 282). An organic intertwinement of values and knowledge, conceived as critical engagement, lies at the core of Dewey’s moral philosophy. The critical engagement model very closely resembles how I view the philosophical position and ambition of the technological mediation approach. This approach expands the relationship of value and critical reflection by acknowledging the moral significance of technologies and by urging that it be accounted for.

According to Dewey, the task of philosophy consists of deliberate critical inquiry into the nature of human experience as entangled with values. In other words, its goal is to formulate the basis for an informed choice for further actions:

Its primary concern is to clarify, liberate and extend the goods which inhere in the naturally generated functions of experience. [...] This does not mean [philosophy’s] bearing upon *the* good, as something itself attained and formulated in philosophy. For

as philosophy has no private score of knowledge or of methods for attaining truth, so it has no private access to good (Dewey, 1929, pp. 407-408, original emphasis).

Dewey is very clear that his moral philosophy bears no prescriptive features or grounds, in no traditional normative accounts, be it in the utilitarian pursuit of the greatest happiness or in a deontological reliance on human reason, as he believes that this would contradict the sole purpose of reflection and critical inquiry into the relational nature of moral pursuits. For Dewey, philosophy is a critical messenger, not a messiah:

[T]he need for reflective morality and moral theories grows out of conflict between ends, responsibilities, rights, and duties [and] defines the service which moral theory may render [...]. [I]t does not offer a table of commandments in a catechism [...]. It can render personal choice more intelligent, but it cannot take the place of personal decision, which must be made in every case of moral perplexity. [...] [T]he attempt to set up ready-made conclusions contradicts the very nature of reflective morality (Dewey and Tufts, 1908/1932, pp. 175-176).

Dewey's idea of moral philosophy to aid in informed decisions but not prescribe the decisions themselves closely resembles the nature of the technological mediation approach, as suggested by Verbeek (2011). As demonstrated above, the starting point of Dewey's philosophical inquiry was to break the walls artificially constructed in philosophy that separate people from their environment. The mediation approach begins with an emphasis on technologies as a counterpart co-shaping people and the world in which they realize themselves: "Whoever fails to appreciate how technology and humanity are interwoven with each other loses the possibility of taking responsibility for the quality of this interweaving" (Verbeek, 2011, p. 155). Verbeek aims to account for such a co-shaping ensemble of people, technologies and the world, in both theory and practice. He consequently reshapes the famous virtue ethics question, with technological mediation in mind, to ask "How to live a good life with technologies?" (2011, pp. 156-158).

Verbeek, as does Dewey, opposes the role of philosophy and ethics as prescriptive and defining ultimate moral positions in dealing with technologies. He argues that "Instead of making ethics a border guard that decides to what extent technological objects may be allowed to enter the world of human subject, ethics should be directed toward the quality of interaction between humans and technology" (Verbeek, 2011, p. 156). More specifically, in the context of the technological mediation of morality, the goal is also to show how the moral standards, principles and values with which we approach technologies co-evolve in relation to these same technologies. Ethics, understood as a practical moral philosophy, appears here as a critical inquiry, a reflection on the quality of human-

technology intertwinement in the world, and specifically about the moral significance of the technologies in it. Ethics presents information for decision-making to the users, non-users, designers and policy-makers. However, such an ethics will not decide for the actors concerned but instead accompany them in the process of decision-making.

To address the mediating presence of technologies in our lives and their mediating capacity for human values, the technological mediation approach aims to reconcile the empirical and normative focus in the philosophy of technology. The following quote illuminates Verbeek's specific viewpoint on this matter:

Accompanying technological developments requires engagement with designers and users, identifying points of application for moral reflection, and anticipating the social implications of technologies-in-design. Rather than placing itself *outside* the realm of technology, an ethics of accompaniment will engage directly with technological developments and their social embedding. Its primary task is to equip users and designers with adequate frameworks to understand, anticipate, and assess the quality of social and cultural impacts of technologies. This type of ethics therefore requires an integration of the empirical turn and the ethical turn (Verbeek, 2011, p. 165, original emphasis).

Thus, echoing Dewey's urgency regarding grounding philosophical inquiry in concrete experiences, Verbeek suggests that philosophically scrutinizing human-technology-world relations is impossible without exploring the messy empirical realities of human practices. Dewey, however, focused on the single citizens empowered by the critical inquiry. Verbeek, conversely, considers a broad range of stakeholders who can and should adopt a reflective stance on technologies in both use and design. Users, in their daily interactions with technologies, directly co-produce and are reciprocally influenced by technological mediations. Designers create technologies with certain aims and use patterns in mind, whereby specific material features incite users to follow designers' intentions. Non-users also belong to this broad range of reflective actors, as those who actively manifest their stance to *not* use a certain technology. Policy-makers are also concerned stakeholders who deliberate on the future use and regulation of a given technology (Verbeek, 2011).

The quote above summarizes the goal of the moral philosophy of technology guided by the ideas of technological mediation. Namely, philosophy cannot prescribe the right course of action regarding a specific technology. Rather, it equips a broad range of stakeholders with the necessary means of inquiry—both empirical and philosophical—into specific human-technological practices, which empower them to make informed decisions about the design, use, non-use and regulation of a technology under consideration.

I can now present a preliminary summary of the “moral” part of my conceptual exploration. I have argued that a relational approach to values best mirrors the background assumptions, scope and goals of the technological mediation approach. Pragmatism allows the mediation approach to adopt a practice-based take on values, whereby they are enacted and manifested in lived human–technology practices. Adopting this perspective assumes a dynamic nature of values, their continuous developmental conception. Value dynamism denotes values as open to revision in view of the change in the sociomaterial environment that both enables and is oriented by them.

This leads to the second part of my theoretical exploration of moral mediation. Namely, what does the “mediation” part encompass regarding the idea of technologically mediated value dynamism? So far, the technological mediation approach has not explicitly dealt with the idea of value dynamics, instead focusing on how technologies co-shape situations of moral choice (Verbeek, 2011). The following section discusses how the mediation concept links technology and value dynamism by relying on its pragmatist origins. Apart from pragmatism, I also turn to other philosophical approaches that consider the relationship of values and technologies (e.g., Coeckelbergh, 2012; Vallor, 2016), particularly the approach to technomoral change (Swierstra et al., 2009).

3.3 Exploring the “mediation” part in the moral mediation account

In the previous section, I suggested that the “moral” part in the moral mediation account assumes a relational and developmental account of values, sensitive to their sociomaterial embedding. Here, I explore how the “mediation” concept can incorporate such a dynamic and flexible definition of values, while bridging it with technologies. To this end, I explore how the relational and developmental perspective on values is represented in various approaches to the ethics of technology, beyond technological mediation (e.g., Coeckelbergh, 2012; Swierstra and Rip, 2007; Swierstra, Stemerding and Boenink, 2009). I further rely on the pragmatism of Dewey, accompanied by the work of Walzer (1994), to clarify the different levels and stages of morality. Finally, I briefly correlate the technological mediation approach with the technomoral change approach of Swierstra (2011), also grounding it in Deweyan pragmatism and explicitly acknowledging the co-evolving nature of technology and morality. This will allow me to delineate the scope of the technological mediation approach and its position on value dynamism.

As I have suggested above, exploring the ethical dimension of technologies is a well-established line of research in postphenomenology. Verbeek (2008, 2011) developed a

moral mediation account within the technological mediation approach to demonstrate how technologies co-shape the moral perceptions and decisions of people. His ultrasound example showed how technologies mediate the moral decision-making of parents. This is especially significant in view of the ultrasound’s ability to visualize potential genetic mutations such as Down syndrome. The specific manner in which the unborn appears on the screen enables different normative interpretations of it as a patient, a gendered individual or a subject of care for prospective parents. This, in turn, presents different areas of moral interest and care for prospective parents, who, guided in part by what the ultrasound reveals, must make moral decisions about the future care of the child.

Highlighting the moral significance of technologies has become an important line in postphenomenological research. For instance, Wellner (2015) has demonstrated how cell phones mediate the moral attention of people, increasing the speed and scope of information processing and decreasing the threshold for focus, tolerance and patience. Van den Eede (2015) has explored how self-tracking technologies mediate perceptions of the self and others, enabling a dispersed human–technology intersubjectivity. Irwin (2018) has highlighted how the values of fairness, accountability and transparency are reduced with the introduction of speech recognition algorithms. These examples demonstrate how postphenomenology accounts for the multiple ways in which technologies co-shape, challenge or enable moral concerns.

However, to research how technologies mediate the value frameworks calls for an expansion of the moral mediation account. To date, postphenomenology has considered how technologies co-shape moral perceptions and choices. However, it has not highlighted how technologies can resurface a moral infrastructure for decision-making, reconfiguring the meaning of values and exposing their dynamism. The present conceptual exploration of technological mediation aims to do just that. Dewey’s pragmatist account can help me present the mediation approach as a specific bridge between technologies and values, thus making it sensitive to the idea of value dynamism. The two approaches are complementary, sharing fundamental theoretical assumptions regarding the relationality of experiences and practices. While the pragmatism lens emphasizes the environmental model of human practices, only in passing does it consider the role of its material setting. The mediation approach highlights the role of technologies in co-shaping human relations with the world but obscures the dynamic, back-and-forth nature of these relations. Through the pragmatism lens, I demonstrate how technologies can enable, re-affirm, challenge or re-articulate values through highlighting the active role of each counterpart in dynamic human–technology–world relations. Before I further explore the contribution of pragmatism to expanding moral mediation, I inquire how other approaches in the

ethics of technology have dealt with relational and developmental perspectives on values and what the mediation concept can infer from them.

Accommodating a relational and dynamic view on values

The phenomenon of value dynamism follows naturally from the relational nature of people and their sociomaterial environment. If value is understood as simultaneously enabling and being enabled by sociomaterial practices, a change in such practices can imply a different value manifestation. The moral mediation account, which embeds pragmatist considerations and acknowledges the mediating role of technologies, presents value dynamism as an inherent property of values in sociomaterial practices. Technological mediation is not alone in its pursuit of clarifying the interdependent developmental nature of values, as several authors work in similar directions (e.g., Coeckelbergh, 2012; Swierstra and Rip, 2007; Walzer, 1994; Swierstra, Stermerding and Boenink, 2009). Examining how other philosophers deal with the phenomenon of value dynamism can offer insight for the technological mediation approach.

For instance, Coeckelbergh (2012) emphasizes the necessity of understanding and exploring the evolving relations of people with the natural and material world and argues that only then can people form their relations consciously, guided from the inside, not by some external ephemeral force:

... [W]e should shape our (new or already existing) relations with these [nonhuman] entities as these relations [...] are changing and growing. Instead of regulating what we do, instead of applying a Law or Code [...], we would do better to engage in the slow change of moral evolution and moral metamorphosis [...]. [T]here is no all-powerful and all-knowing Gardener—a god or we ourselves—which manages the moral order as a garden. There is change, but this change results from what we do in response to other entities and our environment, and what this environment and other entities do to us (2012, p. 204).

Coeckelbergh essentially appeals to taking seriously the relational nature of people with their sociomaterial environment because only in their mutual co-shaping is identifying and living values possible. The author understands values as lived and experienced, not static or prescribed by some other authority, human or otherwise. Thus, when the relationality thesis is endorsed, the dynamic and relational nature of values follows.

Moreover, the ethics of relational growth that Coeckelbergh endorses oppose a passive analytic or observational stance toward values because such an external perspective on values would contradict their lived nature: “We should not love wisdom in a Platonic way

but act and find it in the world; there is no wisdom outside activity and experience. As Diogenes knew, we have *live* wisdom and *live* value. Value is neither to be described nor to be created; it has to be lived” (2012, p. 199, original emphasis).

In this sense, the technological mediation approach both takes the relationality thesis seriously and extends it a step further, attempting to operationalize it. Verbeek proposes to both *live* the human–technology relations and *in living them, to give them shape* by reflecting on how they develop (2011, pp. 156–158). The expanded moral mediation account, incorporating value dynamism, would help to reflect on how human–technology–world relations are both guided by certain values and reconfigure them.

Swierstra and Rip (2007) offer an interesting angle on value dynamism, by suggesting that technologies can destabilize and provoke moral routines. New technologies can offer new possibilities that existing values and norms can offer no satisfactory responses to. The ambivalence and uncertainty that new technologies represent can inspire reflection and an adjustment of normative views and moral intuitions. As Swierstra and Rip note, “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” (2007, p. 6). New technologies often lead to moral disagreement, dilemmas and the re-articulation of previously working norms. The way that technologies destabilize the moral landscape can allow us to inquire into the dynamics of morality, to determine how the (potential) presence of technologies mediates values.

I argue that framing technologies as moral provocateurs that spark moral reflection can explain one possible mechanism of value dynamism in the expanded moral mediation account. However, I would like to emphasize that focusing on the destabilizing role of technologies offers a limited view on the nature and scope of technological mediation, because technologies can also enable new value practices and re-affirm existing value meanings. I develop this point in more detail later in this chapter in the discussion about mediation at the different levels and stages of morality. For now, it is important to further explore the view of technologies as moral disruptors, for it offers key insights about ethics and morality that the mediation approach can use.

The destabilization of moral routines, and the ensuing ethical discussions, invites Swierstra and Rip to reflect on the nature of morality and ethics. In this, they build on the pragmatist scholarship of Dewey, who (1976) suggested that morality is elusive and hidden because it is uncontroversial and accepted; it is essentially a compilation of values and norms that have proven to be effective and functional time and again, and as such, stabilized to the level of some abstraction that people need not review. For this reason,

Dewey often refers to morality as “moral routines” and “moral habits,” to highlight its generally accepted and tacit character.

According to Swierstra and Rip (2007), when technologies destabilize our moral routines, they thaw them from their (more or less) solidified form and enable us to reflect on them. Their consequent definitions of morality and ethics are as follows: “Whereas morality is characterized by unproblematic acceptance, ethics is marked by explicitness and controversy. Ethics is ‘hot’ morality; morality is ‘cold’ ethics” (2007, pp. 5–6). Ethics means reflection on morality: whenever one discusses moral conflicts or dilemmas or deliberates about what could be a good course of action, one *does* ethics. Or, as Swierstra and Rip frame it, “‘ethical’ is the articulation (including contestation) of what used to be morally self-evident” (2007, p. 6). These ideas embed very similar principles as the technological mediation approach, perhaps not least because the authors were inspired by Dewey’s moral philosophy. The above definitions of morality and ethics will guide my further explorations of the moral mediation account.

Adopting a relational and developmental perspective on values in the mediation approach produces several consequences. Firstly, it indicates the importance of reflection on human–technology–world relations that are both enabled by certain values and can reframe them. Secondly, morality is not a one-dimensional landscape but instead has different layers, or levels, which are typically dormant. For the present attempt to clarify the concept of mediation this means that moral mediation does not concern values as single entities. Rather, values as building blocks of morality can comprise different dimensions that can manifest in response to the sociomaterial practice at hand. Finally, as Dewey elaborated, value dynamism closely relates to the degree of value stabilization, or the proven accumulated ability to be a working solution. I consider it important to clarify how technologies can mediate the different layers of morality and the different stages of its liquidity. I approach this subject by building on the ideas of Dewey (1976), Walzer (1994) and Swierstra and colleagues (2009). This will consequently allow me to elaborate on the concept of mediation as sensitive to value dynamism and provide a starting point for where and how to study how technologies mediate values.

Mediation at different levels and stages of morality

Dewey specifically focused on the idea of moral malleability at different levels. Reviewing his ideas, with a view to the expanded moral mediation account, can help to further elaborate the scope of mediation. In the rich scholarship of Dewey, the idea of moral malleability and value dynamism comes as a consequence of the relational co-shaping nature of people and their sociomaterial environment. To remind the reader, in this

account, values appear not as moral finalities but as ends-in-view, open to the review of previously assumed moral avenues and the construction of new ones.

Another manner in which Dewey highlights moral malleability and dynamism comes to the fore in his revival of the Greek concept of potentiality. Dewey (1938/1940) discusses potentiality as both a category of existence and an inseparable human quality of reinvention. Potentiality enables people to develop that which was previously latent and actualize their (moral) lives in novel ways, in interactions with the world and its human and nonhuman entities (ibid., pp. 101–102). Dewey suggested that it is important to revive the Greek category of potentiality in modern moral philosophy to highlight the inherent ability of humans to reinvent themselves and their environment. In relation to values, potentiality represents the ability to review some stable notions that were used for years but cannot address present-day challenges. However, Dewey wanted to revive the classic notion of potentiality with a notable distinction, by abandoning the idea of fixed moral ends in favor of moral ends also conceived as potentialities, actualizing only in relation with the environment:

When the idea that development is due to some indwelling end which tends to control the series of changes passed through is abandoned, potentialities must be thought of in terms of consequences of interactions with other things. Hence potentialities cannot be known till *after* the interactions have occurred (Dewey, 1938/1940, p. 102, original emphasis).

Dewey famously rejected the idea of moral values as detached from the experiences of people, existing only as fixed external guidelines⁶. He similarly disagreed with accounts

⁶ To reiterate: Dewey wants to return to the Greeks in building his empirically-grounded moral philosophy because they endorsed the critical reflective choice and the relational nature of all forms of life, but he wants to change its assumptions regarding the fixed (moral) ends in favor of the innovation and discovery of human good. Dewey drew inspiration from Plato’s cosmology, but opposed its fixed and finite order. Plato suggested that for harmonious interaction of people with the whole of cosmos to occur, there is but one social order and one structure of human nature, and any alteration from this predetermined structure will yield chaos and disaster. According to Dewey: “[T]he return must abandon the notion of a predetermined limited number of ends inherently arranged in an order of increasing comprehensiveness and finality [... recognizing] that natural termini are as infinitely numerous and varied as are the individual systems of action they delimit; and that since there is only relative, not absolute, impermeability and fixity of structure, new individuals with novel ends emerge in irregular procession. It must recognize that limits, closures, ends are experimentally or dynamically determined, presenting [...] a moving adjustment of various energy-systems in their cooperative and competitive interactions, not something belonging to them of their own right. Consequently, it will surrender the separation in nature from each other of contingency and regularity, the hazardous and the assured; it will avoid that relegation of them to distinct orders of Being which is characteristic of the classic tradition. It will note that they [moral ends] intersect everywhere; that it is uncertainty and indeterminateness that create the needs for and the sense of order and security” (Dewey, 1929, pp. 395–396).

of values as being guided by the maximization of happiness and consequently getting lost in the cost-benefit calculus⁷. At the same time, Dewey acknowledged the value of overarching normative guidelines that consistently prove effective (e.g., 1922, 1930). To pursue reflective moral deliberation, one must occupy an established position and have some shared idea of where to begin. Dewey asserted that the shared insights and overlapping conceptions of values are an objective fact of morality. However, contrary to deontologists (particularly Kant⁸) and utilitarians, Dewey suggested that shared conceptions of morality have experiential and temporal underpinnings and are the embodiment of multiple outcomes of concrete situations in the past that have proven right time and again. As such, their effectiveness in providing tentative guidance for future action has stabilized them. Hence, although Dewey admits to some form of overarching morality, he differs notably from traditional moral accounts. He first stresses the relative nature of overarching morality, which originates in problematic situations of the past, and secondly, he emphasizes morality's openness to change in the future, should values prove unfit to direct further action (e.g., Dewey, 1922; 1929).

The work of Michael Walzer (1994) is critical to the moral mediation account because it further clarifies the relation between different levels of morality. Moreover, it suggests how morality can be both contextualized in experiences and practices and stabilized on an overarching level. Walzer suggests that two expressions of morality exist—minimal and maximal—that correspond to two levels of morality: thin and thick, respectively. According to Walzer, “Philosophers most often describe [value dualism] in terms of a (thin) set of universal principles adapted (thickly) to these or those historical circumstances. [...] Morality is thick from the beginning, culturally integrated, fully resonant, and it reveals

itself thinly only on special occasions” (1994, p. 4). Similar to Dewey, Walzer acknowledges and highlights the importance of thin morality and endorses its co-shaping relationship with the thick level. According to him,

‘[M]inimalism’ does not describe a morality that is substantively minor or emotionally shallow. The opposite is more likely true: this is morality close to the bone. [...] In moral discourse, thinness and intensity go together, whereas with thickness comes qualification, compromise, complexity, and disagreement (Walzer, 1994, p. 6).

Related to the ideas of moral mediation, Walzer's work suggests the importance of understanding the intricate relationship between the more abstract, or thin, and localized, or thick, levels of morality. They mutually inform each other, whereby “minimalist meanings are embedded in the maximal morality” (ibid., p. 3). This point echoes Dewey's critique of the detached individualistic conceptions of morality in Kant and his acknowledgment of the overarching morality as stemming from a mass of accumulated experiences. There is a lesson here for the expanded moral mediation account; namely, in the focus on localized human-technological practices, it is critical not to lose track of the larger sociocultural embedding, which is also normatively rich and telling.

In this regard, Walzer identified the importance of thin morality in attempting to thicken normative concerns. In an encounter with the unknown or the conflicting, the shared, thin morality allows people to collectively deliberate on the new phenomenon that caused (or can cause) a disruption. When people are confronted with something unknown or that conflicts with their conventional beliefs, they still recognize some features in it without knowing experientially, in elaborate qualified terms, what it is. By this token, when technologies mediate values, they necessarily first confront their thin meaning, thickening it during the process of reflection and interpretation. This is also reflected in the exploratory case of Google Glass, whereby the commenters had a shared, but almost elusive, sense of privacy but conjured multiple understandings of it as they analyzed what was at stake with Glass.

Because people can unthinkingly rely on thin minimal morality, it is usually invisible and appears independently of the hurdles of human life. According to Walzer, only in times of crisis and disturbance do people discover that they have thin morality, and they consequently reflect and revise it in thick conceptions. Swierstra and Rip (2007) mirror Walzer's view when they frame technologies as moral disruptors, which marks a point of distinction between these approaches and the position of technological mediation. Namely, a technology as a new unknown need not necessarily present a conflict or a crisis to reflect the moral hermeneutics of technological mediation. The moral mediation

⁷ Dewey opposed the idea of reflective deliberation being reduced to the utilitarian calculus of attaining maximum happiness: “Deliberation is irrational in the degree in which an end is so fixed, a passion or interest so absorbing, that the foresight of consequences is warped to include only what furthers execution of its predetermined bias. [...] The office of deliberation is not to supply an inducement to act by figuring out where the most advantage is to be procured. It is to resolve entanglements in existing- activity, restore continuity, recover harmony, utilize loose impulse and redirect habit. [...] Deliberation has its beginning in troubled activity and its conclusion in choice of a course of action which straightens it out” (Dewey, 1922, pp. 198–199).

⁸ Dewey's main issue with Kant consisted in Kant's individualistic conception of moral philosophy, originating in the pure reason of single individuals and disregarding the fact of moral disagreement (1922). Hence, moral rights and ought's can be understood rationally by all human beings, and when understood rationally, no disagreement between such conceptions can occur. Hence, there is no need to consult actual human experiences. Dewey took issue with both experientially unaided individual reason and the supposed lack of moral disagreement. Specifically, he disagreed with how they presupposed a conception of nature as rational and as such, perfectly accessible to and revealed identical to human reason. Dewey's analysis of nature in its diverse socio-material manifestations, human beings and moral ends as ends-in-view, all entangled and interdependent, suggests that moral conflict and disagreement are inherent and persistent to the relational order of things. Therefore, Dewey opposed Kant's moral judgements as absolute and stemming from single individuals without regard for the context and other individuals.

account can show how, in the course of value dynamism, moral frameworks are also re-affirmed, not only challenged. Augmenting the mediation approach with Dewey's emphasis on interrelational ontology in sociomaterial practices allows the examination of value dynamism *within* human–technology–world relations, and not only outside of them with crisis as an external destabilization. Moreover, it can also show how technology allows for new value meanings and practices. According to Dewey (1922),

Every object hit upon as the habit traverses its imaginary path has a direct effect upon existing activities. It reinforces, inhibits, redirects habits already working or stirs up others which had not previously actively entered in. In thought as well as in overt action, the objects experienced in following out a course of action attract, repel, satisfy, annoy, promote and retard. Thus deliberation proceeds (1922, p. 192).

Thus, Dewey suggests that an encounter with a new phenomenon can both enable new and review existing moral habits, projectively and in practice. From both the mediation perspective and Deweyan pragmatism follows that a crisis is not a pre-condition to value dynamism. Contrary to Walzer (1994) and Swierstra and Rip (2007), the technological mediation approach, accompanied by pragmatism, maintains that value dynamism can also manifest in non-crisis situations, with technologies framed not only as disruptors but also as enablers of moral practices.

Nevertheless, understanding the co-shaping relationship of the thin and thick levels of morality is relevant to the discussion of moral mediation. It suggests how destabilization, crisis or conflict induced by technologies as moral disruptors can offer one method to detect value malleability. However, it is critical to remember that a reference to crisis might not always be necessary to illuminate the moral hermeneutics of technologies. I explore other ways to identify and reflect on value dynamism in the chapter that follows, where I study how people accommodate technologies in their referential frameworks (see Chapter 4).

What the discussions above clarify is the importance of considering different levels and stages of morality when examining value dynamism. However, the difficulties that emerge when explicitly considering the role of technologies in value dynamism also become visible. Tsjalling Swierstra's approach of technomoral change was the first to highlight the active role of technologies in the constitution and change of values (2011). To delineate the ambitions and scope of the mediation concept, in the next subsection, I wish to briefly correlate the technomoral change and technological mediation approaches.

Explicitly considering technologies in value dynamism and change

The philosophical approach of technomoral change suggests that the normative frameworks of people are not static but co-evolve with the introduction of new technologies (Swierstra et al., 2009). It draws inspiration from the pragmatist ethics of Dewey and considers the specific role of technology in value change. Technology introduces new courses of action and, with this, opens new moral avenues or invites a review of the old ones (Swierstra, 2013; Vallor, 2016). At the same time, providing new courses of action inevitably means relying less on the old ones and, correspondingly, relying less on the values they embody. The accents we place on values and how we interpret them also shift. For instance, the good manners in the 1960s dictated offering your visitor a cigarette. Today, this would be considered inappropriate, since smoking does not correspond with a healthy lifestyle value (Swierstra, 2011). In summary, the technomoral change approach is interested in how value changes occur in relation to technologies.

To explore how values evolve over time and with the introduction of technologies, Swierstra and colleagues (2009) rely on the robustness and clarification of a given value as an entry point. According to the authors, the robustness or stabilization of values passes across three levels: the macro-, meso- and micro-levels. The macro-level reflects only gradual developments of fundamental and abstract normative principles (such as flourishing), which do not easily change. Their change, even when induced by technologies, is not quick, because they have proven to be suitable guidelines to ethical problems in different contexts over time. The meso-level of technomoral change specifies a value to some extent by reviewing it in specific practices (for instance, the well-being of a child). Because ethical problems are subject to cultural and social interpretation, different interpretations may exist on how to enact the value in question. Thus, closure regarding what it means never really occurs. Finally, on the micro-level, the practical requirements of a situation require concrete ethical questions and decisions. For example, a concrete ethical question concerning the well-being of a child could be the following: Should the prospective parents perform a full genome sequencing on their newborn baby? Because practical requirements and options often change, fueled by cultural traditions and individual moral intuitions, the normative micro-level is not likely to stabilize. Thus, the technomoral change approach uses the pyramid of value robustness as an indicator for how some values are more prone to change than others. It also suggests that the micro-level of concrete ethical questions is the most favorable for exploring the dynamics of technomoral change.

Although the technological mediation approach and the technomoral change approach similarly endorse the co-shaping nature of values and technologies, they do so to different purposes. The technomoral change approach was originally developed to deepen and substantiate policy-making discussions regarding the future of a given technology in

society (e.g., Swierstra et al., 2009; Boenink et al., 2010; Swierstra and Rip, 2007). As such, it adopts a broader societal lens to explore how technologies change values. The technological mediation approach focuses more on the individual level to inform the practices of technological design and use (e.g., Verbeek, 2005; Dorrestijn, 2012). The mediation approach builds upon (post)phenomenology with its dedication to lived experiences and a first-person perspective. As such, it explores the moral mediation of new technologies, beginning with individuals: how people appropriate new technologies and make them meaningful and how technologies mediate the concrete experiences and practices of people. The technomoral change approach does not at all exclude an individual viewpoint. However, in an attempt to provoke group ethical deliberations, it must scale up from the individual level to present broader generalized concerns, to which many individuals can relate. At the same time, the mediation approach, by developing a new focus on value dynamism, can potentially extend beyond individual concerns and become useful for discussions at a larger scale.

Another point of distinction between the approaches could involve the object of interest. Whereas the technomoral change approach explicitly focuses on a change in values over time, the mediation approach explores how technologies mediate values and induce their dynamics in the present. As the pyramid of value robustness indicates, the technomoral change approach considers change in values over a broad temporal trajectory. The mediation approach focuses on lived practices to show how different dimensions of values materialize in the present. From this temporal perspective, the technomoral change approach's scope is arguably larger than of mediation, which scrutinizes technologically mediated value dynamics as they occur during human encounters with technologies. At the same time, the somewhat narrower focus of the mediation approach allows the exposure and scrutiny of the dynamics of value change itself, which remains underexposed in the technomoral change approach.

These distinctions between mediation and technomoral change are not clear-cut, and both approaches could potentially venture into thinner or thicker, or present- or future-oriented, domains. Kiran, Oudshoorn and Verbeek (2015) have suggested that the technological mediation approach can also contribute to policy-making on new technologies and anticipate future moral mediations, given that technologies help co-shape the ethical debate around themselves. Similarly, Swierstra (2016) has clarified that the technomoral change approach requires an elaboration of daily lived messy morality and that policy-level deliberations require such thick substantiations. Both approaches mutually inform each other, since they represent different aspects of the same process. No technomoral change would exist without technologically mediated value dynamism,

while at the same time, value dynamism, however foundational, is a first step in the larger process of value change.

While I have somewhat explained the intent and scope of both approaches, it is unclear how they can manifest them in practice. I leave these reflections, for now, at this preliminary stage. To reflect on the two approaches in a more substantiated manner requires attention to the methodological means and empirical pursuits that they endorse. Although this exceeds scope of the present conceptual investigation of moral mediation, I will return to this discussion in the concluding chapter of this dissertation (see Chapter 8).

For now, what the discussion in this section clarifies is that morality and ethics are two sides of the same coin. Morality presents the accumulation of workable normative means and guidelines to direct present action, and ethics lends itself as a reflection on these tacit moral rules (Swierstra and Rip, 2007). To transform morality into ethics requires some sort of moral disruption. Technologies can convert dormant moral views into reflective ones by confronting them with new situations and challenging them in other ways (*ibid.*). However, technologies not only disrupt moral routines but also foster new moral understandings and co-shape ethical debates within human–technology–world relations (Verbeek, 2011).

I have also endorsed a view that morality is multilayered, consisting of thin and thick levels, conceived as abstract normative guidelines and as experientially rich normative contestations respectively (Walzer, 1994). Abstract moral views can act as entry points to the thicker elaboration. The lesson for the moral mediation account here is that to explore value dynamism, both levels of morality are important.

3.4 Conclusions

In this chapter, I have theorized about the phenomenon of moral mediation and given it substance, while relating it to the existing philosophical accounts that deal with value dynamics. More specifically, I have clarified the “moral” and the “mediation” parts in the moral mediation account, expanded with value dynamism. I have suggested that the moral counterpart incorporates the ethical significance of technologies beyond what has been previously considered in the technological mediation approach. Namely, I presented a conception of values as relational to the sociomaterial practices that both enables them and is co-shaped by them. What follows from the interrelated nature of values with their embedding is a developmental account of values. In parallel, I have expanded the mediation counterpart with such dynamic ideas on values by highlighting

the interrelational ontology within sociomaterial practices. Here, I have suggested viewing technologies as the mediators of moral routines *within* human–technology–world relations. According to this view, technologies not only disrupt but also enable and re-affirm values, challenging or stabilizing the existing moral understandings and enabling the new ones. With this, I have also highlighted the importance of the different levels of morality and the different stages of moral stabilization as potential sites of the mediation of values. I have thus sensitized the mediation concept to the idea of value dynamism and presented the mediation approach as a special bridge between technologies and values.

The pragmatist lens of Dewey has been particularly helpful in developing the conceptual vocabulary for moral mediation. To be able to more deeply consider value dynamism, I have argued for the need to return postphenomenology to its pragmatist origins. As it currently stands, the mediation approach primarily focuses on the micro-practices of people with technologies. The pragmatist approach provides this with more depth, suggesting that in those practices, the sociomaterial world is enacted, including the value frameworks. Returning to pragmatism allows the expansion of the postphenomenological approach to the idea of value change, namely, an expanded version of moral mediation that exceeds the approach presented in *Moralizing Technology* (Verbeek, 2011). At the same time, it also suggests where and how value dynamics can be observed. Namely, the interrelated nature of values and sociomaterial practices hints at the profound hermeneutic dimension of values that must be clarified, the one that transcends situations of crisis. As such, enriching postphenomenology with Deweyan pragmatism allows the substantiation of its interrelation claims at an ontological level, supported by an environmental model of sociomaterial practices, and the production of a relational dynamic account of values, as both enabling and being co-shaped by human–technology–world relations. Using Dewey’s pragmatist lens in this manner facilitates the first steps toward understanding postphenomenology as a distinctly moral philosophy of technology.

The conceptualization of values as relational, and the focus in the mediation approach on lived experiences, invite the location of values in human practices with technologies. However, this is not an easy task. As explained by Mol (2002) and Dussauge and colleagues (2015), there is no direct access to values-in-practices, as there is no mental beeline to locating them in the minds of people. This requires a process of interpretation, related to existing human experience and the larger sociocultural embedding. This is precisely what the line of appropriation aims to clarify, as followed in Chapter 4. There, I explore the hermeneutic dimension of values in sociomaterial practices through the process of appropriation. The following chapter elaborates how examining the dynamics of appropriation can deepen our understanding of value dynamism mediated by technologies.

The current chapter has resulted in a conceptual clarification of the moral mediation phenomenon. Explaining the background and scope of the “moral” and “mediation” counterparts allows the study of value dynamism in relation to technologies and presents it as a serious consideration in the field of the ethics of technology. To achieve this, it has been important to achieve a detailed exploration of value theory, the mediation approach and other approaches in the ethics of technology that deal with value dynamism. With the help of these theoretical resources, I make value dynamism accessible for a further conceptual and empirical scrutiny, while explicitly linking it to technology.

Chapter 4.

**Human appropriation of technologies as a key to
moral mediation**

4.1 Defining appropriation

To remind the reader, the larger goal of this dissertation is to understand how technologies mediate values. I am curious as to how moral concerns and perceptions manifest in relation to technologies and how existing normative ideas undergo re-articulation, facilitating moral decisions. Verbeek (2015, pp. 101–103) has suggested that the key to understanding the moral mediation of technology lies in the process of appropriation, which includes both the projective and practical dimensions of human interpretation. Following Verbeek's intuition, in this chapter, I investigate the scope, theoretical standing and significance of the concept of appropriation, broadly defined as how people relate to technologies and actively make sense of them. This chapter aims to elaborate how examining the dynamics of appropriation can deepen our understanding of value dynamism in relation to technologies.

With these aims in mind, I first define the concept of appropriation in view of the existing term in the field of STS (Section 4.1). Secondly, I examine the theoretical standing of the term, drawing on its phenomenological origins in the field of hermeneutics and, more recently, in material hermeneutics (Section 4.2). Next, I suggest how to theoretically align the hermeneutic essence of appropriation in view of the technological mediation approach (Section 4.3). Explaining the interaction between technological mediation and human appropriation will allow me, in Section 4.4, to elaborate on the significance of the appropriation phenomenon for the technological mediation of morality and to provide some concluding remarks (Section 4.5).

The lens of domestication studies

The concept of appropriation is not new, and it has a firm standing in the field of STS, particularly in the theoretical and practical framework of domestication (e.g., Silverstone and Hirsch, 1994; Sorensen, 2006; Berker, Hartmann, Punie and Ward, 2006a). Domestication refers to the process of “taming” new technologies, adopting them into households and other sociocultural units. Appropriation appears here as the first stage of the process of domestication, concerned with an initial attribution of meaning to a new technology before it is (or is not) fully adopted and integrated into the household. Below, I briefly discuss the meaning and scope of the appropriation concept as related to domestication studies to subsequently clarify the different meaning and ambition that the technological mediation approach bestows on appropriation.

Domestication as a concept, method and theory emerged in the late 1980s through the early 1990s, suggesting that the meaning of a certain technology is negotiated by both the inside (domestic, household) and the outside (market, objective economy), making them

mutually constitutive (Silverstone and Hirsch, 1994). According to Sorensen (2006), “it presupposed that users played an active and decisive role in the construction of patterns of use and meanings in relation to technologies” (p. 46). As such, domestication is a relational activity where both the user, her environment and a new technology must become accustomed to one another; renegotiate certain boundaries, routines, and meanings; and conjure new ones. Carter, Green and Thorogood (2013) have referred to domestication as an interactive process that “involves symbolic work (the creation of meaning), cognitive work (learning) and practical work (for example, changing patterns of use and daily routines)” (pp. 348–349). As a part of the Social Construction Theory in STS, domestication studies focus on the negotiation of social rules and routines as well as on the power and control that users engage in to adopt a new technology (e.g., Berker, Hartmann, Punie and Ward, 2006a).

To perform domestication analysis thus requires considering a new technology in context, by studying the daily routines and practices of its consumers and understanding their larger sociocultural embeddedness. To achieve this, domestication studies have proposed approaching the process in four stages—appropriation, objectification, incorporation and conversion. A qualitative empirical lens would accompany them to “encapsulate the nuances of consumption and the way that users inscribe artefacts with meaning to give them a place in a network of the home and everyday life” (Berker, Hartmann, Punie and Ward, 2006b, p. 6).

Originally, appropriation referred to the context of consumption and assimilation within the moral economy of the household:

An object—a technology, a message—is appropriated at the point at which it is sold, at the point at which it leaves the world of the commodity and the generalized system of equivalence and exchange, and is taken possession of by an individual or household and owned. It is through their appropriation that artefacts become authentic (commodities become objects) and achieve significance (Silverstone, Hirsch and Morley, 1994, pp. 18–19).

As the quote above demonstrates, appropriation denotes the process of encountering a generic object and making it one's own, revealing how a generic object from the outside realizes its symbolic and physical potentiality in the rich sociocultural world of an individual or a household. Silverstone, Hirsch and Morley further remark that “Appropriation reveals itself in possession and ownership” (1994, p. 19), thereby emphasizing the practical use and physical presence of a product for appropriation to

occur. Or, in the words of Carter, Green and Thorogood, “Appropriation at its simplest occurs when a device is purchased and users take it home” (2013, p. 350).

Such a narrow, strict meaning of appropriation has blurred as domestication studies evolved, ultimately appearing to reach the scope and level of generalization of the process of domestication itself: “Domestication involves the appropriation of the new into the familiar, or [...] as a process in which that appropriation is attempted” (Silverstone, 2006, p. 245). However, the meaning of appropriation as the first step in the domestication process has prevailed to date in many case studies that perform domestication analysis (e.g., Lim, 2008; Richardson, 2009; Carter, Green and Thorogood, 2013; Bertel, 2018).

In summary, within domestications studies, the concept of appropriation denotes the process of acquiring a new technology, bringing it into the household and attributing it with a preliminary meaning. Making sense of a technology here belongs to the level of collective entanglement, rather than being the property of single individuals (with an exception of Sorensen [2006], who also focuses on individual domestication), because multiple sociocultural contingencies, crucial for overall domestication, best manifest at the level of a family household, workplace or society. Appropriation analysis, just as the overall domestication study, is descriptive by nature, in view of its qualitative focus and sociological standing. However, it provides a rich detailed grounding for normative conclusions for those who seek them. Finally, the appropriation stage in the domestication study concerns the overall consumption and commodification process, impossible without the actual presence of a technology in the marketplace and, consequently, in the household.

I now turn to the manner in which the technological mediation approach examines the concept of appropriation to determine whether it resembles the elaborations above.

The lens of technological mediation

The approach of technological mediation comprehends the concept of appropriation with a view of the (post)phenomenological grounding and the underlying ideas of technological mediation. Appropriation here refers to both the projective and practical activity of sense-making, or implicitly or explicitly attributing meaning to a new technology. Phenomenologically speaking, appropriation is essentially a hermeneutic activity. During appropriation, people interpret a technological phenomenon and integrate it into the existing frameworks of understanding, necessarily updating them. The process of appropriation is not confined to the theoretical domain but instead resembles the mutually informing symbolic, cognitive and practical activities that underlie domestication (Carter, Green and Thorogood, 2013). The foregrounding and revision of the normative ideas and intuitions, moral routines and habits occur somewhere in this multidimensional process.

Comparing the ambitions and scope of the appropriation concept from the points of view of domestication studies and the technological mediation approach, one could argue that although they bear some resemblance, they also possess considerable differences. Appropriation denotes a hermeneutic dimension of mediation, or how people take up and attribute meaning to technological mediations. It is an intentional process, always directed at a specific artifact within embodied sociocultural experiences. The appropriation concept in domestication studies predominantly analyzes the post-factum practical adoption of technologies in the daily lives of people, particularly in the setting of their homes. The appropriation concept in the technological mediation approach, however, concerns the projective dimension of this process as strongly as the practical one. Projective appropriation explains how people, confronted with an uncertain and ambiguous technology, make sense of it and attribute it with meaning by relying on their own past experiences, sociocultural embedding and information from various sources. Projective appropriation demonstrates that people can experience a certain technology long before practical exposure. Phenomenologically speaking, projective appropriation represents the hermeneutic circle in action (Gadamer, 1975/2004), whereby people comprehend an unknown by projecting their own histories and personalities onto the sociotechnical environment, continuously revising preliminary meanings with new information and practical experiences. The appropriation concept in the technological mediation approach, in short, denotes how people, both explicitly and implicitly, develop a relation to a technology.

Another difference concerns the target group of appropriation. In the domestication study, the primary focus is on the group level: the level of the household or society. In contrast, the phenomenological origins of the technological mediation approach incline it to favor a micro-perspective, which considers the rich lived experiences of single individuals. Therefore, large-group generalizations are not the primary goal in the appropriation study under the technological mediation approach (although they can be); this cedes the focus to informed perspectives of how the construction of meaning occurs in in-depth individual cases.

Similarly, because projective processes occurring during appropriation in the technological mediation sense (e.g., conceptualizing, comparing, fostering new meanings, reconfiguring existing ones, etc.) are of equal import as the practical ones (e.g., physically approaching a technology in question, understanding it through use, etc.), the physical presence of a technology is not as essential for appropriation here as it is for domestication studies. Although the experience of using a technology provides a richer, more balanced and more nuanced canvas against which appropriation occurs, the possibility of using the technology is not always there: for instance, when the technology in question is still on

the brink of introduction (consider Google Glass). In the current age of technological innovation, new technologies appear daily, be this in a physical or digital form or in the shape of technological visions. In this context, people must often deal not with the technology itself but with promises, hopes, visualizations, video presentations, scenarios, debates, concerns and fears regarding the new device. Before the technology actually enters the market and the household, people already possess an idea regarding what it is and how it fits (or does not fit) with their mindset, life goals, habits and moral landscape. In short, people have already appropriated it projectively. Thus, the actual presence and use of a certain technology is not a prerequisite to its appropriation, from the technological mediation point of view.

Finally, a crucial difference between these two takes on appropriation is an explicit focus on its normative dimension from the technological mediation perspective. While domestication studies do encounter the changing moral routines of people with the adoption of new technologies (e.g., Berker, Hartmann, Punie and Ward, 2006a), this is more of an incidental normative finding of the otherwise sociological study, concerned with the overall process of fitting a technology in the daily lives of people. In the technological mediation approach, the concept of appropriation is intimately linked to the process of moral mediation.

In the previous chapter, the approach of technological mediation clarified *that* the norms and values of people are not divorced from the technologies around us. Consider Verbeek's (2008) analysis of how ultrasound technology co-shapes prospective parents and their yet unborn children in different (normative) contexts, providing certain responsibilities and roles. While this example provides a convincing illustration of the technological mediation of morality, it does not explain *how* such a mediation occurs. Consider another example, adapted from Swierstra (2011). In the 1950s, when one hosted guests, social norms dictated that guests be offered a cigarette as a sign of care and politeness. Today, however, offering a cigarette could be considered not only impolite but harmful to the health of guests. How is it that the same technology can foster radically different norms regarding its use? Furthermore, what is it that ensures such a value dynamism? I hope to answer these questions with the help of the appropriation concept.

Connecting the cigarette example above to the earlier intuitions about appropriation suggests that normative ideas about cigarettes have changed with additional knowledge that people have gained from their use over time, while the cigarettes themselves have remained practically the same. The appropriation denotes a process that captures the dynamic balance between the existing experience, perceptions and knowledge that people possess, including normative views, on the one side, and the cumulative unknown that a

new technology represents in a given context on the other. The assumption in the examples above is that attempting to understand and interpret a technology shapes and negotiates the norms and values of people. The detailed dealings of such interpretative processes of appropriation deserve further inquiry.

A conceptual clarification offered in this section allows for a preliminary understanding of the appropriation concept, by suggesting that it represents a sense-making activity that involves the interaction of (at least) three actors: people, with their existing knowledge and beliefs; technologies, representing a phenomenon that requires the attribution of meaning and its integration into the existing frameworks of understanding; and the world, as an active context against which the human-technology encounter occurs.

At least two important conclusions follow from this preliminary definition. First, appropriation is always an intentional activity, directed at a specific technology. Also, as the cigarette example suggests, appropriation proceeds both projectively and practically to constitute a single mode of appropriation. Based on projective appropriation, one may choose to review the practical use or refrain from using a technology in question altogether. In this broad sense, technological appropriation never fails. This leads to the second conclusion, following the definition of appropriation above. Namely, the three dynamic and interrelated elements of the appropriation process prevent it from being a static, once-and-for-all event. Once a change has occurred in one of the elements constitutive to the appropriation process that does not fit the interim appropriation mode, a new or revised meaning is produced to better accommodate the situation. The stability of the appropriated technology, or of a preliminary meaning bestowed upon it, depends on the interaction of people and technology in question in a specific sociocultural setting. However, this remains a dynamic and fluid process.

In this subsection, I have also outlined the differences between the appropriation concept in the sense of the technological mediation approach as opposed to domestication studies, consisting primarily of focus, scope and normative inclinations. However, it remains unclear how value dynamism takes shape during the process of appropriation and which elements of the process are responsible for it. To answer these questions, I now turn to the (post)phenomenological origins of appropriation, and particularly to the hermeneutics of Hans-Georg Gadamer (1975/2004; 1977) and the material hermeneutics of Don Ihde (1990; 1998).

4.2 Turning to the (post)phenomenological origins of appropriation

Phenomenological inquiry into interpretation: Gadamer and the hermeneutic circle

Appropriation, as identified above, denotes the sense-making activity of taking up technologies and technological mediations, during either a new or a repeated encounter. As such, it is inherently an interpretative process. To better understand its workings, I now turn to phenomenology. In phenomenology, a systematic study of interpretation, its nature and its principles define the field of hermeneutics. The work of the continental philosopher Martin Heidegger and his student Hans-Georg Gadamer on the principles of understanding and interpretation defines a landmark in the phenomenological study of hermeneutics. Before I proceed to explaining the hermeneutic account of Gadamer, which is the focus of this section, I first wish to introduce a few elements of the hermeneutic account of Heidegger that Gadamer incorporated and adapted in his account, namely, the ideas of “As” structure of interpretation, the hermeneutic circle account and the concept of historicity inherent to it. Explaining these concepts first allows a tracing of the evolution of hermeneutics that Gadamer elicits.

Heidegger emphasizes that we cannot escape interpretation: the first movement of the human mind is interpretative and grounded in prior experiences and conceptions. This also implies that understanding precedes the process of interpretation while also being a product of previous interpretations. In this manner, people always see something as something, which Heidegger defines *the “As” structure of interpretation*: “Whenever something is interpreted as something, the interpretation will be founded essentially upon fore-having, fore-sight, and fore-conception. An interpretation is never a presuppositionless apprehending of something presented to us” (Heidegger, 1927/1962, p. 191-192). People always possess presuppositions about a phenomenon that confronts them. However, these presuppositions are dynamic and open to revision, which leads Heidegger to describe interpretation as *the hermeneutic circle*. Once a new situation questions a previously established understanding, the process of interpretation revises it and establishes a new meaning, whereby the older one joins the fore-structure for the future interpretations of new experiences. With this, the circle is never complete, and an established understanding is never stable, just as the reconfiguration in the meaning and use of cigarettes presented above has illustrated.

Heidegger also considers understanding to be a practical knowledge, a reflexive capacity to provide an orientation for future existence: “This circle of understanding is [...] the expression of the existential *fore-structure* [...] In the circle is hidden a positive possibility

of the most primordial kind of knowledge” (1927/1962, p. 195, original emphasis). Understanding for Heidegger, then, is future-oriented and comprises a mode of realizing existence.

In his account, a hermeneutic situatedness, which Heidegger defines as *historicity*, precedes understanding. The concept of historicity refers to the situatedness of being, to its being thrown into the world to a certain tradition, being-in-the-world, its overall worldly condition. Presented differently, it is the cumulative cultural, normative and temporal contexts beyond a person’s control that, together with one’s experiences, knowledge and perceptions, condition and are formative for her understanding. Historicity thus plays a key role in the hermeneutic circle, even more so, later, for Gadamer.

The accounts of “As” structure of interpretation and historicity in Heidegger suggest that, for him, the hermeneutic circle is an ontological issue regarding explaining the structure of our situatedness in the world. While Heidegger’s hermeneutic pursuits aimed to disclose the possibilities for understanding that underpin the existence of being, his student Hans-Georg Gadamer (1975/2004) aimed “to clarify the conditions in which understanding takes place” (p. 295). Thus, whereas for Heidegger, the hermeneutic circle described the circle of life itself, Gadamer used it predominantly as a method to understand and describe the process of interpretation.

In the works of Gadamer, the process of interpretation in the hermeneutic circle primarily signifies the constant movement of the part to the whole and back, thus revising and verifying a preliminary meaning of a confronting phenomenon with the knowledge that lies within it (1975/2004; 1977). Gadamer primarily refers to textual interpretation—to an engagement of a historically situated reader with a text, as something new that confronts the reader and invites interpretation. However, the hermeneutic circle account allows the understanding of how interpretation functions in a broader sense, for instance, in the relation between the interpreter and the world or any particular object in the world (Fry, 2009).

Gadamer’s hermeneutics begins by stressing the productive nature of understanding and incorporating the Heideggerian concept of historicity and its productive significance for the hermeneutic circle. Gadamer countered the position that the author’s intention is the locus of the meaning of the text, for in that case “understanding becomes a transaction between the creative consciousness of the author and the purely reproductive consciousness of the interpreter” (Linge, 1977, p. xxiv). Historicity, the larger tradition in which people are embedded, spurred Gadamer to actively reject the concept of understanding as reproductive:

Not just occasionally but always, the meaning of a text goes beyond its author. That is why understanding is not merely a reproductive but always a productive activity as well. [...] It is enough to say that we understand in a *different* way, *if we understand at all* (Gadamer, 1975/2004, p. 296, original emphasis).

The passage emphasizes that there is no one true meaning as a result of interpretation but rather that interpretation is always open and relates only to the variety of ever-expanding contexts. This also gives weight to the context, the present situation in the process of interpretation—it, too, can bestow variance to the establishment of meaning. As such, both the interpreter and what confronts her are active parties in the process of interpretation.

Historicity, or in Gadamer's words, "*effective history*," is also behind the formative nature of interpretation, because it allows an entry into the mindset of another time, place or object. *Prejudice* is a key concept that explains the significance of effective history for Gadamer. Prejudice denotes the cumulative potential of the preconceptions, provisional judgments and biases that constitute human directedness to the new phenomena and form an inalienable part of one's hermeneutic situatedness. Gadamer discards the modern negative meaning of prejudice and instead relies on its ancient meaning as prior awareness or pre-judgment (Gadamer, 1975/2004, p. 273).

While suggesting that, for interpretation to be effective, the interpreter must always be conscious of "being affected by history" (Gadamer, 1975/2004, p. 301), Gadamer also acknowledges the limits to such reflection. Because interpretation is a relational process, reflecting on it and constituent pre-judgments would require stepping outside of the *hermeneutic situation* of relating to a new phenomenon. Following Gadamer, people always find themselves within a situation, or within a relation to the other. It is impossible to foreground the entirety of one's pre-judgments due to the beings-in-history that people are: "All self-knowledge arises from what is historically pregiven, [...] because it underlies all subjective intentions and actions, and hence both prescribes and limits every possibility for understanding any tradition whatsoever in its historical alterity" (Gadamer, 1975/2004, p. 301). Although it is never possible to completely disregard our prior awareness, it is critical to attempt to recognize and expel existing biases to view a new phenomenon on its own terms. Viewed as such, prejudice appears to enable the dialogue with the confronting phenomena rather than constituting a hindrance to interpretation: "It is not so much our judgments as it is our prejudices that constitute our being" (Gadamer, 1977, p. 9).

Accompanying the idea of hermeneutic situation and being conscious of one's effective history is another important concept in Gadamer's scholarship: *a horizon*. Every current hermeneutic situation has a point beyond which the vision is limited, and a horizon is a

situated standpoint within which a person is embedded: "Our own past and that other past toward which our historical consciousness is directed help to shape this moving horizon out of which human life always lives and which determines it as heritage and tradition" (Gadamer, 1975/2004, p. 303). Following Gadamer, the horizon that each of us necessarily possesses in any given situation consists of both our accumulated personal histories, with our gained knowledge, experience, perceptions and normative ideas (i.e. "our own past"), and the larger historical tradition, or "that other past," that defines our being-in-the-world from a shared viewpoint. The gradual expansion of understanding that people acquire throughout their lives grants the horizon a dynamic, evolving nature.

The *hermeneutic circle* denotes a principle of interpretation during an encounter of different horizons, the present and the future, the familiar and the strange, an attempt to establish common grounds of understanding. A past horizon represents the totality of historical consciousness that embeds all preconceptions and prior awareness, while a present horizon sketches the limits of a given hermeneutic situation during an encounter with a new phenomenon. In a hermeneutic situation, the present horizon confronts something that questions it—a horizon of the future. Consequently, what underpins the hermeneutic circle and culminates in a temporary understanding is a *fusion of horizons* (Gadamer, 1975/2004, p. 305). It is a continuous process, "for there old and new are always combining into something of living value" (ibid., p. 305). The fusion of horizons explains the circularity in interpretation, for "As the historical horizon is projected, it is simultaneously superseded" (ibid., p. 305). The hermeneutic circle thus embeds the temporal ontology of being-in-the-world, whereby the future horizon speaks to the past one, updating the concerns of the present situation in an ever-evolving effective history.

The same logic of the fusion of horizons can be transposed to clarify how people appropriate technologies, whereby people project preliminary meanings onto a confronting technology, which itself suggests certain meanings and practices in the virtue of its design and a specific sociocultural setting. Having elaborated on the phenomenological account of interpretation, I next demonstrate how it relates to technological appropriation, how the two accounts follow a similar logic and where they diverge.

Relating the hermeneutic circle account to the human appropriation of technologies

I suggest that a principle of interpretation similar to the hermeneutic circle as outlined above underlies the process of technological appropriation. What enables this theoretical fusion is the joint hermeneutic pursuit to uncover the dynamics of sense-making with active constitutive elements. The hermeneutic circle can explain the dynamic nature of the appropriation process, which does not allow for the establishment of a single static

meaning to a given technology. By this token, the evolving perceptions and experiences of a specific person against a confronting phenomenon (a technology, in our case), and within an evolving sociocultural situation, ensure that the same technology can simultaneously possess multiple meanings for each given situation or practice, with all existing conceptualizations informing the concerns and pre-judgements that guide a person.

One could suggest that the hermeneutic circle principle can explain a hermeneutic side of the concept of the multistability of technology, which is essential in the field of postphenomenology. Multistability refers to the inalienable ambiguity of technology, whereby a technology receives its meaning only in its use in a particular situation, thus suggesting multiple “stabilities” regarding what the same technology can signify (Ihde, 1986). The hermeneutic circle explains how the relational aspect of the multistability is shaped, namely, through the specific materiality of a technology that suggests certain actions and the historical horizon of the person in view of the situation at hand, which is instructive for the initial meaning of a technology for the given person.

Crucially, the hermeneutic circle stresses the productive nature of the process of interpretation of both parties, in this case, a person and a technology. A person attempting to capture the meaning of a technology unavoidably casts her historical horizon with prior judgments and the current context over a new technology, just as the new technology suggests certain meanings above others by means of its design, the company that stands behind it and its suggested price. The process of appropriation enacts both human and technological assumptions, confirms some and revises others to reach an attribution of (temporary) meaning.

The account of the hermeneutic circle would thus explain what sets the appropriation of technologies in motion (i.e., productive fore-structures of human understanding); how these dynamics proceed (i.e., in circular back-and-forth motion, revising the existing prejudices and letting the new phenomenon speak on its own terms, subsequently becoming embedded in the existing structures of interpretation as an established meaning); and why it culminates in only a temporarily stable understanding (i.e., continuous interpretation, always subject to revision in view of the constantly expanding horizons, as in gaining new grounds for interpretation and the changing context).

However, the hermeneutic circle assumes that interpretation is a direct, albeit a circular, process: from one to the other, and back. Gadamer often discusses an example of a person reading a book to establish an understanding of a certain historical period or to better understand the author of the book (but never a reproductive understanding, for there is

no original one true meaning) (see Figure 1 below⁹). Gadamer considers how a meaning is uncovered through the reader working out her own interpretative fore-structures and how the author of the book expresses herself, the story she conveys and the concepts she uses. What is omitted, however, is the medium through which this circular process of interpretation occurs—the book itself.

Figure 1. Visualization of the hermeneutic circle with a person reading an electronic book

When reading a book, one must hold it, find an appropriate position for reading, feel the weight of the book, experience the smell of its pages and turn them. An electronic book (an e-book) or reading from a digital screen in general, as the modern-day reader would know, provides for a different context of reading than with a printed book. Consider how an e-book provides the opportunity to receive an immediate translation or a definition of an unknown word, simultaneously increasing our knowledge and removing the reader from the embodied experience of the story. Or, consider how it removes the expected weight of Dostoyevsky’s *Karamazov Brothers*, enabling reading virtually at any place or time. Similarly, the instant swapping between the hundreds of pages allows for a quicker read while also complicating the digestion of this fast-paced information.

Moreover, a story can be communicated by other material means, such as archeological artifacts in a museum. These can supplement textual interpretation with richer details, or in the absence of textual accompaniment, “tell” the story in their own by revealing the age, shape, form and cultural embedding of specific exhibits (Ihde, 2005). Although

⁹ For visualizing the workings of hermeneutic circle, as intended by Gadamer (1975/2004), an example of a printed book can be equally substituted with an electronic book, or any other phenomenon.

the primary findings of the story can be the same when read in a book, heard through a podcast or viewed during a museum visit, the story changes with the manner of presentation. The hermeneutic circle account stresses the importance of the context that sketches the limits of a given hermeneutic situation. If we consider this point seriously, the material setting forms not only the context of interpretation but is an active medium in this process. The current circular scheme of interpretation between an interpreter and a confronting story does not distinguish between a printed book and a visit to a museum in the delivery of the message, and thus it misses a material dimension of interpretation.

Without accounting for the active role of technology in the process of interpretation, the account of the hermeneutic circle could not fully address the goal and scope of the human appropriation of technologies. What seems necessary is an account of hermeneutics that is sensitive to the material setting of interpretation. With this in mind, I turn to the field of material hermeneutics and, more specifically, to the postphenomenological account of technological mediation of Ihde and Verbeek.

Accounting for the role of technologies in interpretation

Since the introduction of information and communication technologies in the 1960s and 1970s, the hermeneutic approach has developed in scope. In particular, the works of Dreyfus (1972; 2001), Borgmann (1984; 1999), Ihde (1979; 1990) and Capurro (2010) have advanced the field of hermeneutics beyond the interpretation of text and have contextualized human interpretation within an increasingly technological environment.

Hubert Dreyfus (1972) highlighted the importance of information technologies in producing the contexts and practices from which people draw knowledge. However, information technologies such as computers and the Internet inevitably enable a divide between the digital and the real, presenting “the worst of a series of asymmetric trade-offs” (2001, p. 106) between the virtual, the invulnerable and the detached and the body, the real, the concerned and the responsible. For Dreyfus, information technologies annihilate “vulnerability and commitment,” which are essential for interpretation and understanding, “necessarily eliminat[ing] meaning as well” (2001, p. 102).

Albert Borgmann (1984) also stressed the hermeneutic potential of technologies, particularly their capacity to enable or disable social practices. He considered technologies threatening to “focal things and practices:” for instance, when a microwave distorts the preparation and process of a family dinner. In his later work, Borgmann (1999), much like Dreyfus, emphasized the devastating practical consequences of information technologies for the process of understanding. In *Holding on to Reality*, Borgmann (1999) discusses the threat of “virtual ambiguity” that digital technologies produce, “a loosening of the

ties that should connect our celebrations with the real and entire context” (p. 230). For Borgmann, thus, a divide also exists between the “real” world of people and the virtual world of technologies. In their encounters, technologies present only a fractured context that prevents an event of common understanding and contributes to “the devastation and loss of meaning” (ibid., p. 230).

Don Ihde (1979; 1990), contrary to Dreyfus and Borgmann, did not focus on the negative role of technologies in understanding. Technologies, for Ihde, are not neutral means for human intentions; instead, they actively mediate how people experience and understand the world: “Technologies [...] should be regarded as means by which our perceptions and our wider experience are modified and transformed” (1998, p. 1). According to Ihde (1998), accounting for a mediating role of technologies in the process of interpretation calls for an introduction of “thing interpretation” (p. 8), “instrumental visual hermeneutics” (p. 177) and “a hermeneutics of things” (p. 187), or in other words, material hermeneutics (Verbeek, 2003), where reality appears as a technologically mediated product or image to interpret. It has fallen upon material hermeneutics to explore what the mediating potential of technologies signifies for the process of interpreting reality and knowledge.

Rafael Capurro (2010), inspired both by Heidegger’s and Gadamer’s accounts of the hermeneutic circle and by Ihde’s analysis of human–technology–world relations, produced an account of digital hermeneutics. This account, on the one hand, recognized the historical embeddedness of people, and on the other, the productive and transformative influence of the “digital code.” The interrelation of the two Capurro referred to as digital ontology:

[T]hings are (understood) as far as we are able to digitize them. Digital ontology is pervasive in the sense that it is not necessary that people adhere to it consciously. It has a tendency, as every ontology, to becoming apparently the only true perspective (2010, p. 38).

For Capurro, modern technology weakens people as the interpreters of the world: technology produces visible and invisible networks that people cannot fully control, and by participating in these networks, people lose their autonomy and become networked, interdependent subjects (2010, p. 36). In view of this, the task of digital hermeneutics is to understand the ontological role of technologies in the production of human subjects.

While this short account of the recent developments in hermeneutics is by no means exhaustive, it depicts an important shift: the acknowledgment of the presence and significance of technology in the process of interpretation. Dreyfus and Borgmann

consider technology alienating and a hindrance to understanding. However, they do not specify how to identify a place for the increasing presence of technologies in the interpretative frameworks of people. Capurro, on the other hand, withdraws from normative valuations and instead stresses the ontological nature of technologies, thereby reducing the productive role of people in the process of interpretation. Ihde's account of technologies as mediators seems to provide an encompassing and non-reductionist view of the role of technologies in interpretation. It stresses the productive, interdependent capacities of both people and technologies and thus presents an interesting avenue for a closer exploration in view of our pursuit to understand the human appropriation of technologies.

Postphenomenological inquiry into interpretation: Ihde and the material hermeneutics

Don Ihde (1990; 1993) analyzed the relations between people, technologies and the world within the framework of postphenomenology. This framework builds on phenomenology in exploring the lifeworld of people but also extends it further to account for the "historical changes in the twenty-first century" (Ihde, 2009, p. 5). These changes refer to the ever-increasing intertwining of human lives with technologies. Postphenomenology suggests that human-world relations are not straightforward but that technologies play an active mediating role in how people perceive, interpret and act in the world. To this end, the framework aims "to probe and analyze the role of technologies in social, personal, and cultural life" (ibid., p. 25) and how they co-shape the reality of people. Within the framework of human-technology-world relations, Ihde delegates the domain of interpretation to hermeneutic relations.

Ihde (1990) distinguishes four types of human-technology-world relations, which are designated to analyze how technologies mediate human existence in the world: embodiment, where a technology-in-use disappears from view and becomes a transparent counterpart to the human experiences of the world (e.g., a pair of glasses); hermeneutic relation, where a person interprets the world through a technology (e.g., a thermometer); alterity, where a person interacts with a technology to access the world (e.g., a cash machine); and background, where technology forms a silent background of human experiences and becomes noticed only when broken (e.g., air conditioning). Within this framework, the relation most pertinent to the study of appropriation is the relation of hermeneutics, schematically represented as "human $\rightarrow$ (technology-world)" (Ihde, 1990). However, as I will further explain, this does not suggest that interpretation is the exclusive domain of the hermeneutic relation.

For Ihde, technologies are "perception-mediating and perception-transforming devices" (1998, p. 185). Ihde proposes the thesis that perception originates within interconnected yet different "bodies:" "Body One" and "Body Two." *Body One* refers to the sensomotorial physical body, or a perceptual bodily awareness, "a being-here, located, sensory being with specific styles of movement" (ibid., p. 89). *Body Two* concerns a lived, social body enriched with the historical and cultural frameworks of interpretation, prior perceptions and awareness. Examining perception through two bodies mirrors Ihde's earlier conceptualization of perception as consisting of both the micro and macro levels (Ihde, 1990). Ihde's combined view on perception would regard microperceptions as pertaining to the perceptual bodily awareness of Body One, and macroperceptions to the culturally and experientially informed Body Two. Interpretative activity depends upon the dynamic interrelation of the two bodies, both sensorial micro- and cultural macroperceptions.

As briefly mentioned in the preceding section, Ihde suggests expanding hermeneutics from the predominantly textual domain to also include the material one, whereby material hermeneutics "gives things voices where there had been silence, and brings to sight that which was invisible" (Ihde, 2005). Ihde gradually expands the scope of material hermeneutics from predominantly comprising imaging technologies that visualize meaning and knowledge (1998) to including any material artifacts as material culture that reveals or reconstructs knowledge, supplementing and balancing textual hermeneutics (Ihde, 2005). With this, Ihde suggests that "technologies operate in hermeneutic ways" (ibid.), revealing or communicating some meaning and thus participating in the co-production of knowledge.

Relating such a broad definition of material hermeneutics to the earlier fourfold scheme of human-technology-world relations means that every one of these relations can be viewed from the angle of material hermeneutics. The hermeneutic relation would explicitly review the technological mediation of interpretation. The embodiment relation would inquire into how the person reveals herself to the world and the world to her through incorporated technologies. The alterity relation with hermeneutics in mind would be enabled when the technological design communicates certain practices with this technology. Finally, the background relation would uncover the silenced blending of technologies with our environment. In what follows, I focus on hermeneutic relations as dealing explicitly with the process of interpretation, bearing in mind that all four relations incorporate the material hermeneutics angle.

The hermeneutic relation also represents another caveat to Ihde's hermeneutics, which is typical for all four types of human-technology-world relations: while technologies mediate how people relate to the world, it is unclear how the mediated world finds its

way back to people. Or, specified in terms of the hermeneutic relation, while technologies mediate how people perceive and interpret the world, it is unclear how the cultural body can subsequently incorporate the mediated world. When technologies mediate what appears to us as real and co-shape our object of interpretation, the mediated interpretation cannot go unnoticed for the reference schemes in our macroperception that embody all lived experience and prior awareness. If the material hermeneutics of Ihde is to be of help to understanding the dynamics of technological appropriation, then the linear scheme in human–technology–world relation seems problematic, particularly in the domain of interpretation.

In his 2005 book *What things do?*, Peter-Paul Verbeek steps further in postphenomenology by asserting that people and technologies co-constitute each other. Verbeek (2005a, 2011) has further conceptualized and developed the mediating phenomenon of technologies to highlight that no pre-given subjects exist who act upon the passive objects in the world. Verbeek stresses that the subject and object of mediation are mutually constitutive and co-shape each other: “What the world ‘is’ and what subjects ‘are,’ arises from the interplay between humans and reality” (2008, p. 13). Moreover, the technological mediation approach highlights the active role of both people and technologies in the construction of reality: “[M]ediation can be seen as an event in which competing perspectives are disclosed simultaneously, constituting the human perceiver not as a neutral observer but as an active editor of reality” (Verbeek, 2005b, p. 1). Applied to Ihde’s material hermeneutics, the co-constitution thesis suggests that instead of linearity in human–technology–world relations, a circular relationship of co-constitution comes to the fore.

The material hermeneutics account, then, would treat the process of interpretation not as a direct encounter between a person and the world but as a necessarily technologically mediated one, where all three parties are active in the process of interpretation. Verbeek’s development of the co-constitution thesis adds to the material hermeneutics account the principle of circularity, whereby not only does a person co-shape the world through technologies, but the mediated world always returns to the user, adapting their physical and sociocultural perceptions. It seems that the material hermeneutics account provides some answers for understanding how people appropriate technologies, by both acknowledging the active role of technologies in the process of interpretation and by treating the overall process as a dynamic one. I closely examine this presupposition in the following subsection.

Relating the material hermeneutics account to the human appropriation of technologies

The study of the human appropriation of technologies originates in the field of postphenomenology and, as such, shares its core insights and presuppositions. Most importantly, the role of technologies in the process of interpretation is foregrounded, with technologies as active mediators. Although, as mentioned above, the dimension of interpretation is present in all four human–technology–world relations, the hermeneutic relation explicitly focuses on meaning-making (Ihde, 1990). This appears to explain how the constitution of meaning flows from the human to a particular technologically mediated situation in the world, where the world never appears to people directly, only as being technologically mediated. As such, the hermeneutic relation is of particular interest for the appropriation study.

To synthesize the insights of Ihde (1990; 1998) and Verbeek (2005a) into an encompassing material hermeneutics account for the appropriation study, I continue with the example of an e-book from the preceding subsection (developing a principle which would also hold for any screen-free technology). Figure 2 below schematically represents Ihde’s hermeneutic “human → (technology-world)” relation (1990), overlapped with Verbeek’s co-constitution idea (2005a), in the case of an e-book.

Figure 2. Visualization of the material hermeneutics in the case of an e-book

In this figure, a person (Human, H) wants to learn about world events (World, W) through a story in an e-book (Technology, T). To mirror Ihde’s hermeneutic idea and learn about world events, a person must “read” them through and from a technology, an e-book in

this case. The world appears to the reader not directly, but via text, a (small) screen and the buttons and overall materiality of the e-book. As such, the world, in Ihde's words, appears as "framed" (1998, p. 91) because "what is presented is presented as already distinct from ordinary or lived-bodily space" by virtue of "limited and selected-out *framing* of the image presentation" and "an on/off presentation" (p. 91, original emphasis). Therefore, the e-book alters the perception of the reader, because it simultaneously reduces the sensory experience by framing the world through its particular design and modes of presentation, and magnifies it, by allowing access to the world that is not available to the naked eye while sitting in a chair at home.

Of equal importance for the appropriation study is Verbeek's co-constitution thesis (2005a), which suggests dynamics in the process of interpretation, not only from the human to the technologically mediated world but also back to the human. Such dynamics would disclose the co-shaping potential of all three parties in the process of the human appropriation of technologies. In Figure 2, the circular arrows around Ihde's "human → (technology-world)" relation (1990) represent Verbeek's co-constitution thesis (2005a), suggesting that the person reading the book, its author, via the content of the story, and the e-book itself co-shape the meaning of what is being presented and read. While the book suggests certain meaning to the reader, the reader's historical and cultural Body Two allows the interpretation of the story in view of prior perceptions, knowledge and judgments. The sensomotorial Body One, on the other hand, concerns the material context of the hermeneutic situation, noting the physical interaction with the book through its numerous buttons, screen, battery charge and weight, which also contribute to the process of interpretation. As such, awareness on both the sensomotorial level of Body One and the experiential, sociocultural level of Body Two appears productive. What is unclear, however, is how the prior awareness of the reader, particularly the sociocultural part, undergoes revision through the co-constitution process.

While Verbeek augments Ihde's material hermeneutics by acknowledging the continuous dialogue between the different counterparts of mediation, he does not explain how such a feedback loop functions. In the case of the sensomotorial Body One, a person can correlate the meaning of the read with the experience of the world by physically participating in or witnessing certain events. It is less clear how the existing sociocultural frameworks of interpretation are reviewed in view of the technologically mediated hermeneutic situation. Hasse (2008) has inquired how, given the interrelated nature of micro- (bodily and physical) and macroperceptions (sociocultural, experience-based), material hermeneutics can embed the cultural context (p. 47). If micro- and macroperceptions together constitute a scheme of interpretation, what ensures the dynamic, reciprocal nature of sociocultural macroperceptions? When Verbeek (2005a) updates the nature and

the schematic representation of Ihde's human-technology-world relations, he integrates the unresolved issue of linearity in hermeneutic, just as in the other types of human-technology-world, relations.

If we seriously consider the human-technology-world co-constitution, then, while interpreting the world through technologies, technologies co-shape and mediate the prior awareness and understanding of people. Technology as a mediator enables different or new perceptions that join our macroperceptions to form a basis for further interpretive processes. For this reason, a person is not the same person and the world is not the same world when they find themselves in a technologically mediated hermeneutic situation. Despite Verbeek's co-constitution thesis (2005a), Ihde's hermeneutic relation fails to account for how the prior perceptions and sociocultural awareness of people are co-shaped with technologies. The framework of postphenomenology incorporates technologies in the interpretation process as mediators. However, by not explicating how the mediated world gets embedded in the perceptions of people, hermeneutic "human → (technology-world)" relations continue to be linear, despite the suggested co-constituting nature of their relations. This leaves the human side of the interpretation process as a static given.

In summary, the appropriation study inherits from material hermeneutics its inclusion of technology as an active mediator in the process of interpretation. Although this suggests the dynamic co-constitution of all the parties in this process, such a dynamism remains underexposed. As such, the human side of the interpretation process appears with a seemingly static fore-structure of interpretation, providing direction for the sense-making activity. It seems that an encompassing account of interpretation that would acknowledge the active role of both people and technologies in the process of interpretation, and the consequences of such a dynamic ensemble, is missing. The following section attempts to produce such an account, grounded in both Ihde's account of material hermeneutics and Gadamer's account of the hermeneutic circle.

4.3 Toward a hermeneutic lemniscate as a principle of technologically mediated appropriation

So far, I have established that neither Gadamer's account of the hermeneutic circle (1975/2004) nor Ihde's account of material hermeneutics (1990; 1998) can alone satisfy the ambition behind the appropriation process. Namely, neither explains in an encompassing manner the interpretative processes that underpin human understanding in an encounter with a (new) technology. I have also identified the need for an encompassing account of interpretation. The hermeneutic circle account highlights the productive nature of

the existing fore-structures of understanding in the process of interpretation and the prior conceptions and knowledge that both the subject and object of interpretation inevitably project onto each other. However, the hermeneutic circle does not account for the role of the material setup through and with which interpretation occurs. The material hermeneutics account acknowledges the mediating role of technologies in the process of interpretation but does not explicate how the mediated reality returns to the existing experiential and sociocultural perceptions of people. It seems that both of the mentioned interpretation accounts possess that which the other is missing. An opportunity presents itself to combine the two approaches in an attempt to produce an encompassing account of interpretation underlying how people appropriate technologies. For the purpose of continuity, I again refer to an e-book as an example.¹⁰

Considering the mediating role of technologies in the process of interpretation as well the productive nature of the historical horizons that each of the components in the process of interpretation inalienably possesses, a hermeneutic situation will resemble a combination of two hermeneutic circles, interrelated and always in flux. The structure of such an integrated process of interpretation would resemble a lemniscate, a figure-eight shaped curve (∞), consisting of three linking, interrelated components: human, technology and world. Figure 3 below suggests a visual model of such a lemniscate principle, applied to the case of an e-book.

Figure 3. The hermeneutic lemniscate in the case of an e-book

In the figure, the left icon represents a person attempting to understand that which confronts her, with all the existing fore-structures of interpretation grounded in a larger historicity. The icon in the middle represents an e-book, as a technologically mediating

actor in the interpretation process, which necessarily frames reality in a certain manner, suggesting certain perceptions and actions, while concealing others. Finally, the icon on the right represents the world event that confronts a person, in this case represented by a story in an e-book. The story projects certain meanings and perceptions onto the reader that the reader must interpret in the dynamic process of pivoting between her existing structures of interpretation and the projected meaning of the story, always passing the e-book as a mediating link between the two.

The hermeneutic lemniscate above outlines the hermeneutic situation that confronts the reader. A fusion of horizons, or the temporary stabilization of meaning, occurs when the process of interpretation passes all three counterparts in the process: the reader, the device and the world event represented in a story. Figure 3 essentially consists of two arrows: from the reader to the story through the e-book and from the story back to the person, again through the e-book. I have chosen to break the two arrows into four smaller ones to show the explicit mediating role of technology (here, the e-book) in the process. For instance, to access the story, the reader must interact with the e-book: turn it on, choose the desired book from the existing library, define the screen settings and determine whether taking notes is desirable (the upper left curve of the lemniscate). The e-book then projects the reader's specified preferences regarding the presentation of the story onto the selected book (the lower right curve). Together with these preferences, the story itself carries specific messages, meanings and perceptions that it projects onto the reader (the upper right curve). The story, however, appears to the reader as framed not only by her own preferences and the meaning that the story suggests but also by the specific material design of the book: the size of its screen, buttons, battery capacity and connectivity to the Internet, which together shape the reading experience and the productive context for the interpretation process (the lower left curve). This going back and forth between the initial query of the reader, the technological mediation of the e-book and the story, representing certain events in the world, constitutes the fusion of the horizons represented by each of these parties, denoting a sense-making activity leading to a temporary understanding. With this preliminary understanding, both the projective and practical appropriations of the e-book stabilize until they can no longer accommodate the changes in the environment of the person, the technological setup or the person herself. When this occurs, the preliminary projective meaning or the defined practical use of a technology will mirror these changes, with the appropriation mode changing accordingly. As such, the appropriation process never finishes, mirroring the fluid interrelated model of the lemniscate elements.

Note that the fact that a technology finds itself in the middle of the lemniscate does not attribute it with a central, primary place in the process of interpretation. On the contrary,

¹⁰ Please, refer to the chapters that follow for an application of the appropriation model in the case of other technologies, such as SST+ (Chapter 7) and Google Glass (Chapter 6).

the fluidity of the lemniscate ensures that none of the parties to the interpretation process occupies a central role because all three must contribute for a temporary understanding to occur. This also means that the human being is not the default point of entry into the lemniscate, as suggested by Gadamer. One could conduct a hermeneutic study beginning from a technology (for instance, to discover its embedded script(s) and affordances) or from the specific sociocultural event or context (for instance, to understand how such a situation becomes transformed before it reaches the people). Because the goal of the appropriation study is to understand how people make sense of technologies, it would be logical to begin from the human side. However, the appropriation study, or any hermeneutic study with the lemniscate as the structure, would always simultaneously inquire what the technology and the world situation project and how this echoes the existing structures of understanding of the person in question. The three parties are never separate but are always engaged together in the process of interpretation. What one examines is a specific hermeneutic situation that must be studied from all sides, regardless of the initial entry point into that situation. As such, the human, the technology or the world are not the center of the hermeneutic lemniscate.

The continuity and fluidity of the lemniscate follow from Gadamer's suggestion that every interpretation is necessarily temporary, for as soon as a stabilization of meaning occurs, it becomes part of the fore-structure of understanding for future interpretations. In parallel, new knowledge of the world and its active context continuously question established meaning. Note also how the lemniscate structure of interpretation links to the ideas in the technological mediation approach, suggesting that perception and action are intimately linked (e.g., Ihde, 1990; Verbeek, 2005a). In the lemniscate, too, the perceptions the reader receives in an encounter with a technology form the background for further action, prompting either going along with the suggested meaning or disproving it. When absorbing a knowledge conveyed through the book, the reader always correlates the incoming information with the prior conceptions and experiences that underpin her fore-structures of understanding. In parallel, the physical awareness of the world also plays a role, for example, regarding how the statements of the book mirror the present situation in the surrounding world and the views of not only the reader but also of her family and friends, both of which require action from the reader. This can inspire a new meaning of the book, relying on the effective history of the reader, the mediating capacity of the e-book and the suggested narrative of the book.

I can now refer above considerations regarding the role of people and technologies in the interpretation process to the starting point of this chapter, namely, the human appropriation of technologies. I suggest considering the hermeneutic lemniscate as a structure that enables the process of appropriation. The continuity and fluidity of the

lemniscate would represent the human, the technological and the world as the active co-shaping parts in the process of interpretation. The lemniscate refines Gadamer's hermeneutic circle account by foregrounding the active role of technologies in the process of interpretation and appropriation. On the other hand, the continuity and fluidity of the lemniscate also clarify Verbeek's co-shaping idea, explaining why the interpretative structures of human understanding are never static and how the technologically mediated world returns to people. Namely, through the effective histories of people, the initial meaning of a technology remains in flux. As soon as a preliminary meaning is established, it becomes the background for further interpretation, triggered by the new information about the device, new or possible contexts of application and the experience generated in using the technology. The process of appropriation is never finished. It is the effective history of a person, together with the productive context and the technological mediations, that ensure multiple possibilities for interpreting the same technology, and consequently, devising several courses of action.

Throughout the chapter, I have referred to the book and the e-book as examples for devising the idea of the lemniscate and its structure. However, the principle of technologically mediated interpretation, presented here as the hermeneutic lemniscate, holds true for many other technologies that increasingly accompany people in their everyday lives. Consider how smartphones, activity trackers, computers and virtual/augmented/mixed-reality goggles help people to gain the most intimate knowledge of themselves and the world around them. Or how the ultrasound, prenatal genetic diagnosis or SST help revise the longstanding moral ideas and habits that people possess. This is not to say that technologies somehow determine what people ultimately know or do; rather, they mediate how people perceive and understand the surrounding world and themselves within it. With this, technologies act as an inalienable counterpart of human life that people must acknowledge and account for. In Chapters 6 and 7, I apply and refine the hermeneutic principle developed for the appropriation study in the case of both digital and non-digital technologies.

With this overall principle of interpretation in mind, I now refer it back to the aim of this chapter, namely, how the human appropriation of technologies can help to explain value dynamism mediated by technologies. I explore this question in the following subsection.

4.4 The hermeneutic lemniscate and the value dynamism

The overall ambitions of this dissertation are to understand how technologies mediate the values of people, inquire into the dynamics of this process and understand what

enables and conditions it. I suggest that the hermeneutic lemniscate as a principle of interpretation behind the appropriation of technologies holds some answers to these questions, particularly in shedding light on the phenomenon of value dynamism.

In Chapter 3, I have distilled the technological mediation perspective on values as relational and dynamic, both guiding sociomaterial practices and being enabled by them. A value also denotes what is important to a person, a concern or “a consideration in influencing choice and guiding oneself and others” (Blackburn, 1996, p. 390). A norm would denote a rule that governs a behavioral pattern (e.g., the etiquette that evolved around Google Glass). In the context of the technological mediation approach, values and norms never exist in a vacuum but are instead enacted in the particular human practices and encounters that provide them with contextual meaning. As such, the general meaning of a value and its contextual manifestations belong to the interpretative fore-structures of human understanding, which represent historicity as the larger sociocultural embeddedness of a person and the accumulated experiences and knowledge of a particular individual. Positioning values in the effective fore-structures of understanding suggests that the development of their meanings also belongs to the structure of interpretation. The hermeneutic lemniscate can be of help here.

Every situation or practice in which a person finds herself has a hermeneutic component, whereby a person must comprehend what it is that confronts her and determine the appropriate course of action. When a person encounters a new technology, either in practice or in the representations of others, this also constitutes a hermeneutic situation. As suggested above, values belong to the effective fore-structure of human understanding. I do not intend to identify the exact locus of morality within the larger scope of effective history, because such an analytic exercise would deprive values of their defining relatedness. Although Gadamer did not explicitly discuss the nature of values, he did acknowledge that within the larger history that forms the fore-structure of understanding, moral ideas and beliefs are intertwined with all other elements that help us interpret the world: “To distinguish between a normative function and a cognitive one is to separate what clearly belong together” (Gadamer, 2004/1975, p. 309). Values, entangled with existing perceptions, knowledge and experience, allow a person to always project pre-judgments and initial meaning onto the unknown that confronts her (e.g., a technology).

To understand the attribution of meaning in relation to values, we can approach this process in the context of a hermeneutic situation. One always initially casts her native normative context and routines onto a new technology in its actual or projected use context, with a view of her specific goals or background. However, the technology in question would also always suggest certain values and normativities by means of its design

and the intentions of its stakeholders. As such, the hermeneutic lemniscate would surface the technologically mediated encounter between multiple values belonging to the person, technology and sociocultural embedding.

For instance, consider the earlier example of the ultrasound examination during pregnancy that Verbeek (2008) has used to suggest that technologies mediate morality. If we examine it from the perspective of the lemniscate, in this single activity, several normativities are foregrounded. The hospital setting, where the ultrasound is conducted, may suggest care as the overall value of the practice. The parents are concerned with the well-being of the mother and future child. The ultrasound itself may contextualize care into the value of discovery or the value of knowledge, offering prospective parents to know not only the sex of their future child but also whether he or she might have a genetic condition such as Down syndrome. Moreover, the ultrasound provides information in a very specific and detached manner, suggesting to the parents a perception of their child also as a patient, with several possibilities of care. The parents might not necessarily want to know whether their future child might have a genetic condition. However, they know that the ultrasound makes this possible and are thus forced to answer existential questions of how to further care for the yet unborn child that could also result in deciding not to keep the child. This example demonstrates how in the dynamic back-and-forth process of reviewing the projected values of the parents, suggested values of the context at hand, functions and design of the ultrasound, new concerns become visible alongside the initial moral beliefs of the parents. It also shows how the values initially projected by the parents are revised in view of what the ultrasound reveals (e.g., developing the value of care into deciding whether to keep the child and accepting the consequences of this decision). The hermeneutic lemniscate shows how a specific meaning of a value and new normative concerns take shape in the hermeneutic situation with the prospective parents, ultrasound and hospital setting as active parties in the interpretation process.

The lemniscate can also shed light on the other example I referred to in the beginning of the chapter, namely, how human values regarding cigarettes have changed over time. The productive history of people at the background of interpretation would account for accumulative experiences with this technology in the society and consider scientific findings that have become available since 1950s explaining the damaging properties of nicotine. As such, in the 1950s, the value of care projected upon a cigarette did not meet resistance in the context of hosting a party and offering a cigarette to one's guests. However, doing the same in 2019 would foster a value of harm rather than care in view of the shared accumulated knowledge on the properties of cigarettes. On the other hand, a smoker offering a cigarette to another smoker could still invoke the values of care and

civility, because they would assume a shared acceptance of responsibility regarding the cigarettes.

What becomes apparent through these examples is that human norms and values are prone to dynamism in a similar way as prior conceptions and pre-judgments in the process of interpretation. Throughout appropriation, people develop a relation to technology and technological mediations. Here also, the specific manifestations of values develop or new ethical concerns come to the fore. For instance, a technology can reveal what is important to people and make it available for reflection, particularly by enabling options that contradict the beliefs of certain people (for instance, in the case of euthanasia). Some technologies can also re-articulate existing norms. For instance, consider how cellphones and Internet connectivity have re-shaped the norms of work, making constant availability a norm and transforming the idea of static work places into being time-and-place flexible. Certain technologies can also foster new moral understandings when no similar technology has been previously available, as in the case of Google Glass and the new social etiquette it enabled (Sintumuang, 2013). Finally, a new technology can also re-affirm existing moral views and values, for instance, the electric bicycle enables cycling, regardless of age, and minimizes effort (although one still could call an e-bike disruptive to the moral landscape of traditional bikers, because an e-bike can move with high speed and low sound).

Considered in the framework of the hermeneutic lemniscate, these examples illustrate how the moral landscape of people is dynamic and responsive to their technological practices. The lemniscate model can explain the interpretative processes at work that enable such a dynamism, namely, the fluid and continuous interrelation between the productive fore-structure of human interpretation, the technology at hand, with its particular mediations, and the practice or situation within which a human–technology encounter takes place. Conceived as such, the hermeneutic lemniscate sheds light on the intimate relationship between the human appropriation of technologies and technologically mediated value dynamism, where the latter is an inalienable dimension of the former.

4.5 Conclusions

This chapter has presented an account of the human appropriation of technologies and has aimed to clarify its role in the technological mediation of morality. I preliminarily defined the concept of appropriation as the sense-making activity in an encounter (first or repeated), with a technology as an object of interpretation, and examined Verbeek's

suggestion (2015) that it is during appropriation of technologies that the values and norms of people take shape and undergo reconceptualization.

First, I defined the concept of appropriation from the technological mediation perspective against the same concept existing in the STS field of domestication studies. Although the two concepts share similar ambitions, the concept of appropriation in the technological mediation approach focuses on both the projective and empirical dimensions of the sense-making activity, favoring phenomenological micro-studies to large-group generalizations, as well as an inquiry into technologically mediated morality. Appropriation in the sense of domestication studies, on the other hand, interprets the concept as the first stage of “taming” the technology, with a focus on practice and a large-group audience.

Next, I attempted to provide a theoretical grounding of the appropriation concept by turning to its origins in the field of (post)phenomenology. Building on the scholarship of Gadamer (1975/2004) and his account of the hermeneutic circle allowed me to arrive at the circular motion of interpretation process. Here, the productive history of an interpreter and the phenomenon that confronts her enable the arrival at a temporary understanding that subsequently becomes embedded in the productive history of the interpreter and is subject to revision upon change in the initial hermeneutic situation. However, the hermeneutic circle account does not acknowledge the mediating role of technologies in the process of interpretation. Ihde's material hermeneutics account (1990; 1998) allows accounting for that shortcoming, acknowledging the active role of people, technologies and the surrounding world in the construction of meaning. Ihde's account, however, fails to explain how the co-construction of the subject and object of interpretation, as endorsed by Verbeek (2005a), takes shape. I have aimed to account for the productive role of technologies in the process of interpretation, while maintaining the active role of people as generators and enactors of meaning. This prompted me to suggest a principle of interpretation, whereby both people and technologically mediated reality attribute their meaning in an active dialogue, pivoting between different sociocultural horizons, mediated by technology. I subsequently suggested that such an interpretation resembles neither a circle nor a linear trajectory. Rather, it resembles a hermeneutic lemniscate that embeds the fluidity and continuity of the interpretation process, enabled by people, technologies and the world.

The lemniscate principle can help provide a deeper understanding of value dynamism because it takes seriously the technologically mediated nature of moral hermeneutics. I have suggested viewing the moral landscape of people as a part of the effective history that enables the appropriation of technologies. The lemniscate model allows distinguishing an inalienable hermeneutic dimension of the technological mediation of morality. In the

lemniscate, the productive history of people projects initial pre-judgments regarding a new technology and confronts the normativities of technology, enacted through its design and stakeholder intentions in particular practices. The interpretative process denotes an encounter and a revision of the initially projected values in the fusion of multiple horizons. In this process, the meaning of values temporarily stabilizes, whereby the initially projected values are either confirmed, revised or supplemented with new normative layers. The values at stake remain dynamic in view of the continuous process of interpretation that the ever-expanding fore-structures of human interpretation and contextual factors ensure, while being mediated by the technology at hand. The technologically mediated hermeneutic lemniscate mirrors all of these insights in its fluid and continuous movement between the human, technological and world parties of the interpretation process.

Moreover, technological appropriation can result in choosing not to use a technology in case it violates existing value commitments. One could suggest that in this case, technological appropriation has failed. However, arguing this would appeal to the meaning of appropriation in the sense of practice-oriented domestication, as reviewed above in Section 4.1. As suggested earlier, the appropriation of a technology includes not only a practical but also a projective dimension. From the perspective of appropriation as a technologically mediated hermeneutic activity, appropriation never fails, for it always produces some meaning, or some perception of a technology that consequently informs action. The practical activities involving technology, be they personal or of other people, inform its projective appropriation, allowing people to use that technology as they deem fit, revise their use in view of new insights or not use it at all. Alternatively, a decision not to use a technology can be reached only upon a projective appropriation in view of its physical absence, informed by technological visions, previous fears or a considered judgement.

Now that we possess a sense of what the concept and structure of appropriation entail, as well as the initial theoretical understanding of the technological mediation of morality, more practical questions arise. How can one conduct a study of the human appropriation of technologies? How can one systematically trace technologically mediated morality-in-the-making? Following the (post)phenomenological dedication to empirically informed micro-level inquiries, an appropriation study would aim to analyze the construction of meaning with regard to new technologies across relatively small groups of individuals. It would also need to comprise a thorough and detailed inquiry that would allow the methodological tracing of the bottom-up construction of meaning across the group to allow for a cautious, empirically grounded general logic of sense-making to come forth with regard to the particular technology at hand. The following chapter sets out to identify and analyze such a method.

Chapter 5.

**Identifying a method for studying the human
appropriation of technologies:
Interpretative Phenomenological Analysis**

5.1 Attention to language in examining the appropriation process

I have, by now, theoretically established that value dynamism can be studied with the lemniscate through the human appropriation of technologies. I now wish to empirically study how value dynamism manifests itself. In other words, I want to study the lemniscate and the material and moral hermeneutics intertwined within it. This suggests a more complicated framework than that used by either Ihde or Gadamer. It is no longer a circle or a unidirectional relation but a lemniscate with three active counterparts. The question that confronts me now is how to study, empirically and systematically, the complex interrelation of people, technologies and their environment in the lemniscate during the process of appropriation.

A method to study how people appropriate technologies must be able to identify how people incorporate the technology in question into their daily lives and interpretative frameworks, or how they attribute it with meaning. It must simultaneously demonstrate how, during the appropriation process, certain normative concerns crystalize, whereby the entangled norms and values are confirmed, challenged or develop new facets. In short, a method for an appropriation study must provide insight into the dynamism of the moral landscape of people, enabled by the technology in question.

The technological mediation approach, standing on the shoulders of (post)phenomenology, concerns itself with “mak[ing] micro-scale analyses of the mediating roles of technologies in the human-world relations” (Rosenberger and Verbeek, 2015, p. 13), examining “the character of the relations human beings have with [a] technology and the ways in which it organizes relations between human beings and the world” (ibid., p. 14). To conform to these goals of the technological mediation study, qualitative empirical methods are the most appropriate. The challenge is to choose a suitable method among the many that exist in the field of qualitative empirical research.

The method of the study co-shapes its process and results and must therefore share at least some of the theoretical foundations of the study. Commenting on the choice of a method for a study, Smith, Flowers and Larkin (2009) note that “This is not so much a matter of choosing ‘the tool for the job’ [...], but a question of identifying ‘what the job is’” (p. 43, original emphasis). Because an appropriation study is hermeneutic in nature, Gadamer can once again provide insight regarding the search of suitable methods. In particular, his emphasis on the intimate link between language and conversation, on the one hand, and the process of interpretation, on the other, can serve as a starting point.

In Gadamer’s hermeneutics, language is critical for understanding: “It is language that is constantly building up and bearing within itself this commonality of world-orientation” (Gadamer, 2006, p. 17). Reality becomes intelligible to us through language, where it functions as a medium, or a lens that sharpens the perception of reality and brings it into focus. In particular, it is through speaking with others or engaging in a mental conversation with the self that a particular meaning comes to being.

At the same time, language, belonging to the effective history of the interpreter, not only mirrors reality but also necessarily co-produces it, expanding and distorting manners of perceiving something. As such, the use of language in attempting to interpret reality is not neutral:

Speaking is the most deeply self-forgetful action that we as rational human beings perform. [...] Language contains a self-protecting and self-concealing power, such that what happens in it is protected from the grasp of one’s own reflection and remains hidden in the unconscious. When one has recognized both the revealing and the self-concealing nature of language, then one is obliged to go beyond the dimensions of sentence logic and press forward to wider horizons (Gadamer, 2006, p. 26).

Therefore, for Gadamer, to understand how one reaches an understanding, how the act of interpretation occurs necessitates reflecting on the use of one’s language and accounting for its mediating properties in the course of a conversation.

The goal here is not to perform a thorough linguistic analysis but rather to be aware of how a particular linguistic tradition actively participates in the sense-making process. This requires focus primarily on what is being said and in which context, what metaphors and comparisons are being invoked to communicate a meaning and the emotional tone of the speaker. Reflecting on the conversation in this manner allows the nuances in the sense-making activity to be contextualized and brought to the fore, which is essential for the study of the human appropriation of technologies.

Verbeek (2015), when commenting on possible empirical methods to capture how people appropriate technologies, suggested that the method of Conversation Analysis (Sacks, 1992; Edwards and Potter, 1992; Te Molder and Potter, 2005) can help capture how, through conversations, people construct a world around them and the specific meaning of technologies in it. Accounting for language and conversation insights, the broader method of Conversation Analysis and Discursive Psychology (CA&DP) is thus a possible candidate for an empirical method for an appropriation study. It was developed by Derek Edwards and Jonathan Potter (1992) to methodologically study conversation and its implications

for social interactions and daily life. The following section examines the method in more detail, as well as questions its fitness as a method for the appropriation study.

5.2 Exploring the Conversation Analysis and Discursive Psychology method

The CA&DP method reveals a morality of everyday life through its focus on how people talk and non-verbally interact, through the sequential and rhetorical analysis of a conversation (see Sacks, 1992; Edwards and Potter, 1992; Potter, 1996; Te Molder and Potter, 2005; Te Molder, 2008). Based at the intersection of sociology, ethnomethodology, linguistics and social psychology, the method emphasizes the interaction patterns that underlie human conversations (Hutchby and Wooffitt, 2008). It demonstrates how such patterns shape the legitimacy of discussion points, as well as how, through these interaction patterns, people attribute to themselves, and distribute to others, epistemic rights and responsibilities.

Human talk is perceived as action-oriented, where participants, with each utterance in a conversation, perform certain actions (e.g., attributing responsibility or praise). As such, *how* people talk—how they take turns speaking, which words or utterances they use, the tone of their voice and their pauses and sighs—are considered by the CA&DP method as tools for achieving specific goals in an interaction. In this sense, human talk is not neutral but is deeply normative, because it involves issues of identity and responsibility.

At its core, the CA&DP method explores human entitlement to speak. For instance, turn taking in a conversation, agreement on the distribution of roles and the determination of who is accountable for attributing meaning and interpretation to the matter at hand all shape specific interaction patterns in the course of a conversation. The CA&DP method reflects on how such interaction patterns constitute and are constituted by the object of the conversation, suggesting that both a conversation and the knowledge at its outcome are deeply normative enterprises (Myers, 2004).

More specifically, the CA&DP method aims to recognize the formative and moralizing nature of interaction patterns in a conversation. This goal is closely linked with recognizing and reflecting on specific epistemic rights and responsibilities in a conversation that are concerned with the actual and expected knowledge of the speaker and the other parties in the conversation (Haen et al., 2015). The CA&DP method explores how such epistemic rights and responsibilities co-shape a conversation and how participants attribute such rights onto themselves and others, contest them or agree with them. This involves the

retrospective and prospective attribution of guilt, blame, praise, accountability and obligation with regard to the object of the conversation (Heritage and Raymond, 2005).

As Haen and colleagues (2015, p. 167) note, epistemic rights and responsibilities closely relate to the identity of a person and their entitlement to speak, which ultimately influence the actions of people. The CA&DP method approaches a conversation sequentially, examining how the participants in a conversation treat what is being said. Furthermore, it explores how alternative interpretations of reality (or of a specific object of conversation) are produced to counter those produced by other participants. The areas of interest here concern determining who is justified in claiming certain knowledge, how people hold each other accountable, how agreement or dissent regarding the distribution of roles occurs in a conversation and other manners through which people coordinate the interaction process (Te Molder, 2008). Reflecting on such interaction patterns reveals the implicit morality of a conversation and points to the non-neutrality of the consequently produced knowledge claims.

In this regard, empirical material for reflecting on the nature of a conversation includes naturally occurring interactions in the ordinary context of human lives. As opposed to prearranged interactions—experimentally designed and set up (e.g., in interviews)—naturally occurring interactions present a richer and more untainted background to study “talk-in-interaction,” “how sequences of actions are generated” (Hutchby and Wooffitt, 2008, p. 12) or how a conversation is achieved in practice. To this end, CA&DP analysts record the naturally occurring interactions and thoroughly transcribe them using a special transcription system (e.g., indicating time gaps, pauses, overlapping utterances, concurrent speech, word cut-offs, animated tone, intonation shift, etc.). The analysts then perform a sequential analysis, or “a next-turn proof procedure” (ibid., p. 13), to understand the properties of a conversation, its order and its structure as a process of social accomplishment:

This is what underlies the focus on sequences: throughout the course of a conversation or other bout of talk-in-interaction, speakers display in their sequentially ‘next’ turns an understanding of what the ‘prior’ turn was about. That understanding may turn out to be what the prior speaker intended, or it may not; whichever the case, that itself is something which gets displayed in the next turn in the sequence (Hutchby and Wooffitt, 2008, p. 13).

As such, the CA&DP method is less concerned with what participants say, or the descriptive content of the conversation. Rather, in this method, center stage belongs to

the interactional nature and form of the conversation that specific words help to achieve (Te Molder and Potter, 2005).

This brief overview of the CA&DP method allows the examination of its fitness for the study of the human appropriation of technologies. As inferred from Gadamer's hermeneutics (2006), the appropriation study has close affinity with language, and primarily with sense-making activity. The CA&DP method suggests itself as a natural candidate for an appropriation study due to its focus on human talk and conversation. However, as I explain below, its specific focus on the interactional nature of conversation ultimately causes it to diverge from the goals of the appropriation study.

Firstly, although it does focus on human conversations, the true focus of the CA&DP method is the morality of the conversation itself, or *how* people speak, instead of *what* they are saying: "[T]he focus is not on individual cognitions (intentions, motives, attitudes) but on understanding how the talk is treated by others (as blame, compliment et cetera)" (Haen et al., 2015, p. 168). The appropriation study, conversely, is concerned with the descriptions, opinions, attitudes and biases of a specific individual rather than the interactional goals of a conversation. The content, as such, is of greater importance for the appropriation study than the form or structure of what is said.

Secondly, and stemming from the preceding observation, the method for the appropriation study need not limit itself to the naturally occurring interactions of people. Although sense-making can occur in groups, it is not restricted to them and can occur in individual encounters with a researcher, for instance, during interviews. Particularly because the object of the appropriation study is frequently a new or emerging technology that has not yet entered the market, or has only limited market exposure, naturally occurring interactions either using the technology in question or discussing it would be rare to encounter. In such circumstances, fostering someone's thought processes, opinion making and reflection on a new technology would require invoking their proactive agency, by confronting the person with carefully designed information prompts, scenarios or moral provocations. In this sense, staged interactions take precedence over naturally occurring ones, with open interviews (carefully designed to limit potential bias) a likely empirical background.

In view of these defining features of the CA&DP method, I must disagree with Verbeek's (2015) endorsement of CA&DP as an empirical method to study appropriation. Findings of CA&DP would not fully satisfy the goal of the appropriation study. Concerned with the sense-making activity of specific historically and culturally situated people, the content of and interpretations during conversation are of paramount importance for

the hermeneutically oriented appropriation study. However, this now leaves me with the challenging task of identifying which method would fit the goals and scope of my study. I now turn to another method at the intersection of psychology, hermeneutics and linguistics, which is more content focused and could potentially satisfy the demands of the appropriation study, namely, IPA (Smith et al., 2009).

5.3 Exploring the Interpretative Phenomenological Analysis method

Originally emerging from the field of psychology in the 1990s, IPA was meant to contrast with the discursive methods of research that were dominant at the time. Discursive methods focused primarily on how research participants construct accounts of themselves and their experiences in everyday talk. The CA&DP method, upon which I elaborated in the previous section, is a notable example of the discursive method. According to Smith (2011a), the prevalence of discursive methods downplayed the necessity of studying the content of what is said. The IPA method suggested focusing on the content of how people attempt to make sense of various phenomena, and it offered a systematic method to do so. Thus, IPA developed to bring the sense-making process to the forefront of research.

In this section, I first briefly introduce the method, its goals and its theoretical foundation before proceeding to describing its analytic process in more detail. Such an extended description of the IPA method will allow me, in the following section, to arrive at an informed decision regarding its fitness for the technological appropriation study.

The foundation and goals of Interpretative Phenomenological Analysis

As a method, IPA finds theoretical grounding in phenomenology, hermeneutics and idiography¹¹ (Smith, 2011a, b). Phenomenologically, IPA focuses on the study of the lived, embodied experiences of people. Critically, IPA draws heavily upon Gadamer's hermeneutics, particularly his principle of the hermeneutic circle and the productive nature of biases in producing an understanding (Smith et al., 2009). Accordingly, IPA emphasizes that "there is no direct route to experience and that research is really

11 Idiographic research (e.g., Schwandt, 2007, p. 145) focuses on in-depth detailed studies of individual socially and historically situated cases, relying on the exact descriptions and experiences of the participant in trying to make sense of an event. Idiographic research methods include case studies, interviews and any other methods focused on holistic representation of the research participants. Idiographic research is often contrasted with nomothetic research, which focuses on large-scale research groups with a goal of generalization across broad populations (e.g., survey and questionnaire methods, quantitative research methods). Idiographic methods often belong to the domain of qualitative research, while nomothetic to the quantitative research.

about trying to be ‘experience close’ rather than ‘experience far’” (Smith, 2011a, p. 10). Furthermore, IPA is a hermeneutic activity, because it acknowledges that it is impossible to directly engage with the experience of people. A researcher is faced with a situation where she must attempt to make sense of the experience of which the participant is trying to make sense. For these reasons, IPA scholars refer to the research process in IPA as double hermeneutics, which clearly demonstrates how and whence the presented analysis is derived. This requires a detailed, close-up analysis of the rich experiential narrative of participants, resulting in balanced patterns of convergence and divergence across the research cases. By doing this, IPA manifests its idiographic commitment.

The “father” of IPA, Jonathan Smith, outlined detailed criteria and recommendations for a good IPA study (e.g., 2011a, p. 17–18, p. 24; 2011b), which should feature “depth of interpretation, sensitivity of analysis, the importance of particular utterances” (Smith, 2011b, p. 59) and demonstrate “what the data are, how the data were obtained, *and* what the data means” (ibid., p. 60, original emphasis). In-depth semi-structured interviews support this strong idiographic commitment of IPA to the detailed personal accounts of participants. Conducting interviews with a consequent rigorous analysis is a cornerstone of IPA. As Smith (2011a) notes, a successful IPA analysis must have “interpretative flair” (p. 23), whereas a good IPA piece, in general, “needs to be plausible and persuasive in terms of evidence presented to support the claims made” (p. 23).

However, the intensity and depth of individual experiences require that the scope of research must remain manageable. Here, IPA also draws on Gadamer, in that it favors a small research participant group with rich idiographic findings over a large group that would inevitably require the significant simplification of data. Gadamer’s philosophical hermeneutics favored in-depth study over generalizations based on large numbers, because it allows for situated knowledge regarding how a certain phenomenon manifests. According to Gadamer, “The individual case does not serve only to confirm a law from which practical predictions can be made. Its ideal is rather to understand the phenomenon itself in its unique and historical concreteness” (1975/2004, p. 4). The IPA method follows this ideology, and as a result, an IPA study is “an extended interpretative narrative, introducing and analyzing the experiential themes and interwoven with significant passages from participants’ extracts” (Smith, 2011b, p. 58). As such, top IPA papers have relatively small study samples, ranging from one to ten participants (Smith et al., 2009).

An IPA analysis denotes the developing sensibility of discerning sense-making in action and interpreting it according to participants’ lived experiences and proactive agency. As such, it is a hermeneutic exercise of *at least* two layers: an IPA researcher interpreting the interpretation activity of the research participants (Smith et al., 2009). In parallel, as the

discussions on appropriation in Chapter 4 indicate, the material setup of research provides additional layers for the interpretation process. For instance, how an IPA researcher captures the thoughts of the research participant (e.g., recording an interview with a phone or a professional recorder) also co-shapes her process of analysis, often simplifying it (e.g., presenting captured speech for later transcription) while also complicating the process (e.g., leaving the researcher to guess the parts of the recording that were less audible or interrupted, always maintaining the sufficient battery level of the device, etc.). The next step, the transcription of the recording, is also a hermeneutic exercise in itself, because it transforms the speech of the participant into readable words, often in a specific manner (e.g., describing the intonation, emotional tone or special circumstances of the interview, etc.). For this reason, I stipulate that IPA research is an exercise of *at least* double hermeneutics, where triple and further layers can be discerned upon inspection. However, the goal is not to discern and analyze such possible hermeneutics layers in any given IPA study; rather, the goal is to maintain critical awareness of the projective and material processes that inevitably underlie the process of interpretation.

Having outlined the philosophical and ideological foundations behind IPA as well as its ambitions and scope, I next examine the methodological procedures that make IPA a rigorous qualitative research inquiry.

The analytic process underlying Interpretative Phenomenological Analysis

A hermeneutic study into the sense-making activity of people, idiographic by nature, must include a thorough research and analysis procedure to structure the research process and create verifiable results for the public at large. This subsection presents a detailed account of the data collection and analysis that guide the work of IPA researchers.

An IPA study collects data in the form of semi-structured qualitative interviews from a relatively homogeneous group of research participants who are united by a certain shared experience or other shared features. Transcription proceeds verbatim, highlighting in text instances when the intonation changes or the participant laughs or pauses for a long time (such additions are useful for the analysis process). The IPA method searches for patterns of meaning that are shared by multiple participants, regardless of the particular nature of their lived experiences. To this end, it focuses on the particular to view the general: each interview is treated as a set of “particular instances of lived experience” (Smith et al., p. 37) that deserves close-up, detailed analysis to arrive at the idea of how, and by what, the sense-making process is triggered. In this regard, it is crucial to remain true to how participants express themselves, their choice of words and the terms used. As such, the development of emergent descriptions and themes in IPA is different from the coding

technique, dominant in social sciences. This also explains why the IPA method favors manual data analysis over data processing software (e.g., NVivo or Atlas.ti) (ibid.)

Being idiographic by nature, the results of an IPA analysis do not intend to be fully generalizable, which reflects the subjective nature of the analysis. The subjectivity in IPA analysis is the outcome of the double (triple, quadruple, etc.) hermeneutics underway in the study. It does not discredit the study, because the IPA method acknowledges it and identifies how the subjectivity of analysis emerges throughout the study. This subjectivity is a systematic product of the dialogue between the different levels of interpretation and is open for the reader to verify through both the researcher's analysis and excerpts of the participants' interviews. The multiple hermeneutic layers in the IPA study are what makes it "a reflective engagement with the participant's account" (Smith et al., 2009, p. 80).

Two core processes constitute an IPA analysis: moving from the descriptive accounts of participants to interpretative pieces; and gradually uniting particular patterns into shared themes across multiple participants, while retaining the commitment to the participants' choice of words (Reid, Flowers and Larkin, 2005). The iterative and inductive nature of analysis allows the two core processes to be implemented. It embodies the idea of the hermeneutic circle, whereby one can arrive at the whole only by pivoting between the parts. In IPA analysis, the researcher never considers a piece of the interview transcript in isolation but rather positions it against the overall transcript. This requires several rigorous readings of the interview transcript, usually beginning anew after completing the analysis. Such an iterative and inductive mode of analysis accounts for the details and nuances in the data and ensures that the final interpretative narrative remains true to particular lived experiences and mirrors their gradual unfolding.

To systematize the process of analysis in IPA, Smith, Flowers and Larkin (2009) suggest approaching it in *six steps*, each non-exhaustive, iterative and mutually informative: reading, initial noting, developing emergent themes, seeking connections among emergent themes, moving to the next case and seeking patterns among cases.

During the first step, *reading*, the researcher must understand the lifeworld of a participant by immersing herself into the collected data. This involves listening to the audio tape and transcribing but primarily reading and re-reading the transcription of the interview. This helps produce a preliminary view on how the narrative develops, identify richer pieces of the interview and identify potential contradictions in the participant's narrative. Ultimately, the phase of reading helps to move from generic accounts to specific perspectives, feelings and explanations.

Step two is *initial noting*, and in practice, it often accompanies the reading of the transcript. This is the most detailed and time-consuming stage, when the researcher writes down everything of concern to the participant and begins the interpretation process. Smith, Flowers and Larkin (2009) recommend leaving much space on the paper for note taking, because the notes can be many and can expand upon subsequent re-readings of the transcript. The authors also suggest dividing the process of noting into three interrelated steps: descriptive, linguistic and conceptual notes.

Descriptive comments denote what is of concern to the participants by relying on their key words and phrases. Descriptive comments also serve to develop the structure of the sense-making activity of the participant. Sometimes how participants present certain concepts also carries meaning and is thus significant to reflect upon.

To this end, *linguistic comments* aim to explain what participants conveyed with the linguistic modes they used, such as laughter, pauses, the use of pronouns or metaphors, and tone. The nature of linguistic comments in IPA resembles those of the CA&DP method, in that both connect language with meaning. However, while the latter focuses on the function of language for conversation, its structure and its morality, the former connects language with the immediate thoughts and feelings of participants and is thus true to the experiential level of phenomenology.

Finally, *conceptual comments* are the most distant from the original content, because this is when the researcher interprets participants' key concerns and experiences within the context of the larger narrative and the researcher's own professional and personal background. This is where Gadamer's hermeneutic circle again manifests to produce the abstract level of knowledge about the overarching concerns in the research participant's talk.

Step three concerns *developing emergent themes* in the transcript, after thorough note taking, and revisiting the transcript several times. Emergent themes must capture the understanding of the said, reducing the amount of detail while maintaining complexity. They appear in chronological order, which requires breaking the transcript down from the whole into parts, ensuring that the dialogue between them is visible in the emergent themes. This is yet another reference to Gadamer, where to arrive at the event of understanding requires the analytic exercise of dissecting the whole into parts, only to finally piece them back together following an interpretative process. The emergent notes, therefore, reflect the crucial elements of sense-making at a given point in the interview, as a result of both description and interpretation.

Step four deals with *searching for connections across emergent themes* to further organize the analysis and produce an emergent structure. The researcher explores how the themes identified thus far fit together. This can mean discarding certain themes because, although they may be interesting, they do not fit the original research question and its scope. Connecting the themes requires searching for parallels or similarities between the emergent themes to downsize the original sample into overarching, super-ordinate themes.

The IPA method lends the researcher several ways to produce super-ordinate themes, such as abstraction (connecting related themes and making a new name for the overarching theme), subsumption (whereby one theme acts as a magnet for the others and becomes a super-ordinate theme), polarization (drawing on oppositions between the themes), contextualization (focusing on temporal dimension, key events or local experiences), numeration (the significance of the number of times a certain theme resurfaces) and function (understanding the function of certain narrative elements for the overall story). Using these means helps to rearrange and downsize the original emergent themes into a coherent set of representative super-ordinate themes. Visualization should accompany this process to assist the researcher in organizing the themes (e.g., in graphs, tables or figures) and to verify the researcher's interpretative process.

Step five implies *moving to the next case* and repeating all of the steps completed for the first interview. The most crucial task here is to retain idiographic commitment, which requires treating each new case on its own terms, letting new themes develop from the narrative of the participants to prevent the knowledge gained from the previous interview interfering in the process. Although the entire idea behind the hermeneutic circle reveals that it is impossible to fully remove the updated fore-knowledge of the researcher, it is still possible and, in the case of IPA, strongly desirable to be conscious of the ideas from the previous interviews and bracket them as much as possible.

Step six involves *looking for patterns across cases* and producing a master table for the entire group of conducted interviews. This requires zooming out from individual interviews and correlating super-ordinate themes across interviews. However, not all of the themes emerging from participants' narratives can converge, because distinctive voices always exist. Although such distinct pieces may not correlate with those of the other participants, they deserve to be presented in the results of the research, in view of their diverging nature and what they can reveal about the studied phenomenon: "The specifics are unique, but they are hung on what is shared and communal" (Smith et al., 2009, p. 38). Therefore, this final task is creative and often involves renaming themes and reshuffling super-ordinate themes. The result of this step is a master table of all of the super-ordinate themes, with

the subsequent emergent themes and short descriptions of them. A proper master table both possesses commonalities across interviews on the higher level of conceptualization and interpretation and retains individual particularities.

Such an extensive introduction to the IPA method presents it as a hermeneutic tool to explore the sense-making activity of people based on their historical and social situatedness. It also acknowledges the co-shaping interpretative efforts of the IPA analyst, embedded in the sociomaterial environment. The focus of interpretative activity can range from specific life experiences to specific objects in the lifeworld of people, accompanied by a rigorous method to approach the information provided by research participants. Coupled with phenomenological and, specifically, Gadamer's heritage, which underlie the IPA method, it appears to be a proper candidate for a method to study the human appropriation of technologies. The following section explores the suitability of the IPA method for an appropriation study.

5.4 Inquiring into the fitness of Interpretative Phenomenological Analysis as a method for an appropriation study

As presented in Chapter 3, the technological mediation approach has an interactionist take on values, where values do not exist in isolation but are enacted in the relation between people and their sociomaterial environment. Therefore, understanding the dynamics of moral mediation is impossible without grasping the context that informs it and lies at the background of a particular human–technology relation. Moreover, as suggested by Chapter 4, appropriation is essentially a hermeneutic activity, whereby a person explicitly or implicitly interprets a new technology and attributes it with meaning throughout a lemniscate principle. Every person possesses a richness of prior experiences, perceptions and knowledge that informs their sense-making activity in an encounter with a new technology. It follows, then, that an effective method for studying the appropriation of technologies must maintain a focus on people, what they say and their larger context; technology in question; and a sociocultural embedding. In this regard, it is crucial to comment on the relation between the two methods that I have discussed so far, the CA&DP and the IPA, and on how IPA relates to the lemniscate principle underlying the process of appropriation.

The methods of Conversation Analysis and Discursive Psychology and Interpretative Phenomenological Analysis in relation to an appropriation study

The CA&DP method uncovers the normative dimensions of the linguistic resources that people draw upon in conversation by analyzing how people say things, how they position

themselves in a conversation, the types of words they use and the turns they take while speaking. With this, the CA&DP method brilliantly depicts the morality of conversation, showing that it is, by far, a very normative, rather than a neutral, process. However, the depth and breadth of what is said remains concealed.

In contrast, IPA is not discursive but experiential by nature. It studies what people say “in order to learn about how they are *making sense* of their experience” (Smith, 2011, p. 10, original emphasis). Because the focus of IPA is the participant’s account itself, the transcription of IPA interviews—unlike that of the CA&DP method—does not require a detailed write-up of the prosodic elements of the conversation (all non-verbal cues or utterances, length of pauses, etc.) (Smith et al., 2009, p. 74). Instead, it focuses on the exact descriptions and accounts provided by research participants and the meaning they attribute to them in the context of a discussed phenomenon (e.g., a new technology). Exploring the rich narratives of the participants also enables the tracing of their everyday morality and the determination of how they arrive at potential or existing normative issues in relation to the technology in question, or how people define the normatively salient features of a technology in relation to their life.

With this, the IPA method allows the identification of how the participants make a technology morally significant in their conversations, rather than the pursuit of a moral reflection on the act of speaking or a conversation itself, a domain of the CA&DP method. Although the latter can also inform sense-making activity to a certain extent, the goal of the appropriation study is to trace and analyze the sense-making of people in relation to technologies, particularly the moral side of it. Therefore, for the purpose of my research, IPA can better aid in the investigation of technological appropriation than can the CA&DP method, as it can not only sketch the moral landscape of people but also identify how technologies mediate it.

In this regard, the shared philosophical roots of the technological mediation approach and IPA are very important. Both originate in the field of phenomenology, which focuses on exploring the lived experiences of particular individuals. From here, the shared adherence to micro-level studies, as opposed to large-scale inquiries, also originates. Particularly concerning the study of the human appropriation of technologies, hermeneutics takes center stage in exploring the interpretative sense-making of people. Similarly, both phenomenology and hermeneutics are central for IPA: “Without phenomenology, there would be nothing to interpret; without the hermeneutics, the phenomenon would not be seen” (Smith et al., 2009, p. 37). Thus, the shared philosophical assumptions behind the technological mediation approach and IPA suggest a fruitful relation between the two.

Interpretative Phenomenological Analysis and the lemniscate principle

As I suggested in Chapter 4, the lemniscate principle of interpretation can help to clarify the dynamics of value dynamism, or the mechanism of continuous value development. To understand how value dynamism is unveiled, the lemniscate seriously considers the mediated character of the hermeneutic circle. It demonstrates that the hermeneutic circle does not occur in a vacuum but always through a medium. The lemniscate, by highlighting the active role of people, technologies and the sociocultural environment, provides the dynamics of the hermeneutic circle, including value frameworks and their meanings. I suggest that IPA can facilitate the study of these dynamics both empirically and systematically.

The structure of the lemniscate itself, visually represented through a model with arrows navigating back and forth between a person, a technology and the world, urges the inclusion of technological practices and how people foresee engagement with a certain technology in a given environment. The IPA method can help to uncover the relational experiences, both projective and practice-based, of people with specific technologies. As suggested above, unlike the CA&DP method, IPA can do so by focusing not only on how people express themselves but also on what they say, and crucially, doing so not only descriptively but also interpretatively.

The IPA method allows capturing value dynamism through studying all of the elements of the lemniscate in the process of appropriation. Depending on the question, it can zoom in on specific parts of the lemniscate. Since my goal is to study the human appropriation of technologies, IPA can help to focus on the human counterpart in the lemniscate while simultaneously accounting for the technological and sociocultural roles in human meaning-making. Unlike the CA&DP method, IPA allows to capture the content of meaning attribution, or the projective and practical interaction with a certain technology. With this, it can focus on the specific valuations and moral sensibilities that arise during the construction of meaning and trace how they are connected with the technology under study. In other words, the IPA method allows to capture a specific manner in which the lemniscate manifests for embodied individuals in relation to a specific technology.

Finally, with IPA, I attempt to make a philosophical point supported by empirical and philosophical analysis. Using the conceptual framework of moral mediation as expanded by value dynamism, I process and analyze IPA findings. I can thus not merely describe and observe certain moral trends but constantly accompany IPA findings with philosophical analysis. This is the vision of empirical philosophy that I have outlined in Chapter 3 and the one I want the IPA method to help me fulfill. However, since IPA originates in the

field of psychology, I must first clarify how I intend to use it as a method for empirical philosophy.

Making Interpretative Phenomenological Analysis into a method for empirical philosophy

A few defining features of IPA must be explicitly correlated with the exigencies of the technological appropriation study. The first concerns the field and scope of application of IPA. The IPA method originated in psychology, where it is still frequently utilized (Smith et al., 2009). However, its application extends into other fields, as does the use of the CA&DP method. While the experience of illness remains the top subject area of IPA studies, the scope of IPA research is wide, ranging from psychological distress to the experiences of education, music, alcohol and information technologies (Smith 2011a,b).

Moreover, one of the top IPA papers, as judged by Smith (2011a), specifically concerns the influence of a certain technology, a ventricular assist device, on patients with heart problems. One study result demonstrates how a gradual embodiment of the device and its background noise has provided patients with the comfort and security of remaining alive, albeit in the beginning, causing significant distress (Chapman et al., 2007). Commenting on transposing phenomenological research into the field of psychology (particularly with IPA), Smith, Flowers and Larkin (2009) argue that “While philosophy has made an enormous contribution to understanding the process of examining experience, it is important to realize that philosophy does not own phenomenology” (p. 32). Paraphrasing the authors in pursuit of the method for sense-making with emerging technologies, one can equally say that psychology does not own IPA. In view of the above, extending the field of IPA research to the philosophy of technology and focusing on making sense of emerging technologies is not only possible but also falls within the broad research agenda of IPA.

The second IPA feature necessary to examine in relation to an appropriation study is the focus of the IPA study. The IPA method is concerned with studying the lived experiences of participants and how the participants themselves make sense of their experiences. The focus is on experience that carries some existential import to participants, which is often related to certain normative issues that arise in the process. Connecting the IPA method with an appropriation study would shift the focus to new and emerging technologies, which would differ from the traditional IPA studies. Because such technologies either remain in the innovation pipeline or have only taken a first step into the market and are limited in quantity and with restricted access, participants would generally not have direct experiences with such technologies. However, this does not preclude the use of IPA for an appropriation study.

According to Smith, Flowers and Larkin (2009), “The aims set by IPA researchers tend to focus upon people’s *experiences* and/or *understandings* of particular phenomena” (p. 46, original emphasis), with the “*perceptions* and *views* of participants (as alternatives to ‘understandings’)” (ibid., original emphasis) being a parallel focal research point for IPA. This means that although direct experience with a discussed phenomenon is desirable, its lack does not preclude conducting an IPA study.

As suggested in Chapter 4, indirect experience with new and emerging technologies often precedes a direct encounter with a new technology, which can enter the minds of people early on in form of news, public debates, anticipated benefits, hopes and fears, as well as through advertisement, a company’s reputation and the experiences of early adopters with the development version of a new technology. In combination, this shapes the productive foreground of sense-making in relation to the technology in question and allows the exercise of proactive agency in pondering its relation to the participant’s lifeworld. Therefore, an IPA study can still be effective in discerning the sense-making of participants in relation to new and emerging technologies, because it would focus on their perceptions and life views as well as invite them to exercise proactive agency as to how the new technology could relate to their historically and socially situated lives.

What this means for an appropriation study using the IPA method is the increased sensibility of the researcher to conducting interviews in such a manner as to engage the accumulated experiences of the participants and invite their projection onto the technology in mind. This requires, first, identifying and touching upon the topics of existential import throughout the interview, and second relating them to the technology being studied and its capabilities. Combined with a thorough IPA analysis, this can comprise a rewarding process to identify how research participants make a certain technology morally significant in their life stories and how it can mediate—or already mediates—their normative conceptions.

Thus, in relation to the study of the lemniscate throughout the appropriation of technologies, the IPA method can lend itself to empirically trace the mediation processes within human–technology relations in the specific embodied lifeworld. In this regard, an IPA method can be helpful because it can examine sense-making in the encounter of humans and technologies, remaining true to specific human experiences, understandings and perceptions. An IPA study wishes to both “see what it’s like from the participant’s view, and stand in their shoes” (Smith et al., 2009, p. 36) and “stand alongside the participant, to take a look at them from a different angle, ask questions and puzzle over things they are saying” (ibid.). This is why IPA authors refer to it as the hermeneutics of both empathy and questioning, being “based on a reading from *within* the term of the text which the

participant has produced” (ibid., p. 37, original emphasis). Therefore, the IPA method in an appropriation study can perform empirical hermeneutics “from within,” by combining the phenomenological sense of “within” of the mediation approach with the experiential and linguistic sense of “within” of the IPA method.

To this end, and acknowledging both the strengths and the limitations of the IPA method in relation to an appropriation study, it is a suitable method to study the dynamics of appropriation and gain a better understanding of the processes of technological mediation. Although the method did not originally focus on the role of technologies in human lives, it can be put to this end without stretching the boundaries of IPA research too far. It can help the appropriation study to understand how people take up new technologies in their conversations and in reasoning about their lives and how the technologies in question relate to them. In doing so, IPA can help to reveal not only how people make technologies normatively significant in their conversations but also how they integrate them into their interpretative schemas, assimilating the understanding of a new technology with their existing preconceptions, or rejecting them due to perceived incompatibilities.

Notwithstanding the suggested fitness of the IPA method for the appropriation study, it must necessarily be adapted to the cases at hand in some way while still complying with the rigorous analytical steps. To identify and analyze the mediating role of technologies in the normative frameworks of people, in the following part of this work, I examine the specific technological cases of Google Glass and the sex selection chip, or SST+ that I will introduce in detail in Chapters 6 and 7. As I have demonstrated in Chapter 2, experience with Google Glass does exist, although it is limited to the designers and early adopters of its development version. SST+, however, exists only in the prototype phase and in the form of newspaper and research articles, as it is facing stringent legal regulations on the medical and non-medical markets. Therefore, applying the IPA method differs in the case of Google Glass from the case of SST+ and thus requires the careful design and justification of the research steps.

However, in both cases, IPA appears to be a fruitful method to inquire into the moral mediation potential of these technologies, because both present topics of existential import for many people such as privacy, human relations and communication, childbearing, responsibility and sex–gender relation, to name a few. In this regard, literature research could be the first step to jumpstart the research and help in forming the preliminary interview schedule, although the latter must always remain flexible and adaptable to the course of a conversation with a given participant.

In conclusion, the IPA method promises to also generate rich findings for the appropriation study of Google Glass and SST+, although the application of the method in each case may have to be modified based on the context. Because theoretical reflection on the IPA method does not allow the full prediction of how the application of the method will play out in both cases, I reflect on using IPA in an appropriation study in the following chapters to provide a practice-based picture of using IPA as a method in the philosophy of technology.

5.5 Conclusions

This chapter has aimed to find a suitable method for the study of the lemniscate throughout the human appropriation of technologies, which I have defined as a hermeneutic activity of sense-making where people take up a new technology, attribute it with meaning and position it within their moral landscape and interpretative frameworks. This chapter has aimed to identify a method to systematically study the moral mediation of technologies in the process of appropriation. I have identified certain preliminary requirements for such a method, namely, a focus on sense-making and an ability to trace the dynamism of the normative concerns that crystalize in the process. In view of this, I have also suggested that such a method must be qualitative in nature. Drawing on Gadamer’s hermeneutics has allowed the distillation of an entry point for the method search, namely, close affinity with language and the study of conversation.

Verbeek (2015) suggested CA&DP as a candidate for the method of an appropriation study, in view of its focus on the construction of meaning through human interaction. This method focuses on how people talk and how this is a deeply moral enterprise. The CA&DP method approaches human conversation structurally and sequentially through turn taking and the attribution of epistemic rights and responsibilities. This allows the examination of the morality of human conversations. However, such an approach largely obscures the content of conversations, focusing instead on *how* people talk and what they achieve through interactionist talk. In an appropriation study, on the contrary, the focus is on the implicit and explicit sense-making of research participants, revealed through what they say rather than how they say it. Because an appropriation study is essentially an interpretative exercise, it requires a sharp focus on the narrative content of the conversation rather than a structural reflection on it.

Moreover, the CA&DP method favors studying naturally occurring human conversations, with the analyst as an external observer of the act. Since new and emerging technologies are predominantly in the spotlight of an appropriation study, naturally occurring interactions either using the technology in question or discussing it would be rare to encounter. In

this sense, somewhat staged interactions take precedence over naturally occurring ones, with open interviews as a likely empirical background. Contrary to Verbeek's arguments (2015), such defining features of CA&DP make it less suitable for an appropriation study.

I next reviewed IPA as a method with a focus on language and experiential meaning-making. Although originating in psychology, the method has a philosophical background in hermeneutics, frequently drawing on Gadamer. It focuses on how people make sense of certain phenomena and attribute them with meaning. The IPA method remains close to people's projective and practical experiences within their particular lifeworld, carefully interpreting people's accounts. It is thus intimately linked with the lemniscate principle, because by uncovering material and moral hermeneutic structures, it allows the study of different parts of the lemniscate model throughout appropriation. The shared philosophical standing of IPA and the appropriation study suggests a fruitful relation between the two.

I have also examined a few possible limitations of using IPA in an appropriation study. Primarily, the appropriation study would shift the focus of IPA on particular lived experiences in the field of psychology to new and emerging technologies that are often yet unavailable for use. Upon further examination, I have suggested that this does not pose a significant obstacle for the use of IPA in the appropriation study, because the indirect presence of the new technologies is usually abundant in the form of expectations, promises, fears, commercial promotion and legacy, as well as the presentation of limited experience with the development versions of the device in question. Thus, an IPA study can still be effective in discerning the sense-making of research participants in relation to emerging technologies, because it can focus on their perceptions and life views as well as invoke their proactive agency regarding how the new technology could relate to their lives.

Upon careful consideration, I have suggested that IPA is a suitable method for an appropriation study, by revealing the specific workings of the lemniscate principle and providing empirical insight into the dynamics of moral mediation. However, theoretical reflection alone cannot account for the practicalities of using the method in specific cases. In the chapters that follow, I first attempt to apply the IPA method to the cases of Google Glass (Chapter 6) and SST+ (Chapter 7), exploring the fitness of the IPA to capture value dynamism through the lemniscate and understand the accompanying challenges. In the concluding chapter, I explicitly relate the empirical findings to the lemniscate model, examining how the IPA method helps to study its different parts. This also allows me to draw conclusions regarding the fitness of the IPA method to understand the workings of the lemniscate in an attempt of empirical hermeneutics "from within."

Chapter 6.

Appropriation study of technology-in-use:
Google Glass, technology developers and selected
remarks on the ethics and practice of design

As demonstrated in the previous chapter, I wish to identify and analyze the mediating role of technologies in the moral frameworks of people through an appropriation study. The first attempt at empirical hermeneutics “from within” human–technology relations concerns the case of Google Glass. Although I have previously introduced the case in Chapter 2, I briefly recap the primary findings of the exploratory empirical study of YouTube comments and explain how they specifically highlight the ethics of design (Section 6.1). I then explore how Google Glass developers, designers and engineers appropriate Glass (Section 6.2). This study aims to analyze how, through the attribution of meaning throughout the design process and beyond, the moral import of Glass materializes and calls forth the values of its designers. To do so, as suggested in Chapter 5, I rely on IPA as the empirical method. Reflecting on the IPA study also prompts me to explore the ethics of technological design. In Section 6.3, I particularly focus on the approach of Value Sensitive Design (VSD) as one that attempts to explicitly account for values in the design process. Finally, I draw conclusions regarding the conducted appropriation study and its relation to the practical field of design, suggesting how they can complement each other (Section 6.4).

6.1 Re-introducing the Google Glass case study, with attention to the ethics and practice of design

Google Glass is a mixed-reality technology that overlays physical reality with digital images, augmenting human vision with notifications, directions, web search queries and other elements of communication interface. Glass was introduced by Google in 2013 in the US. Soon after its introduction, privacy concerns emerged related to the Glass-embedded video camera and lack of information about how the device operates or how Google manages the data collected by Glass. Google rolled back the Glass project in 2015, to reintroduce it for niche use in 2017 and continue to work on the mass market version (Levy, 2017). In Chapter 2, I conducted an exploratory empirical study in the spirit of experimental philosophy to understand how early users and non-users of Glass, as well as the curious public at large across the YouTube platform, appropriated Google Glass. More specifically, I was interested in how, amid the discussed lived and anticipated practices with this technology, the value of privacy was articulated, debated, questioned and affirmed.

The mediation analysis of the practices enabled by Google Glass revealed various different understandings of privacy, each valuable to discussants due to the intricate web of values involved. The value of privacy that emerges from these practices is multidimensional, porous, contingent and only rarely fits the dominant legal and corporate formulation of

the control of information. In fact, it is more about the lack of control and how people develop methods to cope with it. Table 1 below summarizes the findings from the comment analysis, presenting (1) the problem within a discussed social situation, (2) the entangled web of values, and (3) in which context privacy was called upon to safeguard those values.

	Problematization	Values concerned	Privacy in relation to...
Google Glass	Complicated, unclear data management practices	Human freedoms, identity building	Control of information
	Questionable behavior of Glass users, boundary between private and public	Responsibility, justice, accountability; Personhood, personal freedom, self-care	Limited access to the self
	Uncertainty concerning constant observation without clear purpose or context	Respect, courtesy, involvement	Communication
	Uncertainty of constant observation, private/public boundary, disrupting social etiquette	Identity building, self-representation, social interaction	Public space
	Extension of private sphere, overexposure online	Proportionality, balance, forgetting	Experience and memories

Table 1. Reasoning with privacy in the case of Google Glass

The technological mediation approach can help to uncover the sociotechnical dynamics and the interconnected values mediated by technology. On the one hand, it suggests examining the specificities of the technological design, what it invites and how it amplifies and reduces certain perceptions and can thus guide specific actions. On the other hand, the mediation approach focuses on the specific lived user practices and experiences in the dynamic cultural contexts. In the case of Glass, it has helped to demonstrate how this technology extends the private sphere much further into the public realm than, for example, the introduction of the cell phone did. Glass introduces, albeit for private purposes, the possibility of seamless, constant observation of the public space, without the knowledge of the purpose and extent of this observation, which is much closer to lived human interaction than detached, top-down CCTV cameras. Glass thus mediates the character of the public sphere, encouraging reformulations of boundary-making in public–private spheres and changing people’s expectations of one-on-one social interaction and communication in public.

The study of comment discussions has also demonstrated the porosity of boundaries between different understandings of privacy. For instance, the privacy of experience and memories, as well as of activity, are closely connected to the control of information

and limited access to the self, which are all called into reflection by the Glass-enabled observation practices, albeit for different reasons and in different contexts. Thus, the value of privacy and the values entangled in the privacy-related practices enacted by Glass are co-constituted in relation with this technology and present people with options to act in a certain manner (e.g., sabotaging the wearers of Glass, safeguarding certain public/private locations from the presence of Glass wearers, being rude to or avoiding them, etc.). With the help of the technological mediation analysis of YouTube comment discussions, I could trace and analyze how people morally evaluate Google Glass, by referring to the value of privacy, and how privacy in turn takes shape through Glass-mediated, anticipated and actual, experiences of commenters.

Finally, the exploratory empirical study, in revealing how different understandings of privacy materialize in relation to Glass, also notes that both privacy as the control of information and Glass itself are perceived as design flaws, something that could have been anticipated, reflected upon and mitigated in advance. The perception of Glass as a design failure is explicitly weaved through many of the comment discussions, whereby YouTube commenters react to its bulky design, the explicit presence of a camera and the inability of Glass to visually communicate the action of recording or taking a picture. All of these issues center the practice and ethics of design when discussing the case study of Google Glass. An opportunity presents itself to determine whether the appropriation study of Glass-mediated values and practices can, in any way, be helpful to the field of technology design.

In addition, as mentioned in Chapter 4, practical experiences with Google Glass involved not only early adopters and curious potential users and non-users but also the designers, developers and engineers of this technology. The fact that Glass is still in a stage of (re)development for a repeated mass market introduction, while its 2013 versions are still discussed online, and the new 2017 versions have found a suitable niche market, suggests the utmost importance of Glass (re)design and development. According to insights from STS (e.g., Latour, 1987), engineering ethics (e.g., Van de Poel and Royakkers, 2011) and the philosophy of technology (e.g., Vermaas et al., 2011), design is a value-laden process. Developers of technology are people who inevitably possess inherent ideas, biases and predispositions that consequently—implicitly or explicitly—materialize in the technological artifact. In view of this, people who were involved first hand in the design and development of Glass are an ideal group for an experience-based appropriation study of Google Glass, with the help of IPA. Throughout the IPA study, I wish to determine how Glass mediates the moral perspectives of designers through their work experiences and practices. The next section presents the findings of the IPA study with Glass developers and designers.

6.2 Interpretative Phenomenological Analysis of Google Glass appropriation

As the privacy study regarding Google Glass suggests, the introduction of this technology did not go smoothly. Emergence of “Glass-free zones” and a “Glass etiquette” can be considered appropriations of this device, developed by both users and non-users of Glass to accommodate it in their daily lives. Such curious appropriations are a superficial sign of the underlying tensions between the values promoted by Glass, such as global connectivity and openness, and those to which people adhere and are not willing to adapt, in this case, primarily privacy. Through the mediation analysis, I have demonstrated how studying how people learn to deal with Google Glass reveals what is valuable to them. I suggest that a closer look at the Glass appropriation by people related to its process of development can also reveal further insights regarding the dynamics of values through the transformation of meaning attribution. In what follows, I study how developers who were, in one way or another, involved in creating software for Google Glass appropriate this technology.

Study design and limitations

The empirical work for this study consisted of semi-structured interviews, analyzed following the IPA methodology, as outlined in Chapter 5. According to IPA, first-hand experience is desirable for understanding how Google Glass was attributed meaning in the life and work practices of developers. My primary strategy of enrolling the interviewees in the study consisted of consulting the Google Developer Expert’s (GDE)¹² website (<https://developers.google.com/experts/>) in searching for the developers Google nominated as experts in the field of Google Glass. After the first interviews, I employed the snowball technique to extend the interviewee base. In the end, according to the IPA guidelines, I conducted ten semi-structured interviews, eight with GDEs and two with Google application developers.

In contrast to structured interviews that follow a predefined set of questions, semi-structured ones provide researchers with the flexibility to ask questions depending on the situation, while working toward a set research goal (Kvale, 1983). I designed the questions in such a way so as to elicit how developers appropriated Google Glass, both projectively

¹² Google Developer Expert is a program initiated by Google to unite the leading practitioners in the field of Google software and product development or, as the company defines it: “Google Experts are experienced, recognized developers of Google technologies [...]. They distinguish themselves through frequently speaking at conferences, share their passion and experience by publishing videos and tutorials, writing code samples, mentoring developers and startups and much more. Thanks to their support, developers, high-potential startups and technical communities around the world build and launch highly innovative apps.” Retrieved from the program’s website page on September 7, 2016 from <https://developers.google.com/experts/about>.

and practically, and to address how their sociocultural context affected this. Please refer to Annex A for a sample interview schedule and an anonymized list of interviewees.

I conducted the interviews in February 2016, primarily over Skype (one in person), since most of the identified developers resided outside of the Netherlands. The limitations of conducting interviews over Skype relate to technical setup and occasional delays in connection that interrupt a conversation. However, such delays did not occur often. All interviewees were male adults, covering a broad range of geographic locations, from Ukraine to the United States. The interviewed sample nonetheless satisfies the IPA criteria of the experiential group belonging united by a specific area of interest and a small number of GDEs specializing in Glass-related development.

Prior to conducting the study, I obtained a permission from the BMS faculty Ethics Committee to ensure that the study embedded ethical and legal standards of research with human participants. I approached the respondents in person or by email about the possibility of participating in the study, presenting the details of my work and the particular IPA study on Google Glass. After the approached respondents had had time to acquaint themselves with the study and agreed to participate, we arranged the dates and times of the interviews. At the beginning of our Skype sessions, before conducting the interviews, I obtained verbal informed consent to record the conversations and use the anonymized interviews for my research, including in publications. I also informed the participants that they retain the right to withdraw from the study at any moment without undue prejudice.

I personally conducted and manually transcribed all of the interviews. Any personal data, such as names and professional affiliations, were anonymized to ensure that the processed information used for research could not be linked back to individual participants. Following *European Textbook on Ethics in Research* (2010), I anonymized the names of the respondents (e.g. *Edward*) and italicized them for recognition in text. Processing and storing the data followed the 2016 European Union General Data Protection Regulation to ensure the privacy of the participants beyond the anonymization of the data.

Data analysis followed the IPA methodology, as presented in Chapter 5. After transcription, I read each interview several times, annotating them with descriptive, linguistic and conceptual notes. I preserved the original phrasing and word order of the respondents. Transcription proceeded verbatim, with words in capital letters indicating the elevated intonation of the respondent and phrases in brackets representing my own insertions. For reasons of brevity, I omitted some information from the presented quotes, indicated as “[...]” if the information did not concern the discussed matter or was extremely repetitive.

Following advice of Smith, Flowers and Larkin (2009) regarding the value of data visualization to assist in the analysis process, I used Microsoft Word to produce tables with the original transcripts and analysis. Figure 4 below shows an excerpt of the coded interview. My threefold notes formed the basis for initial description of the data, after which I tentatively sketched the overarching themes within a single interview. A similar process was followed in each of the ten individual interviews. I then created another column with emergent themes relevant to the neighboring piece of the text. Based on that, I dissected the text into chronological boxes as per emergent themes and assigned each box an identifying number. I also assigned a distinct color to the columns, with numbers and themes, one for each

Figure 4. An excerpt of a coded and annotated interview in the case of Google Glass

interview. I did this to later distinguish between different themes, not only per interview, but also between the interviews. I repeated the same procedure with every remaining interview and proceeded to designing a master table that reflected all of the emergent themes relative to the study and their organization into the dominant super-ordinate themes.

I determined the themes based on the IPA method, guided by the recurrence principle (Smith, Flowers and Larkin 2009). Thus, since I had ten participants, the super-ordinate theme would need to run through at least five of the interviews. However, the idiographic focus is also an important IPA aspect, which means that I did not disregard the less

frequently occurring themes, and I could outline them as super-ordinate if I deemed them important to this study. If this was the case, I reflected upon it in the write-up of the theme.

As a result, the study produced seven overarching themes that each depict overlapping and individually occurring instances of how Glass developers appropriated the technology. Short interview excerpts accompany the narrative analysis to support it and contextualize the generalizing titles of the overarching themes. The seven dominant and often intertwined appropriation themes that materialized during the analysis are the following:

- a. Glass as a misunderstood opportunity: “a bit too early” and “a step too far”
- b. Glass as a technology of the self
- c. Glass as a cell phone reference
- d. Glass as an epitome of the future
- e. Glass as a privacy controversy: from “disaster” to “overhype”
- f. Glass as “an open laboratory”
- g. Glass as a pride of engineering excellence

The following subsection presents the results of the data analysis, detailing each of the identified appropriation themes.

Interpretative Phenomenological Analysis findings

a. Glass as a misunderstood opportunity: “a bit too early” and “a step too far”

Many of the interviewees noticed that the clients for whom they were to develop Glass products and people on the streets in the proximity of the developers wearing Glass were not aware of the actual capabilities of the device. In the business domain, a mismatch existed between the demands of the clients and the possibilities of the device. For instance, *Jeremy* recalls how a law company hired his firm to develop innovative Glass solutions. The clients wanted to be able to record a litigation process with Glass, potentially a lengthy process, unaware that “Glass can do only 15 minutes of continuous recording or you have to strap a battery pack to your back.” *Jeremy*’s clients subsequently “didn’t think it was a good idea.”

In a similar vein, *Jeremy* skeptically approached a new social etiquette in relation to Glass, represented by the emergence of the terms such as “Glasshole”:

I don’t think the term “Glassholes” was justified. I think it was created by people who had a fear of the technology and had a very shallow understanding of the technology.

Those were the people who said, “Oh, you’re continuously recording the things I do” and such. While we know the device has a 15-minute battery life—so you couldn’t do that. So I think the whole Glasshole thing is a fear for new technologies.

Thus, for *Jeremy*, the new social etiquette surrounding Glass and the public at large referring to device wearers as “Glassholes” was not only unjustified but also demonstrated that the fear people have of Glass spurs from a lack of understanding of the technology. He believes that people will get used to a new device in due time and that creating such stereotypes only hinders this process. Ultimately, *Jeremy* blames the lack of design cues from the device for creating public uncertainty and fear regarding Google Glass. Consequently, he concludes that “it was a bit too early. The Glass was a step too far for most people.”

Other developers disagreed with this viewpoint. For instance, considering the social aspects of Glass and its societal embedding, *Edward* thought that the device was “already adequate.” He did admit that the device faced certain “barriers to acceptance” in society, but he was more preoccupied with user experience design considerations, such as the need to improve the asymmetrical form factor of the device and its limited field of vision (FoV), not central to the user’s sight.

Overall, Glass as a missed opportunity was a dominant manner through which the developers appropriated the device. An overall agreement existed that design improvements related to the communicative form of Glass would be pivotal for its future redesign, to account both for the real (but not feared) technological potential and the societal concerns and fears that lead to the present misinterpretation of the device. Interviewees suggested that the Glass project was treated with fear and hostility because it was misunderstood. Following the insights of Swierstra and colleagues (2009), this was a case of technology as a disruptor, an adversary that questioned existing social practices and explicitly invited that they be reconsidered (e.g. with the consequent emergence of the new social etiquette in public). The interviewed developers firmly believed that the redesign of Glass, accounting for societal reaction and properly manifesting the capabilities of Glass, can help not only to realize the device’s use potential but also to calm the moral sensibilities.

b. Glass as a technology of the self

This theme stresses how interviewees become accustomed to the idea of Glass, learn to use it and devise different methods to incorporate it in their daily lives. This theme echoes the theoretical ideas of Foucault (1986) on the technologies of the self as the (material) practices and habituation routines that participate in the formation of a specific human subject.

Dorrestijn (2012) reinterpreted this idea in the context of technological use and its moral significance in the process of embodiment. To become embodied as a technology of the self, a certain technology often requires time and active learning to use, thus restructuring routine behaviors and forging often unnoticed normative changes (for the user and their environment) along the way. This prompted Dorrestijn to consider the mediating role of technologies in the cultivation of human subjectivity, whereby technologies not only shape the material conditions of existence but also entrench specific methods and orders of doing things. I refer to the current theme of appropriating Glass as “technology of the self” because it precisely depicts how in interacting with Glass and dynamic sociocultural environments, its developers and designers have emerged as specific subjects, guided by different routines, design and normative consideration to fit Glass in their daily lives.

In the experience of the interviewed developers, people easily dismissed Glass without giving it adjustment time. The interviewees suggested that developing daily and long-term applications of Glass requires time and reflection. In this regard, I have distinguished three patterns: groups of those who have fully incorporated Glass into their lives, dismissed it completely or found niche applications for Glass, avoiding its regular use.

In a first group, *Andrew* and *Owen* embraced the device and wore it daily, even after the Glass project was withdrawn. For them, Glass became a daily technology of the self, helping to present them as proactive subjects, unwilling to miss any moments of life, and ensuring that the people around them understand this. They perceived Glass as a constant accompaniment of their lives and a first device enabling voice-based interactions with the world, something still new in 2016.

Glass fascinated *Andrew*, and he wanted to buy it immediately, regardless of the price and the required enrollment in the Explorer program. *Andrew* explained it like this:

I have always been an early adopter actually, but in this case it was an amazing device. Even with the price tag—it was really expensive, I think this is the most expensive thing I’ve bought actually, even my computers are cheaper than that. But they [Glass] changed the way we think about computer interaction. [...] The reason why I’m still using it is that I want to experience this technology, I want to say in the future “I used Google Glass. I really used it. I didn’t just own it”—because it will change the future.

At the same time, *Andrew* objects to its bulky design and safety risk caused by the battery overheating, which can even leave scars. In view of this, *Andrew* suggested using Glass for small tasks, curiously, not just to avoid burns, but primarily to maintain normal interaction with other people: “You have to look up right, so it will, when you use it, look

weird to the other people. It is better for small interactions.” Regardless of his being critical of the device, it became an integral part of his life.

Owen, by contrast, is fascinated with Glass despite its technical shortcomings and uses Glass frequently both indoors and outdoors. Glass for *Owen* is a device that allows living life at the pace it deserves and not missing a single memory. He reflects, “It’s the ability to do something very quickly, very simply and then go on with my life. It’s kind of a cornerstone of Glass.” Another daily use of Glass for *Owen* is it being “a memory jar”:

I take pictures with it and I use those pictures as a memory aid. So if I’m shopping and I need to check out the price of something and compare it to another store, I’ll just take a picture and reference it later. Or if I’m doing something and I wanna remember where I was that afternoon or the name of the store, I’ll put it in the memory jar to remind me if I wanted to do something later.

Owen adds that his social and family circles have become accustomed to him wearing Glass, so much so that whenever something exciting happened, they counted on him to record it and share it with them.

Unlike *Owen*, who does not mind wearing Glass outdoors, *Andrew* recalls the process as irritating, because people stared at him and asked questions:

Everybody looks at me. First, it is a little bit interesting, maybe even kinda cool for people. But then it gets annoying, because everybody looks at you and tries to understand what it is. So people stop you and ask questions about you, about the Glass. It gets annoying actually.

He notes that his colleagues and friends got used to him wearing Glass and do not notice it anymore. However, he did initially receive questions from colleagues concerning the recording function of Glass. *Andrew* had to build a trustworthy behavior track record while using Glass to keep any concerns at bay: “I ensured [colleagues] that I would share pictures with them all if I take one, and I told them I will not take pictures discretely, and they trusted me.”

As such, a rich incorporation of Glass into the daily routines of *Andrew* and *Owen* did not go unnoticed for their social circles, whereby new (however small-scale) societal norms and expectations took shape, regarding always being on camera when next to a Glass user and thus delegating to them the job of managing digital memories.

In a second group, the interviewed developers decided to refrain from using Glass, after first carefully studying its possibilities and limitations. In contrast to the first group, the developers here appropriated Glass as a technology of the self in a sense of deciding not to use it at all but only to develop applications for it. This also demonstrates that to appropriate a technology does not necessitate using it, albeit it does require some form of reflection upon it, attributing it with some meaning and (implicitly) reasoning as to why not to use this technology.

According to *Rick*, *Patrick* and *David*, the limited real-world functions of Glass have discouraged its widespread adoption. According to *David*, the key to social acceptability lies in an instrumental approach to technology—a device must be able “to fix” some issues to be widely adopted: “Let’s say you would be blind and with Glass you would see 10%—would you really care [for societal non-acceptance]? But the problem is that it’s not solving any problems.” Instead, according to *David*, it created some new ones, such as the socially inappropriate behavior of “Glassholes.”

Patrick mirrored the arguments of *David*, albeit focusing on the design of Glass as a reason not to wear it:

Of course I was a part of this experiment—I’ve got mine as early as I could, I tried it out and it worked. [...] But it’s now too cumbersome to be an everyday device. When you’re wearing Google Glass, you’re standing out of the crowd. It’s a very strong statement. This hinders the pervasiveness, not everyone wants to make a statement like that. [...] You have to downsize this, make it into an everyday worn product by an everyday person.

In this group, the interviewees understood Glass as fostering an identity that “stands out” in view of both its bulky design and lack of functionality. The questionable use of Glass by some fostered a normative consideration for its non-use in this group, coupled with public contestation. As such, Glass as a technology of the self here allowed the definition of oneself as a pragmatic and considerate technology user who refrains from using Glass.

A third group devised a contextual application for Glass, using it only on certain occasions, thus sparingly and consciously allowing Glass to play a role in their self-representation. The interviewees here were well informed about the benefits and limitations of using Glass, which led them to use the device proportionally. In this group, the interviewees expected nothing more of Glass than an occasional reference, akin to the rearview mirror in a car. The interviewees here appropriated Glass as a self-branding device while being conscious of its limited societal appropriation. These interviewees reflect on the emergence of the

business etiquette of using Glass, relative to the task at hand. Overall, these developers would like to use Glass more often, but a negative societal reaction to it has fostered a cautious and contextual appropriation of the device.

For instance, *Jeremy* positions Glass as a platform that allows engineers to relatively easily program a wide range of ideas, which is “quite a fun thing to do.” He also perceives Glass as a method to be more practical and efficient, or “to be better informed, to get richer contextual information” (e.g., to get the content of a food product or to obtain an efficient route to the train). *Rick* used Glass as a method to increase the visibility of his product and make a name for his company in a new market niche.

Referring to their clients, *Jeremy* and *Patrick* observed a context-dependent protocol for Glass: people would use it in big meetings for promotional activities but not during face-to-face meetings with clients. According to *Patrick*,

The people I met who had Glass, were using it on special occasion mostly: they go to a conference, they give a speech—then of course they have Glass to make a statement that they are the ones who have Glass. But then again, at the dinner at the same night I wouldn’t see them wear it.

Jeremy similarly recalls a customer saying, “We wanna have an application on Glass because we want to be innovative.” In such a contextual use, Glass serves as an image trademark, a self-branding device to indicate someone who is proactive and cares about innovation.

Edward, in contrast, considered Glass a highly functional technology that cannot be used daily because it requires a vast supportive infrastructure. Both he and *Rick*, when considering societal acceptance, focused on the technical side of Glass. In particular, they considered a limited FoV that forces people to constantly look up in the right corner of their eye. Nonetheless, *Edward* strongly defends designers’ choices, suggesting that people require time to get used to the device and the idea behind it to perceive Glass as “natural.” *Edward* suggested referring to the car analogy to make his argument:

The small FoV that they chose is very similar to having a rare-view mirror in your car, and so you get used to that. And when you’re driving a car, then you know when you want to look there and what you are going to expect to see there. So it gives you the information that you need about traffic and it’s very natural.

Edward, akin to the Foucauldian idea of technologies of the self, highlights the inevitable learning process, when people must grasp the possibilities and limitations of the new technology and adjust to them accordingly.

In short, the interviewees devised different modes of (not) dealing with Glass in daily life, each representing a certain method to embody Glass as a technology of the self. The innovation baggage that Glass carries prompted some to express their value of self-identification and promotion that is instrumental to certain activities. For *Andrew*, Glass allowed him to fulfill the value of self-identification, representing him as a proactive and innovation-gearred version of himself. Glass also fostered an emergence of business etiquette, dictating its proportional use. For people like *Owen*, Glass enabled them to better exercise their value of well-being, translated as keeping up with a fast pace of information sharing and management. No matter how often the interviewed developers chose to use Glass, it fit the multitude of their daily and work contexts, revealing context-appropriate value considerations and inviting them to implicitly or explicitly reflect upon them (e.g., *Andrew* and his colleagues' privacy).

c. Glass as a cell phone reference

Cell phones have served a very dominant reference point in two instances concerning Google Glass. First, developers identified the cell phone as an example of how an initially controversial technology finds a firm place in society. The developers referred to a cell phone adoption model to highlight the historical path dependency of technology: a new technology first faces public resistance and unacceptance, but it inevitably loses its novelty, protests weaken and people get used to it. Consider the following quote from *Jeremy*:

I remember when—I'm pretty old—I remember when I got my first cell phone, people though I was just showing off, oh why do you need that, it's not like you start phoning and people will be able to reach you. I think it's the same thing with Glass.

Historical comparisons make it easier for people to make sense of a new technology. The cell phone reference as a projective appropriation of Glass most literally resembles the lemniscate principle of interpretation, whereby prior experiences (collective or individual) constitute the pre-judgements cast upon new phenomena. The cell phone reference in the context of Google Glass shows the hermeneutic lemniscate in action, whereby developers use it to attain a preliminary understanding of Glass and, faced with a negative societal reaction, reinforce their prejudgments by invoking historical path dependency or review their existing meanings to cast a new one.

Many of the interviewed developers described themselves as "tech enthusiasts" who welcome and embrace technological progress. For them, a cell phone is a symbol of such past progress, and they desire a new symbol to embody progress in the future. It is in relation to the "interpretative prejudgment"—the ambition of technological innovation and the belief in the scientific progress—that developers appropriate Glass. Consider *David's* quote:

When smartphones first came out, we largely used them the same ways we used our desktop computers, our laptops, but over time we started using them very differently. I saw Glass as the same sort of thing. In the beginning people thought of it as "Oh, it's a smartphone on my head" and it's not until later—and people like me and some of the advocates at Google were saying, "No, it's more than that, it's different than that. It supplements your phone, doesn't replace your phone."

This quote exemplifies two modes of appropriating Glass in reference to a cell phone. At first, a cell phone is used to acquire an initial understanding of a new technology. As soon as the knowledge base of the new device is substantiated, the initial frame of reference becomes a part of a productive history for future meaning-making, and the new technology gains its own independent place in the knowledge system of people.

In parallel, the interviewees interpret Glass by making a linear projection from the cell phone example. Such a linear interpretation could be considered an attempt to downplay societal concerns about Glass and dismiss alternative paths of its adoption. *Edward*, for instance, provided an analogy to cell phones, arguing that "the aspect of novelty" was to blame for the alarmed societal response to Glass. According to him, people considered the visual aspects of Glass as strangeness; "People were noticing you in a way as if you're wearing a strange hat." He suggested that the more widespread Glass becomes, the more normalized it will be.

This became even more evident in a conversation with *David*, who indirectly references cell phones to validate Glass. Consider the following instance, when *David* recalls the introduction of cell phones in the 1990s:

It's very hard to push through the validation of technology. [...] It [Glass] is a vision. It's a really clumsy awkward vision, exactly the same as the first cell phones from the doctors. [...] In '93, mobile phones were actually picking up and it was socially unacceptable. "Why call? People will find me anyway!" And then a few years later it's totally different.

David insists that no matter how revolutionary, as with older technology, Glass will ultimately be adopted. He further purports that Glass is first of all “a vision,” a “research, not a product”—an appropriation strategy that could justify the current technological glitches, societal problems and underdevelopments. Eliciting examples from the past serves as an indirect call to adopt the new technology, since old technology—such as cell phones—also had concerns but is now widespread and considered normal.

Insights from the STS could be instructive to caution against such a technologically deterministic position. A linear historical interpretation underscores present-day unrest regarding Glass as a temporary condition and justifies it with the novelty of the device and the lack of knowledge about its abilities. Following the STS slogan “It could have been otherwise,” it is a mistake to assume a linear trajectory of technological development and adoption, for it is not as inevitable as it may appear in hindsight (Bijker, Hughes and Pinch, 1987; MacKenzie and Wajcman, 1985). From this viewpoint, two technologies from different time periods would be unlikely to follow the same developmental trajectories, because they are embedded in different sociomaterial environments.

Technologically induced value dynamism (e.g., concerning privacy, as presented in Chapter 2) is also never a product of a technology in isolation. According to the interviewed developers, societal resistance in the name of privacy has been more prolific in Europe and the US than in Ukraine or Turkey. Even in the US, it was more vocal on the East coast than the West (e.g., *Owen*). Thus, by interpreting Glass as a device that will one-sidedly change how people behave, their social norms and expectations, ideas about good communication and interaction provides an easy yet simplistic manner to reason with technology. This mode of thinking, however, was pervasive among the developers I interviewed.

Overall, the example of cell phone adoption lends itself to developers as a projective means to cast new frameworks of dealing with Glass and as a manner to speed up complex process of technology adoption by diminishing societal concerns. The cell phone reference manifests the value clash between those behind Glass and those (not) adopting it, opposing the value of innovation with the costs of privacy, trust and freedom of expression in public spaces, among other concerns. Appropriating Glass as a cell phone reference is also deeply normative, because the interviewees expect public judgement to soften toward the acceptance of Glass, shifting the burden of responsibility to adapt to the public.

d. Glass as an epitome of the future

A few interviewees appropriated Glass as an agent of social change and a representation of the future, worth wishing and waiting for. *Jeremy* perceives Glass as a cutting-edge device

that transforms how people think about wearable computing devices. He emphasized that Glass is a learning process regarding how interactions between people and technologies change. He regards Glass as an indication of social and technological change, “a very good insight on what we can expect in the next 5–10 years in terms of computing and the way that we start using the wearable devices.” Future is a powerful framework that *David* appeals to when confronted with Glass: “You know it’s the future, it’s a glimpse of the future. And that’s why it’s awesome. Because you know this is gonna be there. It’s a no-brainer it’s gonna be there.” *David* was particularly vocal about Glass as an agent of future change, and I chose primarily his quotes for this theme because they embed but also exacerbate the similar perceptions of other interviewees.

It is important to transcend the technologically optimistic narrative and consider how Glass comes to be valued as a future orienteer. Although *David* admits that Glass in its current form is no longer a viable technology, he foresees a role for it, nonetheless. For him, people are already beings deeply mediated by technologies: “We are already cyborgs, with just very clumsy interfaces.” The interfaces he refers to are present-day technologies, such as smartphones, tablets, computers or Google Glass. However, the knowledge, “how we can think” or the “consciousness” of all the world’s population is not only accumulated in the biological brains of people. According to *David*, the Internet is “an external brain of 1 billion people,” responsible for searching, sharing and communicating knowledge and ideas. The problem for *David* is that it takes people too long—“that’s sad”—to become one technologically interconnected whole, which he deems as “the only solution for world’s peace—that we actually become one organism. That’s what we already are, right? It’s still clumsy, still a child-faced, but it’s there.” *David* thus attributes a role of pivotal importance to Glass, as the missing puzzle “closing down hurdles of connecting to the external brain [and] getting it close to your senses.” The arguments here closely resemble those put forth by Ray Kurzweil on the concept of singularity (2005), which Kurzweil described as a state achieved by technological progress when people transcend biology. This remains a widely debated idea (e.g., Allen and Greaves, 2011; Ford, 2009). Nevertheless, *David* appropriates Glass as a device fostering a technological singularity.

David is realistic concerning the negligent chance for success of Glass and sets it apart as the first attempt. According to him, “If you zoom out, [Glass is] just a leverage, a one percent chance of succeeding with a huge product, whose main value is to get things moving.” Nevertheless, for *David*, Glass is a step in the right, inevitable direction. It is both a promise of the future in the present and a mediator, a first step to an enhanced and transcending interface to the future of ultimate interconnectivity. With the lemniscate again explicitly surfacing, *David* constantly refers to biology when he anticipates the future

of something uncertain and complex: human brains and the Internet are compared, with Glass as an interface between the two.

In summary, the appropriation theme of Glass as an epitome of the future reflects highly utopian beliefs about the role and future of technology in general, and Glass in particular. One could also argue that such hopes about the inevitable, intimate entanglement of people and technologies are elitist, because they disregard not only the still highly present digital divide in the world but also the possibility that not everyone would choose such a future or would want to be always (inter)connected and enhanced. Valuing Glass in this theme as a societal–technological orienteer reveals normativity about the desirable visions of the future that the interviewees operate with and would like to project upon the world. This is particularly exemplified in a suggested failure of Glass in regarding its own present in favor of the future, its role “to get things moving,” be it regarding expected technological progression or the more lenient societal norms and attitudes that would accommodate such developments.

e. Glass as a privacy controversy: from “disaster” to “overhype”

As demonstrated in Chapter 2, the matter that sparked public debate around Glass most concerned the individual and social values of privacy. Privacy was also a controversial matter for developers. The ideas here varied from dismissing privacy concerns as insubstantial to considering finding solutions to them a matter of professional honor.

Andrew regards the device’s camera as the reason why people did not widely adopt Glass. However, he believes it is only a matter of time before people become accustomed to it and stop distinguishing it as a concern:

I think even if it has a camera on it, people will get used to it. They always say that when the mobile phones were first in, the reaction was almost the same, people didn’t like it. So I think the camera on it does not make any difference at all.

Jeremy, however, has a different opinion. He also considers the camera a primary obstacle for societal adoption, but he suggests that to ensure a smoother societal introduction, Glass is better off without it:

The best thing that Google might have done is not include camera on Glass. I understand why there is a camera, it definitely adds value to it. But in the perception of people, it would’ve made so much more sense if it didn’t have a camera. The intrusion would’ve been less.

According to *Jeremy*, a good technology must seek excellence in both the technical and social domains, otherwise it is bound to fail: “I think in terms of technology, it was pretty awesome. You know, just by winking a system would understand that you wanted to take a picture. So from a technological point of view—brilliant, but from a social—a disaster.” The key to the adoption of Glass, according to *Jeremy*, is decreasing the image of intrusion the camera represents and raising awareness as to what the device is and what it does and does not do: “[P]eople now think that, ‘Ah, there’s a person with Glass looking at me—they are recording everything I say,’ because they don’t understand the technology.”

Patrick, for instance, considers the social controversies surrounding Glass a product of mass media, and a much exaggerated one: “I think that a discussion that was going on at that time—that this is invasive, it is recording everything, privacy is gone—I think this is overhyped. For the most part people really didn’t care that much.” *Rick* agrees, dismissing the privacy concerns of the public as “noise” that will pass when people become accustomed to the device. “I’m sure Google Glass 2.0 is going to succeed—we only need to solve technical problems.”

Both *Patrick* and *Owen* recall going into government institutions in Hungary and the US on business matters, wearing Glass without it attracting any attention from either the security of the building or the people inside. *Steve*, on the other hand, on similar occasions in Ukraine, was explicitly asked not just to turn Glass off, but to remove it while in the bank or at work, for matters of privacy. Therefore, experiences in this regard differ, which could perhaps be partly explained by different cultural attitudes toward privacy and differing degrees of familiarity with the device.

Patrick does grant a privacy concern to Glass in relation to the camera, or as he puts it, “a recording fiasco.” He is preoccupied with the potential Glass offers—to record everything non-stop:

[It] would not be every day a single image—it would be 24 images per second for your whole life. ... [I]t’s gonna have an implication on society. And the implication will be partly privacy, partly ‘Do you really wanna see all the [things] you upload?’ Is this beneficial—I’m not sure. But then again, for who? We don’t know either.

Hence, for many developers, the potential to record is at the core of a wide range of ethical concerns regarding Glass.

Interestingly, *David* disagrees precisely on this matter. When considering the question of privacy regarding Glass, he said,

What do you think Google thought of that? Were they annoyed? No, they were happy—they learned. They thought, ok, so, if we're gonna get devices out there, these will be the questions. [...] There are the spy cameras you can buy anywhere and store the [data] for free—nobody complains about that. And they [Google] make something really visible, really open—and the problems are still there. [...] It wasn't the privacy issue. I think this was the first kind of technology that was that far advanced and we all realized this is the future. And it's scary.

David attributes the privacy problem not to the ability of Glass to create audiovisual recordings but to the societal fear of the unknown. Moreover, he considers the privacy debates an obstacle to introducing new technologies such as Glass. He believes that a lack of knowledge about technology and an inability to consider a long-term perspective stand behind the privacy fears: "They [Google] started with a future movement and everybody starts talking about privacy." Moreover, *David* considers the privacy discussions obsolete: "The thing is, everybody already gave up on that, let's be honest." When I asked him to clarify this position, he explained that there is no privacy dilemma, since by checking social network accounts and using Google Maps or fitness trackers daily, people make a conscious trade-off between privacy and technological functions.

Edward posed an entirely different angle on this subject. Although, mirroring *David*, he deems cameras and microphones to be "rarely intrusive," he admits that in the case of Glass, they evoked a real public concern related to privacy. As such, *Edward* believes it critical that Glass developers address this concern in product design:

I think the designers do need to think about ways to vividly assure people, not the wearer or the user themselves, but other people around them. To show them somehow that their privacy is respected. That means they need to know the easy way of showing that it has been disabled or something like that.

Understanding Glass primarily on engineering terms, *Edward* nonetheless deems privacy "a sensitive matter" and "a matter of trust," and he believes that it is the engineer's responsibility to address societal concerns and that it is technically possible. According to *Edward*, a method does exist for the engineers of Glass to both regain the trust of users and the people around them and avoid the need for such creative appropriations: they "can simply think about a blocking function, for a safety mode." Gaining the trust of public should be a significant enough motivation for developers and designers, according to *Edward*. He has the confidence that his fellow engineers working on Glass all have the chance to succeed:

Just like we have an airplane mode that turns off the radio function in your phone, perhaps then you [could] have a privacy mode in devices like this. I think the designers are resourceful, they will be able not only to achieve their assumptions, but also make it vividly reassuring, make it correct and make it acceptable in every single way.

Overall, the developers were very conscious of the privacy situation surrounding the introduction of Glass and were generally the first to bring it up during interviews. However, how they appropriated the privacy controversy with Glass disclosed a variety of individual moral beliefs and professional attitudes, ranging from dismissing privacy concerns as long overdue, media noise and the result of a technologically uneducated and fearful public; to considering the privacy controversy a professional honor to restore public trust in Glass and make it a privacy-sensitive technology. In particular, this theme of appropriating Glass as a privacy controversy reveals the multiplicity of the moral standing regarding privacy among the developers themselves and how Glass redistributes the accents between their personal and professional accounts of privacy, inviting the developers to responsibly reflect on design.

f. Glass as "an open laboratory"

Many of the interviewed developers discussed the novelty aspect of Glass as hindering its wide societal acceptance. Glass was referred to as a "revolutionary" device, one "ahead of its time." The interviewees explained that the introduction of Glass presented a learning process that would require time to understand the technology. According to *Owen*,

Glass was different and so unique that nobody, including Google sometimes, had a really good idea about the shape of applications—what should they look like, how should they behave, what would be the acceptable behaviors on Glass. So this is the learning process for all of us.

Another interviewee, *David*, defined this process as "an open laboratory." *David* also positions Glass as "a research, not a product," or a new research approach by Google. This new approach could be best characterized as the living lab where "What Google is doing—it's a new way of doing research—so it is actually doing scientific research by creating it, getting thousands of people to play with it, and learn from that." Neither the public nor the creators thus precisely understand what the future holds for Glass, the significant difference being that the public does not know that they are part of the experiment, with Google intentionally conducting it. *David* deems this as normal, because only "as you go, you'll find where you need to go." He values Google for their visionary, curious and proactive mindset: "What Google is doing is looking for the sharp edges of their ideas and

they find that ok, where's the problem? ... The only thing they did is they took the effort to find out. And the only way to find out is to create it."

Taking Glass up as research carries justificatory connotations. By praising Google's mindset as a company, both *Owen* and *David* approve of and support its new research strategy. Research entails a gradual process, where the end goal is still in view and the development shortcomings are present. A product, on the contrary, means delivering the result of the research, where most things have already been considered. By positioning Glass as ongoing research, the interviewees attempted to anticipate and justify the criticism concerning the device, since research is supposed to be messy, problematic and complex.

The manner in which both the general public and Glass developers attempt to make sense of the device closely resembles what, in the philosophy of technology, Ibo van de Poel calls a "sociotechnical experiment" (2009a, 2013) (I will introduce an elaborate review of sociotechnical experiments in Chapter 8). In such an experiment, a new technology enters society under conditions of "limited operational experience" and "with large uncertainties, unknowns and indeterminacies" (2013, p. 669). As such, one cannot anticipate the impact of these technologies on society. The question that Van de Poel poses is how to experiment responsibly, suggesting an ethical framework to ensure "the gradual and experimental introduction of a technology into society, in such a way that emerging social effects are monitored and are used to improve the technology and its introduction into society" (ibid., p. 670). Here, Van de Poel stresses "the need for learning"—about the experimental technology and how society responds to it and accommodates it—as an essential condition to overcome uncertainty and ignorance in social experiments.

One could argue that the introduction of Glass in society was in fact a social experiment with little sense of direction. In contrast to the suggestion of Van de Poel, there was no ethical guidance or societal awareness on the conditions of the experiment, with Glass as an experiment transforming societal and normative canvas along the way. While the interviewees generally praised Google as a visionary company guided by professional enthusiasm and curiosity, they did not consider the effects of such a "living lab" on society or why this is important. As such, appropriating Glass as an open laboratory details professional solidarity with Google for its innovative research approaches while also downplaying ethical (self)reflection in sociotechnical experiments.

g. Glass as a pride of engineering excellence

Csikszentmihalyi and Halton (1981) studied how people use material things to position themselves in relation to others and attribute certain identities upon themselves. Following

their analysis, one can argue that Glass is used as a device to connect to the professional sphere of engineering and design and to manifest professional identity.

In general, the interviewed developers approached Glass from a technical perspective, soberly acknowledging its possibilities and limitations. Their professional background in software engineering, cloud computing and user experience design allowed them to dissect and evaluate Glass according to its functionality. For instance, *Edward* explained his interest in the device in the following way:

I was quite impressed how high the performance seemed to be. Understanding that it is a very low powered computer that needs to use a very small battery and therefore it cannot do a lot of very intensive processing. And yet it was able to process live video, to synchronize with movements very effectively. I was very impressed with that.

He continues to stress how impressed he was with Glass and its performance, to the point of appropriating the device as the embodiment of the success of engineering work:

I was impressed—because I'm a technical person—I do like to speculate about what kind of engineering would be required to achieve it. And I was impressed with the performance. Imagining that we designed it! The engineers work very hard to make it accessible.

As attested by the quote above and illustrated by other quotes from earlier sub-themes, professional background serves as a tool to explain excitement over the product and indicate an immediate technical take on Glass. Using group personal pronouns such as "we" instead of "they" indicates considering Google Glass as a pride for the profession to which *Edward* belongs. It is only in this instance where he claims group belonging—*Edward* is very clear about not participating in the design of the device (although he did contribute to developing the web platform essential for its functioning).

Many of the interviewed developers exhibited similar tendencies, praising Glass as a technology of infinite possibilities extremely ahead of its time (*David*, *Owen*) that is technologically far-reaching and exciting (*Rick*, *Patrick*). Thus, Glass becomes meaningful as a materialized symbol of engineering excellence in terms of the technological capabilities of Glass and the work necessary to enable them. Glass is appropriated in this theme as a symbol of professional achievement and pride that can to some degree explain why the overall attitude of the interviewees was to defend the technology and blame the unwitting public for not understanding it properly. The appropriation theme of Glass as a pride of engineering excellence could also partly explain how a strong allegiance to

professional self-identification can, in some value conflicts, outweigh societal normative considerations.

Discussion of Interpretative Phenomenological Analysis findings

The analysis of how developers appropriated Google Glass has revealed that no perpetual grammar of appropriation exists; rather, it is flexible, reflective of personal (moral) histories and the evolving sociocultural context and sensitive to the mediating capacity of Google Glass, in each of the unique cases of the interviewed developers. Throughout the interviews, professional background in technology development and design formed a strong backbone, against which developers reasoned with Glass. Also, geographical belonging, as well as the diverse sociocultural environment surrounding the interviewees, played a role. Together, this provided an empirical embedding of the hermeneutic lemniscate as a model of appropriation, with people, technology and the world as active parties.

In general, seven intertwined appropriation themes materialized during the analysis:

- a. Glass as a misunderstood opportunity
- b. Glass as a technology of the self
- c. Glass as a cell phone reference
- d. Glass as an epitome of the future
- e. Glass as a privacy controversy
- f. Glass as “an open laboratory”
- g. Glass as a pride of engineering excellence

Each of these appropriation themes reflects not only how the interviewed developers make sense of Glass but also what becomes meaningful to them in the process, and how they consequently interpret it. These are the designers’ visions-in-the-making that become embodied in the technology and are what precisely makes design a non-neutral process. Appropriation represents a dialectic process of looking back and forth at a technological script, with all its affordances, limitations and corporate ideology, and relating it to the personal background, the “historical situatedness”—social, normative or professional—of the engineers and developers of Glass. In some cases, Glass was a complete fit with this background and required only the spontaneous, subconscious reflection of the interviewees to become enrolled into their existing life networks. In others, Glass partly coincided with the guiding principles and views of the developers, requiring only a certain adjustment of (normative) considerations or a partial sacrifice on the use of Glass to make it fit for contextual integration in daily life. In other cases, Glass did not satisfy the

functional and design demands of the interviewees and did not fit into their routines. These developers stopped using the device.

The seven different manners in which the interviewed developers have appropriated Glass adeptly reveal the hermeneutic lemniscate principle at work: appropriating Glass *as something* and turning to individual sociocultural experiential frameworks for reference, while considering the current technological possibilities and limitations, as well as the social controversies Glass generated. Cultural contexts and how other people reacted to Glass also actively co-shaped how the interviewees made sense of it. What the interviewees demonstrated by generating at least seven different meanings of Glass and what they predominantly attributed to the public, anticipating change in the public understanding of this technology, empirically illustrate the provisional and dynamic nature of sense-making and the attribution of meaning. This demonstrates how sensitive the meaning attributed to technology is to changes in any of the three constitutive elements of the lemniscate: the personal histories of people, the technology in question and the surrounding world.

The IPA findings have also illustrated how design is not a neutral process and how the developers and engineers behind the products are greatly aware of this. They reflect, implicitly and explicitly, on the role of value in technological development and develop their own ways to grapple with inevitable value conflicts. In short, the IPA findings have revealed the substantial role the design process in considering value dynamism. The following section attempts to understand the question of ethics in design by reviewing the approach of VSD and correlating it with the empirical philosophical findings of this appropriation study.

6.3 Ethics of technology design: Value Sensitive Design and the unaccounted multidimensional nature of values

Various design approaches attempt to address in practice value-laden technology design, incorporating ethical reflections into the development of technology early on (e.g., VSD [Friedman, 1999], Care-centered VSD [Van Wynsberghe, 2012], Disclosive Computer Ethics [Brey, 2000], Designing for Trust [Camp, 2003], Design for Values [Van de Poel, 2015; Van den Hoven, 2005], Values at Play [Flanagan, Howe and Nissenbaum, 2005], Product Impact Tool [Dorrestijn, 2012]). However, VSD, piloted by Batya Friedman and colleagues in 1970s, stands out as one of the earliest, most comprehensive and, to date, most influential approaches attempting to methodically incorporate ethical considerations regarding technologies in the design process. For these reasons, in the remainder of the

chapter, I focus on this approach to review its take on values, technologies and ethical considerations in design.

Value Sensitive Design belongs to the practical domain of ethics and posits that the normative ideas of stakeholders inform the process of technology development (Friedman, Kahn and Borning, 2002; Friedman and Kahn, 2003). As such, technological design is not neutral, and VSD thus aims to account systematically for the human values present within it from early stages. To accomplish this task, VSD researchers utilize iterative three-dimensional investigations: conceptual, empirical and technological. In the conceptual stage, researchers map out the stakeholders, the values in play and whether value conflicts occur. This is followed by an empirical investigation into the design and use context to determine how the identified values are realized and which of the conflicting values receives priority and why. At the level of technical investigation, a design system is built to implement and support the findings of the conceptual and empirical stages and accommodate all pursued values. In this way, VSD enables a win-win situation by means of a theoretically grounded design approach to accommodate different conflicting values for the benefit of all stakeholders.

However, to be able to design the identified values into a technology, these values must be specified in concrete design requirements. To achieve this, Friedman and Kahn (2003) suggest conceptualizing values in a generally accepted manner to ensure that VSD can accommodate different value manifestations from varying contexts into a universal value set analysis for design. As such, the authors endorse a set of 12 “human values with ethical import¹³” (Friedman and Kahn, 2003, p. 1187) that incorporate both the traditional moral values of rule and consequentialist ethics (such as autonomy, freedom or trust) and more modern values inherent to the ICT community (such as ownership, calmness and environmental sustainability). This commitment was further extended when Friedman et al. (2006) embodied the identified value set in a guideline table on value meaning and specification to be considered in design. Although the authors maintain that this list of values is tentative, flexible and subject to ad hoc scrutiny, there nonetheless exist several problems worth considering in detail.

The primary issue, which yields the subsequent ones, addresses the approach to values in VSD. At first glance, the VSD founders plea for a middle ground between a set of universal and particularistic values, affirming VSD as an approach “that allows for an analysis

of universal moral values, as well as allowing for these values to play out differently in a particular culture at a particular point in time” (Friedman and Kahn, 2003, p. 1183). At a closer look, however, a clear priority in design is attributed to the preselected set of 12 values mentioned above, with a later addition of a thirteenth, the value of courtesy (Friedman et al., 2006). Moreover, the VSD founders “highlight [the] ethical status [of these values] and thereby suggest that they have a distinctive claim on resources in the design process” (Friedman and Kahn, 2003, p. 1187). Repeatedly emphasizing in a later work that the suggested list is not exhaustive, however, the authors elaborate that the list is “intended as a heuristic for suggesting values that should be considered in the investigation” (Friedman, Kahn and Borning, 2006, p. 366). As a result, while VSD aspires to provide a method applicable to values in design in general and promises to reflect a middle ground between universal and particular takes on values, *de facto*, VSD approaches the extreme of universalism. This makes it vulnerable to consequent issues of detachment from the practices and lived experiences of people, generalizations and unspecified origin that I have elaborated upon in Chapter 3.

Although VSD has received recognition and merit from many academics and design practitioners due to its desire to include ethics in the design process and a comprehensive method to do so (e.g., Cummings, 2006; Timmermans, Zhao and Van den Hoven, 2011; Van de Poel, 2009b; Van den Hoven and Manders-Huits, 2009), it has also received a share of criticism, often related to the suggested value list (e.g., Alsheikh, Rode and Lindley, 2011; Borning and Muller, 2012; Le Dantec, Poole and Wyche, 2009; Manders-Huits, 2011; Yetim, 2011).

Le Dantec et al. (2009) challenged the choice of a value list as a bold heuristic for being itself embedded in cultural and professional views. The authors demonstrate that the VSD “manifesto of values” arises from the ICT community, which has traditionally promoted “personal expression and collaboration” as well as other cultural commitments that the authors trace to the revolutionary US ideals of the 1960s (ibid.). By devising a list that can claim primacy in design consideration, the authors claim that VSD positions itself “within the nimbus of morality, cultivating a dogmatic response with respect to which values are worthy of consideration and disengaging from a commitment to understanding the nuanced manifestation of a plurality of values” (p. 1142). Moreover, the methodological hierarchy of VSD, argue Le Dantec et al. (2009), supports a view that certain values deserve primary consideration in design. In principle, the tripartite methodology promotes an iterative and mutually informing study on values in design, by virtue of which “[a]n artifact ... emerges through iterations upon a process that is more than the sum of its parts” (Friedman, Kahn and Borning, 2002, p. 2). However, as the authors note, the ordering of conceptual investigations over the empirical, backed by a pre-given value

¹³ The comprehensive list of values endorsed by Friedman and Kahn for Value Sensitive Design (2003; 2013) is as follows: human welfare, ownership and property, privacy, freedom from bias, universal usability, trust, autonomy, informed consent, accountability, identity, calmness, and environmental sustainability.

list, discourages practitioners from a contextualized and extensive value discovery and value specification.

Mirroring and elaborating this issue, Borning and Muller (2012) caution that providing a list of values for primary consideration and supplementing it with pre-given conceptualizations can evoke bias in conceptual investigations. They argue in favor of value discovery among stakeholders, which would return the plurality of values to the fore. Another plea concerns the deeper contextualization of the suggested value set, or as the authors assert, “[B]e explicit about the particular culture and viewpoint in which they [the suggested values] were developed, rather than [...] making implicit claims about more universality than are warranted, or perhaps even intended” (ibid., p. 1126). The crux of the criticism concerns the non-neutrality of the selected value set and the lack of its context qualification. Thus, the incoherence regarding proclaiming and maintaining a middle ground in values entails multiple practical problems that challenge the integrity of the VSD approach.

This leads to the deduction of an overarching normative challenge to the VSD approach, which can be formulated as “Whose and which values in design?” Alsheikh et al. (2011) address the question of value bias in VSD with a case study on long-distance relationships mediated by ICT in an Arabic cultural context and invite VSD to be cross-culturally sensitive to “understand users in terms of their own values and priorities” (ibid., p. 83). Manders-Huits (2011) instantiates this issue and questions VSD’s take on identifying values and translating them into a final product. She also argues for a more contextualized value conceptualization, cautioning, however, avoiding the trap of the naturalistic fallacy of conflating empirical facts with ethical values, or “by reducing an ‘is’ to an ‘ought’” (p. 279). Echoing the voiced concerns and addressing the potential issue of a naturalistic fallacy, Van Wynsberghe and Robbins (2014) argue for “a proper value analysis,” providing an ethical reflection on the identified list of values, embedding them in context, and “correctly translat[ing] values into contemporary norms” (albeit ultimately saying that this is a tall order for engineers and designers and proposing trained ethicists as more suitable candidates for the job) (p. 956). Overall, the critics of VSD ask for a reflective value discovery and conceptualization, sensitive to the value context.

The perspective of the moral mediation approach could provide guidance on how to address the broad issue of value discovery and conceptualization in VSD. The primary difference between the two approaches concerns the position on the nature of values considered in design. The VSD approach endorses the view that technological design allows for specific “value suitabilities,” where “a given technology is more suitable for certain activities and more readily supports certain values while rendering other activities

and values more difficult to realize” (Friedman, Kahn and Borning, 2002, p. 61). This view partly correlates with the basic tenets of the technological mediation approach, whereby technologies are intentional, in that they transform how people perceive and act in the world, readily presenting one set of options to a user, while foreshadowing an alternative one (Ihde, 1990). However, the concept of “value suitabilities” in VSD remains unproblematic because of the passive correlation VSD attributes to the values and technology. While in VSD, values are considered as an *ex-ante* or *ex post-facto* addition to the design process, from the mediation perspective, values, like people, do not exist outside, out there, but are the outcome of mutual shaping with technology in the practices and experiences of people.

Following the technological mediation approach, not only can technology amplify and reduce certain facets of the world, but by doing so, it also enables a distinct reality, which people perceive and upon which they make practical decisions; or, as Verbeek (2006) contends, “When technologies co-shape human actions, they give material answers to the ethical question of how to act” (p. 361). For this reason, it is also important in the process of technological design to understand how values are constituted and negotiated in relation with technologies. In view of this, a mediation analysis of morality, as I have suggested in Chapters 3 and 4, places much attention on studying the practice and context within which a technology is or will be imbedded and understanding how people appropriate a technology and how what is meaningful and valuable to them takes shape in the process. With these considerations in mind, I suggest that the appropriation study, building on the technological mediation approach, could enhance the VSD approach, in the stage of both the conceptual and empirical investigations, with the missing value qualifying and contextualizing component.

Sensitivity to values remains a core benefit of the VSD approach. It manifests in considering the design process as non-neutral and imbued with values. However, this sensitivity is largely lost in the process of translating values into norms and design requirements, since concrete design options require concrete value specifications.

For instance, the value of privacy frequently draws attention from VSD scholars. Most often, it is conceptualized under the lines of control of information, with informed consent as a primary mechanism to support such a value of privacy (e.g., Friedman et al., 2002; Van den Hoven and Vermaas, 2007). While following narrow specification guidelines makes an ethics in design operational, such an approach also risks embodying only certain aspects of the value, ignoring the complex context within which the value is manifest predominantly. The findings of the exploratory study on Google Glass and privacy in Chapter 2 and the

IPA findings in this chapter empirically support the theoretical suggestions, urging a turn to the practices of people and the anticipated application context.

Van Wynsberghe (2012), in her study on healthcare robots, identified a similar problem regarding a narrow take on values in VSD. According to her, the VSD approach must more closely consider “the context, the practice, the actors involved and how care values are manifest” (p. 120). Van Wynsberghe consequently developed a Care-centered VSD approach that evaluates the practice regarding the potential impact that the introduction of care robots could have on it. An appropriation study grounded in the mediation approach could further enhance VSD to make it applicable for a variety of contexts and technologies.

The integration of the mediation lens with the stages of conceptual and empirical investigations in VSD can enable the developers, designers and engineers of technology to better comprehend values in design and to enhance reflexivity during conceptual and empirical investigation. Mediation analysis could primarily be helpful to deepen an understanding of the value in design by studying how it manifests in current or anticipated use practices, as even an exploratory mediation study of privacy and Google Glass revealed multiple value dimensions and design considerations that could potentially be used for a redesign of Glass. Equally important, and in line with the value-laden ideas of technological design that Friedman and colleagues endorse, is to understand how VSD practitioners themselves attribute meaning to this value in relation to a technology under construction. The IPA study in this chapter illustrates how the technological mediation approach, with the help of the appropriation study, can help to identify, contextualize and analyze the moral background of the design problem, which could help to better inform the design process. This could allow VSD to better relate to potential users and application contexts.

6.4 Conclusions

Chapter 6 has explored the application and fitness of an IPA-based appropriation study, grounded in the technological mediation approach, to technology with limited availability and currently undergoing redesign. However short the period of introduction of Glass was, some people were still able to experience it, and others made it an inalienable companion of their daily lives, both of which enabled an experience-based IPA study of how developers appropriate Glass. The IPA study identified a rich normative background of meaning-making in the case of Glass, prompting its developers and designers to make their value commitments visible, confront oftentimes conflicting public values and shift the emphasis in prioritizing some normative considerations over others. With this, the

IPA study not only analyzed and visualized the embedded workings of the lemniscate principle of interpretation but also proved its fitness to zoom in on the moral mediation of technologies. In parallel, it also suggested that design is not a neutral process, and it requires ethical reflection and accompaniment.

In this regard, I have reviewed the approach to VSD as one aspiring to account for the values present in the process of design. Throughout the chapter, I have demonstrated that if VSD aspires to develop technologies to which users can meaningfully relate, it is necessary to learn more about these technologies and determine how they mediate the moral standing, perceptions and intuitions of not only the future users and non-users of this technology but its developers as well. In the process of translating values into design requirements, VSD loses some of its initial value sensitivity. Conducting an appropriation study to identify how people attribute a technology with meaning is one empirical philosophical method to account for contingent moral evaluations in VSD.

An IPA-based appropriation study could enhance the conceptual and empirical design stages of VSD in two ways: by grounding the process of value discovery and by accounting for the values of technology developers in the design process. An appropriation study, grounded in the mediation approach, offers a closer examination of how values evolve alongside technologies, against the evolving background of personal histories and the sociocultural environment. It could thus offer VSD a new perspective on values while simultaneously only substantiating the approach and corroborating it.

One could charge the technological appropriation analysis with a frequent criticism applied to VSD, namely, falling in the trap of naturalistic fallacy: simply because all of these insights are identified in the value discovery process, this does not mean that they should be broadly applied and included in the final product design (Manders-Huits, 2011). However, the appropriation study not only produces a rich web of technologically mediated values, concerns and conflicts but by doing so, it also enlarges the space for the deliberation and critical reflection of these findings, allowing for better-informed decisions regarding value trade-offs and prioritization in design. It suggests areas of moral interest where certain value developments are likely to take place, given the analyzed hermeneutic situations. As suggested by the case of Glass, moral mediation essentially presents a learning process that allows one to look into and critically reflect on how technologies mediate our lives. In the spirit of the technological mediation approach (see Chapter 3), the appropriation study does not provide normative guidelines in itself regarding how to evaluate the identified values and possible value conflicts or dictate which value conceptualizations ought to be designed. It thus does not alter the deliberation

process inherent to VSD, which traditionally open to a variety of ethical perspectives, but it does contextualize and expand it.

The IPA study in this chapter has suggested that the process of ethical reflection in design is inalienable to the mindset of technology developers. However, they lack a structured manner to guide and express it. Contrary to the suggestion of Van Wynsberghe and Robbins (2014) to “outsource” ethical reflection on a project to a trained ethicist, I suggest that it would be better to capitalize on the existing tacit knowledge of the designers. In particular, the work of user experience researchers and designers is conducive to the integration of an empirically rich mediation analysis, because their work, by default, presupposes empirical explorations and analysis. Complementing the structured VSD approach with context-sensitive technological mediation analysis offers a method to expand and structure the process of value discovery and analysis and, as such, to strengthen the ethical deliberation in design. In this way, the mediation approach supplements the existing ethical pursuits in design by inviting to consider a broader scope of moral questions, also from a new relational angle. Moreover, it provides technology developers a method to conduct reflective value discovery and conceptualization that is sensitive to the value context. Combining VSD with the mediation approach would allow VSD to regain its initial value sensitivity and become more philosophically substantiated.

However, in this chapter, I have dealt with the case of a technology that already exists, if only at the introductory stage. My next case concerns a technology that exists only in a laboratory and permeates the minds of people in the form of promises, concerns, fears and hopes—the nanochip for sex selection (SST+). How can one identify value sensibilities and dynamism in the case of a technology at the doorstep of innovation? Would my design suggestions still hold in this case? The following chapter explores the appropriation of a technology does not yet exist and test the fitness of an IPA-based study for an anticipatory case.

Chapter 7.

Appropriation study of technology-in-the-making:
Sex selection and the moral significance of emerging
technology

The potential¹⁴ to select the sex of a future child has been available since the early 1990s. Ethical concerns accompanied sex selection technology (SST) early on, ranging from worldwide population imbalances and gender discrimination to the fear of reinstating eugenic movements. Consequently, SST faces strict regulation globally; it is only allowed when medically justified to prevent a transfer of genetic diseases or if national law endorses family balancing as a non-medical motivation. Currently, SST is expensive, invasive and often requires several attempts. However, SST+, a microfluidic chip for sperm sorting, suggests that a cheap, non-invasive method of sex selection in the setting of one's home may also be possible (MESA+, 2017).

The chapter aims to explore the moral mediation potential of SST+ by identifying and critically reflecting on the anticipated manners in which SST+ could mediate the daily routines, practices and perceptions of people. The chapter proceeds as follows. In Section 7.1, I explain how SST+ differs from SST, briefly review the ethical debate regarding the current technology and position SST+ within it, as well as present several considerations regarding how to approach the moral mediation of emerging technologies. Section 7.2 provides a foundation for an IPA-based appropriation study of SST+ by grounding it in a thorough literature study. This will allow me to identify several lines of the moral mediation potential of SST+. The IPA study in Section 7.3 explores how the potential users and non-users of SST+ in the Netherlands reason with this technology and how it mediates their values and moral considerations. The concluding section will allow me to reflect on the appropriation study of technologies-in-the-making, suggesting that it is a useful method to identify and analyze the ethical implications of emerging technologies as well as make them available for reflection early on.

7.1 Understanding emerging sex selection technology

In pursuit of understanding the dynamics of the moral mediation of technologies, SST+ lends itself as a good opportunity to develop further the appropriation study based on IPA and the technological mediation analysis. Unlike the analysis applied to the case of Google Glass in the previous chapter, an appropriation study of SST+ would need to face a technology that is not yet available on the market, where no practical experience of its use and only limited factual knowledge about its workings exist. Exploring technological appropriation in this case would need to rely more on its projective counterpart, as explained in Chapter 4. According to the lemniscate principle underlying the appropriation

study, technological appropriation does not require the physical presence of the artifact (although this is desirable to substantiate the study), for it penetrates the minds of people early on in the form of technological promises and societal hopes, fears and concerns. Such technological visions, against a dynamic sociocultural context and accumulated personal histories and knowledge, allow individuals to acquire a projective appropriation that can inform future practice. Although framed differently, the significance of accounting for such a projective appropriation is present in the call of the Responsible Research and Innovation field to carefully assess and account for technological visions during decision-making regarding concerned technologies (Grunwald, 2016). As such, the sex selection case presents an opportunity to conduct the appropriation study in relation to emerging technologies that are still in the innovation pipeline.

In contrast with Google Glass, SST+ is a new and updated version of a previously existing technology with established practices and strict legal regulation. As mentioned above, the possibility of sex selection has sparked vibrant ethical debates worldwide. However, the new material setup and expected affordability of SST+ could enable new sex selection practices and challenge existing ones. In anticipation of this new technology and the change in the material context it suggests, an appropriation study of SST+ could revisit the case of sex selection for non-medical reasons and consider the value dynamism it entails.

To gain plausibility and avoid speculation in the absence of use experience, an appropriation study in the case of SST+ that anticipates its moral significance would need to rely more on literature analysis than in the case of Google Glass. In practice, this means that prior to conducting an IPA-based study, I must correlate the new technology against existing SST practices. This would imply carefully studying the ethical debate about SST to understand what new concerns could arise in relation to SST+ and how these existing concerns could be reconfigured. Identifying this moral mediation potential of SST+ can inform the preparation for exploratory appropriation study.

Following IPA, I ultimately wish to approach the potential users (and non-users) of SST+ in the Netherlands to understand how they perceive the possibility of such a technology and its hypothetical introduction in the country. Here, in absence of use experience, I must rely on the proactive agency of people, which is also constitutive to the IPA method, to study their projective appropriations of SST+. Note that passing a judgment on whether it is ethically justified to use SST+ is not an aim of the study. Rather, an appropriation study in this chapter, empirically oriented and accompanied with a technological mediation analysis, would aim to present a new angle in the sex selection discussion that is sensitive to the material changes that SST+ suggests and the everyday experiences of real people.

¹⁴ Parts of Sections 7.1 and 7.2 are adapted from the following article: Kudina, O. (2018). Accounting for the moral significance of technology: Revisiting the case of non-medical sex selection. *Journal of Bioethical Inquiry*. <https://doi.org/10.1007/s11673-018-9891-4>.

Technological background

Assisted reproduction in the form of sex selection became available in the early 1990s. Currently, SST is possible via sperm sorting and pre-implantation genetic diagnosis (PGD) (Parliamentary Office of Science and Technology, 2016). In sperm sorting, two dominant methods are available: MicroSort, whereby distinguishing in vitro X and Y chromosomes is possible with the addition of fluorescent dye, and the Ericsson method, which relies on the higher mass factor of X chromosomes to sort the sperm when it passes through a protein of serum albumin. Conducting PGD requires the extraction of female oocytes for an in-vitro fertilization (IVF) procedure. Once the embryo develops eight cells, one cell is removed for chromosomal DNA analysis, which can reveal the sex of the embryo, among other characteristics (Harper and SenGupta, 2012). Because it provides higher result certainty than sperm sorting (99% vs. 75–85%), PGD dominates the market of sex selection (GenderSelect, 2017). However, because PGD necessitates an accompaniment of IVF, successful pregnancy depends on additional factors and often requires several IVF attempts. The overall cost of sex selection is high, between 1,300–3,400 USD per attempt for sperm sorting, and 18,000–25,000 USD per attempt via PGD/IVF (*ibid.*).

Sex selection faces strict regulation worldwide. However, the prevention of the vertical transfer of genetic disorders, such as hemophilia, Lesch-Nyhan syndrome, Duchenne-Becker muscular dystrophy and Hunter syndrome, justify the medical use of SST (World Health Organization, 2011). A non-medical exception concerns the desired variety of sexes in the family, when parents already have two or more children of one sex and want to have a child of another sex. Such a “family balancing” application of SST is available in the US, Cyprus, Ukraine, Israel and several other countries (Bayefsky and Jennings, 2015, pp. 54–55). The technology behind sex selection is invasive (particularly with PGD/IVF), expensive and requires multiple attempts. Despite this, sex selection for non-medical reasons is a top motivation for cross-border medical tourism (Van Hoof, Pennings and De Sutter, 2015) and accounts for up to 9% of the PGD/IVF cycles in the US, as of 2005 (Baruch, Kaufman and Hudson, 2008).

One recent technological development could overcome the above-mentioned constraints (MESA+, 2017; Valkenberg, 2014). A microfluidic chip-based technology can measure sperm characteristics, such as motility and morphology, to ameliorate problems with the selection of spermatozoa that are common to assisted reproductive technologies (ART). However, an adapted version of the technology could also be used for sex selection, since, in addition to cell viability and acrosome state, the microfluidic chip can also analyze the chromosomal content of individual sperm cells (De Wagenaar et al., 2015, p. 1295). It would follow similar logic as the existing sperm sorting techniques: X chromosomes are longer and therefore heavier than Y chromosomes. The microfluidic chip operates

at a nanolevel, where the chromosomal variation in weight would be significant for determining chromosomal sex, thus making sex selection in principle possible. One would need to present a sperm sample on a chip, which would sort the sperm into X- and Y-bearing groups, providing two options depending on the desired outcome. A chip-based form of sex selection, in view of its non-invasive nature, offers a home setting as a potential application site. Form-wise, it would likely take after its predecessor, as an at-home microfluidic chip for the assessment of semen quality, whereby a disposable chip, requiring small volumes of sperm sample, would be “used in combination with a handheld measurement system and management software” (Segerink et al., 2012, p. 66). Moreover, at-home application would significantly reduce the costs of sex selection and expand it beyond the medicalized domain.

It is critical to emphasize that the confidentiality of the research and its still predominantly open developmental avenues permit only a limited view of the technical specifications of SST+. Although researchers have confirmed the successful proof of concept of certain sperm characteristics (De Wagenaar et al., 2015), there is no word of pursuing the sex selection trajectory for human use. It is not clear how SST+ will manage the cells with an extra or missing chromosome (a chromosomal aneuploidy), although researchers previously used on-chip analysis that utilized staining protocols to successfully test for chromosomal anomalies in individual sperm cells (*ibid.*, pp. 1299–1300). On a practical level, conducting the entire sex selection process at home implies not only the point-of-care sperm sorting promised by SST+ but also self-insemination, akin to using a turkey baster or a disposable syringe for at-home insemination using donated sperm. This approach presents limitations and often necessitates multiple attempts at pregnancy (Wikler and Wikler, 1991). Although the form and usability of the technology remain unknown, anticipations of a chip “for 12.95 at the drugstore” (Valkenberg, 2014, ¶16) suggest an expected resemblance to a pregnancy test in terms of cost, ease of use and acceptability. Some anticipate that “The [sex] selection chip [...] has the potential to become available at a large scale and a low price; therefore, the social effect is likely to be quite substantial if the technology would indeed be introduced” (Verbeek, 2015, p. 197).

Importantly, as mentioned earlier, sex selection for non-medical reasons remains illegal in many countries, with rare exceptions for family balancing. At the same time, history suggests a close intertwining of technological innovation, public views, moral frameworks and legislation. Initially, SST appeared to increase the birth of female animals to boost agricultural outputs, but it later migrated to use in humans. Both the research and the history of SST identify no technical obstacles to using SST+ for people and indicate that it is in principle possible (Valkenberg, 2014).

In what follows, I wish to consider the potential leap of SST+ to human use, although I want to stress that no support for pursuing this agenda exists among the technology's developers. Nonetheless, such an anticipative exploratory study is useful and necessary as a testbed for considering the previously unacknowledged moral significance of the material setting in the sex selection practice. Moreover, in the hypothetical event of market introduction, this study can offer matters of concern for the responsible design and governance of SST+, a technology that still has an open future regarding its form, usability and societal embedding.

In the present study, the physical or market presence of SST+ is nonessential (albeit desirable) for identifying its potential moral significance, because SST already permeates the minds of people in the form of technological visions, promises, concerns, fears and hopes, all of which mediate appropriation of SST+ (Grunwald, 2016). As Boenink, Swierstra and Stemerding (2010) have demonstrated, technological promises and visions mobilize societal and scholarly fears and hopes, which can be instructive for understanding the moral significance of a technology that is yet to materialize. Although an empirical investigation would substantiate the study, an inquiry into the technological potential to mediate public (moral) views, routines and habits, grounded in practices with similar existing technology and informed by the societal and ethical discourse on the matter can be informative in the wake of a technology potentially at society's doorstep, as is the case of SST+.

Ethical considerations regarding the societal risks of SST are what have ultimately informed its strict regulation for non-medical reasons. The next subsection briefly reviews the debate to date and positions SST+ within it to inquire how the new technology faces old challenges and alters the debate, if at all.

The ethical debate regarding sex selection technology and how SST+ fits within it

Risk-benefit considerations polarize the discussion concerning sex selection into two camps: those who see benefits to SST beyond medical necessity and those who challenge the idea on multiple grounds.

Rights-based claims of a libertarian nature present a case for sex selection, suggesting that people should be free to make reproductive choices without guidelines from the government or anyone else, insofar as these choices do not limit the freedoms of others (Dickens, 2002; Savulescu, 1999). Some consider SST beneficial for reducing abortion rates and diminishing the suffering of women, who give birth to undesired children; and children, who would live their lives knowing that they were unwanted (Puri and

Nachtigall, 2010). Others suggest that SST empowers women and can decrease violence toward them (Steinbock, 2002). Thus, by relying on the virtue of procreative rights and liberties, the proponents of sex selection for non-medical reasons argue that the technology is in the best interests of mother and child.

Worry regarding catering to the preferences of prospective parents and disregarding the inherent worth of a child characterizes the case against sex selection (Sandel, 2004). Some suggest that SST will start a race to "designer babies" and enact the slippery slope of eugenics (Fukuyama, 2002; Strong, 2001). Others worry about the discrimination-by-design that SST embodies, particularly with PGD/IVF, when "a single trait [...] obliterates the whole" (Parens and Asch, 1999, p. 13). Sex selection technology transforms sex into a paramount trait when considering the future of an embryo (Wertz and Fletcher, 1992). Ascertaining the sex of an embryo becomes sufficient to either allow its gestation or discard it altogether. This invites questions regarding the moral status of an embryo relative to its potential development into an autonomous child with independent moral standing and, in parallel, questions of management strategies regarding the surplus embryos (*ibid.*).

Some argue that because SST is discriminative by design, it promotes sexism and will foster unreasonable gender expectations in prospective parents (Blyth, Frith and Crawshaw, 2008). Several policies and regulations have appropriated this argument as a significant moral hazard of SST, suggesting that the risks of the potential psychological harms to children outweigh the potential benefits to prospective parents, rendering the use of SST for non-medical reasons impermissible (European Parliament, 2013; HFEA, 2002).

Those who oppose SST predominantly assume a global preference toward selecting males. There is a worry that SST could provoke worldwide sex-ratio imbalances, challenging the sociocultural standing of women or even diminishing it to their childbearing abilities (Hvistendahl, 2011). However, because sex/gender preference empirically relates to dominant sociocultural views, this is not a generalizable assumption in a global context and will not receive significant attention in this chapter (e.g., Dahl et al., 2003; Rathenau Institute, 1996; Gleicher and Barad, 2007).

The debate around SST encompasses diverse ethical concerns and anticipated benefits. The use of SST+ suggests a certain and safe selection outcome at low cost and with home use, which would also eliminate the need for embryo creation. While this change in the material setting of the sex selection practice may address some of the ethical concerns outlined above, it does not tackle all of them.

One may suggest that for prospective parents, SST+ promotes the four general moral principles originating in the field of bioethics: non-maleficence, beneficence, respect for autonomy and justice (Beauchamp and Childress, 2011), which provide a new set of arguments to support sex selection. SST+ could be beneficent to prospective parents and support the principle of autonomy by allowing an independent pursuit of desired reproductive agendas. It could embed the principle of non-maleficence, because it is non-invasive and obliterates the involvement of embryos. Finally, SST+ could be just by allowing equal access to the technology at low cost and ease of use.

However beneficial SST+ could be for prospective parents, in relation to future children, the ethical concerns remain intact. Even though SST+ could bypass ethical concerns regarding embryo creation and management, it would not alter the potential to promote sexist attitudes and psychological risks to a child.

Therefore, SST+ could ameliorate some ethical concerns but leave others intact. Nevertheless, this does not render the new technology normatively obsolete. On the contrary, by significantly altering the material setting of sex selection, SST+ could affect society in ethically nuanced, subtle ways that could gradually inflict social and normative change in both individual and public views. In other words, SST+ could mediate the moral landscape of human beliefs and practices.

Quantitative arguments regarding population imbalances and net risks versus benefits dominate the ethical debate on sex selection. Such “hard” impacts of technology are useful in deliberation, because they invite unequivocal pro or con judgments regarding its future (Swierstra, Stemerding and Boenink, 2009). However, SST+ may alter society in softer ways, which often bypass the radar of policy-makers but ultimately produce significant sociocultural and normative change. Because technology helps to co-shape what counts as real, possible and reasonable, it is not neutral. It appears that deliberations on the fate of a certain technology and its informed use are not complete without accounting for the moral mediation potential of technology. However, to explore and account for the moral mediation of technology, it is first necessary to understand how to approach the moral mediation of a technology still within a developmental pipeline. The following subsection discusses this question.

Approaching the moral mediation potential of technology-in-the-making

The technological mediation approach can help to understand how SST+ can mediate the quality and structure of human practices, experiences and other dimensions of engagement with the world (Verbeek, 2005). As suggested by Verbeek, the ethical implication of human–technology intertwinement that characterizes our everyday

existence is that technologies also help to shape the moral evaluations and decisions of people (i.e., technologies mediate the morality of people) (2011). Regarding the case of SST+, the question is how to identify and understand its moral mediation potential to account for it during deliberations on the fate of this technology and its informed use. Approaching the mediation of values from the perspective of human practices proved useful in the case of Google Glass, and thus I use it as the starting point in the SST+ case.

The technological mediation approach positions morality in the interaction of people and technologies (see Chapter 3). Therefore, to explore and analyze how technologies co-shape, enable, challenge or change in any way the (normative) engagement of people with the environment, one must scrutinize the practices that technology enacts or destabilizes (Mol, 2002). Even based on scarce knowledge about SST+, one may deduce that it would enact a different material context for the practice of sex selection from that currently available via PGD/IVF and sperm sorting. A natural question would thus be how such a material shift in practice could fit with existing methods of approaching sex selection.

Exploring the moral mediation of technology from this angle would entail studying how existing and envisioned practices match or conflict and what normative contingencies they reveal. However, SST+ is a technology at the brink of innovation, with no accumulated experience of its use. How can one identify the normative impact of a technology still under development? This would require an element of anticipation based on a thorough study of existing and envisioned practices, embedded in theory and literature review.

This is where an IPA study comes in. In Chapter 6, IPA was useful to distill the dynamism of value constellations within the practices Glass enabled. In the case of the sex selection chip, the IPA method must adopt a more forward-looking direction, grounded in a thorough literature study and evoking research participants to project their visions of chip use against their existing experiences and interpretative frameworks. Examining the lemniscate model of interpretation, by analyzing how people make sense of SST+, even in an anticipative manner, should reveal value configurations, re-affirm or revise certain existing moral understandings and allow for new valuations. The challenge for the IPA method would be to maintain its rigor when relying primarily on the proactive agency and accumulated experience of people.

To help IPA uncover value dynamism through projective appropriation, I first conduct a literature-based study to identify the potential moral charge of SST+. This will aid me to ground the interview questions by suggesting certain areas of attention. In parallel, just as with any interview questions, this inevitably steers the interpretation process of participants. The challenge for me as a researcher is to present minimal information

prompts about what is currently known about SST+, bearing in mind that information prompts can never be neutral. The hope is that through the interaction of SST+ visions both presented by me and projected by the participants themselves, their sociocultural histories and their embedding, some forms of value dynamism will resurface.

As with any ethics-related aspect, the moral mediation of emerging technologies is difficult to identify, anticipate and manage. Nonetheless, encompassing and informed decision-making on the design and use of new technologies would be incomplete without accounting for their moral mediation potential. The anticipative moral mediation analysis, grounded in a literature exploration and an IPA study, can shed light on how a technology can fit the moral landscape of people and co-shape new moral insights, when this technology is still at the brink of introduction. This is useful for broadening the deliberation process on technological future with ethical considerations that go beyond the discourse of risks and harms that current dominate the SST discussion on the political and ethical levels. Moreover, an exploratory study of SST+ appropriation can present a different angle in the sex selection discussion that is sensitive to the material changes of SST+ and the everyday experiences of people.

7.2 Exploring the moral mediation potential of SST+ through literature

All discussions about the future of technologies carry a note of speculation. With SST+, the few known features prompt new, and build upon, existing ethical questions about sex selection. This section explores how SST+ could mediate the normative canvas of human experiences and practices based on literature analysis and retrospective case studies. When anticipating the mediating effects of SST+, I attempt to avoid speculation by grounding my reasoning in the theoretical approach of technological mediation, literature studies and the careful assessment of technological promises regarding SST+. I also consider retrospective and current examples of biotechnologies in society. Such examples provide a sense of where and how possible tensions in practices and values may arise, bearing in mind the non-linearity of technological development. As such, the mediation analysis of the potential normative implications of SST+ is explorative, non-exhaustive and anticipative, thus providing a springboard for further critical discussions.

The potential ethical implications of SST+ stem from anticipated changes in the sex selection practices, broadly classified in three clusters, namely, the demedicalization of the sex selection practice, the transformation of SST+ to a direct-to-consumer technology and the move of SST+ to an open market. These clusters represent overarching themes across

specific normative considerations and have been identified through literature analysis. The themes often overlap, and certain ethical concerns could fit several categories. The cluster scheme below allows a somewhat structured navigation of the ways in which SST+ can mediate the normative landscape of people.

Demedicalization of the sex selection practice

A major difference of SST+ in relation to existing techniques is the potential move from a clinical to a home setting. Currently, sex selection predominantly involves PGD/IVF, which require time, financial investment, logistical planning and invasive physical interventions and often result in psychological burdens to prospective parents (Franklin and Roberts, 2006). SST+ could *demedicalize the practice of sex selection* by offering an affordable, non-invasive technique for use at home.

Performing sex selection at home can *reintroduce elements of the value of naturalness* in pregnancy-related practices, facilitated by technology. This can also enhance the value of privacy in family planning practices, not only regarding the privacy of decision-making but also concerning bodily privacy, by allowing prospective parents to conduct the procedure at home without involvement of a third party. As such, SST+ could facilitate the value of naturalness in assisted reproduction and enhance the procreative liberties and autonomy of prospective parents.

Interestingly, SST+ could *increase the role and importance of men in the reproductive process*. Some argue that ART increased the autonomy and procreative rights of prospective mothers and diminished the significance of fathers in parenting, contributing to “the end of men” (Rosin, 2012). SST+, on the contrary, could highlight the significance of the prospective father by assigning him a primary role in the beginning of the conception journey. SST+ requires proactive decision-making from the father-to-be by asking whether he wants to determine the sex of his future child (preferably in discussion with a prospective mother) and, if so, demanding an active contribution. The sexing of a child is a key practice in the transition to parenthood and the attainment of the moral status and responsibility of parents (Schadler, 2013). By placing the sexing process ahead of obtaining evidence about pregnancy and the health status of the embryo, SST+ allows prospective parents to transition to parenthood and thus assume parental roles and responsibilities much earlier. By placing the prospective father in charge of the sexing process, SST+ elevates his role and importance in decision-making regarding having children. This increase in the paternal role can mediate parental relations and the power balance in different ways, from leveling responsibilities and participation in childbearing to fostering patriarchal authority and exploiting the power of the required male role with SST+.

SST+ as a direct-to-consumer technology

Framing SST+ as an open market technology that is directly available to prospective parents without medical oversight could *transform the status* of prospective parents *from patients* seeking medical assistance in their reproductive ambitions *to customers* requiring technological facilitation to realize their choices. The history of PGD indicates that assuming a customer status provides an enhanced feeling of entitlement to choose and increases the perception of control over one's destiny (Franklin and Roberts, 2006). Such an increased sense of autonomy with the patient-to-customer shift in SST+ could mediate parental perceptions and their expectations of themselves and their child.

SST+ as a direct-to-consumer technology could further intensify an existing *fate vs. choice discussion* in assisted reproduction. Virtue ethics is a common example of ethical reasoning concerning sex selection. To determine the moral status of this practice, its opponents appeal to parental virtues (Sandel, 2004; McDougall, 2005). Assuming that unpredictability is a fact of nature, to enable a child's flourishing, a good parent must possess a virtue of acceptance. SST+ would entice a parent to perform a wrong parental action, because selecting the sex of a child means violating the virtue of acceptance. Hence, SST+ is morally wrong. Yet, if we examine the technology through the lens of the mediation approach, we seem to take for granted the assumption that "unpredictability [...] is an intrinsic feature of human reproduction" (McDougall, 2005). Merely the existence of SST+ challenges this assumption. By presenting the option of selecting the sex of a child, SST+ decreases the unpredictability, and consequently the acceptance, criteria according to which we evaluate good parenthood. The sex of a baby is now available for choice. Whether or not a couple chooses to select the sex of their child is up to them, but it has escaped the domain of fate and is now a profoundly technologically mediated option. By significantly simplifying the process of sex selection, SST+ can decrease the factor of unpredictability in childbearing, thus creating a threshold of the unconditional acceptance traditionally associated with good parenthood.

Transforming SST into a direct-to-consumer, low-cost, in-home and effective technology may invite public curiosity, feed into existing interest regarding sex selection and facilitate the acceptability of the practice. Moreover, a change in the material setting of SST+ may invite prospective parents who never considered the possibility of sex selection to do so. After all, if the technology promises to be affordable, safe and easy to use, it could invite prospective parents to answer the question of *why not to use this technology*. SST+ can mediate parental deliberations regarding sex selection by actively confronting their decision-making and inviting reflection. It may also provide additional stress and anxiety in justifying private reproductive choices. Therefore, while SST+ may increase parental

autonomy and reproductive liberty, the "Why not?" reconfiguration may simultaneously decrease them, creating a sense of pressure to justify private choices.

The move of the SST+ to an open market

The transfer of SST from the medical to the open market domain can affect how people approach the subject of responsibility regarding sex selection. The questions of responsibility related to SST+ are multidimensional and involve different actors. Judging from historical and current cases of ART, concerned stakeholders include at least prospective parents, the industry developing this technology and bringing it to market and medical professionals.

One could argue that that the "Why not?" attitude that SST+ could facilitate denigrates the responsibility of *prospective parents* by commodifying children and inciting consumerism in childbearing decisions. I would argue that SST+ mediates the value of responsibility by simultaneously bringing its multiple dimensions to the fore: while it may invite a simplified perception of complex decision-making regarding childbearing (as suggested above), SST+ also invokes a new responsibility, to recognize the inherent uncertainty that accompanies parental choice regarding sex selection. Prospective parents routinely face responsibility for their reproductive choices, when choosing to conceive a child or facing an unwanted pregnancy or deliberating on how to manage pregnancy or how to raise a child. However, SST+ confronts prospective parents with an additional responsibility, the one that comes with using the technology.

Prospective parents might rejoice at the opportunity to fulfill their preferences and, some may say, their natural right to decide on the future of their children. While SST+ highlights the option to choose, the approach of technological mediation helps to reveal what the technology foreshadows. The natural counterpart of a right is a duty. If one frames SST+ as a manifestation of parental rights and liberties, or as the right to choose, this would also entail a duty, or a responsibility to accept the limitations of that choice. While SST+ allows the selection of the biological characteristics typical to one sex or the other, it does not change the inherent uncertainty regarding the sociocultural inclinations, identifications and preferences of the child. How prospective parents approach this responsibility depends on their personal histories and dynamic sociocultural contexts, which may result in multiple scenarios of parent-child relations, depending on the degree of enforcement of parental perceptions and expectations onto the child. In parallel, public discussion forums, medical practitioners and government Technology Assessment efforts can help prospective parents to make informed decisions about the use or non-use of SST+ and its consequences by helping them to scrutinize the technological promises, recognize and account for the ethical implications of this technology.

The *industry, and particularly its marketing branches*, bear the responsibility to ensure that prospective SST+ users make informed choices about the use (or non-use) of their product. Marketing informs the mindset and facilitates the decisions of prospective customers and also influences how people appropriate the object of advertisement. SST+ is not a neutral diagnostic tool but a technological mediator that contributes to shaping the choices of people about the future of their offspring. With regard to SST+, it is crucial to deliver a balanced message, emotionally and scientifically, about what SST+ can or cannot do. For instance, it would be misleading to foster a connection in the minds of people between choosing the sex of the sperm and having a successful pregnancy, or about choosing the biological sex of a child and the gender identity they develop later in life. The complicated relationship between sex and gender has received a great deal of scholarly attention (Goffman, 1979; Eckert, 2017). In particular, the seminal work of the sociologist Erving Goffman exposed and analyzed the influence of the mass media and advertisement on the sex–gender discussion and public perceptions of gender roles and identities (1979). SST+, with only two options to choose from and the possible “Why not?” attitude, can further challenge the sex–gender discussion in society. Promoting SST+ with a direct appeal to preferred gender characteristics could further engrave public stereotypes about the direct correlation of sex and gender and reduce the visibility of other possible gender identities.

The stakeholders who develop technology and put it to market always have responsibility toward their consumers and the public at large, at least regarding the safety, security and other “hard impacts” regarding the direct use of their product. As history shows, an open market setting, under a legislative regime that cannot keep pace with technological development, offers little incentive to private companies for ethical self-reflection beyond the legally-mandated requirements. However, recent developments in the direct-to-consumer genetic testing business indicate that ethical reflection can arise within the industry itself in an effort to innovate responsibly and mitigate ethical concerns. Addressing the consumer boom with genetic testing technologies, private genetic testing companies have collaborated with a public think-tank Future of privacy forum (2018), including academics, legal practitioners and advocacy groups, to produce self-imposed, industry-wide ethical guidelines. The guidelines have yet to be tested practically regarding their impact and effectiveness, but “While no policy could ever eradicate risks for consumers who agreed to give their DNA, the industry guidelines are attempting to address some of the biggest fears” (Brown, 2018). However impactful these guidelines may be, they indicate an acknowledgment on behalf of the industry of responsibility beyond the direct use of their product and offer an example for other direct-to-consumer diagnostic tools, such as SST+.

Finally, it is easy to assume that if SST+ moves from a medical to a private domain, this would eliminate the involvement of the medical professionals. Drawing on the example of direct-to-consumer genetic testing, the transition would not necessarily obliterate the role and responsibility of *medical professionals* (Lovett Rockwell, 2017). Lack of market oversight and accountability may exploit the hopes and fears of prospective parents, leading them back to the doctor’s office to help navigate the (emotional and practical) complexities of the selection and conception process. This could return the medical context back to the equation, raising the question of physicians’ responsibilities and the burden on scarce resources, when the original cause is not medically justified.

Discussion of the findings

Overall, this moral mediation analysis, derived through literature studies, reveals how the new material setup of SST+ could enable a new set of sex selection practices, fundamentally change their nature, foster new manners of perceiving sex selection from an individual and societal point of view and crystalize new power relations in the process of childbearing.

Firstly, the move of SST to the setting of one’s home could demedicalize and normalize the practice of sex selection. With this, SST+ could reinforce the values of naturalness and privacy to those who seek this procedure. In parallel, SST+ could highlight the role of men in the reproductive process, which could mediate parental relations in multiple ways ranging from leveling the power balance in childbearing to abusing newly acquired patriarchal authority.

Secondly, making SST+ an affordable direct-to-consumer technology could shift the self-perception of its potential users from patients to customers, entitled to the right of choice, and from parents abiding fate to parents actively determining it. Such shifts could co-shape new normative understandings of what good parenthood means. In parallel, significantly simplifying the process of sex selection and reducing its price could foster a societal “Why not?” attitude, making private reproductive choices available for reflection and potential justification.

Thirdly, the potential move of SST+ to an open market could mediate the value of responsibility in relation to the various stakeholders involved in its introduction and entry to the market. The introduction of SST+ could foster different manifestations of parental responsibility, in the course of evolving personal histories and sociocultural contexts; contextualize the industry and marketing responsibilities toward ethical reflection beyond immediate technological use; and maintain the roles and responsibilities of medical professionals in identifying the myriad nuances that could materialize during the use of SST+.

These theoretical findings based on the mediation approach indicate an intimate interrelation between the technological setup of SST+ and its moral landscape, embedded in everyday practices and perceptions of people. These preliminary findings point to the moral mediation potential of SST+ identified at the level of literature studies and insights into current technological practices. To further substantiate the moral mediation potential of SST+ requires attending to the micro-perspective of the real-life experiences and concerns of individual persons. The following section builds on the literature findings identified in this section and presents an IPA study of how people could appropriate SST+ as well as the ensuing value mediations.

7.3 Interpretative Phenomenological Analysis of SST+ appropriation

Study design and limitations

The study in this chapter aims to understand how Dutch citizens appropriate SST+ for non-medical reasons: how people reason with SST+, attribute meaning to it and position it in their lifeworld. I have focused on citizens of the Netherlands for several reasons. Firstly, SST+ is a Dutch innovation, and hence it is important to understand the position of the people who might be affected by its introduction, both directly and indirectly. Secondly, a study of public opinion in the Netherlands regarding the early versions of SST (i.e., the Ericsson method) and its use for non-medical reasons already exists, commissioned by the Rathenau Institute (1996). The Rathenau study indicated that although Dutch citizens did not have specific preferences regarding whether to have a girl or a boy, 78% of respondents condemned the use of SST (Rathenau Institute, 1996; Volkskrant, 1996). However, the study occurred more than 20 years ago and focused on surveying large population groups. While this survey method allows larger representation, it is unable to capture people's situated beliefs and opinions. It is impossible to know what individual deliberations and reasoning stand behind the numbers of the survey. This is precisely what an IPA study enables: a micro-level that provides deeper understanding into how people reason about a certain phenomenon, based on their everyday experiences. Finally, the technology has developed greatly since 1996, and SST+ suggests significant material changes to the sex selection practice. Therefore, even though the study regarding sex selection already involved Dutch citizens, both the nature of the study and the technology in question differed from the current investigation. As such, the present study approaches members of the Dutch population to understand, from the perspective of their situated life experiences and contexts, how they make sense of the new SST and the possibility of its use for non-medical reasons in the Netherlands.

"Dutch population," just as any general cumulative concept, is an abstract phenomenon that requires construction and definition. Guided by the IPA methodology (see Chapter 5), the study does not strive for statistical representation and, as such, does not require a large sample. Rather, in view of the in-depth idiosyncratic nature of the IPA method and the detailed and lengthy analysis of the interpretation process, it targets a small number of participants and studies them in detail to build a close, rich picture of their modes of reasoning. This IPA study regarding the appropriation of SST+ consisted of seven participants, in line with IPA methodology (Smith, Flowers and Larkin, 2009).

The current study relies on the loose interpretation of IPA regarding the nature of the participant group. The IPA method requires a homogeneous sample to understand how experiences regarding the same phenomenon correlate and thus seeks people either of the same age group, the same sex or another binding feature. This study, by contrast, aims to understand how SST+ can acquire meaning within individually situated experiences, bound by a group belonging to Dutch culture. To ensure the richness of perspectives, it was important to include people from different backgrounds, professions and geographical areas, provided they all were adults who were born and resided in the Netherlands. With these parameters, I recruited seven study participants by relying on the snowball technique.

The resulting heterogeneous group of participants possesses the following characteristics. Study participants represent a wide range of educational and professional backgrounds, including students; employees in the areas of catering and entertainment; administrative/clerical staff; social workers; PhD candidates; and those unemployed at the time of interview. The group spanned the ages of 26 to 56, with four men and three women. Because people inhabiting the central area of the Netherlands known as Randstad seem less hesitant toward technological innovation, qualitative studies of the Dutch population and new technologies suggest including people from different provinces in the Netherlands to ensure a plurality of perspectives (Schuijff and Munnichs, Rathenau Institute, 2012, p. 53). To decrease this potential bias, study participants were recruited from different parts of the Netherlands: one from Limburg, two from Noord Brabant, two from Gelderland and two from Overijssel, with a varying size of cities. Participants for the current IPA study thus did not form a homogeneous group in view of age or professional background, but their cultural and geographical belonging to the Netherlands united them.

The study in this section examines how people made sense of a technology that is still in the innovation pipeline. Therefore, the participants did not possess first-hand experience with it and rather relied on understanding the principle behind SST+, with minimal information prompts from me. In this way, I as a researcher fostered the proactive agency

of the participants to form their opinions and exercise their judgments regarding the technology-in-the-making. Their lived experiences were equally involved, with the interview questions targeting their experiences of being a child and their relation to childbearing and parenthood, as well as living in the Netherlands and considering the expected impact of SST+ on living together in Dutch society (see Annex B for the prompt of interview questions and the agenda of interviews). The current IPA study has thus attempted to obtain an informed picture of the technological appropriation process based on both proactive agency and the lived experiences of the participants.

Language is an important aspect of an IPA study, because it facilitates and informs the understanding of people. I have a working capacity for the English language and a conversational capacity for Dutch. Because I wished to interview the participants myself to ensure the best possible command of the material, my linguistic abilities represented a language bias and a limitation of the study. Although the study participants were all Dutch, I approached the participants in English and conducted the interviews in one of two languages, English and Dutch, depending on the preference of the participant. As a result, four of the interviews were in English, two were in Dutch and one used a mixture of both. I attempted to accommodate the language preferences of the participants, but it is likely that my initial English-speaking approach influenced how they expressed themselves. I attempted to mitigate that risk through clarifications and follow-up questions.

Another limitation of the study is the lack of first-hand experience with SST+ by the participants. As such, they relied on the initial prompts about technological workings and principles that I provided. Aware of the certain language barrier that could penetrate the discussion, I also had to ensure that the technological background was as value- and opinion-free as possible to elicit the open interpretation of the participants.

However, the two limitations mentioned above also constitute a unique feature of this study. Traditional IPA study denotes the double hermeneutic circle as its essential feature, where the researcher must interpret the narrative of the participant who interprets a certain phenomenon. In the current IPA study, in view of the language limitations and additional information prompts to foster the interpretative modes, the triple hermeneutic circle is present. Firstly, I provide the information prompt containing technological background in English to the either English- or Dutch-speaking participant. Secondly, the participants interpret—directly and indirectly—the information provided, together with accompanying questions. Lastly, I interpret the recording of the conversation, where the participants attempt to make sense of SST+ in view of the diversity of their lived experiences and opinions. As such, the hermeneutic circle in this IPA study triples. This confirms the IPA position that it is never possible to obtain insights from another

person directly, as if through a beeline to another person's mind. This also indicates that the understanding process entails uncovering and accounting for the multiple layers of interpretation that occur simultaneously in the event of understanding.

As with the IPA study of Google Glass in Chapter 6, I both contacted the study participants in advance to obtain their informed consent for the study (see Annex C) and received permission from the Ethics Committee at the University of Twente to ensure that the study corresponded with ethical standards. I similarly audio recorded the interviews and transcribed them with MS Word, anonymizing the names of the participants. I manually transcribed five of the interviews, and a research assistant helped to transcribe the two interviews conducted primarily in Dutch. The analysis of the data followed the IPA methodology steps outlined in Chapter 5. I used the same color-coding and excerpt numbering techniques as described in Chapter 6 to distinguish between the interviews and emergent themes.

Figure 5. Sorting the data from the SST+ case study into emergent and super-ordinate themes

To aid in organizing the emergent themes into super-ordinate ones, I printed each interview, cut it into separate pieces relating to themes and spread them on the floor (see Figure 5). I then sorted the emergent themes into super-ordinate themes, relying

predominantly on abstraction, subsumption and polarization. Although time-consuming, the combination of working with both digital and physical data was helpful. Figure 5 above visually represents the sorting process.

In pursuit of my master table, I continued working with printed interviews, comparing the findings of each interview. As a laborious process, this was where color-coding each interview, as well as numbering the themes, greatly helped to organize them. Recurrence is an important aspect that helps to define super-ordinate themes across multiple interviews and verify the validity of the study. In the sex selection case, the number of participants was seven. A super-ordinate theme had to resurface in at least four cases out of seven. However, there were rare cases when the theme was dominant in only one or two interviews but nonetheless raised an important issue for the study. I highlighted these themes separately and, if relevant for the research question, presented and explained them in the write-up of the analysis (see Figure 6 below). I next present the outcome of seeking patterns across seven interviews.

6.	Fostering the sex-gender discussion: SST as “a step backwards” in progress from previous Dutch generations	<p>1. SST, gender and culture (total 24: I1,2,3,4,7)</p> <p>a. Value and importance of gender (x2: I2)</p> <p>b. Problem: deeply entrenched culturally and materially inspired ideas of gender (x6: I2,4,6)</p> <p>c. SST and Dutch culture fit</p> <p>i. Dutch value all genders, “emancipatory society” (I3) (x5: I1,2,3,6,7)</p> <p>1. More gender equality because of education (x1: I3)</p> <p>ii. Dutch want one of each sex</p> <p>1. SST fosters and enables this “romantic” idea of one of each (x1: I7)</p>	<p>I2 on SST limiting the gender spectrum, on the value and function of gender in society (structuring):</p> <p>“<i>Matthias</i>: If everybody does this and we keep this view on gender in our society as we have it – because it still is how it is... And it’s, you know, like... It has its pros and its cons. Like the pros is, I know very clearly which toilet to use, makes it very easy for me [laughs] yeah! And for you too, makes it easier, it’s a pro. The con is that people who do not fit directly in those boxes feel very bad and feel sometimes left out. So if a society would be more open to this range of things, and don’t make that connection, I don’t see the bad effect. But of course, if you say like, everybody, we give this technology a chance, and we entrench these gender things – because this is probably why people use it – so we entrench them even more in society. So if everybody does that all the time, then it makes it even harder for people who don’t fit in.” “<i>healthy</i> gender thing would be more equal, that you have more spectrum of whatever you want to be.”</p> <p>SST as no side-effects only when sex is not linked to gender:</p> <p>“<i>Matthias</i>: it [SST] has maybe a negative effect because it puts... it could put people more in boxes. It COULD, not would.... But it also could positive. If you just say like if everybody’s very clear that it’s just biological selection, not</p>
		<p>2. Making SST cheap is key to societal acceptance (x2: I2,3), and secure</p> <p>3. Perceived different experience, two “worlds” (I7), of raising a boy and a girl (x1: I7)</p> <p>iii. The Dutch have a hidden gender bias, in contrast to professed liberal values (x2: I3,4)</p> <p>d. SST and some cultures with gender bias don’t fit</p> <p>i. Assumed worldwide preference towards boys in SST (x2: I4,6)</p> <p>ii. China as a cautionary tale against SST worldwide (x1: I4)</p> <p>iii. SST can diminish suffering in gender-biased countries (x1: I2)</p>	<p>gender part. Only the selection of the sex is what they choose. ... at least imagine if you think so freely about things, so... and then it’s just about that. Ah, maybe you choose a boy because maybe it is easier when he can pee, he can stand [laughs] Or, I choose a woman because it has a vagina and it has an option to have children or whatever... If you have that, then of course for the child it’s no pressure. It’s just an option, we give somebody, an option to bear children...”</p> <p>I1: “I think the thing that I would be afraid of is... uhh... people would become more gendered in a way, because there’s this very eh... explicit decision between girls and boys already implies that there is a very explicit difference between having a boy and a girl. ... It only really makes a difference whether you are having a girl or a boy if you really think that there is... eh... a fundamental difference between having a boy or a girl. And I don’t really believe in that difference... And I think this kind of technology eh... again, reinforces the idea that this difference really is... is fundamental.”</p>

Figure 6. An excerpt of the master table of the Interpretative Phenomenological Analysis

Interpretative Phenomenological Analysis findings

The IPA study generated a plethora of opinions, attitudes, values, normative contexts and subjects of existential concern that together formed the background against which the respondents appropriated the new SST for non-medical reasons. This section presents a detailed account of each of the following super-ordinate themes identified in the study:

- a. Understanding good parenthood
- b. Relating SST+, gender and culture
- c. Considering the value of liberalism and choice
- d. Enforcing the trend to perfectionism
- e. Mediating naturalness

a. Understanding good parenthood in the face of SST+: “You have a child, and then you have to do with whatever you get”

The most dominant theme running throughout all interviews and reflecting similar perspectives from all seven participants concerned what it means to be a good parent and the value of parenthood in the age of new SST. Confronted with the possibility of SST+, the participants shared what being a good parent means to them, donning the hats of both a parent and a child. Most often, they revealed the values of acceptance, openness and unconditional love that SST+ would mediate. The following quote from an interview with *Lucy* illustrates the sense that the participants attributed to the value of parenthood:

I think what I like about having children, is that you... that they are going to be themselves, and going to be like a person, and you cannot... you don’t know what kind of person you are going to get. That there are all kind of different people and they are themselves no matter what you do with them. [...] You have a child, and then you have to do with [laughs] whatever you get, I guess [...] You’ll just have to figure out the best way to take care of them.

Lucy embraces the uncertainty that she considers an inherent part of expecting and raising children. This uncertainty in turn gives rise to the importance of the unconditional acceptance of whatever the child may bring, or “whatever you get.” The duty of the parent that *Lucy* identifies is to support the children “to be themselves,” to let them be their own person. She believes that each child has a unique personality, an identity that other people can only influence to a limited extent, that will persevere regardless of external influence, “no matter what you do with them.” *Lucy* attributes great value to the perceived uniqueness of each child and their self-determination, with the parental responsibility to be open to it and support it.

With children, uncertainty appears as a first-order value of having a child, with the consequent parental duties of openness and acceptance that follow from embracing the conditioning uncertainty: “You have a child, and then you have to do with [laughs] whatever you get, I guess.” In this statement, *Lucy* provides sequential ordering phrases (“and then”) to emphasize the order of priorities in parenting. The parental job, according to her, is to provide the best care possible in the context of the uncertainty that children bring with them. As such, in the eyes of this respondent, the values of parenthood derive from how she conceptualizes children and what having children means, namely, their uniqueness, self-determination and the uncertainty they bring. Viewed from this angle, parental virtues primarily focus on acceptance, openness and unconditional love.

Other respondents echo this view. *Matthias* holds a following view on parenthood: “I think that love and acceptance are very important, that you help to let the child grow in the direction that it has to, but also say sometimes that something isn’t right. But like, it’s first important that you’re supportive.” This statement highlights values of openness and acceptance, as well as of helping the child to acquire a moral compass. For *Melanie*, the most important factor in parenting is “unconditional love, whatever your child chooses or does.”¹⁵ *Hendriks*, in parallel, highlights the value of support and letting the child be whatever they choose: “Very important for good parenting is the attitude towards your child, that he can choose whatever he wants in his opinion and that it’s ok.” Implicit here is the call to parents to communicate such an attitude of acceptance and openness to their children, or to encourage the development of an independent self, capable of one’s own views and decision-making. Parental acceptance and support appear as the keys to this. Overall, the respondents make sense of parenthood in relation to how they conceive of the children. As such, a good parent exhibits openness to the uncertainty a child necessarily brings, unconditional love and acceptance.

It is interesting to examine how these values come to the fore in the interviews, when considering the possibility of SST+. Many of the participants equal even an idea of SST+ with expectations and preferences, which in their minds, could interfere with the values of acceptance and unconditional love that a good parent should possess. The following excerpt from an interview with *Anouk* outlines the relation between being a parent and having expectations in the face of SST+:

[With SST+,] I think the parents have certain expectation from a child. It’s unclear to me WHAT expectations they would have from a child with a specific sex, but umm... it could be. That’s why-that’s why you need to know the specific reason why

someone—especially wants to have a boy: for what reason? What do they expect from a boy different than from a girl [...]

You have kind of expectations, I know... but nothing guarantees that your expectations work out! No, it’s in your head. You may have the expectations, but you will never have the guarantees that it will work out (like that). I had expectations for my kids as well, that they would perform very well in school (laughs). That didn’t turn out (laughs). And so I had more expectations, but yeah, ok... I don’t know if you (sighs)... Sure, you hope them to be good people, and if they succeed in life that’s ok. But they have to do it in their own way, and not according to your expectations of kids.

In this excerpt, *Anouk* suggests that possessing expectations is an inalienable feature of parenthood, whereby parents project their hopes upon their children. However, she also suggests that it is important to be flexible in these hopes and expectations in the face of reality and, most importantly, in the face of the ambitions and ideals the children themselves might possess: “But they have to do it in their own way, and not according to your expectations of kids.” In this, *Anouk* attributes the primary role to the agency of children in identity building and decision-making, where parental expectations are always an accompanying, but never a defining or overshadowing, factor.

Anouk draws a sharp contrast with parental expectations related to the sex of a child: “It’s unclear to me WHAT expectations they would have from a child with a specific sex,” questioning the ground for parental expectations linked to sex that SST+ may rise. This links to an earlier statement *Anouk* made about children and the possibility of SST+: “It’s a child, I don’t want it a boy or a girl.” This suggests that for *Anouk*, the sex and/or gender of the child are not important, and she sees a problem with sexing the children before conception. She is vocal about the necessity of understanding the motivation of parents who wish to use SST+. Consequently switching to the subject of expectations and the value of being flexible as a parent, it is possible to infer from *Anouk*’s words that she sees danger in identifying the sex of a child prior to conception, a danger linked to fostering strong and possibly misleading gender expectations from a yet unborn child.

Matthias also discusses the relation between SST+ and parental expectations, suggesting that parents can infer a link between the choice of sex and gender expectations, relative to the choice of sex made.

Matthias: I think it’s real pressure on the child. Because when... We’re talking about sex selection, but the difference between sex and gender is something that... it’s yeah,

¹⁵ Translated from Dutch. Original: “Het onvoorwaardelijk houden van, wat je kind ook kiest of doet.”

different. And people I think also... our society here perceives sex selection as gender selection a lot of times...

Olya: In the Netherlands, you mean?

Matthias: Yeah, in the Netherlands! If they select to have a girl, they don't want most of the time that... They expect certain behaviors—that's why they wanted a girl! If it was pure like, they want a baby with a vagina or a baby with a penis—that's not why they select it! They have all those other images about what that baby should be. So also in this society it would put pressure on the person. [...] I think if you're a little bit more authoritarian in that sense, yeah, you expect something from it, you made a decision, you have certain expectation. That's what I mean with sex and gender, a lot of the time it's connected. So it WILL have an effect, I think, on how a parent can behave, it feeds into that...With planning and all these things. I plan to have a boy, I expect certain things from a boy.

Matthias parallels the sense-making process of *Anouk* by suggesting that parents choose to use SST+ for a reason that is often linked to certain gender expectations. In his eyes, the parents wishing to use SST+ could operate with cause-and-effect logic, where the cause would be choosing one sex of the two offered by SST+ and the effect the consequent gender. The rationale for this logic for *Matthias* lies in the apparent connection between and confusion regarding sex and gender in (Dutch) society. *Matthias* defines sex as "a baby with a vagina or a baby with a penis," denoting the biological aspects of a child. Gender he conceptualizes as attributed social identity, characteristics and behaviors, or "certain behaviors" or "other images about what that baby should be." *Matthias* identifies a problematic relationship between sex and gender, suggesting that although they differ, much of the time, they are perceived as inseparable: "[O]ur society here perceives sex selection as gender selection a lot of times;" "sex and gender, a lot of the time it's connected." However, he considers conflating these two concepts as a danger that could result in gender expectations toward a child conceived via SST+: "If they select to have a girl, [...] they expect certain behaviors—that's why they wanted a girl!" SST+ could intensify that connection, by providing only two options for parental deliberation.

As *Matthias* pinpoints, SST+ entails planning and decision-making. According to him, parents who choose to use SST+ expect the outcomes of their decisions to align with their plans. This could lead parents to assume and expect certain gender behaviors from the children who they selected via SST+. *Matthias* worries that using SST+ could result in psychological pressure on children to adhere to expected gender identities and behaviors. Considered from this angle, the planning and decision-making that SST+ requires from potential parents contradicts the values of openness and unconditional acceptance that the respondents attribute to parenthood.

Hendriks frames the potential value conflict as the defining feature of sex selection:

In the very procedure itself is the main risk. So that at a certain moment a child becomes aware that his parents wanted him to be a boy, let's say, and then he might think about the reasons for wanting to get a boy in their life, and whether they fit. Then he might interest his life to this... perfect image of a boy that the parents had before having him. ... It's the sex selection thing. They put pressure on a child to become this image that parents had of a child before having him.

Hendriks invokes the future image of a child selected via SST+ and presents a perspective of this child in considering what he identifies as "the main risk" of the technology. According to him, by selecting one sex over another, parents necessarily have accompanying gender expectations, in this case, the "perfect image of a boy that the parents had before having him." He projects a scenario whereby the fact of sex selection becomes known to the selected child later in life, confronting the child with existential identity-related questions. The risk of SST+ that *Hendriks* ultimately foresees, in parallel with *Matthias*, is implicit or explicit pressure on children to adhere to the gender expectations held by parents prior to their conception. By reversing the angle of the selection situation from parents to children, *Hendriks* suggests, just as *Anouk* did, considering the motivation of parents for sex selection, and he outlines potential negative effects the consequent gender expectations might have on the selected children.

In the case of *Ben*, the sex selection procedure appears as the material manifestation and culmination of parental gender expectations:

[With SST+], apparently, you don't love or you don't accept your child as he is, by definition. So, whether it's a boy or a girl. ... If you choose to not have a girl, you actively choose to not have a girl, so basically [pauses] the boy is worth more to you. But actually you really want to have a boy, you don't want to have a girl. You are very motivated to not have a girl.

For *Ben*, SST+ profoundly violates the parental values of acceptance and unconditional love "by definition." Previously, the selection of sexes was the prerogative of nature, where people had no say in and had to accept whatever nature provided; at present, the determination of sex can be a deed of man, enabled by SST+. However, the choice of one entails the rejection of the other. In this case, *Ben* sees a problem in the active choice that SST+ could grant to people: "If you choose to not have a girl, you actively choose to not have a girl, so basically [pauses] the boy is worth more to you." This act of rejection in

SST+ and the active manifestation of the priority of sexes constitute an issue for *Ben*, who values acceptance and love for the child “as he is.”

In addition to the perspectives above, *Lucy* highlights the value of being able to cope with uncertainty, even in the case of SST+. Just as *Anouk*, she considers that good parents must be flexible in their expectations to enable their children to flourish.

If you use this technology and you get a kind of... then you get kind of a child you want, then maybe umm...you might have more expectations of a child. So if you really wanna have a daughter and you have a daughter, and it's kind of... ehh... a tomboy kind of daughter, then that might be tough then as a parent to still be open to who the child really is or wants to be. So that might be that kind of... yeah, maybe a thing that I see in this. Like, if you really wanna have a daughter, then you really wanna have a girly girl, probably. If the reason is just social. And that might not be what you get, because you never know what you get from a child. [...]

I can still imagine parents to be able to get over it and I mean... if you're a good parent, then you get over it and you just accept whatever you get... It's a little bit different but... I think if you really, really hold on to your expectations, and get really disappointed with that, a child will...WILL feel that, and then will feel like... [sighs]... I think it's very dependent on a child, parents, situation... But I can imagine that it would make children feel like failure in some way. But I wouldn't say in any child or any family.

Lucy conceives of SST+ as a technology to “get kind of a child you want,” which could foster parents' expecting the child to be the way they wanted it to be. She echoes the perspective of *Matthias* regarding the apparent connection of sex and gender and presents SST+ as a material embodiment of the sex–gender link. However, again reiterating the uncertainty of childbearing, *Lucy* questions and problematizes the materialized conflation of sex and gender that SST+ enables: “If you really wanna have a daughter, then you really wanna have a girly girl, probably. [...] And that might not be what you get, because you never know what you get from a child.” She considers the scenario of parents who wanted to have a girl, with the consequent female gender expectation, and whose child later did not adhere to the expected gender behaviors. *Lucy* reasons that because the parents made a choice of sex prior to conception, their gender expectations might be deeply rooted and might, in the face of conflicting life situations, prevent them from maintaining the value of openness and unconditional acceptance, or “to still be open to who the child really is or wants to be.”

Lucy foresees that in such situations, different options are possible depending on the flexibility of the parents and their ability to be open to their child. According to *Lucy*, if the parents cannot let go of their gender expectations and continue to project them onto the children, psychological damage to the children will result; “It would make children feel like failure in some way.” One could also, like *Hendriks*, identify the psychological damage as inherent to SST+, “in the very procedure itself is the main risk.” These suggestions concur with the literature findings concerning the anticipated psychological risks and pressure for children born with SST presented in the previous section. Such anticipations of the respondents also echo the ultimate rationale of banning sex selection for non-medical reasons.

However, as *Lucy* posits, this negative scenario might not manifest in every family. According to her, the use of SST+ and its effect on a child depends on the parents' ability to actively deal with their expectations and the uncertainty that life brings: “I can still imagine parents to be able to get over it and I mean... if you're a good parent, then you get over it and you just accept whatever you get.” “Get over it” appears here as a call to parents to uphold flexibility and as what *Lucy* earlier called the parental ability to figure things out. *Lucy's* suggestion mirrors the principle of the technologically mediated lemniscate, whereby one actor in the hermeneutic situation cannot singlehandedly determine how appropriation takes shape: it is only in the dynamic entanglement of people (prospective parents, in this case), SST+ and the sociocultural environment that specific appropriations appear. As *Lucy* stresses, every situation is different, and the effects of sex selection might not necessarily be negative.

Overall, the rich canvas of the beliefs, values and opinions that the participants presented brought to the fore the mediating force of SST+ in relation to the values of parenthood. On the one hand, SST+ appears as a conditioning technology, confronting the values of unconditional love, openness and acceptance that the participants see as pivotal for parents. On the other hand, SST+ appears in the participants' narratives as a materialized link between sex and gender and the material manifestation of their gender preferences. The participants highlight the apparent connection in the eyes of the public between sex and gender, a complicated relationship that is easy to conflate. By presenting a choice between two options, SST+ might foster this link between the two concepts in the minds of parents. The participants consider fostering gender expectation in the children of the selected sex a danger, with possible complications of the parent–child relations, the active projection of gender expectations upon children and the potential for psychological pressure on them. However, SST+ need not result in pressure on children if parents uphold the value of flexibility and openness to the agency of children in identity building and decision-making. As such, the participants identify the mediating effects of SST+ on

parental values and parent-child relations and touch upon the complicated sex-gender relations in the context of family building.

b. Relating SST+, gender and culture: “A step in a wrong direction”

The second most dominant theme that resurfaced in six interviews out of seven dealt with the complex sex-gender relation and how SST+ could fit with this on both the individual and societal levels. Many respondents remarked upon the difficulty of separating the concept of sex from the concept of gender, oftentimes equating the two. It is against this background that many respondents positioned SST+ to understand how it fits the domains of family and society that they inhabit.

All seven of the respondents, when considering the potential introduction of SST+ in the Netherlands, firmly asserted that Dutch society values men and women equally. In the words of Matthias, “For most of the people in the Netherlands, there is the dominant thought that society value[s] girls and men the same.” Consider the following excerpts from *Anouk*:

I think society, at least EUROPEAN society, is getting more and more... I don't know... Emancipatory. I can imagine that many years ago there was a distinction: a man, a man works, and the woman did the housekeeping and raising the children. But nowadays these problems are gone. So I don't think you... ehm... educate your boys to... be the ehm... to earn the income, to not raise your young girls to become a housewife... I think it's getting more equal, so... At least from European... I-I can imagine that in other countries there is still a distinction on the societal ways that some people prefer to have a boy than a girl, because there the emancipatory... is not so... prerogative (laughs). [...] So I cannot imagine the reasons why you socially want to have a girl or a boy nowadays... That's what I said, maybe in earlier times girls were supposed to work in the house, take care of the children... But nowadays no. ... It was a very long time ago, maybe it was a different generation. ... But nowadays it's not so clear anymore.

Anouk here identifies with broader European society as a way to position The Netherlands against “other countries” whose values may differ from those of the Dutch in the face of SST+. She describes European society as “emancipatory” and defines it as making no valuation distinction or preference between sexes and genders. She provides a sharp temporal contrast between past (“there was a distinction”) and present society (“nowadays it's not so clear anymore.”) *Anouk* describes the former societal order, which had clear gender roles, labor divisions and expectations, as problematic. These contrasts with current society reflect this problematization: “But nowadays these problems are gone.”

She values the equality of sexes and genders that she see embedded in present-day society and appreciates that it has become a societal “prerogative” in Europe (as opposed to some other countries that still may have gender preferences). Because of the professed equality between sexes and genders, *Anouk* struggles to understand why anyone would wish to use SST+ in the current context: “I cannot imagine the reasons why you socially want to have a girl or a boy nowadays.” She repeatedly stresses the temporal contrast between the former societal canvas, imbued with gender stereotypes; and the current one, supposedly is void of them. This temporal contrast appears to stress societal development and the progress regarding views on gender and equality that present-day society has according to *Anouk*.

Most respondents also suggested that should SST+ be introduced, people in the Netherlands could likely use it to ensure that both sexes are represented in their families. When asked why this could be, the most dominant rationale, shared across the interviews, was because it is “nice” to have both. The two excerpts below, from two different interviews, present some substantiation of this statement.

Melanie: Here in the Netherlands, I think the number one reason [to have SST+] would be that it is nice to have a boy and a girl: different colors, different sports, football and ballet, different color of the room. [...] It's nice to be able to experience both. The experience of raising a boy is very different than raising a girl. People would find it best to be able to experience both, and not raising a boy only or a girl only. That's how it is in the Netherlands¹⁶.

Ben: Because a girl and a boy really are different, many people think it's nice to have both, to have experience of both. So, to kick a ball with a boy, run around, do sports and such; and a girl, you could take her along shopping, and dress nicely. Then you have all from the both worlds. ... It's just different, whether you have a boy or a girl.

Both *Melanie* and *Ben* suggest that raising a boy and a girl are fundamentally different experiences based on the different activities one expects to be able to do with a boy and with a girl. For instance, *Ben* anticipates that one can “kick a ball with a boy, run around, do sport,” whereas with a girl, “you could take her along shopping, and dress nicely.” *Melanie*'s view is similar, concluding that “The experience of raising a boy is very different than raising a girl. People would find it best to be able to experience both.” As such, in the

¹⁶ Translated from Dutch. Original: “*Melanie*: Hier in Nederland denk ik echt dat de nummer 1 reden is dat het leuk is een jongetje en een meisje te hebben. Andere kleertjes, andere sporten, voetbal en ballet, andere kleur van de kamer. [...] Het is leuk om het allebei te mogen ervaren. De ervaring van het opvoeden van een jongen is heel anders dan het opvoeden van een meisje, en het liefst willen de mensen het allebei hebben ervaren, en niet alleen maar een jongen en alleen maar een meisje. Dat is dan zo in Nederland.”

eyes of *Melanie* and *Ben*, SST+ could satisfy the demand in Dutch society for ensuring that both girls and boys are represented in a family.

What is interesting in the excerpts above is how the selection of one sex or the other fosters different expectations regarding the experience of raising children of that particular sex. The following definition, of Butler, is relevant here, because it clarifies the conceptual difference between sex and gender: “*Sex* is understood to be the invariant, anatomically distinct, and factic aspects of the [...] body, whereas *gender* is the cultural meaning and form that that body acquires, the variable modes of that body’s acculturation” (original emphasis, 1986, p. 35). Following this definition, if people were to use SST+ because of the expected differences between raising boys and girls, or the differences in expected behaviors and social attributions, then perhaps not sex but gender selection is what they might have in mind with SST+. The excerpts above suggest that some people consider that there is a fundamental difference between the two sexes in terms of raising them. According to West and Zimmerman (1987), drawing such a distinction in matters other than purely biological is what denotes the process of gendering people: “Doing gender means creating differences between girls and boys and women and men, differences that are not natural, essential, or biological” (p. 137). In contrast to the excerpt above from *Anouk*, the two other excerpts above suggest that the selection of a particular sex in SST+ could entail the expectation of a particular gender identity from a future child, or particular experiences, social practices and identifications. Although not representative, the excerpts suggest that the conflation of sex and gender is possible, even in a society that most of respondents portray as having no preference between genders or sexes and valuing them all equally.

The following excerpt from an interview with *Lucy* mirrors these concerns and suggests that the introduction of SST+ could further feed into the complex sex–gender relation. According to *Lucy*, because SST+ provides only two options for selection, it suggests that they are principally different:

I think the thing that I would be afraid of is... uhh... people would become more gendered in a way, because there’s this very eh... explicit decision between girls and boys already implies that there is a very explicit difference between having a boy and a girl. ... It only really makes a difference whether you are having a girl or a boy if you really think that there is... eh... a fundamental difference between having a boy or a girl. And I don’t really believe in that difference.... And I think this kind of technology eh... again, reinforces the idea that this difference really is... is fundamental.

In contrast to *Melanie* and *Ben*, *Lucy* believes that the two sexes are not fundamentally distinct and that raising a boy is not profoundly different from raising a girl. However, according to her, it is precisely the idea of this fundamental difference that SST+ emphasizes, the idea that makes *Lucy* “afraid:” “I think this kind of technology eh... again, reinforces the idea that this difference really is... is fundamental.” The fear that *Lucy* exhibits concerns the possibility of a more gendered society caused by SST+, or that “people would become more gendered in a way, because [...] explicit decision between girls and boys already implies that there is a very explicit difference between having a boy and a girl.” *Lucy* appears to be very conscious of the sex–gender distinction and the complicated relation between the two. She implicitly argues against the potential gender expectations that could accompany a selection choice via SST+. According to *Lucy*, by suggesting that there are explicit differences between sexes, SST+ could foster ideas that “having a boy and a girl” is also profoundly different, hence fostering particular gender expectations.

Lucy’s worry echoes the suggestion that Goffman made in 1977 regarding any practices, social situations or occasions that aim to portray the essential differences between the sexes. He used the example of public toilets segregated for male and female use under the excuse of fundamental biological differences between men and women. Goffman stresses that although these technological constructions serve the same biological needs of both sexes, their architecture embeds societal expectations about gender differences: more grooming facilities in female restrooms suggest socializing and spending more time there more frequently; whereas the austere design of male restrooms suggests strictly going about one’s business. Goffman concludes that any such sociomaterial practices “do not so much allow for the expression of natural differences as for the production of that difference itself” (1977, p. 324). *Lucy*’s understanding of SST+ closely mirrors Goffman’s suggestion, in that SST+ could be considered a device that purposefully creates the difference in sexes and the consequent expectations of genders.

Hendriks reasons with SST+ and gender in a similar manner. He suggests that not only could SST+ reproduce the societal differentiation of gender expectations, but it could also legitimize it by making it materially embedded:

Olya: What do you think about this technology potentially being available in the Netherlands, for social reasons?

Hendriks: No. No. No. No. No-ooo. The main reason for me that it would legitimize in a physical way our societal view upon sex differences. So the whole idea that there are differences between men, different expectations or how they should behave, blablabla in a society regarding being a man or a boy or a girl. To some extent, I agree that it’s a choice of a family to have that policy towards their children that way.

But if we're also going to support that physically, I would say it's a step in a wrong direction. Of course some people would say, who are YOU to tell ME what kind of child I will get? And then of course it's hard for me to, I would say, yeah, in a certain way I am and we are, saying to other people... I have problems with it but I have a feeling it's not ok to do it. It's about emotionally and rationally.

Hendriks takes a clear stance against the potential introduction of SST+ in the Netherlands (repeating "No" five times, with high intonation). According to him, SST+ has the potential to materially embed and thus legitimize the gender views and expectations that exist in Dutch society: "[I]t would legitimize in a physical way [...] the whole idea that there are differences between men, different expectations or how they should behave."

Hendriks acknowledges that such expectations might exist and belong to the private domain of the family, even possibly being a parental prerogative. However, he struggles to support such private tendencies on the societal level by offering SST+ for private use: "But if we're also going to support that physically, I would say it's a step in a wrong direction." This excerpt reveals a conflict between individual rights and freedoms and the values of the collective in the case of SST+. Although *Hendriks* respects liberal values, he feels it is reasonable to trump them in the case of SST+: "I have problems with it but I have a feeling it's not ok to do it. It's about emotionally and rationally." His strong response against SST+ in the beginning of the excerpt embodies his "gut feeling," an emotional argument regarding the matter. He later supplements it with a more analytic, rational substantiation, providing several arguments. *Hendriks* highlights the weight of both rational and emotional justifications concerning SST+, suggesting that it is important to regard them both in such socially relevant matters.

The following excerpt from *Matthias* provides a rich summary of most of the concerns of the respondents above and provides an additional insight regarding people who might not identify with either the male or female gender:

If everybody does this and we keep this view on gender in our society as we have it—because it still is how it is... And it's, you know, like... It has its pros and its cons. Like the pros is, I know very clearly which toilet to use, makes it very easy for me [laughs] yeah! And for you too, makes it easier, it's a pro. The con is that people who do not fit directly in those boxes feel very bad and feel sometimes left out. So if a society would be more open to this range of things, and don't make that connection, I don't see the bad effect. But of course, if you say like, everybody, we give this technology a chance, and we entrench these gender things—because this is probably why people use it—so we entrench them even more in society. So if everybody does that all the time, then it

makes it even harder for people who don't fit in. [...] Healthy gender thing would be more equal, that you have more spectrum of whatever you want to be.

Matthias raises a variety of issues in the excerpt above. He hints that Dutch society might still possess gender stereotypes and expectations, and that this is not necessarily a bad thing. With this, he mirrors the suggestions of *Melanie* and *Ben* regarding the presence of gender expectations and stereotypes in Dutch society. *Matthias* approaches the subject of gender from a socio-analytic perspective and suggests that gender distinctions structure society, for instance, in matters of public restroom segregation, which enables people to identify clearly which room to choose and thus fosters self-identification. However, he expresses a concern that not everyone might fit the clear, dual gender categorization that traditionally dominates within a society, the one that SST+ might promote: "[P]eople who do not fit directly in those boxes feel very bad and feel sometimes left out."

Matthias feels that the idea of sex–gender duality that SST+ embeds would complicate the lives of people who do not identify with male/female sex categories or masculine/feminine genders. He anticipates that the use of SST+ would be guided by traditional, dualistic gender views and expectations linked to a choice of sex, the ones that *Anouk* identifies as vestiges of the past. For him, making SST+ openly available to the public would mean that "we entrench these gender things—because this is probably why people use it—so we entrench them even more in society." In this, how *Matthias* understands SST+ is very similar to how *Lucy* and *Hendriks* think of it. According to *Matthias*, the critical aspect regarding gender is to ensure that it is not limited to two options and that each has its own value: "Healthy gender thing would be more equal, that you have more spectrum of whatever you want to be." Considering this, SST+ might not be what *Matthias* identifies as a "healthy gender thing," because it could provide only two possible options and thus foster gender expectations.

Overall, the topic of sex and gender relation in Dutch society resurfaces throughout the interviews from various angles. While some of the respondents suggest that Dutch society is void of gender expectations and stereotypes, identifying them as the relics of the past generations, others posit that even in a liberal Dutch society that values the equality of all sexes and genders, the conflation of sex and gender and the lack of clarity between the concepts and their relation to each other could ensure that gender stereotypes and expectations still prevail. Six out of seven respondents anticipate that in the Netherlands, people might use SST+ to raise both a girl and a boy. However, this shared assumption alone suggests that differing expectations could result from raising a girl or a boy, which may conflict with the value of equality and lack of gender preference that all of the respondents attribute to Dutch society.

Some of the respondents explicitly suggested that SST+ could reinforce the idea of gender duality, differences and gender expectations in society and complicate existence for people who do not identify with two traditional sexes/genders. As such, the generally anticipated risk of SST+ in relation to future children and society overall could comprise materially entrenching gender expectations as linked to the selected sex.

It is interesting to link these findings to the results of the mediation analysis in the previous section. For instance, as mentioned in Subsection 6.5, by placing the sexing process ahead of the conception and identification of pregnancy, SST+ could help parents assume parental roles and responsibilities much more quickly. Insights from gender theory indicate that parents are critical in the recruitment of the gender ideals and identities of their children, particularly in the early years (West and Zimmerman, 1987, p. 141–142). By virtue of placing the sexing process ahead of other conceptions and pregnancy-related practices in the environment, where the concepts of sex and gender are not entirely clear and are potentially used interchangeably, SST+ could also imply the gendering of a child earlier, strengthening the gender ideas that potential parents might possess.

As such, both the IPA study and the mediation analysis in the previous section suggest that SST+ could further complicate the already complex and precarious relationship of sex and gender in Dutch society. SST+ could potentially suit the needs of those seeking procreative freedoms but complicate the identification process for those struggling to fit traditional sex/gender categories in view of dualistic gender expectations.

c. Considering the value of liberalism and choice: SST+ as “an aspect of a very liberal society that you as a society would not want”

The following super-ordinate theme reflects how the respondents consider the possibility of sex selection for non-medical reasons in relation to individual freedoms and rights, particularly in the context of Dutch society, which is described by most participants as liberal and respectful of individual choices. In at least four interviews, the discussion of liberalism was explicit. Three respondents reasoned with SST+ in direct relation with euthanasia and assisted dying in general.

The excerpt of the interview with *Matthias* below presents a rich, value-laden narrative of attempting to make sense of SST+ in view of traditional norms and current developments in the Netherlands.

Matthias: At the moment it could be that if it [allowing sex selection SST for social reasons] were put in the Parliament, I’m not really sure, I think it has a chance to be more legal, actually.

Olya: Why is that?

Matthias: Because confessional parties are less strong at the moment, the Christian parties. So I think the liberal parties are more in favor or accepting it as a choice.... The discussion in Holland is, on the other side, about euthanasia. That’s more of a discussion, should you be able to say at a certain age, to say I’ve had enough. And even there parties are in favor for, almost in majority in parliament. So to make it even more liberal as we already have. So then I think, if you’re that easy about death, then to make a choice like this...

Although it’s a different subject, it has different merit. In the other case, we think of a person that’s already there and can decide for themselves. And of course with this technology it’s about someone who does not exist yet, so it cannot decide for itself, to make certain decisions about its own life. But I still think there is... I think there is maybe a move towards more acceptance than in the past. ... The move is to have more options even when you’re not ill and more freedom for people to make decisions. I think you should be really careful. ... And also the question should be, should a state provide these options. It’s also a thing. I would prefer a state that does everything to keep me alive [laughs], more or less.

In this excerpt, the possibility of legalizing sex selection for non-medical reasons fosters *Matthias* to reflect on the value of liberalism in Dutch society, in the face of the expanding technological options. *Matthias*, concurrent with the literature findings in the previous section, frames the possibility of sex selection as a choice, and on the political level, as the right to choose. He considers the Netherlands a liberal society, one that provides and respects the right to choose. Although *Matthias* supports the right to choose, he appears hesitant to embrace all possible (technological) options that further expand liberalism, for instance, in the case of sex selection for non-medical reasons. One can intuit this hesitation from how *Matthias* cautiously compares SST+ with the present-day political discussion in the Netherlands on assisted dying (“euthanasia”), particularly regarding expanding its legality for non-medical reasons. Amid this comparison emerges a critical reflection on the value of liberalism and on how certain opportunities, albeit possible, might not be desirable overall.

From the words of *Matthias*, one can interpret liberalism as a value of free choice and decision-making regarding matters concerning one’s own life. He provides an example of the current political discussion in the Netherlands about legalizing the right “to say I’ve

had enough,” or assisted dying (euthanasia and physician-assisted suicide) for anyone tired of living, even without medical reasons causing unbearable suffering (Uit Vrije Wil, 2017). According to *Matthias*, although Dutch society in principle favors individual freedoms and choices, he currently observes a trend toward further expanding individual liberties: “The move is to have more options even when you’re not ill and more freedom for people to make decisions.” Although *Matthias* appears critical of this expansion, particularly regarding government involvement in dying (“I would prefer a state that does everything to keep me alive”), he imagines that the current liberal political climate could favor the introduction of SST+: “[I]f you’re that easy about death, then to make a choice like this...”

However, *Matthias* believes that assisted dying and SST+ fundamentally differ regarding agency. It appears that SST+ would challenge the value of liberalism by providing a choice about the future of not yet existing people who cannot make the choice themselves. In this manner, the liberal approach to legalizing assisted dying, where people can decide on their own lives, would not fit the case of SST+ for non-medical reasons. This, in parallel, sketches the limits of individual choice and the right to choose in the case of SST+. Ultimately, *Matthias* appears to question to what extent the value of liberalism actually concerns SST+, and he cautiously suggests that liberal pro-choice policies need not always apply.

The subject of limits to individual liberties in a liberal society also resurfaces in an interview with *Hendriks*:

Olya: What do you think about this possibility in general [SST+ for social reasons]?

Hendriks: [...] It’s really hard. I have several points, you know. Maybe one point, I really like this idea that a person can decide for himself what everyone wants, in case of abortion, in case of life ending... Yeah, it’s really important for me that there’s no society saying that no, you can’t abort or no, you can’t ehm... your life... end it yourself. I really like this personal ehmm... ability to choose whether or not. But I think with this sex selection, you’re actually not choosing for yourself but for the person that is about to come to the world. That makes societal opinion about it a little bit more legitimate. You know what I mean? [...] I think the idea with liberalism is not that you would be free in A-A-A-LL aspects. [...]

Olya: What is the relation between sex selection technology and liberalism?

Hendriks: [pause] Maybe that it is an aspect of a very liberal society that you as a society would not want... There are issues at hand when even ... even in a liberal society you would not want to fit together.

For *Hendriks*, as for *Matthias*, the idea of liberalism, “that a person can decide for himself” in a society that does not restrict individual liberties, is of existential importance. He

approvingly cites cases of the rights to abortion and assisted dying as examples of such liberal rights. However, on par with *Matthias*, he draws a stark contrast with sex selection and suggests that liberalism has its limits; “The idea with liberalism is not that you would be free in A-A-A-LL aspects.” Because in the case of sex selection one chooses not for oneself but for another person who is yet to enter the world, sex selection warrants societal concern and distance from the liberal principles of respect for one’s choices. He questions the desirability of SST+ on a societal level and generalizes his critical approach to the technology by suggesting that “it is an aspect of a very liberal society that you as a society would not want.” With this, *Hendriks* suggests that SST+ does not contradict the value of liberalism; rather, it highlights one aspect of it—the right to say no to what is offered.

Paul, considering the potential future of SST+ in the Netherlands, also distinguishes the right to choose and the right to say no:

Paul: I don’t have problems with it [SST+]. I would not do it but I would not have problems with it. Some people, they think it’s important. Yeah? And what’s important for them—well, you have to give them a chance... But I would not choose for it. But the same, if you’re older and you think life is not responsible to live—and it must be also possible. You understand what I meant?

Olya: Maybe not, can you explain a bit more?

Paul: Some people they are old, and they are not in good condition. And they want to say, I want to end my life. And I’m also saying, that must be possible. Thus, this one must be possible also.”

In this excerpt, the value of liberalism emerges through *Paul*’s considerations of allowing people to do what they find important and retain the possibility to refrain from a certain action (as he himself expects to refrain from SST+). *Paul* presents the core idea of liberalism, when he suggests that if people find something important, they must have the chance to fulfill it. Similar to *Matthias* and *Hendriks*, *Paul* draws a parallel between ending one’s own life and SST+: “[T]hat must be possible. Thus, this one must be possible also.” Unlike the other respondents, *Paul* does not distinguish between assisted dying and SST+, and he applies a general principle: if one is permitted, then the other must also be permitted. As such, SST+, for *Paul*, does not challenge the principle of liberalism but rather falls under its wide umbrella: because both assisted dying and SST+ represent matters of concern and importance for people, in both cases, people must have the right to do what they consider best.

In contrast to the other respondents above, *Lucy* places liberalism in the context of parental virtues to draw the line on individual freedoms:

Lucy: I'm finding it difficult really to say that people... if they really want it, shouldn't be able to use it. But in the end I don't think it's emm... it's a good thing. No... I think it's good to have as little choice about what you're getting as a child as possible.

For *Lucy*, SST+ fosters a value conflict between her appreciation of liberalism and an understanding of virtuous parenthood. On the one hand, she struggles to deny people the use of sex selection if they express such a desire. On the other hand, as we have seen above, a good parent, in the eyes of *Lucy*, possesses the virtues of acceptance and unconditional love. Upon consideration, *Lucy* finds that the values of good parenthood trump the value of liberalism in making the choice to select the sex of one's future child: "[I]t's good to have as little choice about what you're getting as a child as possible."

Overall, the value of liberalism in relation to SST+ appeared in discussions on individual choices and freedoms and their scope and applicability in a society that the respondents define as liberal. Three out of four respondents struggle to define the limits to liberalism in a society that traditionally respects individual freedom of choice but still suggest that SST+ could be an example of such a restriction. Particularly for one respondent, in the case of SST+, the parental virtues of embracing the uncertainty that a child brings appear more important than the parental right to decide on their family. Another respondent considers that if using SST+ is important to people, they should be granted such an opportunity, given that Dutch society permits other life-related decisions such as the right to end one's life with age. However, particularly in comparing SST+ with assisted dying, other respondents suggest that liberal principles of choice need not apply to SST+: because the decision-making concerns people not yet conceived, they cannot make decisions about their own lives. According to these respondents, approaching SST+ with the value of liberalism in mind contradicts its constituent value, namely, agency in the matters of one's own life. Overall, the value of liberalism comes to the fore as dear to most of the respondents, who define and re-articulate its scope in view of the possible implementation of SST+.

d. Enforcing the trend to perfectionism: "[I]t's like you have to sketch your entire life"

The following theme identifies a close connection in the eyes of the respondents between SST+ and a perceived societal trend toward perfection. The respondents were critical of the idea of perfection and associated the potential introduction of SST+ with the pressure to fit into the "perfect society," where many choose to select the sex of their child. These subjects resurfaced in five out of seven interviews. The following excerpts from *Lucy* present a substantiation of the ideas above:

There are certain types of families that really have this idea of emm... kind of a perfect family that they want to create. And they can be from all kinds of social backgrounds, so it doesn't really matter how rich they are. But I feel like families that are more involved in the kind of family that they get emm... than I am, probably, and some others. And I can see them using this [SST+], like building a family, and having the baby, and doing everything in the pregnancy, buying a 1000 EUR strollers even when you are not very wealthy, having the best things for your baby... I think those kind of families would be more inclined to pick the type of the sex of the child than others.

[...] Yeah, and also parents would... I mean, it might not also be... emm... as accepted by the outside world to have... Like you would get questions about it if you have three guys, like, Why didn't you have a girl in the end, the last one? So you would have to kind of justify yourself the whole time.

In the first paragraph, *Lucy* attempts to identify the types of people who might be open to using SST+. According to her, this is a specific type of people, with whom she openly does not identify: "Families that are more involved in the kind of family that they get emm... than I am, probably, and some others." The distinguishing feature of these people, for *Lucy*, is their striving for perfection in family matters: "This idea of emm... kind of a perfect family that they want to create." *Lucy* further describes these families as "doing everything in the pregnancy, buying a 1,000 EUR strollers even when you are not very wealthy, having the best things for your baby." This sentence in particular highlights *Lucy*'s normative stance, when she takes issue with parents who might go to excesses, while not having proper means, just to adhere to the idea of perfection that they might possess. SST+ appears here as one of these excesses. In this paragraph, *Lucy* is being normative, whereby SST+ appears as an identity device to denounce the idea of perfection and highlight the value of simplicity that she sees as important in having a family.

The second paragraph raises the issue of what an overall trend to perfection and embracing SST+ en masse could imply for parents who might not want to use it. According to *Lucy*, societal acceptance of SST+ could mean less tolerance towards families who choose natural procreation, potentially resulting in several children of the same sex: "[I]t might not also be... emm... as accepted by the outside world." *Lucy* anticipates that this could put pressure on families to justify their procreative choices. In general, the mediation potential of SST+ identified in this excerpt could challenge the lives of people who do not see value in the race to perfection. Similarly, it might also foster societal pressure to adhere to new standards of diversity in a family layout, restricting people's freedoms regarding family building.

The subject of perfection in relation to SST+ also arises in an interview with *Hendriks*:

What is very important nowadays is that everything needs to be perfect, a child needs to be perfect, education, you need to have a perfect girl- or boyfriend or... There's so much pressure to have this perfect life. In this sense, this technology could improve because it can make your family life perfect. That way it might be a positive impact in how we think nowadays about our lives, our society. But I don't think this is like a good thing to happen. ... For a lot of people, nowadays, it would fit in their idea of perfection, [...] also of the family ways. ... But I think, generally, this whole way of thinking, of making your life perfect, it's only leading us to a more disabled society. I would not like it. ... Yeah, like for me, a perfect family, that it would not... that there is no pressure on the child to perform better.

Hendriks expresses frustration with what he identifies as the overall societal trend to perfection in every sphere of one's life ("everything needs to be perfect"), to the extent that he considers it a pressure: "There's so much pressure to have this perfect life." He regards SST+ as a technology that fits into and addresses this trend toward perfection: "[T]his technology could improve because it can make your family life perfect." However, *Hendriks* disagrees with the concept of living an idealized life and views it not only as pressuring but also as disabling society: "[T]his whole way of thinking, of making your life perfect, it's only leading us to a more disabled society. I would not like it." As *Hendriks* views it, the trend to perfection, and by consequence SST+, would conflict with how he conceives of a perfect family, when "there is no pressure on the child to perform better." SST+ appears here as a technology of pressure, symbolizing the idea of perfection, or the idea to conform to certain idealized norms. *Hendriks* condemns both this idea and SST+, which he perceives as a materialized call to perfection.

Melanie echoes the mindset of *Hendriks* and *Lucy* by suggesting that SST+ would fit only with a particular group of people. She also attempts to reason with what she considers a Dutch trend toward wanting to have both a girl and a boy in a family in the face of SST+.

In the Netherlands, I think that you want [to have both] because it is nice. Because it is nice to have a beautiful house, fine to have a nice car, and it is completely great if you have a boy, because then you can show him off, first shop for boys' clothes and say 'Look, he drives a car for the first time!' or 'He rides a bike for the first time!' And if you get a girl, you can make nice ribbons, with everything cute and cuddly; and as a result, she will like everything girly. That's why I think it has to do with culture: having a child is a sort of a social status. Better a pretty car. It's nice to be able to experience both. [...]

Parents often hope for [a certain gender], especially those busy with that status. It's those people who way in advance write on Facebook that they picked a name; and who show off what they already have in their house to give that girl. All these 'Look at this room!' and 'Check out these ribbons!', 'Look, I already have a onesie, I have a skirt!'¹⁷

Melanie presents a normative account of the idea of desiring that both sexes be represented in the family. She attributes this idea to culture, whereby, according to her, "having a child is a sort of a social status." Having both sexes represented in a family thus has a certain social relevance, not exactly prestige, but something that indicates the status of a family: "[I]t is completely great if you have a boy, because then you can show him off." Having children appears as a mechanism of social standing, of securing one's status in society. Children are something you can "show off," brag about and display, something that can supposedly reveal a certain social status of the parents and the entire family. As a result, according to *Melanie*, only certain people would be interested in SST+, "especially those busy with that status."

The choice of words and descriptions she uses to describe "those people" who might use SST+ indicate a reproach of the idea of hunting for social status and the means people utilize to secure it, including SST+: "It's those people who way in advance write on Facebook that they picked a name; and who show off what they already have in their house to give that girl. All these 'Look at this room!' and 'Check out these ribbons!'" "Those people" as a phrase appears to distinguish *Melanie* from the particular group of people with whom she does not identify, to secure her own identity as someone for whom social status may not be as important. From the words of *Melanie*, SST+ resurfaces as a method to attain the ideal of social standing, the perfect social status. The normative account that *Melanie* provides of people who seek such a social standing seems to suggest that it contradicts her beliefs, just as SST+ does in this regard.

Ben also struggles with the idea of wanting to have one of each sex represented in the family, something that he denotes as "romantic" and problematic for him.

17 Translated from Dutch. Original: "*Melanie*: In Nederland denk ik dat je het wilt omdat je het leuk is om te hebben, omdat het fijn is om een mooi huis te hebben, fijn om een leuke auto te hebben. Het is fijn een leuke hond te hebben, en het is helemaal leuk als je een jongen hebt, want dan kun je eerst laten zien en jongenskleren kopen en zeggen 'Kijk hij rijdt voor het eerst auto, of hij rijdt voor het eerst op een fiets' en als je een meisje krijgt kun je mooi strikjes maken en allemaal lief en knuffelig, en vervolgens gaat ze het liefst op iets meisjesachtigs. Dan denk ik dat het met cultuur te maken heeft: het hebben van een kind is een soort status. Liever een mooie auto. Het is leuk om het allebei te mogen ervaren. [...] Maar ouders hopen wel vaak, vooral mensen die met die status bezig zijn. Dat zijn van die mensen die op Facebook van tevoren al zeggen die de naam al hebben en die dan allemaal laten zien wat ze al in huis hebben om dat meisje te geven. En 'Kijk dit kamertje', en 'kijk al die strikjes', 'kijk ik heb al een rompertje, ik heb al een jurkje.'"

I think that many parents would think it's nice to have a boy and a girl. I think it's... romantic is a crazy word, but this idea that every child means something different. ... that it's not set in stone per definition, and that everyone determines exactly their house, tree and child, how my family looks like. I think, it's like, it's like you have to sketch your entire life like this. But you don't know what you're on to and whether you will have children, you have no clue how that will look like! And the fact there is also no possibility of this, means you don't have to have problems about it. [...] Romantic is a slightly wrong word, more this unexpected effect in it, thanks to which it just... becomes.¹⁸

Even though, as *Ben* sees it, many parents would prefer to have one of each sex, he does not consider it prudent to develop a perfect plan for everything in life. *Ben* juxtaposes two views. On the one hand is his view of how things should be: "romantic," "that every child means something different," "that it's not set in stone per definition," letting things be, letting things happen, "this unexpected effect in it, thanks to which it just... becomes." That the idea of having a perfect life plan threatens his view appears, for instance, in people wanting (and with SST+, planning) to have one of each sex in the family: "that everyone determines exactly their house, tree and child, how my family looks like." *Ben's* emotional response to this challenge reveals his confrontation with the idea of perfect planning: "But you don't know what you're on to and whether you will have children, you have no clue how that will look like." Crucially, *Ben* suspects that having one's life planned out might invite problems; therefore, it is a possibility best avoided: "And the fact there is also no possibility of this, means you don't have to have problems about it." *Ben* does not mention SST+ explicitly, but it appears between the lines as a method to help fulfill a perfect life plan, the idea that *Ben* opposes in favor of the "unexpected effect" of life.

In general, this theme references the views of respondents regarding the idea of perfection and how SST+ fits within it. The theme of perfection appears differently among respondents, for instance, in the family layout, in a desire to have the children of both sexes; and on societal level, represented by an idea of social status. However, all of the respondents exhibit concern regarding the idea and possible consequences of the perfectionism trend in society. Their responses also agree regarding how SST+ appears as a technology both promoting perfection and fitting into the perceived societal trend, something that they ultimately consider undesirable.

18 Translated from Dutch. Original: "*Ben*: Ik denk dat heel veel ouders het leuk vinden om een jongen en een meisje te hebben, en ik vind het iets.. romantisch is een gek woord, maar het feit dat niet, dat elk kind wat dat betreft anders is. Dat niet per definitie vast staat, en dat iedereen precies bepaald van huisje boompje beestje, hoe ziet mijn gezinnetje eruit. Vind ik, alsof je, alsof je je hele leven daarin moet uitstippelen.. Daarin is het juist dat je, dat je niet weet waar je aan toe bent en dat je gaat kinderen krijgen, maar je hebt geen idee hoe dat eruitziet! En het feit dat die mogelijkheid er ook niet is, zorgt ervoor dat je, dat je er ook geen probleem over hoeft te maken. ... Ja romantisch is een beetje een verkeerd woord, maar gewoon het onverwachte effect erin waardoor het een beetje ... wordt."

e. Mediating naturalness: "May we really determine everything?"

The final theme that appeared in at least five interviews was the value of naturalness, broadly construed, and its relation to SST+. The two clusters within which this theme surfaced were the value of naturalness in pregnancy and the value of naturalness in itself as a driving force in life.

The theme cluster related to *naturalness in pregnancy* appeared in all three interviews with female respondents, one with children, one unsure of whether she wanted children and one expecting a child. Below is an excerpt of an interview with *Lucy*, who provided a rich account of the value of naturalness in pregnancy, particularly in face of SST+.

I don't know... Ehhh... Yeah, I honestly don't really see the point [in SST+]. And what makes it less nice is that you... if you use it, you cannot get pregnant the natural way—and that's the nicest way to get pregnant, I guess. SO if you need all kinds of medical help to get pregnant anyway, then I could see ok, well, maybe... But umm... I wouldn't give that part up, just to be able to select the sex of a child. [...]

I think also in the Netherlands we have really umm... ehh. Well, a culture or a tradition, I don't know if you would call it that—of doing things the natural way. Especially around birth and pregnancy, things are supposed to be as natural as they could be. Also, we have a tradition of home birthing, of using no... ehh... pain medication, of having as little check-ups as possible, all these things... All this has to do with the idea of a natural pregnancy. Emm... And this doesn't fit in the idea [of sex selection]... Because you won't need IVF, probably but uhm. But you don't get pregnant the natural way, yes, so. ... It would be much easier, but still, but STILL it's not natural. [...]

Well, to be honest, now that I think about it, I kind of also emm... Feel for this tradition of natural pregnancy and birth. So I don't see why... doing something extra would make pregnancy better than doing as little as possible.

Lucy clearly identifies that SST+ would not be suitable for her, not only because she misses the point of it but also because it makes pregnancy artificial: "What makes it less nice is that you... if you use it, you cannot get pregnant the natural way—and that's the nicest way to get pregnant, I guess." SST+ here appears to violate the value of naturalness in pregnancy with which *Lucy* identifies, particularly regarding the conception process. *Lucy* acknowledges the use of SST+ in cases where medical assistance would be warranted. However, she would not forego natural pregnancy "just" for the possibility of selecting the sex of a child, which highlights the importance of naturalness in her case.

Lucy further identifies the value of naturalness, “doing things the natural way” in all aspects of pregnancy as a dominant value in the Netherlands, as “a culture, or a tradition.” This culture denotes refraining from any technological interference in pregnancy-related aspects to the farthest extent possible: from refusing pain medication in labor to the tradition of home birth. Although observing naturalness in childbearing is not a prescriptive norm, it is still widely accepted and practiced in the Netherlands (Pasveer and Akrich, 2001; Chrisiaens, Nieuwenhuijze and de Vries, 2013): Dutch women frequently choose home birth (13.1% of all births in 2015) and rarely receive an epidural (21.8% of the total number of pregnant women in 2015) or a cesarean section (16.6%) (Perined, 2017). *Lucy* not only identifies with this societal trend toward naturalness in birth-related practices but also supports it and condemns SST+ as a device that would contradict this value: “I don’t see why... doing something extra would make pregnancy better than doing as little as possible.”

Anouk similarly appreciates the natural aspects of conception, suggesting that “Having children is a... a gift from nature, which should be influenced by technology as less as possible.” *Melanie* is even more explicit in suggesting that the potential introduction of SST+ in the Netherlands is unnecessary, and she objects to technology becoming the norm in family practice:

I’d like to prevent that we find this [SST+] normal, but if everyone does and we give access to it... Yeah, I think I wouldn’t find it necessary because I think it’s a great gift when once a seed finds an egg, and that becomes a child. Without any additional interference. No hospital, just a man with a woman, with each other, I think that’s beautiful.¹⁹

Powered by ideas of naturalness in pregnancy, *Melanie* considers the conception and birth of a child “a great gift,” that can occur by itself, with no technological influence required. Invoking an image of natural conception, *Melanie* suggests that SST+ could challenge and change that natural wonder, something that she finds “unnecessary.”

As such, all three respondents who touched upon the theme of naturalness in pregnancy identified this value as prerogative, particularly in the Dutch context. Against this background, the respondents considered the potential introduction of SST+ in the Netherlands undesirable and unnecessary and believed that it could prevent prospective parents from enacting the value of naturalness or redefining what naturalness means.

¹⁹ Translated from Dutch. Original: “*Melanie*: Ik zou het willen voorkomen dat we dit [sex selection] normaal vinden, maar als we het met zijn allen normaal vinden, en we laten het toe... Ja, ik denk dat ik het niet nodig zou vinden want ik vind het wel heel mooi geschenk dat ergens dus er een zaadje een ei vindt en dat dat een kindje wordt. Zonder dat er ook maar iets van een andere handeling bij hoeft te komen. Geen ziekenhuis, gewoon van man naar vrouw, in elkaar, dat vind ik toch wel erg mooi.”

The second cluster of themes in the overarching theme of naturalness concerns its understanding as a *driving force in life*. Participants were often critical toward the potential introduction of SST+, because they associated the technology with taking control over nature and manipulating it, thus providing a condemning valuation overall. *Anouk* was explicitly critical of SST+, which she conceived as fitting into the technological trend of taking control over life, something she did not hold in high esteem:

I’m not in favor of this technology, at least not for social reasons. You cannot control the whole world and your whole life. Technology is getting further and further and further. And it looks like everything is being controlled. Technology is good on the one hand. But you don’t need to have to control everything.

Anouk reflects upon the role of technology in modern life, something that she considers a means of control. She equates the pace of technological development with increasing control: “Technology is getting further and further and further. And it looks like everything is being controlled.” However, considering SST+, she suggests limits to what people can control with the help of technology should be enacted: “But you don’t need to have to control everything.” In this excerpt, SST+ appears as a technology of control over life, a control that, according to *Anouk*, people should not possess.

The value of naturalness was prominent in the interview with *Melanie*, who considers many technologies, in general, and SST+, in particular, as bending nature and potentially threatening its creations.

Olya: This possibility, the sex selection for non-medical reasons, what do you think about it?

Melanie: I think it’s very troublesome²⁰.

Olya: Why?

²⁰ Translated from Dutch. Original: “*Olya*: This possibility, the sex selection for non-medical reasons, what do you think about it? *Melanie*: Ik vind het echt heel lastig. *Olya*: Why? *Melanie*: Omdat je dan, je past gewoon de hele natuur aan. Je bent de natuur aan het verweren op iets wat zomaar een geschenk is waar niemand echt goed van kan verklaren hoe en waar het van komt. Het is een wonder van de natuur, en als je dat gaat aanpakken.. Ik vind het al raar dat er dingen groeien die wij aangepakt hebben, en dat we alles perfect en lekker maken, dat we tomaatjes die net wat zoeter, net wat ronder zijn kunnen maken. Maar om dan nu ook je kind zo kunstmatig aan te passen, dat vind ik wel hard. *Olya*: We already have technologies that help us change what nature gave us. Why is this technology so different? *Melanie*: Nou, ik vind het in het algemene lastig dat wij in de natuur ook proberen dingen mooier te maken. Laatst kreeg ik een bos bloemen, en daar zat een roos in, die was zowel wit als rood door elkaar. Dat is het resultaat van gemanipuleer. En dan denk ik naar die bijzondere roos en daardoor vind ik het eigenlijk niet meer mooi. Eigenlijk vind ik dat helemaal niet uit de natuur. Wij hebben het zo gemaakt, en bij een kind vind ik dat nog erger. Als we dat allemaal dan zo mogen gaan bepalen, mogen we echt alles bepalen? ... Ik vind dat het voor zoiets bijzonders al, iets wat eigenlijk al van de natuur krijgt, vind ik het al hartstikke eng dat mensen dat aan kunnen tasten.”

Melanie: Because then you bend the whole nature. You disintegrate nature to achieve something that is already a gift, which nobody can explain really well how and where it comes from. It's a miracle of nature, and if you want to disintegrate that... I already find it strange that there are things growing that we took away [from nature], and that we make everything perfect and tasty, that we can make tomatoes that are just a tiny bit sweeter, just a bit rounder. But to adjust your child in such an artificial way, I think that's really harsh.

Olya: We already have technologies that help us change what nature gave us. Why is this technology so different?

Melanie: Well, I find it difficult in general that we try to make things more beautiful in nature. I've recently received a bouquet of flowers, with a rose inside, which had both white and red colors. That was a result of manipulation. And then I think of that particular rose, and because of that I don't think it's beautiful anymore. Actually, I think that it's completely not from nature. We made it like this, and with a child, I think it's even worse. If we are able to determine all of that in such a way, may we really determine everything? ... I think that for something so special, something that we already receive from nature, I find it really scary that people can damage it.

Melanie finds the idea of SST+ "troublesome" in view of its expected ability to "bend the whole nature," because SST+ could meddle in the process of conception, something which *Melanie* considers a gift, "a miracle of nature" that SST+ would "disintegrate." She is critical of technological intervention in other areas of human life, such as agriculture, where the ambition exists to "make everything perfect and tasty." However problematic she finds such societally accepted technological interventions, she does not accept the role of SST+ in conception: "adjust[ing] your child in such an artificial way."

Melanie exhibits a primary concern for the value of naturalness in life, something that, according to her, modern technologies already threaten. However problematic she finds the artificial manipulation of nature, in regard to children and SST+, she thinks "It's even worse": "If we are able to determine all of that in such a way, may we really determine everything?" *Melanie* positions SST+ as a potential "damage" to the natural gift of conception and childbirth, "something so special, something that we already receive from nature." In this sense, she parallels *Lucy*, who considered SST+ as "something extra" without additional value. *Melanie*, however, also considered it to threaten how nature functions. *Ben* considered a similar issue on a broader scale, from the societal perspective:

Ben: I don't think in general that it's a good idea if people would be able to choose.

Olya: Why is that?

Ben: Because I have the feeling that you get this manipulated society. So, it's not nature that decides whatever is going to happen, but we ... create a certain society. ... What is the next thing? Do we only get one child, one boy? ... I think that nature has to decide. And I'm not religious or something, or things like that, but for me it feels wrong, and it's hard to put a... it feels wrong.²¹

Ben does not think that the ability of choice that SST+ could provide would be "a good idea," because of the feared effect of a "manipulated society." He finds inherent value in nature taking its course as opposed to people determining fate with technological help, or "creat[ing] a certain society." *Ben* fears that SST+ could enact a slippery slope tendency, whereby it would be difficult to identify a limit to human-technological interaction: "What is the next thing? Do we only get one child, one boy?" He posits the "gut feeling" argument, intrinsically feeling that SST+ would be "wrong:" "And I'm not religious or something, or things like that, but for me it feels wrong, and it's hard to put a... it feels wrong." Note how, according to *Ben*, opinions stemming from a religious background would be more warranted than his own opinion, which he struggles to substantiate. Nonetheless, he feels that his view also deserves to be heard and accounted for: "[B]ut for me it feels wrong, and it's hard to put a... it feels wrong." One could interpret this insistence to reflect the profoundness of his belief regarding the value of nature as the driving force in life and the threat SST+ could pose to it.

Overall, respondents who considered the value of naturalness regarding SST+ granted it a priority in providing a gift or a miracle of life that SST+ could only threaten or damage.

Discussion of Interpretative Phenomenological Analysis findings

The IPA method, applied to the case of SST+ for non-medical reasons, has generated a rich account of how participants appropriated SST+ (i.e., positioned and fit it in their frameworks of understanding). This method provided a nuanced methodology to interpret and reflect on how projective SST+ appropriation varied among the participants, generating overarching similarities while maintaining contextual sensitivity. Although none of the participants possessed first-hand experience with SST+, using in-depth interview questions as prompts and relying on their own experiences and proactive agency spurred participants to display an understanding of the technology and a certain attitude

21 Translated from Dutch. Original: "*Ben:* het kiezen van het geslacht waarvan ik echt het gevoel heb dat de balans doorslaat daarin. Dus dat.. dat het feit dat de natuur de verhouding man-vrouw op de aarde zet, en dan kansen, en dat je dan een gemaakte samenleving krijgt." – "Because of this choice of sex, I have a feeling that it breaks the balance. [...] The nature determined the ratio of men-women on earth, and then this possibility [sex selection], then you get a manufactured society."

toward it. While most of the participants would not consider the introduction of SST+ desirable, their motivations for such a position diverged.

In an attempt to distill and reflect upon the specific value constellations of the interviewed Dutch people, my cultural belonging to a different geographical region unexpectedly aided me in this task. Although this inevitably projected other cultural hermeneutic layers from my interpretative structures, it also provided me a sense of a fresh perspective, being both an insider and outsider in the process of analysis. With this in mind, and following the IPA method, I identified five overarching super-ordinate themes, with each appearing in at least four out of seven interviews and representing a particular concern related to SST+.

The super-ordinate themes identified in this study each present a unique normative concern as well as its malleability when faced with SST+. The identified themes concern understanding good parenthood, relating SST+, gender and culture, considering the value of liberalism and choice, enforcing the trend to perfectionism and mediating naturalness. All of the themes consider SST+ in relation to certain values, existential concerns or normative contexts and, as such, represent an anticipated mediating potential of this technology.

Some of these themes suggest a potential value conflict that the possible introduction of SST+ would pose for the moral landscape of the participants. For instance, considering good parenthood, the majority of respondents suggested that SST+ could violate the values of acceptance, unconditional love and dealing with uncertainty that the respondents identified as cornerstones of good parenthood. For some respondents, SST+ would further undermine the value of naturalness in letting life take its course, or represent the manipulation of nature, something that certain respondents considered inherently wrong. Considering SST+ in relation to pregnancy enabled some of the respondents to actively reflect on what they consider important, not only to themselves personally, but also with respect to societal values. As such, one of the respondents identified the overarching, enduring Dutch culture of naturalness in all pregnancy-related practices, where using minimal technological intervention is valued. In this regard, SST+ would re-affirm the value of naturalness in conception, since the respondent regarded the possibility of sex selection as an insufficient incentive to give it up. Overall, presented with the possibility of SST+ in the Netherlands, the respondents revealed what is important to them and how it is mediated by the mere possibility of SST+.

Some themes indicate the negotiation of certain values, an active reflection on and re-articulation of the concepts that elicit concern among the respondents. For instance, one of the most dominant themes in the study concerned a complicated relationship

between sex and gender and the role of culture within it. Confronted with the possibility of SST+, the respondents identified several ways in which SST+, in their eyes, could fit this dynamic. Most respondents upheld the values of equality and liberalism that they associated with Dutch society. On the one hand, SST+ could fit the value of freedom of choice by allowing potential parents to determine their family layout. On the other hand, the respondents predominantly regarded SST+ as a value-laden technology, attributing it with the possibility of promoting dualistic gender expectations and stereotypes.

The respondents suggested that SST+ could make the difference between sexes explicit and available for choice. The fear here concerned reinstating the traditional societal layout that, according to the respondents, relied on dualistic gender identities, expectations and stereotypes that directly linked sex and gender. Considered from this angle, SST+ presents the need to reinforce the values that the respondents identified as shared in the Netherlands. For the majority of the respondents, this entailed considering the introduction of SST+ as undesirable in the Netherlands. This also outlined the limits to the value of liberalism that most proclaimed as also defining Dutch society. However, one respondent insisted on making SST+ possible for those who desire such an option, suggesting that a liberal society should do what it can to enable people's happiness. Interestingly, those respondents who opposed the possible introduction of SST+ also reasoned with a value of well-being in mind. Certain respondents suggested that the possibility of one sex or the other, in the context of complicated and often conflated relationship between sex and gender, could complicate the life and, arguably the well-being, of people who do not identify with or fit into dualistic sex/gender categories. They suggested that the introduction of SST+ in Dutch society could be unproblematic only if a clear distinction between sex and gender and a clear understanding that SST+ could offer a choice of only certain biological features could exist.

This conversation about SST+ also spurred active reflection on the value of liberalism and its relation to SST+. Many respondents used comparison as a means to do justice to SST+, where end of life choices and the right thereof was the most popular comparison. Although most participants agreed on the weight of the value of liberalism and the right to choose in Dutch society, they diverged on the extent to which this value could actually apply in the case of SST+. Invoking a comparison with the right to assisted dying, at least three of the respondents suggested that if Dutch citizens have the right to make life-decisive choices at the end of the life spectrum, they should also have the right to make such choices at its beginning. However, two of these respondents further substantiated and subsequently challenged such consequentialist logic, suggesting that the two cases profoundly differ. They highlighted the agency aspect that they considered the key to liberalism, namely, an ability to make choices regarding one's own life. While in the case of assisted dying, people

can make decisions regarding their own lives, SST+ would require prospective parents to make choices regarding yet unborn children. This caused respondents to question whether the value of liberalism at all fit the discussion regarding SST+. In this manner, SST+ enabled some respondents to illuminate the value they identified as important in the discussion on SST+, identify it, reflect on it and consider its role in the technological debate. This instance in particular illustrates the moral mediation of SST+ in action, whereby the appropriation process reflects an active negotiation of the value in question and the complex nuances that accompany it.

The narratives of the respondents, although not explicitly presented in the sections above, also indicate an openness to the possibility of moral change regarding SST+, illustrated by the following exemplary quote from *Melanie*: “There are more and more things that we consider nowadays as normal, but previously we did not. Then I think, yes, maybe in 20 years, ‘Huh, have I ever said that?’ Then it might be completely normal that you choose for a boy or a girl, and I’d think that.”²² This respondent not only acknowledges the idea that values can change but also foresees this occurring in her lifetime. The change in values and moral views is presented here as a dynamic element of life.

Notable in the discussion on the technological mediation of morality is an excerpt from the interview with *Hendriks*. *Hendriks* defines himself as coming from a conservative, religious farming family. Before we even began the interview, he described an encounter with SST in his family. The context was farming, where having cows was essential to generating farming products and, as such, responsible for earning any profit.

Hendriks: My parents have a farm with cows and there they apply sex... not this specific technology but the main technology of selecting... eh like female cows... My parents are very Christian. So at first, it’s really funny, at first they were like, ‘Oh no-no-no, we will never do that! It’s like... it’s like messing up God’s plan!’ Then, I think it started a little bit with irritation. It’s really irritating if you really could [do that but you don’t]. For my father, for example, when he then for the second time, the THIRD time in a row gets a male calf, you, I think at a certain point, you’re like, well, maybe we change for one [quietly] and then for two [laughing]... so slowly [it gets accepted].

This excerpt exceptionally clearly illustrates the value dynamism with the example of sex selection in animal farming. Sex selection technology here mediates the relation between the attained values of naturalness and religious guidance, on the one hand, and the value

of profit (rather, the lack of profit) precisely in view of letting nature take its course, on the other. *Hendriks* reflects with irony on how technology slowly modifies initially held beliefs to achieve a new balance between all concerned values.

Overall, the IPA study unveils step by step the different parts of the projective hermeneutic lemniscate mediated by SST+ and how, amid this, moral mediation occurs. The rich findings of the study visualize the active and unruly process of attempting to make sense of a new technology, referencing it with existing individual experiences and knowledge and, depending on this, revealing, at times unique, at times shared, value constellations and possible conflicts. The IPA study of SST+ foregrounds the interpretative appropriation process of the respondents, where value dynamism appears as an inalienable counterpart of technological appropriation. Although the respondent did not possess first-hand experience with the technology, their rich life experiences allowed the anticipation of the future use practices and specific scenarios regarding the introduction of SST+ in the Netherlands. As suggested by the IPA method, the proactive agency of the interviewees allowed them to engage in explicit and implicit technological reflections and valuations, which presented a rich foundation for an IPA study. In attempting to make sense of SST+ and position it into their lifeworld, the respondents revealed their existential concerns, identified value conflicts and revised certain conceptions to negotiate conflicting meanings, while also reinforcing the understanding of others. In this manner, the IPA study provided insight into how respondents appropriated SST+ and visualized the continued back-and-forth dynamics that the hermeneutic lemniscate figure was meant to represent.

7.4 Conclusions

The study of appropriating a technology-in-the-making primarily existing in the form of technological visions presupposes a degree of anticipation, since no practice of using the technology has yet occurred. In this chapter, I have explored several methods how to study the projective appropriation of SST+ and anticipate its technologically induced ethical impacts. Section 7.2, based on a thorough analysis of current SST practices as presented in the literature and the ethical debate regarding SST, allowed me to tentatively suggest several matters of concern in view of the material changes that SST+ can spur. The demedicalization of the sex selection practice, its transformation into a direct-to-consumer technology and its move to an open market can all yield ethical concerns related to the values of good parenthood, responsibility, deliberations of fate versus choice, the balance of parental roles and the potential “Why not?” attitude toward sex selection. These ethical concerns are not exhaustive, and they merely scratch the surface of anticipation,

²² Translated from Dutch. Original: “*Melanie*: Er is tegenwoordig ook steeds meer normaal wat niet normaal was. Dan denk ik nou ja misschien over 20 jaar Huh heb ik dat ooit gezegd? Dat het dan heel normaal is dat je kiest voor een jongen of een meisje, dan vind ik het wel, dan denk ik dat.”

based on the limited factual and experiential knowledge of SST+. However preliminary, the technological mediation analysis has at this level already allowed the sketching of possible value dynamics on the individual and societal levels.

Integrating literature-based findings, the IPA analysis of the hypothetical societal uptake of SST+ in the Netherlands empirically expanded the appropriation study. Albeit relying predominantly on the proactive agency of the interviewees and seeking no further group cohesion than cultural belonging, the IPA-based appropriation study has revealed a rich web of valuations and negotiations regarding SST+ in its particular cultural context and against respondents' varying personal histories. Among others, it concerned the problematic sex–gender relationship and the meaning and value of liberalism in society, naturalness in birth-giving and the fostering of perfection ideals. With the technological mediation approach, and throughout different explorative appropriation studies and the IPA method, SST+ appears in a morally nuanced and contextualized manner. The appropriation study thus “qualified” the risk–benefit logic in the ethical debate regarding SST, which could lend additional and different information for deliberation and inform decisions regarding its future.

We live in an age when SST is a viable option that people seek to obtain, notwithstanding cost, safety, international borders or regulation. SST+ suggests a material change in sex selection, potentially rendering it affordable, non-invasive and home-based. Whether or not this technology materializes, the possible moral dynamism that this chapter exposes in relation to the still nascent SST+ suggests considering the moral charge of technologies early on rather than waiting for their introduction. Moreover, it suggests an expansion beyond existing risk–benefit logic to also explore how technologies mediate values and normative standards. Such an expansion, at both the levels of ethics and policy-making, is necessary to understand how SST+ could reorganize moral and political frameworks of action and how to deal with it in an informed manner.

Expanding ethical reflection on sex selection along these lines could also help to account for local cultural contexts and beliefs. The anticipated psychological harms and procreative liberties of SST already manifest differently depending on sociocultural context. The ethical implications of SST+ may also materialize in interactions with local environments. In this light, informed reflective engagement with SST+ is possible only with a situated, context-dependent understanding of its moral mediation potential.

Incorporating the intuitions of the technological mediation approach with deliberations over the future of technologies in questions would also help to account for the dynamic nature of the ethical concepts with which we approach these same technologies. As

suggested by the analysis above, the possibility of sex selection mediates the virtue of good parenthood by lowering the degree of acceptability toward the uncertainty traditionally ascribed to virtuous parents. Approaching technologies with static pre-given concepts of moral character in mind would thus miss the scope of their mediating potential. As illustrated by the case of SST+, the technological mediation approach can contextually substantiate the values and conflicts at stake as well as illustrate their provisional and dynamic nature.

Expanding the ethical reflection of technologies along the lines of moral mediation further complicates the field of ethics. However, it indicates both a principle change in reasoning about technologies and a necessary moral expansion of the reflective stance toward them. This IPA-based appropriation study has demonstrated how a moral understanding of SST+ comes to being, how particular mediations of SST+ could crystalize and how people could critically appropriate them. The IPA method facilitates the study of different levels of experience with a technology, particularly when no practical exposure to it yet exists. Such an empirical philosophical study makes the processes of value dynamism visible and highlights the active part of both people and technology within it. The next challenge for the technological mediation approach is to determine how to incorporate these ideas about appropriation and value dynamism into the larger field of the ethics of technology to contribute to the informed use and regulation of technologies. I address this challenge in the next chapter, while also concluding this dissertation.

Chapter 8.

**Reflection on the moral mediation study and its
contribution to the fields of ethics and design**

This chapter concludes this dissertation in two steps. First, to conclude the empirical part, I reflect on how the lemniscate principle of interpretation and the IPA method help us to make sense of value dynamism. Secondly, I conclude the entire dissertation by referring my findings on value dynamism back to the discussion on the ethics of technology. The interrelation of values and technologies was my point of departure. In this concluding chapter, I will explore what the philosophical and empirical take on value dynamism developed in this dissertation implies for the field of the ethics of technologies.

The chapter proceeds as follows. I first reflect on the findings from the empirical cases in Chapters 6 and 7 by zooming in on different parts of the lemniscate model that the IPA method reveals and discussing how this, together, helps to deepen our understanding about value dynamism (Section 8.1). I next return to the ethical variant of the Collingridge dilemma that I introduced in Chapter 1, and I analyze the dilemma in view of the dissertation's findings and correlate it with the existing ethical approaches that deal with technologies and value dynamism, namely, the sociotechnical experimentation and the technomoral change approaches (Section 8.2). Finally, I review the potential contribution of the technological mediation approach to the practical fields of the technology ethics and design (Section 8.3). More specifically, I review the aspirations of the mediation approach to join the practice of Technology Assessment (TA) in the form of ethical Constructive Technology Assessment (eCTA). Afterwards, I return to the approach of VSD discussed in Chapter 6 to explore how the expanded moral mediation account can contribute to it. In combination, this will allow me to draw conclusions regarding the contribution of the moral mediation account, reflect on its limitations and sketch directions for further research (Section 8.4).

8.1 Concluding the two appropriation studies

This dissertation has endeavored to study how technologies mediate values, with the hypothesis that this occurs during their projective and practical appropriation. I have relied on Gadamer's hermeneutic circle principle (1975/2004) and the technological mediation approach (Ihde, 1993) to understand the intricacies of the appropriation process. To this end, I have outlined the technologically mediated hermeneutic lemniscate as an encompassing principle of interpretation that can explain technological appropriation (see Figure 7 below; Chapter 4). The lemniscate principle accounts for the dynamic and interrelated entanglement of people (H), technologies (T) and the surrounding world (W) in the process of appropriation. The lemniscate principle also explains how, in the encounter of the three, values resurface and undergo revision (see Chapter 4). I have also suggested IPA as a systematic empirical method to study the lemniscate and, more

specifically, value dynamism in the process of appropriation (see Chapter 5). I have also tested its fitness in the cases of Google Glass (see Chapter 6) and the sex selection chip (see Chapter 7). Taking these steps has allowed me to now reflect on the theoretical construct of lemniscate in view of the empirical findings. How is the lemniscate model integrated into the IPA findings? Switching between the detailed level of the cases and the reflection on the value and limitations of IPA will enable me to conclude whether we now possess a good method to study value dynamism.

Figure 7. The visual model depicting the lemniscate principle of interpretation

As demonstrated in Chapters 6 and 7, the appropriation study in the case of Google Glass differed slightly from the sex selection case, although both embedded the lemniscate principle of interpretation, as represented in the Figure 7 above. In the case of Google Glass, a few Glass Explorers got the chance to use the technology, and they shared their experiences online. The technology had limited market exposure but ample media coverage, creating an “absent presence” of Glass. This shaped an *existing appropriation threshold* of Glass, whereby regardless of its limited practical exposure, Glass had a rich appropriation background for potential users and non-users. In the case of the sex selection chip, the technology remains in development. Moreover, the development team has been very careful to refrain from speculating over the future sex selection chip and ensuring that a move toward human use is a hypothetical one. Hence, a limited media overview of the potential sex selection chip exists. This shaped an *imaginary appropriation threshold* of SST+, grounded in existing sex selection practices and informed by technological visions, however careful.

It is in this context that the lemniscate-grounded appropriation study occurred, primarily guided by IPA but also open to other forms of empirical exploration. The lemniscate principle cannot be escaped during an IPA study; it is always there. It is not an additional layer of interpretation added to the IPA findings; it underlies it. In Chapters 6 and 7, I chose to use IPA to zoom in on how the lemniscate model makes value dynamism visible and allows reflection upon it. As can be inferred from the distinctions introduced above,

the two empirical cases confronted research participants with different hermeneutic situations. Regarding Google Glass, the appropriation was both projective and practical, and the study relied on real and anticipatory technological practices, based on its limited market exposure. The interviewed developers thus constructed their existing appropriation thresholds against the varying sociocultural contexts and personal histories through real and projective practices and known technological exigencies. This allowed the lemniscate model to re-expose current value dynamism in relation to Glass and outline several possibilities for its future development. The SST+ case, in lieu of market exposure, relied more on the projective appropriation of technology. The local and temporal experiences of the interviewees allowed them to project technological visions of SST+ against the cultural background of the Netherlands. Navigating these imaginary appropriation thresholds allowed the lemniscate model to reveal emerging value dynamics with regard to SST+ and to substantiate ethical concerns regarding the existing sex selection methods. In both cases, the appropriation study revealed the technological mediation of the moral landscape, which was present-based in the case of Glass and anticipation based in the case SST+.

One could assume that the lemniscate model better suits the case of Glass than the sex selection chip because Glass users quite literally “read” the screen and its numerous messages and instructions. However, I discourage readers from this assumption, for it narrows the potential of the lemniscate principle and reduces it to only visual hermeneutics. Instead, referring back to Chapter 4, the lemniscate model depicts the different sides and levels of sense-making, which allows the interpretation of both the seen and unseen. Beyond visual information, it allows for making sense of the technological projections, hopes and fears and the corporate and cultural baggage of a specific technology by positioning these projections within the local histories of interpreters. Such a broad understanding of the lemniscate model allows for identifying and analyzing the moral mediation of values in both empirical cases, anchoring them in an overarching lemniscate principle of interpretation.

Examining the lemniscate model in the Google Glass case

Consider one of the examples from the Glass privacy study, in Chapters 2 and 6, as correlated with the lemniscate model, depicted on Figure 7 above. A passerby on the street, confronted with a Glass user, projects an initial interpretation, a prejudgment of Glass, comparing it to the use of a cell phone in a gym locker room (upper left arrow, $H \rightarrow T$). This initial meaning simultaneously projects upon the surrounding world, supported by the recording functions of Glass and its ability for immediate cloud synchronization (lower right arrow, $H-T \rightarrow W$). The social surrounding supports the initial interpretation of Glass as a recording device, as demonstrated by the emergence of the Glasshole behavior

(upper right arrow, $H-T-W \rightarrow T$). However, the known features of the device somewhat challenge that meaning, suggesting that the battery capacity of Glass is not sufficient for recording purposes, as it requires supporting infrastructure to work properly (lower left arrow, $H-T-W-T \rightarrow H$). In this particular hermeneutic situation, a passerby assumes she is being recorded, and Glass issues no convincing signals to assure her otherwise. Amid this, the value of privacy crystalizes related both to the limited access to the self and to public spaces, called on to harbor the values of self-identification, personhood, social interaction and freedom. At the same time, the specific understandings of privacy that materialize in relation to Glass confront both Glass users and the environment around them with the values of responsibility, accountability and justice. Examining the lemniscate model in the case of Glass and privacy does not aim to dissect all possible privacy formulations but rather to demonstrate how and why privacy as a value remains dynamic. As the comment study suggests, aligning with the dynamic lemniscate principle of interpretation, the mode of appropriation and corresponding privacy formulations change with Glass-enabled practices, introducing situations that no longer correlate with dominant privacy meanings. It is through tracing and analyzing the possible and actual interactions with Glass in certain contexts, or in Gadamer’s vocabulary, through their fusion of horizons, that one can outline the temporary stabilization of privacy and reflect upon it.

Consider another appropriation example of Glass, this time, from the IPA study in Chapter 6, also in reference to the lemniscate model on Figure 7. When the developers appropriate Glass as a fascinating example of engineering excellence, they initially approach it with a feeling of pride and awe (upper left arrow, $H \rightarrow T$). This initial meaning is then projected on their sociocultural environment, of which Glass is a part, while also noting possibilities for design and capacity improvement (lower right arrow, $H-T \rightarrow W$). Such a vision of Glass is then confronted with societal and media outcries in view of perceived privacy violations (upper right arrow, $H-T-W \rightarrow T$), much as the hermeneutic situation outlined in the paragraph above. With this in mind, the developers wish the world to see Glass for what it is actually worth, knowing that privacy concerns are not fully warranted in view of a limited battery capacity and the device overheating (lower left arrow, $H-T-W-T \rightarrow H$). In this hermeneutic situation, appropriating Glass as a matter of engineering excellence and pride allows the developers to produce a value of responsibility in design and a value of trust with the public. They aim to implement these values by mitigating design flaws and presenting an updated version of the device that could clearly communicate recording. As in the previous situation, the web of values and their dynamism greatly depends not only on technological capabilities and visions but also on the individual histories of the people appropriating it, against evolving sociocultural contexts. Note how the lemniscate principle of interpretation is present in different forms of an empirically exploratory appropriation process, both in an open comment study and in a structured IPA method.

Examining the lemniscate model in the sex selection case

In the case of sex selection, technological capabilities were less available for practical scrutiny and were predominantly present in the form of technological visions from the development team. In this case, the appropriation study has relied upon prospective users and non-users (H), as well as their sociocultural context (W) against the known technological background (T), which was often compared with existing SST. To empirically and theoretically ground the anticipative IPA study, I first conducted a thorough literature study and analysis of current sex selection practices, which allowed me to identify potential lines of SST+ appropriation, along with possible hermeneutic situations that could confront future users. More specifically, the literature-based study identified potential shifts to the demedicalization of SST+, its move to an open market and its transformation into a direct-to-consumer technology. For instance, prospective parents could identify SST+ as an opportunity to fulfill their desires for a balanced family (upper left arrow, $H \rightarrow T$). This preliminary identification can be further fueled by the new material setting of SST+, permitting the sexing procedure at home, at low risks and costs (lower right arrow, $H-T \rightarrow W$). The family-balancing ambitions of parents, coupled with the new setup of SST+, could intensify the societal value of perfection. However contested, the value of perfection becomes materialized in SST+ as an implicit and explicit pursuit for a harmonic family representation (upper right arrow, $H-T-W \rightarrow T$). The idea of desired balance and perfection via SST+ could return to prospective parents, mediated by technological possibilities for only dualistic male/female selection options. With this, SST+ not only makes other sexes less visible but also tightens the perceptual link between sex and gender (lower left arrow, $H-T-W-T \rightarrow H$). In this anticipative hermeneutic situation, the initial curiosity of prospective parents could be intensified by societal visions and the technological ease of sex selection, potentially resulting in the “Why not?” approach to sex selection. In Chapter 7, I have illustrated how an analysis of literature and current technological practices can yield several potential modes of appropriation and hermeneutic situations that can substantiate and contextualize an anticipative IPA study. To this end, after the literature analysis, I conducted an IPA study with potential users (and non-users) of SST+ in the Dutch context.

The IPA study particularly disclosed an active role of the cultural context in appropriating SST+, highlighting the value of the lemniscate in emphasizing the sociocultural counterpart within human–technology relations. Consider how the interviewees were curious about a possibility of SST+ in the Netherlands (upper left arrow, $H \rightarrow T$), prompted by the promised ease of use and low cost of SST+ (lower right arrow, $H-T \rightarrow W$). In Dutch society, however, the value of naturalness permeates all childbearing practices, embedded in the longstanding tradition of home birth and refusal of epidural anesthesia during labor (upper right arrow, $H-T-W \rightarrow T$). Through interactions with the cultural context,

SST+ appears not only as the possibility to select the sex of a future child but also as a violation of the value of naturalness in childbearing (lower left arrow, $H-T-W-T \rightarrow H$). However small and easy, the interviewees perceive the technological intervention of SST+ as predominantly unwarranted and requiring medical justification, albeit admitting that it may become the new norm in the future. This hermeneutic situation illustrates how even the potential introduction of SST+ in the Netherlands reveals a long-lasting value of naturalness, makes it available for reflection and affirms its (professed) favor against SST+, at least for now. It is curious how interviewees anticipate a technologically induced moral change, conditional upon the low cost and the new technology being widely introduced. Under these conditions, interviewees anticipate that the valued naturalness in childbearing, interpreted as a lack of technological intervention, may facilitate the acceptance of sex selection as a new norm. Interviewees explained anticipated value dynamism by the change in technological conditions against the wider societal backdrop. How interviewees appropriate SST+ illustrates an intimate interrelation with the current or potential hermeneutic situations that confront them. Should there be a change in the human, technological or sociocultural components of the hermeneutic situation, the preliminary (moral) meaning of SST+ may be revised. An appropriation study of SST+ thus embeds the interactive, fluid nature of the lemniscate principle of interpretation that allows the navigation of moral dynamics in relation to SST+.

Concluding reflections on the Interpretative Phenomenological Analysis method for an appropriation study

There is a difference in investigating the appropriation of an existing technology, even with only a limited prototype, and a technology still in the innovation pipeline. This closely relates to my initial assumptions about the cases regarding the different stages of technological development and introduction (see Chapter 1). I consequently framed Google Glass as a technology-in-use to reflect that even though the final versions of it are still under construction, it has already received some practical exposure. This introduced what I called an *existing threshold of appropriation*, whereby Glass was a technology simultaneously present and absent. Furthermore, I presented the sex selection chip, or SST+, as a technology-in-the-making existing primarily in the form of technological visions, where the earlier versions of the technology help to substantiate these visions. This consequently introduced an *imaginary threshold of appropriation*, prompting research participants to project their rich sociocultural histories against technological visions.

As the IPA appropriation study demonstrated, the two types of appropriation thresholds introduce unique practical challenges. It might not always be possible to study an emerging technology with trial versions that have already appeared on the market. Even when it is possible, the technology discussed has limited exposure and confronts prospective

users with an existing threshold of appropriation, whereby its early versions are already present but not yet fully available. As the preliminary Google Glass and privacy study indicates, in this case, (prospective) users rely on the limited existing practices with the technology, largely mirrored in online discussions and mass media reports. The challenges in conducting an appropriation study in these circumstances consist of understanding what information is available to prospective users and how to gain access to the limited pool of people who may have experienced the early versions of a technology in question.

However, in cases such as the sex selection chip, even a limited practical use of a new technology is not yet possible, which invites research participants to conjure imaginary thresholds of technological adoption. In the case of SST+, the technology remains in the development process, although several earlier variants of sex selection permeate the global market. Exploring the projective appropriation and value dynamism of SST+ requires the creation of an imaginary threshold against which people can anticipate different appropriation modes. In the IPA study of SST+, I allowed participants to anticipate a life in which the chip plays a role and invited them to construct imaginary thresholds for engaging proactive agency and reflection. Study participants did so by relating their existing knowledge, promises and fears regarding the chip to their particular sociocultural histories. Together, this sketched the hermeneutic lemniscate that guides the projective appropriation of SST+. Through examining the different parts of the lemniscate model, IPA has helped to uncover how, during the projective appropriation of SST+, or of fitting it within the existing experiential frameworks, certain values crystalized and underwent affirmation in light of the new technology or were reframed in relation to it. Although some of these value mediations may not eventually manifest in reality, while other unforeseen ones will, identifying how and why potential value dynamism may occur is critical to understanding and accounting for the role of technology in mediating morality. In this manner, one can use IPA to also investigate value dynamism in the case of technologies-in-the-making.

By examining the different parts of the lemniscate model, IPA allows the identification and scrutiny of value dynamism as it resurfaces from embodied human experiences at both existing and imaginary appropriation thresholds. At the same time, the researcher minimally frames an emerging technology within existing facts about its development and purpose, inviting participants to bring forth their own culturally and experientially bound thresholds. “Minimal” still does not mean “negligible,” because coupled with the interview questions, the researcher inevitably steers participants in certain directions. In particular, IPA is helpful to account for the hermeneutic role of the researcher, during both the setup of the study and the process of analysis (see Chapter 5). With this, the

appropriation study, even in the case of emerging technologies, is both anticipative and experiential.

The IPA method stands firmly at both the existing and imaginary thresholds of technological introduction. Dealing with both existing and emerging technologies enables the exposure of how they mediate specific values and normative understandings and reveals their dynamic manifestation. In Chapters 6 and 7, I have demonstrated how to study both cases in an empirically grounded manner, even in the case of emerging technologies. The appropriation study, reflected in the IPA method, can engage the proactive agency of people regarding a new technology, while grounding it in their experiences and a literature study. The researcher informs participants about what is known about the technology in question and invites them to position it within their experiences and sociocultural embedding. An IPA-based appropriation study thus allows the capturing of which values surface when considering (an emerging) technology, how they are reinterpreted or reaffirmed and how different levels of the same value manifest throughout an interview.

However, as mentioned above, a few practical difficulties and limitations accompany the IPA-based appropriation study. To remind the reader, for the purpose of studying technological appropriation, I have slightly modified the IPA method (see Chapters 6 and 7). Namely, I have narrowed its focus to experiences with technologies and expanded its scope to include an anticipative dimension. To this end, particularly when dealing with technologies-in-the-making, the initial setup of the IPA study (e.g., the preliminary interview questions) requires much time and attention. As illustrated by the SST+ case, a thorough literature study, with great attention to detail, precedes IPA interviews and analysis. As such, the IPA method, itself demanding, becomes more complicated.

Another practical consideration in using the IPA method concerns the manual nature of data analysis. The open, developmental nature of IPA contradicts widespread coding practices, which use repeating labels (see Chapter 5). This prevents IPA from fitting the coding-oriented models of existing qualitative data processing software (e.g., NVivo, Atlas.ti). The founders of the method insist that manual analysis allows both remaining true to the data and capturing the overarching themes as they evolve throughout the interviews (Smith, Larkin and Flowers, 2009, p. 37). In practice, this means that the researcher is faced with large amounts of information to read, annotate and attribute with preliminary themes by using a conventional Word processor (or any other open software). After repeating the same process for each interview at least four times, a researcher can color code columns with emergent themes to distinguish between the interviews and to provide unique numbers to each emerging theme. Next, in my experience, the most convenient

manner to proceed is to print the interviews and cut them according to emerging themes, laying them out for comparison and alignment. For both the cases of Glass and SST+, I spent about three months per case to process and analyze the data (including transcription but excluding data collection). Note that each case contained about eight interviews.

The detailed nature of the IPA method is both a benefit, in being experimentally rich on the individual level, and (at least potentially for some) a drawback, in analyzing a small number of interviews for a relatively long period in a labor-intensive manner. Moreover, as explained in detail in Chapter 5, the goal of IPA is not to provide generalizable findings but to demonstrate idiographic sensibilities, or an informed and experientially close micro-perspective. The practical and theoretical considerations of using the IPA method that I have outlined above can limit its appeal and applicability in view of the human resources at hand and potential time constraints.

In the current PhD project, the IPA-based appropriation studies have satisfied my demand for identifying and analyzing technologically mediated value dynamism. Both appropriation studies manifest the theoretical and methodological ideas developed previously, and both cases utilize the hermeneutic lemniscate principle to interpret technologies under study (see Chapter 4). The lemniscate model that the IPA method uncovers demonstrates how the participants pivot between their experiences and technological interpretations to construct and re-construct existing and imaginary thresholds of technological appropriation. At the same time, the IPA method allows accounting for the hermeneutic relation between the researcher and the research participants, acknowledging that interpretation is never a neutral process. In this manner, both appropriation studies provide rich findings that can be used to inform design practices and the societal use and embedding of these technologies.

In summary, an IPA-based appropriation study offers an encompassing, empirical philosophical method to study how technologies mediate values. Although presenting practical differences and challenges as well as differing in application per stage of technological development, all appropriation studies in this project have succeeded in generating rich findings while following the hermeneutic lemniscate principle. In the cases of both Google Glass and SST+, a technology under question was a confronting unknown, the new threshold that research participants somehow needed to accommodate. In the case of Glass, the interviewed developers referred to its societal introduction and the ensuing privacy debate as a “social experiment,” driven by corporate curiosity and lacking ethical or legal oversight. In the case of SST+, in view of the lack of practical experience, interviewees enacted their proactive agency by projecting various scenarios about technological introduction and the consequent ethical implications (e.g., producing the sexing condoms

and obliterating the sex–gender distinction). In each case, the appropriation study allowed the contextualization of existing and anticipated technological practices by situating them against dynamic personal and cultural backgrounds, thus producing new ethical concerns and reformulating existing ones. It is this phenomenological and empirical sensitivity of the appropriation study that could lend its use to the practical field of ethics dealing with new and emerging technologies. This is where the first line of empirically close conclusions finishes, which allows me to zoom out and conclude in the following sections regarding the larger implications of the moral mediation study.

The field of the ethics of technology frequently addresses anticipation and foresight regarding the potential use and ethical implications of new technologies. However, because technological implications manifest themselves when the technologies in question are already deeply embedded in practice (Collingridge, 1980), informed anticipation regarding new technologies is a complex affair. The following subsection re-introduces the Collingridge dilemma initially presented in Chapter 1 and relates it to the phenomenon of value dynamism. More specifically, I explore the fitness of a mediation-based appropriation study to address an ethical variant of the dilemma. I do so in relation to notable approaches in the ethics of technology that deal with value dynamism, primarily Van de Poel’s sociotechnical experimentation approach (2013) and Swierstra’s technomoral change approach (Swierstra, Stemmerding and Boenink, 2009).

8.2 Value dynamism and the ethical variant of the Collingridge dilemma²³

In Chapter 1, I briefly introduced a classical dilemma in technology studies, the so-called “Collingridge dilemma” (1980). When a technology is still in an early stage of development, it is still possible to influence the direction of its development without yet knowing how it will affect society. Yet, when the technology has become societally embedded, we can ascertain its implications, but it remains difficult to influence its development. This dilemma is one of the most significant challenges for the responsible design, use and governance of technologies.

Various strategies have been developed to escape it. Some strategies focus on anticipation, or “prospective evaluation” (Grunwald, 2009, pp. 1124–25), to get in touch with the potential future impacts of a technology at a moment when they can still be addressed

²³ This section is adapted from the following article: Kudina, O., and P.-P. Verbeek. (2018). Ethics from within: Google Glass, the Collingridge dilemma, and the mediated value of privacy. *Science, Technology, & Human Values*. <https://doi.org/10.1177/0162243918793711>.

through processes of technology development. A good example is the approach of CTA, which conceptualizes technological development in evolutionary terms and approaches innovations as “variations” that are exposed to a “selection environment” of markets, laws and regulations (Rip, Misa and Schot, 1995). This technique aims to create a “nexus” between variation and selection by anticipating the future implications of technologies during their development.

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

I wish to explore the role of the technological mediation approach, supported by my findings regarding the lemniscate principle of interpretation and an empirical philosophical appropriation study, as a complementary strategy to deal with the Collingridge dilemma. I 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 co-shape 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 seem to be either “too early”—evaluating technologies without knowing how the frameworks of evaluation themselves might develop—or “too late”—grasping the ethical impact of a technology but doing so 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 yet understand their social implications, but once we do know these implications, the technologies might have already altered the value frameworks for evaluating these implications.

This connection between technological innovation and value dynamism has a central place in two contemporary approaches in the ethics of technology: Tsjalling Swierstra’s approach of “technomoral change” (see Chapter 3) and Ibo van de Poel’s approach of “sociotechnical experimentation,” which was mentioned above. The technomoral change approach identifies the soft qualitative impacts of technologies and develops scenarios to anticipate how technologies influence moral frameworks to inspire deliberation regarding technological practices and policy-making (Swierstra, Stemerding and Boenink, 2009). The “sociotechnical experimentation” approach takes a radically different direction (Van de

Poel, 2013). It considers anticipation too speculative to be reliable and instead approaches technological innovations as “social experiments” that must be conducted responsibly.

However valuable and important these approaches are, they cannot fully address the ethical variant of the Collingridge dilemma. While the relation between technological innovation and value dynamism is the explicit focus of technomoral scenarios, it plays only a background role in sociotechnical experiments. Yet, responsible sociotechnical experiments cannot function without an idea of potential future ethical frameworks regarding technologies, and therefore it seems to throw the child with the bathwater to give up on anticipation at large. At the same time, technomoral scenarios can only offer “controlled speculations” about the future, with their ultimate goal being to provoke present-day reflections on a given technology. While sociotechnical experiments embody a piecemeal approach that allows for regulation without speculation, technomoral change relies on scenarios to calibrate technological governance and provoke reflection through enhanced imagination.

I suggest that the technological mediation approach, guided by the lemniscate model through an appropriation study, can complement the two above approaches in dealing with technology-induced value dynamism and the consequent ethical variant of the Collingridge dilemma. As the appropriation studies in Chapters 6 and 7 empirically demonstrate, the lemniscate model can make visible and available for reflection the manner in which technologies already co-shape moral frameworks. Studying through IPA or any other empirical method regarding how people—often implicitly—articulate new value meanings, ethical conflicts and dilemmas when discussing technologies, it becomes possible to develop a modest and empirically informed type of anticipation regarding value dynamism, as an alternative to both technomoral scenarios that outline value change in distant futures and the lack of anticipation in sociotechnical experiments.

Technologies influence human values. The introduction of the birth control pill has changed value frameworks regarding sexuality, because it has loosened the connection between sex and reproduction, allowing for new valuations of homosexuality (e.g., Mol, 1997, p. 8). Furthermore, the introduction of Google Glass, as I have demonstrated in Chapter 2, reveals multiple dimensions of privacy and precludes an insistence on one dominant meaning. How can we deal with technologically induced value dynamism in a responsible manner? To answer these questions, I 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 instead co-evolve with technologies (Swierstra, Stermerding and Boenink, 2009). The phenomenon of technomoral change should be considered 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, p. 21). Yet, the fact that they are difficult to trace does not reduce their importance. For instance, consider the soft impacts of the cell phone, which has enabled people to make phone calls everywhere, experiencing whom we are calling as “closer” than the people 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 anytime and anywhere.

“Technomoral scenarios” can be used to analyze and anticipate soft impacts (Swierstra, Stermerding and Boenink, 2009; Boenink and Swierstra, 2015). A technomoral scenario is a structured method to anticipate soft impacts based on empirical research and analyses of the current practices that might 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, p. 6). Such new, problematic situations create frictions and destabilizations: conflicts emerge, and values and norms are contested and compete with each other, because they can no longer respond adequately to new problems. It is precisely these alternative destabilizations, with their consequent soft impacts, that technomoral scenarios attempt to foreground to trigger critical reflection regarding the introduction of new technologies.

Because technomoral scenarios function as a deliberation tool to enhance ethical reflection about technologies, they must appear not as far-fetched technological predictions but as controlled speculation about the co-evolution of technologies and morality. At the same time, technomoral scenarios are often set in distant futures to better demonstrate the manifestation of value change. To this end, much empirical work goes into constructing them. For instance, Boenink, Swierstra and Stermerding (2010) introduced a three-step framework for ensuring the plausibility and empirical grounding of scenarios. To construct the scenarios, researchers must (1) position the emerging technology in the current moral landscape; (2) determine which moral destabilizations the new technology can induce;

and, based on (1) and (2), (3) produce a list of potential soft impacts as plausible moral closures that will form the basis of a scenario. To further these efforts, Lucivero (2012) assessed the plausibility of technological promises and concerns to make scenarios into “grounded explorations” of technomoral futures. Haen (2015), relying on the elements of CA&DP (te Molder, 2008), studied the politics of public conversations about technologies that traditionally disregard soft impacts as illegitimate. He used technomoral scenarios as a reflection tool in stakeholder deliberations to demonstrate to the participants the morality of their conversations (i.e., how they claim epistemic rights and accept or reject responsibilities and the effect this has on shaping the technological discourse). Although this is a non-exhaustive representation of the empirical efforts in the technomoral change approach, it demonstrates the evolving concerns and empirical dedication of this method.

The technomoral scenario method helps anticipate the potential social and cultural implications of emerging technologies by provoking ethical reflection in the present. It does not yet, however, offer a method to study technomoral change “in the making,”²⁴ because it does not address the *dynamics* of the interaction between technology and morality itself but rather its potential *outcomes*. Its empirical pursuits, which are largely directed at making the scenarios plausible and believable in view of the anticipated value change, have mirrored the focus on deliberation regarding the potential soft impacts of technologies. Although the technomoral scenarios approach allows the enhancement of the quality and content of technological deliberations by drawing attention to the soft impacts, it does not yet allow the understanding of the dynamics that underlie the value change. To accomplish this, as I further elaborate, I propose the approach of technological mediation, which provides an empirical basis for studying value dynamism in the present, to complement the technomoral scenario approach.

Sociotechnical experiments

An alternative manner to deal with the Collingridge dilemma in the ethics of technology has recently been suggested by Ibo van de Poel, in his approach to technological innovation as “social experiments” (2011; 2013; 2016). The central observation behind this approach is that we can never adequately predict the societal impact of technological innovations. The anticipation of societal impacts can only be an adequate manner to deal with the Collingridge dilemma when it offers a strong basis for decision-making (Van de Poel, 2016). The wide range of unexpected social impacts of smartphones and the unforeseen

24 Admittedly, there is an ongoing work by some researchers within the technomoral change approach to explicate how specific technology induced moral destabilizations crystalize in the present (see Weingartz, S., dissertation in progress). Nonetheless, to my best knowledge, it does not address the issue I try to engage with in this section, namely how values which we use to design and evaluate technologies change in relation to these same technologies and how to account for that.

risks of the Fukushima nuclear power plant (e.g., Van de Poel, 2011, p. 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, p. 667), we can hardly predict what these impacts will be. For this reason, according to Van de Poel, we must deal with innovations as “social experiments:” interventions in society with unknown outcomes. However, the unknown character of these outcomes does not preclude addressing them responsibly. As with 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, p. 899).

Van de Poel explicitly relies on Collingridge to discard the practice of anticipation as a manner 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, p. 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 (*ibid.*, p. 670).

To support the responsible introduction of new technologies, Van de Poel (2011; 2016) provides an ethical framework for social experiments that comprises four bioethical principles. He further subdivides these principles into 16 ethical initial conditions²⁵ (Van de Poel, 2011, p. 289) that can help experimenters to implement the principles in practice.

While the approach of sociotechnical experiments offers robust guidelines for responsible social experimentation and encourages forward-looking responsibility, it must be augmented with a method to “look forward” in a well-grounded manner. Any ambition to allow sociotechnical experiments to be more than trial-and-error requires a good, yet modest, instrument to look forward in a substantial manner.

²⁵ The sixteen (originally thirteen (Van de Poel, 2011, p. 289)) initial ethical conditions are: 1. Absence of other reasonable means for gaining knowledge about risks and benefits; 2. Monitoring of data and risks while addressing privacy concerns; 3. Possibility and willingness to adapt or stop the experiment; 4. Containment of risks as far as reasonably possible; 5. Consciously scaling up to avoid large-scale harm and to improve learning; 6. Flexible set-up of the experiment and avoidance of lock-in of the technology; 7. Avoid experiments that undermine resilience; 8. Reasonable to expect social benefits from the experiment; 9. Clear distribution of responsibilities for setting up, carrying out, monitoring, evaluating, adapting, and stopping of the experiment; 10. Experimental subjects are informed; 11. The experiment is approved by democratically legitimized bodies; 12. Experimental subjects can influence the setting up, carrying out, monitoring, evaluating, adapting, and stopping of the experiment; 13. Experimental subjects can withdraw from the experiment; 14. Vulnerable experimental subjects are either not subject to the experiment or are additionally protected or particularly profit from the experimental technology (or a combination); 15. A fair distribution of potential hazards and benefits; 16. Reversibility of harm or, if impossible, compensation of harm (Van de Poel, 2016).

Technological mediation

The approach of technological mediation offers a third manner to deal with the Collingridge dilemma in the ethics of technology. Rather than discussing value change in a distant future or conducting responsible social experiments with technology, it studies how technologies mediate value dynamics at existing and imaginary thresholds, thus exploring the foundation of technomoral change itself. As I have demonstrated in Chapters 2, 6 and 7, with the help of the lemniscate principle and the IPA method, the technological mediation approach allows the examination of how people implicitly articulate value conceptions and provide existing values with new meanings in relation to the anticipated mediating roles a technology.

As I have discussed in Chapter 3, because of their common focus on the interaction between technology and morality, the approach of technological mediation possesses a close affinity with the technomoral change approach. However, while the approach of technomoral change assumes the connection between technological and moral developments and aims to anticipate future moral change in relation to technological innovations, the mediation approach enables to study actual processes of technomoral change in practice at the phenomenological micro-level, which ultimately forms the basis of macro-level technomoral developments. Because of its focus on the micro-level of human–technology relations, applying the approach of technological mediation allows the study of how moral frameworks develop in interaction with technological developments.

At the same time, the lemniscate principle of interpretation, coupled with the IPA method, lends the appropriation study a necessary hermeneutic sensibility. This explicates the hermeneutic dimension of value dynamism while both avoiding the trap of treating the research participants as repositories of values and accounting for the non-neutral role of the researcher in the setup and analysis of the study.

For instance, the mediation analysis of YouTube comments in Chapter 2 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. The appropriation 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 ethical impacts of Google Glass, nor does it apply static moral conceptions to approach the device. Rather, it explores specific human practices and experiences to identify how the

introduction of Glass might fit or conflict with them, thus enabling the (re-)articulation of ethical concerns.

My earlier discussions on participants as constructing existing and imaginary thresholds of appropriation might fuel suspicions that the technological mediation approach is itself speculative, even if it delegates speculation to research participants. I wish to preemptively dispel any such suspicions by noting that the mediation approach focuses not on distant-future predictions but on modest anticipations that are empirically and philosophically grounded in the current value dynamism.

The appropriation study is interested in how people make sense of technologies within their experiences and sociocultural settings and how, amid this, certain value dynamics become available for reflection. This phenomenological task would be unachievable unless the participants themselves took charge of the discussion, beginning from their pre-judgments and unique histories. Even though participants inevitably rely on proactive agency to both project and reflect on the threshold situations with emerging technologies, the goal is not to assess the anticipations that participants make or to take them as a given (which indeed would be speculative). Rather, the goal is to understand how these discussions reveal present-based value dynamism, how certain value facets become visible, contextualized and re-articulated and how the accents between them shift already now. Such explorations of value dynamism in the present, coupled with studying existing technological practices, ethical debate and technological visions, form the basis for modest anticipation about prospective value change.

Although some of these anticipated value mediations will not eventually manifest in reality while many other unforeseen ones will, identifying how and why potential value dynamism may occur is important to understanding and accounting for the role of technology in mediating ethical concerns. As the IPA study in the case of sex selection has demonstrated, even an analysis based on a small study sample can draw a rich landscape of ethical concerns, thus re-articulating the existing ethical debate about sex selection and introducing new ethical challenges that are sensitive to the sociomaterial context. An IPA-based appropriation study can thus expand and deepen the ethical debate about technologies with considerations of value dynamism while avoiding the charge of speculation.

A study of the dynamics of technological mediation and appropriation surrounding a technology, be it at the existing or imaginary threshold, opens a new manner of addressing the moral dimension of technology that provides one escape from the ethical variant of the Collingridge dilemma. To remind the reader, according to the value-articulated

dilemma, at an early stage of development, we do not yet know how a technology will affect the value frameworks through 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 certain direction. Complementing the approaches of technomoral change and sociotechnical experiments, the technological mediation approach demonstrates that an empirically informed method to anticipate the impact of technology on value frameworks, which contextualizes the future-oriented character of the technomoral scenario approach and moves beyond the rejection of anticipation by the sociotechnical experiments approach, does indeed exist.

One could argue that the mediation approach is in fact very close to the technomoral change approach, since both reveal how technologies can affect moral frameworks. The mediation approach extends beyond identifying future soft impacts: its focus on the mediating role of technologies in human–world relations enables it to develop detailed analyses of the present-based implications of technologies for the practices, perceptions and frameworks of users. One could also argue that the 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 moral 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 manners in which technologies help to shape human existence and mediate moral frameworks. Throughout the appropriation studies in this dissertation, I have demonstrated how the mediation approach makes this possible.

The technological mediation approach, then, offers a way to understand how people engage in or foresee engagement with technologies: how technologies impact or could impact their daily lives, the concerns that come to the surface and how, amid all of this, specific moral understandings are being invented and re-invented in interactions with new technologies. If we are to responsibly engage with new technologies, the technological mediation approach, guided by the lemniscate principle and accompanied by an appropriation study, could be part of the learning process. The mediation approach enables anticipation and critical reflection on how technologies mediate human practices, experiences and value frameworks. 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.”

An empirical philosophical grounding of the technological mediation approach can potentially lend itself to 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 and reflect on the ethical implications of technology to ensure the informed design, use and governance of the new technologies. The following section explores such theoretical and empirical considerations of the mediation approach with regard to the practical fields of ethics and design.

8.3 Dealing with value dynamism in the ethics and design of technologies

Conclusions from the previous section suggest that the idea of technological mediation itself and the empirical findings based upon it can comprise a helpful element in the deliberations on the future use and design of technologies. In this section, I explore such potentialities in detail by referring the conceptual and empirical findings regarding moral mediation to some of the themes introduced in the earlier sections of this dissertation. Through a distanced reflection on empirical findings in this dissertation, I return to the ambitions of the mediation approach to contribute to the field of TA, as mentioned in Chapter 3. To this end, I briefly reintroduce TA and clarify the ambitions of technological mediation in this terrain. I then reflect back upon the explorations of the VSD approach presented in Chapter 6 and examine the potential contribution of the mediation approach to the effort of combining the design and philosophy of technology. This final section allows me to zoom out and clarify the larger contribution of the moral mediation of technologies as well as to present avenues for further exploration beyond the scope of this work.

Mediation approach and ethical Constructive Technology Assessment

One possible contribution of this dissertation's findings could be to the field of the ethics of technology, particularly the practice of TA, which presents a practical manner of "doing ethics" by evaluating how new and emerging technologies influence our lives. The approaches of TA have evolved over the years, from expert-based to participatory and inclusive stakeholder assessment (Van Est and Brom, 2012). Guided by the focus on harm avoidance, TA traditionally favors hard impacts, relying on the quantification of risks and benefits, or costs and risks, while largely missing the more ethically nuanced and subtle technological effects (Swierstra, 2015). More recently, different approaches have emerged to fill the ethical gap in TA. Ethical Technology Assessment (eTA) was the first of them, producing a checklist against nine ethical dimensions (Palm and Hansson, 2006). The technological mediation approach ventured into TA practice to address the narrow view

of ethical concerns represented in eTA, argue against the checklist approach as precluding value discovery and sensitize TA to the mediating role of technologies (Kiran, Oudshoorn and Verbeek, 2015).

Kiran and colleagues (2015) have suggested that revealing technological mediations from within human–technology relations should provide TA with the ethical qualitative component that remains a blind-spot within externalist assessment procedures. More specifically, they want to complement CTA, a deliberative model of participatory TA, with the technological mediation approach. Constructive technology assessment emphasizes the co-shaping of technology and society, inviting the design process to feed societal concerns back into the development process while technologies are still emerging (Rip, Misa, and Schot, 1995; Schot and Rip, 1997). However, the assessment framework of (C) TA does not explicitly consider the qualitative ethical dimensions of human–technology interrelation. Kiran and colleagues (2015) see the contribution of the mediation approach to TA in considering the mediating effects of technology on the quality of our lives.

However, at no point do the authors specify how to identify potential mediations or analyze them and integrate them into the CTA workshop format. On top of that, the lemniscate-guided mediation of values explored in this dissertation complicates the eCTA efforts further by suggesting that values co-evolve with the same technologies that TA explores. The question arises regarding whether it is possible to bridge the gap between the theoretical and practical contributions of the technological mediation approach and TA practice.

I suggest that an appropriation study, revealing a rich web of ethical concerns and their formulations and re-articulations, could be a method to address the practical concern of how the mediation approach can empirically identify and study our moral sensibilities and hermeneutic situations in TA. The type of empirical explorations similar to those I conducted in Chapters 2, 6 and 7 could be practically integrated into TA workshops and discussions, presenting a level of phenomenological micro-level sensitivity that Kiran, Oudshoorn and Verbeek (2015) identify as missing in TA.

As a young approach, eCTA is still developing. I suggest that the findings from my study of moral mediation and value dynamism can contribute to its maturation. Namely, they can lend eCTA an empirical footing and further substantiate its theoretical assumptions while also accounting for technologically mediated value dynamism. In this way, the "ethical" and "CTA" parts come together to study and engage with morality-in-the-making. This further development of eCTA with the moral mediation account would represent an important step in the technological mediation approach if it were to take its

policy-contribution ambitions seriously. A natural direction for further research regarding eCTA would imply testing these theoretical assumptions in practice, which is beyond the scope of this dissertation.

Practically testing the theoretical ambitions of the mediation approach toward TA practice would imply holding an eCTA-style workshop. Such a workshop could explore whether it is practically feasible to address the mediated character of values in design and assessment. How can eCTA workshop participants construct existing and imaginary threshold situations about emerging technologies to inform the field of the design and ethics of technologies? One manner to do so could be to combine the technological appropriation study with technomoral scenarios.

As suggested above, the technological mediation approach and the approach to technomoral change can be complementary within the empirical exploration of technologically induced value dynamism. Technomoral scenarios could engage participants in a discussion about new technologies and provoke an ethical reflection about values (see Swierstra and Boenink, 2015; Swierstra, Stermerding and Boenink, 2009; Swierstra, van de Bovenkamp and Trappenburg, 2010). However, as mentioned in the previous section, these scenarios currently lack hermeneutic sensitivity regarding the value dynamics at the foundation of technomoral change. Technological mediation could help to construct plausible threshold situations of technological appropriation, which technomoral scenarios could present in a narrative manner to engage in design and policy-making. Appropriation study could offer a systematic method to explore and anticipate the dynamic interaction between technology and values, offering an empirically grounded foundation for technomoral scenarios. Scenarios, on the other hand, could open the ethical implications of technologies for group deliberation, creating moral uncertainties and provoking people, thus inviting them to engage. These two approaches could complement each other, navigating between the micro and macro levels of value dynamism, as suggested in Chapter 3.

These preliminary research directions are bound to face some practical and conceptual differences, for instance, regarding balancing the level of detail that the appropriation study can provide with the available resources and the task at hand. My hope is that combining technological mediation with technomoral change can not only provide richer and more nuanced ethical considerations of technologies in TA but also further clarify the intricate interrelation between the two approaches. Thus, exploring the TA ambitions of the mediation approach in the eCTA model as well as combining technological mediation and technomoral change to this end could be fruitful avenues of the further application and exploration of the moral mediation of technologies in the practical field of doing ethics.

Mediation approach and Value Sensitive Design

In this dissertation, I have identified a possible method to study value dynamism in relation to technologies through the moral mediation account and the appropriation study. In Chapter 6, I discussed the relation of value dynamism to the ethics of design, and specifically to the VSD approach. I believe that my conceptual and empirical findings regarding the expanded moral mediation account can complement existing efforts in the VSD approach. As I have identified above, while being very effective in helping designers bring out the ethical dimension in their work, the VSD approach still suffers from several challenges. Namely, it adopts a narrow conception of values, treating them as pre-given, static and predominantly one-dimensional. The task of VSD then becomes limited to inscribing values in technologies. The limited scope of conceptual and empirical investigations mirrors the theoretical assumptions of VSD. As such, the operationalization of values into design requirements is practically reduced to following a checklist approach (although Friedman and colleagues urge its use as a tentative guideline) (Friedman, Kahn and Borning, 2006).

As I have demonstrated in this dissertation, technologies mediate the meaning and expression of values. In relation to the sociocultural context, technologies reveal different value dimensions. How can one design with this value dynamism in mind? The appropriation study, guided by the lemniscate principle and manifested in the IPA method, can help to reveal how technologies mediate values in both existing and anticipatory uses. Mediation findings can accompany designers in their exploratory stages. The moral mediation account, as expanded in this dissertation, can open the VSD approach to the idea of value change as well as offer a practical manner to expand the stages of its conceptual and empirical investigations. It can thus complement it and somewhat account for its existing challenges.

This is not to say that complementing the VSD approach with the appropriation study would come without its own challenges. Primarily, the question is who would be responsible for conducting an appropriation study. As both the VSD method and the appropriation study in Chapter 6 suggest, ethical reflection is not external to designers; it forms an integral part of their work. This suggests that the practical gap between technological mediation and design practice is potentially small. Rather, as the developers in the Google Glass study suggested, often, no straightforward manner to express reflections on technological impact in design and use exists. Reiterating my earlier VSD reflections, I do not suggest incorporating an embedded ethicist on a design team but instead trust that designers know best how to complete their own work. As such, I opt for supporting the ethical ambitions of designers by providing them with technological mediation tools to streamline the reflection on values in design.

In practice, the scope and depth of the appropriation study and the mediation analysis as I have presented them in this dissertation (not limited to an IPA study) would require additional training to learn the research process and methodology. Even though the mediation analysis can provide a better-informed background for conceptual and empirical analysis in VSD, designing for a multidimensional value could still require trade-offs, albeit better-informed ones. Moreover, some ethical questions offer no structural manner to address them. Designers would have to decide pragmatically, on an ad hoc basis, whether the richness of information the mediation analysis brings would justify the additional time and other resources it requires. Overall, the process would be challenging but feasible.

One manner to learn and apply the method could be during eCTA workshops, as I have presented them above. In this way, VSD practitioners and designers at large could benefit from the introductory facilitating role of a philosopher. A philosophical facilitator during such a workshop could present the method to construct threshold situations of technological introduction and to build technomoral scenarios, as well as how to use these tools to understand the dynamics of values. As with other practical suggestions, this one, too, exceeds the scope of the present research, which suggests it as a possible future development in the mediation approach.

8.4 Conclusions

To conclude this dissertation, I first briefly state what I have achieved in this project before I reflect upon the value of the findings for the larger fields of technology ethics and design discussed in this chapter.

In this dissertation, I have introduced a developmental and relational account of values, sensitive to their sociomaterial embedding and open to change. This has been accomplished by emphasizing the pragmatist origins of the technological mediation approach, which highlights the interrelational ontology of values with their surrounding environment. This has allowed me to clarify the relation between technologies and values in an expanded moral mediation account. The account is expanded in that it transcends the idea of moral mediation introduced by Verbeek (2011), which suggests that technologies co-shape the moral perceptions, inclinations and actions of people. I augment the moral mediation account with the idea that technologies also mediate the meaning of values. The result can be framed as a pragmatist approach to how technologies mediate values.

In addition, I have developed a method for studying the moral mediation of technologies. Expanding upon Verbeek (2015), I suggest that through the projective and practical appropriation of technologies, values resurface and become available for reflection and re-articulation. I have relied on Gadamer's principle of the hermeneutic circle (1975/2004) and connected it to the material hermeneutics ideas of Ihde (1998, 2005) to produce an encompassing principle of interpretation that accounts for the active role of people, technologies and the world in the constitution of meaning, including the meaning of value. I have dubbed this principle the "hermeneutic lemniscate" and suggested that it can be used to trace and analyze value dynamism within fluid human-technology-world relations.

Finally, I have developed a method to empirically study technologically mediated value dynamism. To this end, I have introduced the method of IPA, which originates from psychology and studies the attribution and construction of meaning (Smith, Flowers and Larkin, 2009), and narrowed its focus to experiences with technologies while expanding its scope to include an anticipative dimension. With this, IPA can empirically study the detailed workings of the lemniscate principle of interpretation. In relation to value dynamism, IPA is useful in revealing the hermeneutic dimension of values as well as accounting for the hermeneutic roles of both the research participants and researcher in the analysis process. The IPA method is demanding and time-consuming, with great attention to detail and a manual analysis process. However, its idiographic focus on the micro-scale of individuals and their sociocultural lifeworld produces a rich canvas of value dynamism, which makes IPA useful and worthwhile for studying how technologies mediate values.

In this chapter, I have above provided several brief conclusions regarding the conceptual and empirical findings of this dissertation. The first line of conclusions focuses on the micro-level of empirical data to determine how the lemniscate principle manifests throughout the IPA findings. I have concluded that the lemniscate-guided IPA method is a good method to study how technologies mediate values in the process of appropriation. I suggest that with regard to the stage of technological development and introduction, the research participants have constructed existing and imaginary thresholds of appropriation, positioning technologies within their sociocultural and experiential frameworks. This helps them to appropriate both technologies that are already in use and those still in the making. The lemniscate model helps to clarify how, throughout the process of appropriation, different values surface, undergo re-articulation and make space for new value meanings. I have also concluded that the theoretical limitations to the IPA method that I have discussed above indeed manifest in practice, primarily due to the time- and effort-consuming nature of the method.

Nonetheless, the IPA method is very useful in clarifying the rich landscape of value dynamism and making it available for reflection. The method allows for a richer form of mediation analysis compared to the comment-based experimental study in Chapter 2. It also accounts for the hermeneutic level of values, currently unexposed in other approaches dealing with values and technologies (e.g., Swierstra et al., 2009; Van de Poel, 2015). Furthermore, IPA adds a constructive element to the technological mediation approach that could make it potentially applicable to the fields of design and policy-making. Lemniscate-guided, IPA-based mediation analysis does not aim to evaluate technologies from the outside, or to pass a judgement based on external criteria. Rather, such an analysis remains close to the field of technological development, the actual or anticipated practices with technology to accompany its informed use, design and decision-making on a broader scale.

The second line of conclusions zooms out from the empirical level to reflect on what the moral mediation account, as expanded with value dynamism, implies for the field of ethics. To this end, I have re-introduced the ethical variant of the Collingridge dilemma briefly explained in Chapter 1. This variant builds on the technological mediation of values and suggests that we design and use technologies with certain values in mind, while these technologies simultaneously help to redefine the meaning of the values we use to develop and evaluate them. I have explained how the mediation approach allows the study of value dynamism in relation to technologies in an empirically and philosophically grounded manner. I have also suggested that the expanded moral mediation account, as developed in this dissertation, could facilitate a move beyond the dilemma and complement existing approaches addressing value dynamism. Namely, with regard to the technomoral change approach (Swierstra, 2013), it can provide a solid empirical standing to understand the current value dynamism that can later crystalize in value change. Concerning the sociotechnical experimentation approach (Van de Poel, 2013), the mediation approach can introduce a method for a modest yet empirically grounded form of anticipation to complement the regulative efforts of sociotechnical experimentation. I do not outline how mediation as an escape from a dilemma actually functions in practice, for this largely exceeds the scope of the present research. All chapters until this point have been necessary to arrive at this dilemma and explain its significance. A practical study could be a useful next step to further develop the mediation approach.

Lastly, I have returned to the findings regarding the lemniscate principle of interpretation and the IPA-guided method to study value dynamism in the field of technology ethics and design. More specifically, I have suggested that my findings can help to bring the mediation approach closer to its ambitions regarding policy contributions through the use of eCTA, as briefly discussed in Chapter 3 (Kiran, Oudshoorn and Verbeek, 2015). Namely,

the expanded moral mediation account can provide eCTA with an empirical grounding and account for value dynamism in relation to technologies. I have also suggested that mediation's shift to the domain of TA could be a method to further explore its intricate interrelation with the technomoral change approach, whereby a form of appropriation study and a technomoral scenario method could be complementary in an eCTA workshop. With relation to design, I have returned to the discussion of the VSD approach discussed in Chapter 6 and suggested that even though an appropriation study carries along several limitations, integrating it into the VSD approach could nonetheless be worthwhile. This could practically augment the VSD stages of conceptual and empirical investigations and conceptually expand upon and substantiate the philosophical understanding of values in VSD. Throughout this chapter, I have discussed the potential challenges of implementing an appropriation study, which are primarily related to its time-consuming nature and the potential need to involve a philosopher in some manner.

In short, in this dissertation, I have expanded the moral mediation account with considerations of value dynamism and designed an appropriation study to examine value dynamism in relation to existing and emerging technologies. I have also addressed the question of how we can practically deal with the idea of value dynamism. The type of empirically informed philosophy that I have developed in this project offers one manner to do so. As I have shown in this dissertation, the mediation approach is equipped to study value dynamism in the case of both technologies with prototypes and those existing predominantly in the minds of people. The appropriation study, guided by a lemniscate principle through an IPA method, offers the means to remain simultaneously engaged and distanced when studying how technologies mediate value frameworks. The appropriation study reveals that the values used to evaluate technologies are not independent from these technologies but rather are co-constituted by them. The appropriation study allows the exploration of the value dynamism of both existing technologies and those at the threshold of introduction, from outside and within, both anticipatively and empirically. With the help of the technological mediation approach and an appropriation study, those engaging in doing ethics and the design of technology can construct empirically grounded threshold situations to understand the value dynamism involved. These findings can not only contribute to theoretical discussions in ethics but also possess the potential to facilitate the ethical reflection about technologies in formal decision-making and contribute to the more responsible design and use of technologies.

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Annexes

Annex A–C

Summary

Samenvatting

Анотація

Biography

ANNEX A

Preliminary interview guide for Glass GDEs

- 1 Could you please briefly introduce yourself? What do you specialize in? What does being a Google Developer Expert entail? Have you developed apps for Glass/Google? What are the particulars of cloud solutions for Glass?
- 2 Could you please tell me about the application you developed for Glass? What was your motivation for this app? What is the audience? Usefulness?
- 3 How does it fit the Glass idea?
- 4 When you develop an app, what are your priorities?
- 5 Did you have to adjust the idea for your app to Google's developer guidelines?
- 6 How do you assess or determine the success of an app/your solution?
- 7 Do you assess your product from a point of view of societal use or concern? If so, how?
- 8 If you reveal any potential concerns, how do you tackle them?
- 9 Does it change the way you interact with society, not only tech?
- 10 What is the main idea behind Glass? What do you think of Google Glass?
- 11 What are the chances of Glass fitting into our society like cellphones and tablets? Why?
- 12 What do you think about implementing Google Glass in society? Does/will it change anything?
- 13 What do people need to do to adopt Google Glass? Any special ways of adoption?
- 14 Why do you think the terms "Glasshole" and "Glass-free zone" emerged and what do they mean?
- 15 Why, according to you, did Google shut down Glass?
- 16 How do you think Glass 2.0 might turn out? What's the future like for Glass?

Schedule of interviewees

No.	Anonymized name	Country	Date of the interview	Mode of the interview
1	Rick	Spain	February 9, 2016	Skype
2	Steve	Ukraine	February 9, 2016	Skype
3	David	The Netherlands	February 11, 2016	In person
4	Edward	The Netherlands	February 11, 2016	Skype
5	Jeremy	The Netherlands	February 12, 2016	Skype
6	Andrew	Turkey	February 12, 2016	Skype
7	Patrick	Hungary	February 18, 2016	Skype
8	Owen	USA	February 18, 2016	Skype

ANNEX B

Interview topic guide for sex selection case

- 1 When you think about good children, what are the important aspects, traits you think they should have?
- 2 What do you think about such a possibility in general?
- 3 Would you like to be able to choose a sex of your future child? Why/ why not?
- 4 What does being a good parent mean to you?
- 5 What is the relation between the possibility for sex selection and parenthood?
- 6 Do you think the possibility for sex selection could change the way you think/would think about children? How?
- 7 Would a possibility to select a sex of your future child, if available in a neighboring country but illegal/unavailable in your country, influence your decisions about having children?
- 8 Would such a possibility, if legal and available in your country, influence your decisions about having children?
- 9 If you were to have a child using SST, how do you think this could influence the children, born with SST? Without SST?
- 10 How do you think SST could fit Dutch society?
- 11 What could be the wider social consequences of SST?
- 12 Do you think this technology should be available legally in your country? Why?
- 13 Who do you think should have access to this technology? Why?
- 14 How do you imagine using this technology? In what form? Where should it be available? How would it be used?
- 15 Should such a technology find a place in the health care insurance schemes? Why?
- 16 If you were given a way to select a sex of your future child - safely, with 100% certainty and at a reasonable cost- would you do it? Why?

Agenda of the interviews

No.	Anonymized name	Date of interview	Place of interview	Age range and occupation/training
1	Lucy	06.02.2017	Enschede	25-35 y.o., PhD cand., medicine and philosophy
2	Matthias	10.02.2017	Utrecht	25-35 y.o., lawyer by training, unemployed
3	Anouk	14.02.2017	Enschede	50-60 y.o., secretary
4	Hendriks	21.02.2017	Nijmegen	25-35 y.o., political scientist by training, food catering
5	Paul	10.03.2017	Enschede	50-60 y.o., cook
6	Melanie	11.03.2017	Utrecht	25-35 y.o., city hall officer
7	Ben	11.03.2017	Utrecht	25-35 y.o., marketing manager

Geographical representation of the interviewees: Zutphen, Weert, Hengelo, Nijmegen, Enschede, Nedeweert, Tilburg

ANNEX C

Informed consent form

Before agreeing to take part in the interview, it is **important that you read** the following explanation of this study (page 1 and 2). You (a participant) will be given a copy of this Informed Consent Form.

Title of research: A one-on-one interview regarding the views on sex selection technology, in the context of the PhD project on moral mediation of technologies

Researcher: Olya Kudina, PhD cand., Department of Philosophy, University of Twente, NL

Purpose of the research

The purpose of the interview is to understand how people reason with sex selection technology (SST), encourage them to think about the potential consequences of SST on private, social and international level.

Confidentiality and data management

The interview will be audio-recorded and later transcribed and analyzed for the purpose of understanding how the interviewee interprets SST. Any personal data, such as names, identities, professional affiliations, will be anonymized to ensure that anonymized data cannot be linked back to you. Processing and storing of the data will be handled in accordance with the 2016 European Union General Data Protection Regulation. Only the researcher (Olya Kudina) will have access to the raw interview data (audio recording and original transcripts). This raw data will be stored for 10 years on the private secure servers of the University of Twente in the Netherlands, with double password access, available only to the researcher. The anonymized data (e.g., quotes from the interview) may be used for research and publications.

Explanation of procedures

You will be invited to answer a series of questions explaining your views and attitude to the SST. The estimated duration of the interview ranges from 30 minutes to one hour, depending on the course of the conversation. The researcher will audio record the conversation in order to have a detailed recollection of the conversation for further analysis.

Risks

Participation in the interview is safe for the participants. By participating in this study you do not undergo specific risks, and there are no side effects reported.

Withdrawal without prejudice

Taking part in the interview is voluntary. You are free to withdraw consent and discontinue the interview or complete retrieval of your data at any time, without prejudice from the researcher.

Questions

Any questions concerning the research and the interview and/or in the case of issues due to the research can be directed to the researcher, Olya Kudina, either in person or via olga.kudina@utwente.nl.

If you wish to receive a copy of the interview transcript, please, let Olya Kudina know and she will provide it as soon as it is ready.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked were answered to my satisfaction. I voluntarily consent to be a participant in this study.

Should you wish to receive a transcript of your interview, please, inform the researcher and she will send you a copy once it is ready.

Participant's name:

Participant's signature:

Place, date of signing:

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered to the best of my knowledge. I confirm that the participant was not coerced into giving the consent, and the consent was given freely and voluntarily.

A copy of this Informed Consent Form has been provided to the participant.

Researcher's name: Olya Kudina

Researcher's signature:

Place, date of signing:

Summary

This dissertation investigates the complex interactions between ethics and technology. More specifically, I have explored how technologies co-shape the meaning of values that guide us through our lives and with which we evaluate these same technologies. I have defined this phenomenon as “value dynamism,” referring to the way technologies bring to the surface existing values, re-affirm, challenge them or enable new value understandings. To this end, I have addressed several questions: How can technology co-shape morality? Which understandings of morality, ethics and values allow us to proceed with the assumption of value dynamism? How to conceptually understand and account for it? How to make the moral hermeneutics that value dynamism implies visible and available for philosophical reflection? What kind of empirical methodology is suitable for the task? Can a combination of empirical and philosophical analysis be done in practice? Would exploring the cases of existing technologies and technologies at the brink of introduction be any different regarding the empirical–philosophical analysis? What could a study on technologically induced value dynamism imply for the larger field of ethics? What could this imply for the practical fields of design and Technology Assessment? Overall, this dissertation tries to provide an encompassing view on the phenomenon of value dynamism and the mediating role of technologies in it.

Throughout the dissertation, I approach the interaction of technology and values from the perspective of the technological mediation approach. The technological mediation approach originates in the field of postphenomenology and considers technologies from a relational perspective, as active mediators in human–world interactions (Ihde, 1993; Verbeek, 2005). Technologies are not neutral objects in the hands of autonomous human subjects, rather technologies co-shape the way people perceive themselves and the world around them, and consequently act on that. The ethical consequence of approaching technologies as mediators is that technologies also influence the moral perceptions and actions of people. In a study of ultrasound technology, for instance, Verbeek (2008) showed how the way the ultrasound makes a fetus visible on the screen mediates the moral intuitions of parents about how to further care to the unborn child. By co-shaping the moral inclinations of people, technology mediates morality.

This dissertation takes the moral mediation of technologies a step further by suggesting that beyond co-shaping moral perceptions, technologies also mediate the infrastructure of morality, the meaning of values. I approach this phenomenon of technologically mediated value dynamism by highlighting the origins of postphenomenology in John Dewey’s pragmatist. This allows me to clarify the intimate interrelation of technologies and values by putting forth a relational account of values, whereby values both enable and are a

product of the sociomaterial practices. As such, values appear as lived realities, interactive with their sociomaterial embedding and thus dynamic and potentially changing.

I identify the workings of value dynamism through the process of technological appropriation: the way people make sense of new and existing technologies, both projectively and in practice. The intuition here is that in attributing meaning to technologies value frameworks crystalize and undergo reconceptualization. To understand technological appropriation theoretically, I combine Gadamer’s account of the “hermeneutic circle” (1975/2004) and Ihde’s account of “material hermeneutics” (1998). I show how the two approaches complement each other: the hermeneutic circle principle does not account for the mediating role of technologies, while material hermeneutics misses the fluid back-and-forth nature of interpretation. Reflecting on the two accounts allows me to develop an encompassing principle of interpretation that underlies the way people appropriate technologies. I named it the “hermeneutic lemniscate,” a principle that accounts for the active role of people, technologies and the sociocultural setting in interpretation. The lemniscate principle allows to investigate technological appropriation from either one of its counterparts, while still accounting for their interdependent nature and the fluidity of the established meaning. In this way, the lemniscate principle makes available for reflection the specific value manifestations that become visible in the process of appropriation.

Having established a conceptual model to understand technological appropriation and value dynamism, I also developed a new approach of empirical philosophy to explore it in practice. I propose that the method of Interpretative Phenomenological Analysis (IPA) is best suited for the job of uncovering the moral hermeneutics in the process of appropriation, while constantly accompanying it with the philosophical analysis from the mediation perspective. I have tested this empirical–philosophical analysis in the cases of an existing mixed reality technology of Google Glass and the emerging technology of sex selection that allows to choose the sex of a child prior to conception. Testing the fitness of the lemniscate principle coupled with the IPA method to navigate value dynamism allowed me to reflect on its practical challenges and to outline its broader implications.

The theoretical and practical results of this study represented by the lemniscate principle and the IPA method, accompanied by the technological mediation analysis, allow studying value dynamism in an encompassing way. They allow to explore and analyze how technologies co-shape value meanings in present and anticipate on possible future value mediations in an informed and empirically grounded way.

Ethics is traditionally associated with human affairs and the role of technologies in it is by far not obvious. In **Chapter 1**, I problematize the relationship between technologies and values. I specifically focus on the technological mediation approach, which endorses a view that technologies mediate morality by co-shaping moral intuitions and decisions of people. However, I suggest that moral mediation goes a step further, with technologies co-shaping the meaning of values by re-affirming, challenging, shifting accents between them or enabling new value formulations. I call this phenomenon value dynamism and aim to clarify the active role of technologies in it. What follows from this phenomenon is that values that inform our use, design and regulation of technologies are mediated by these same technologies. This problem prompts an encompassing inquiry into value dynamism that I undertake in the course of this dissertation.

Next, I aimed to empirically verify the idea of moral mediation as expanded by value dynamism before plunging into a thorough theoretical and practical inquiry. In **Chapter 2**, I test my intuition that technologies mediate the meaning of values in a tentative open empirical inquiry. I use the first empirical case for this dissertation, the case of Google Glass, to examine what exactly people meant by “privacy” when calling on this value when faced with this technology. With a blend of digital ethnography and content analysis, I trace value dynamism in how people expressed themselves in comments on YouTube when discussing Google Glass. This preliminary empirical inquiry helps me to identify privacy as a porous, multilayered and practice-sensitive value. Additionally, the study suggests how to further substantiate the research lines outlined in Chapter 1 and gives a taste of conceptual and practical challenges that I have to account for when exploring value dynamism.

I next clarify the theoretical assumptions in the moral mediation approach as expanded by value dynamism. In **Chapter 3**, I explore the “moral” and the “mediation” counterparts in relation to value dynamism. I foreground the origins of the mediation approach in the pragmatist thought of Dewey (1922, 1929, 1939) to explicate the link between the mediation approach and value dynamism by expanding the moral mediation idea beyond co-shaping moral perceptions and actions. Drawing on Dewey also allows me to outline a value perspective in the mediation approach, whereby values are (1) practiced and lived, (2) relational to the sociocultural setting that both enables them and is guided by them, and thus (3) dynamic. In parallel, I review how the field of ethics of technology mirrors the complicated interrelation of values and technologies. I specifically discuss the relation between the mediation approach and the technomoral change approach of Swierstra (2011) as the one explicitly considering the co-evolution of technologies and morality. This allows me to outline the ambition and goals of the technological mediation approach and to conclude on the theoretical foundations for exploring the workings of value dynamism.

Exploring value dynamism essentially presents a moral hermeneutics exercise that implies uncovering several interpretative layers enacted by people, technologies and the world that together constitute moral understandings. In **Chapter 4**, I develop the conceptual principle that helps to understand the constitution of moral meaning in an encompassing way. I do so by explaining how people appropriate technologies, both projectively and practically making them their own and fitting them into their existing interpretative schemes. I explore the idea that the process of appropriation can reveal value dynamism and make it available for reflection. The theoretical result of this chapter is the hermeneutic lemniscate as the principle of technologically mediated interpretation underlying how people appropriate technologies. Navigating the lemniscate reveals which value concerns come to the surface when considering specific technologies and how they undergo (re-) articulation. In this way, the lemniscate principle embeds the relational view on values and the interrelated view of people, technologies and the world in the meaning making.

Having developed the theoretical understanding of value dynamism, I proceed to identify how to study it in practice with a blend of empirical philosophy. In **Chapter 5**, I explore the fitness of IPA (Smith, Larkin and Flowers, 2009) as an empirical method to study the sense making in relation to technologies. I do so relative to the method of Conversation Analysis (te Molder and Potter, 2005) that Verbeek (2015) suggested as a proper one to study moral mediation in view of its focus on the morality of the way people talk. Comparing the two methods allows me to endorse the IPA method for the study of technological mediation and moral hermeneutics in view of its hermeneutic background and the specific focus on the attribution of meaning. I suggest how to expand the originally psychological IPA method to adapt it to the empirical philosophy that I see as necessary to study value dynamism. In the following chapters, I apply the IPA method to study technological appropriation and value dynamism.

In **Chapter 6**, I explore the appropriation of a technology that had a brief exposure to the market and is currently under redesign—Google Glass. In contrast to Chapter 2, here I focus on the appropriation of Glass by the developers and designers who implicitly and explicitly engaged in its development. The IPA study together with the lemniscate principle provide a wide range of valuations and show how they shift in the course of appropriation, for instance, regarding the re-prioritization and shifts in meanings in personal and professional values. This prompts me to reflect on the relation between the technological mediation approach and the field of design as a dominant theme that manifests both through the exploratory study in Chapter 2 and the IPA study in this chapter. To this end, I reflect on the design approach of Value Sensitive Design (VSD) as the one attempting to integrate philosophical insights on values in design (Friedman, 1999). I outline several strengths and weaknesses of the approach, with the latter primarily

related to the narrow conceptualization of values and the limited stages of the conceptual and empirical investigations. I suggest that the theoretical findings regarding values and appropriation (Chapter 3 and 4), coupled with the IPA study can complement and deepen the existing VSD efforts, sensitizing the values it purports to design into technologies to designers, technologies and end users.

Next, I explore the case of a technology that is still in the making and exists largely in the form of technological visions, while the earlier versions of it already exist on the market. The sex selection nanochip promises to make it possible to select the sex of a child in a non-invasive and cheap way in the privacy of one's home. In **Chapter 7**, I anticipatively explore the appropriation of this technology in the Netherlands. Even though the IPA study does not produce predictions on how technology will mediate values, it does point to the areas of moral concern that might eventually materialize in one form or another. Therefore, the IPA method needs to take several precautions to avoid speculation. To inform the IPA study, I first conduct a thorough analysis of the ethical debate around the existing sex selection technology and the social practices around it, outlining how the new material configuration of the sex selection chip correlates with the identified normative concerns and which new concerns may arise in relation to it. Next, I conduct an IPA study of the potential appropriation of the new sex selection technology in the Netherlands, paying specific attention to methodological reflection. I conclude that a forward-looking appropriation study can also give insights in value dynamism. The lemniscate principle coupled with the IPA method is especially helpful to uncover the interpretative layers of both the researcher and the participants, while accounting for the active role of the sociocultural setting and the existing frameworks of understanding in the construction of meaning.

Finally, in **Chapter 8** I reflect on the results of the study of the expanded moral mediation approach. I first return to the empirical studies to discuss how the combination of the lemniscate principle and the IPA method allows to explore value dynamism through appropriation. Some of the limitations concern the time and effort consuming nature of such a study, albeit it's ultimately worthwhile to pursue under the circumstances that allow this. The IPA method navigates the lemniscate principle of appropriation, foregrounding the way values become substantiated with regard to a technology under study, undergoing re-affirmation, review of their previously dominant meanings or materializing wholly new value concerns. Next, I reflect on the dissertation findings with a view to the larger field of ethics and specifically regarding the ethically reformulated Collingridge dilemma (1980). According to this dilemma, when technologies are still in development, we do not yet know how they will influence the value frameworks, but once we do know the ethical impact of technologies, they are already deeply entrenched in society and difficult to change. I will

explore the dilemma from the angle of three approaches that deal with the intertwinement of values and technologies: the mediation approach, the sociotechnical experimentation approach of Van de Poel (2013) and the technomoral change approach of Swierstra (2013). I show how the theoretical and empirical findings in this dissertation allow the mediation approach to move beyond the dilemma and complement the two approaches by modestly anticipating on value dynamism in an empirically and philosophically grounded way.

I also bring back the conceptual and empirical findings of this dissertation to the fields of technology ethics and design. I review the policy-making ambitions of the technological mediation approach in the domain of Technology Assessment and suggest that the dissertation findings can bring the two closer. I also suggest that the line of value dynamism, developed in this study, can help to constructively align the approaches of technological mediation and technomoral change, which up till now have ended up talking past each other despite sharing many assumptions. Finally, I correlate the findings with the design approach of VSD, suggesting that the appropriation study can enhance its philosophical ambitions, as well as substantiate its empirical investigations. Throughout this chapter, I also identify potential challenges of applying the appropriation study and sketch out further research avenues. The conceptual and practical framework to explore value dynamism that I have developed in this dissertation can contribute toward the more informed use, design and regulation of technologies, while accounting for the intimate intertwinement of values and technologies.

Samenvatting

Dit proefschrift onderzoekt de complexe interacties tussen ethiek en technologie. Meer specifiek gaat het onderzoek over hoe technologieën de betekenis van waarden mede vormgeven – waarden waarmee we ons leven leiden en waarmee we diezelfde technologieën dan wederom mee evalueren. Ik heb dit fenomeen gedefinieerd als “waardendynamiek,” waarbij ik verwijs naar de manier waarop technologieën bestaande waarden zichtbaar maken, herbevestigen, ter discussie stellen of nieuwe waardenbegrippen mogelijk maken. Daartoe heb ik een aantal vragen gesteld: Hoe kan technologie de moraal mede vormgeven? Welke opvattingen over moraliteit, ethiek en waarden brengen het onderzoek naar de aanname van waardendynamiek verder? Hoe kunnen we dit conceptueel begrijpen en verantwoorden? Hoe maak je de morele hermeneutiek die waarde hecht aan dynamiek zichtbaar en toegankelijk voor filosofische reflectie? Wat voor soort empirische methodologie is geschikt voor deze taak? Kan een combinatie van empirische en filosofische analyse in de praktijk worden uitgevoerd? Zou het verkennen van waardendynamiek bij bestaande technologieën een andere empirisch-filosofische analyse vergen dan technologie die op het punt staat geïntroduceerd te worden? Wat kan een studie naar technologisch geïnduceerde waardendynamiek betekenen voor het meer omvattende domein van de ethiek? Wat heeft dit voor implicaties voor de praktische gebieden van design en Technology Assessment? In het algemeen probeert dit proefschrift een overkoepelende visie te geven op het fenomeen waardendynamiek en de bemiddelende rol van technologieën daarin uit te lichten.

In het kader van dit proefschrift benader ik de interactie tussen technologie en waarden vanuit het perspectief van de technologische bemiddeling, ook wel technologische mediatie genoemd. Technologische mediatie vindt haar oorsprong in de postfenomenologie en beschouwt technologieën vanuit een relationeel perspectief, als actieve bemiddelaars van mens-wereld-interacties (Ihde, 1993; Verbeek, 2005). Technologieën zijn geen neutrale objecten in de handen van autonome menselijke subjecten, maar technologieën geven mede vorm aan de manier waarop mensen zichzelf en de wereld om hen heen waarnemen en daarnaar handelen. Dit beïnvloedt ook de morele percepties en handelingen van mensen, en dat heeft wederom gevolgen voor onze ethiek. Zo liet Verbeek (2008) in een onderzoek naar ultrasone technologie van echografie zien hoe de manier waarop de echo een foetus zichtbaar maakt op het scherm de morele intuïties van ouders over de verdere zorg voor het ongeboren kind bemiddelt. Door de morele neigingen van mensen mee vorm te geven, bemiddelt de technologie hier moraliteit.

Dit proefschrift gaat een stap verder in de studie van morele bemiddeling van technologieën door te suggereren dat technologieën, naast het mede vormgeven van morele percepties,

ook de infrastructuur van moraliteit, de betekenis van waarden, bemiddelen. Ik benader dit fenomeen van technologisch gemedieerde waardendynamiek door de nadruk te leggen op de oorsprong van de postfenomenologie in John Dewey's pragmatisme. Dit stelt mij in staat om de intieme verwevenheid van technologieën en waarden te verduidelijken door een relationele beschrijving van waarden op te stellen, waarbij waarden zowel voorwaarde zijn – alsook mede een product zijn van de sociaal-materiële praktijken. Als zodanig verschijnen waarden als geleefde realiteiten, interactief met hun sociale inbedding en dus dynamisch en potentieel veranderlijk.

Ik identificeer de werking van waardendynamiek door het proces van technologische toe-eigening of appropriatie: de manier waarop mensen nieuwe en bestaande technologieën begrijpen, zowel projectmatig als in de praktijk. De intuïtie hier is dat bij het toekennen van betekenis aan technologieën, waardenkaders vorm krijgen en onze waarden reconceptualiseren. Om deze technologische toe-eigening theoretisch te vatten, combineer ik het concept van Gadamer van de “hermeneutische cirkel” (1975/2004) en het Ihde's concept van “materiële hermeneutiek” (1998). Ik laat zien hoe deze twee benaderingen elkaar aanvullen: het hermeneutische cirkelprincipe houdt geen rekening met de bemiddelende rol van technologieën, terwijl de materiële hermeneutiek de veranderlijke, heen en weergaande aard van interpretatie mist. Door na te denken over de twee concepten kan ik een omvattend interpretatieprincipe ontwikkelen dat ten grondslag ligt aan de manier waarop mensen zich de technologieën eigen maken. Ik noemde het de “hermeneutische lemniscaat,” een principe dat rekening houdt met de actieve rol van mensen, technologieën en de sociaal-culturele setting in de interpretatie. Het lemniscaatprincipe maakt het mogelijk om de technologische toe-eigening van een van zijn tegenhangers te onderzoeken, terwijl de onderlinge afhankelijkheid en de veranderlijkheid van de gevestigde betekenis ervan nog steeds in aanmerking wordt genomen. Op deze manier maakt het lemniscaatprincipe de specifieke waarde-uitingen die in het toe-eigeningsproces zichtbaar worden, beschikbaar voor reflectie.

Na het opzetten van een conceptueel model om technologische toe-eigening en waardendynamiek te begrijpen, heb ik ook een nieuwe benadering van empirische filosofie ontwikkeld om deze in de praktijk te onderzoeken. Ik stel voor dat de methode van Interpretatieve Fenomenologische Analyse (IFA) het meest geschikt is om de morele hermeneutiek in het toe-eigeningsproces aan het licht te brengen, wanneer het hand in hand gaat met de filosofische analyse vanuit het perspectief van de technologische mediatie. Ik heb deze empirisch-filosofische analyse getest in twee gevallen: de bestaande *mixed reality* technologie van Google Glass, en de opkomende technologie van geslachtsselectie die het mogelijk maakt om het geslacht van een kind voorafgaand aan de conceptie te kiezen. Het testen van de geschiktheid van het lemniscaatprincipe in combinatie met de

IPA-methode om te navigeren in de waardendynamiek stelde me in staat om na te denken over de praktische uitdagingen alsmede de bredere implicaties ervan.

De theoretische en praktische resultaten van deze studie, vertegenwoordigd door het lemniscaatprincipe en de IFA-methode, vergezeld van de technologische bemiddelingsanalyse, maken het mogelijk om waardendynamiek op een omvattende manier te bestuderen. Ze maken het mogelijk om te onderzoeken en te analyseren hoe technologieën de huidige waardenbetekenissen mede vormgeven en op een geïnformeerde en empirisch onderbouwde manier te anticiperen op mogelijke toekomstige waardenbemiddelingen.

Ethiek wordt van oudsher geassocieerd met menselijke zaken en hierdoor is de rol van technologieën binnen de ethiek verre van duidelijk. In **Hoofdstuk 1** heb ik daarom problemen met de relatie tussen technologieën en waarden onderzocht. Ik richt me met name op de technologische bemiddelingsaanpak, die een visie onderschrijft waarin technologieën de moraal bemiddelen door mede vorm te geven aan morele intuïties en beslissingen van mensen. Ik stel echter dat morele bemiddeling een stap verder gaat, met technologieën die de betekenis van waarden mede vormgeven door ze opnieuw te bevestigen, ter discussie stellen, accenten tussen hen laten verschuiven, of nieuwe waardenformuleringen mogelijk te maken. Ik noem dit fenomeen waardendynamiek en heb tot doel de actieve rol van technologieën daarin te verduidelijken. Wat volgt uit dit fenomeen is dat de waarden die ten grondslag liggen aan ons gebruik, ontwerp en regulering van technologieën door dezelfde technologieën worden gemedieerd. Dit probleem leidt tot het omvattend onderzoek naar de waardendynamiek dat ik in dit proefschrift onderneem.

Vervolgens wilde ik het idee van morele bemiddeling, nu uitgebreid met waardendynamiek, empirisch verifiëren voordat ik me verdiepte in een grondig theoretisch en praktisch onderzoek. In **Hoofdstuk 2**, test ik mijn intuïtie dat technologieën de betekenis van waarden bemiddelen in een voorlopig open empirisch onderzoek. Ik gebruik de eerste empirische casus voor dit proefschrift, de Google Glass, om te onderzoeken wat mensen precies bedoelen met 'privacy' als ze een beroep doen op deze waarde en geconfronteerd met deze technologie. Met een mix van digitale etnografie en inhoudelijke analyse traceer ik de waarden in dynamiek lettend op de manier waarop mensen zich uitten in commentaren op YouTube bij het bespreken van Google Glass. Dit inleidend empirisch onderzoek helpt mij om privacy te identificeren als een poreuze, gelaagde en praktijkafhankelijke waarde. Daarnaast specificeert deze studie hoe de in hoofdstuk 1 geschetste onderzoekslijnen verder te onderbouwen en geeft het een voorproefje van conceptuele en praktische uitdagingen waar ik rekening mee moet houden bij het verkennen van waardendynamiek.

Vervolgens verduidelijk ik de theoretische aannames in de morele bemiddelingsaanpak zoals uitgebreid met waardendynamiek. In **Hoofdstuk 3** verken ik de "morele" en de "bemiddelende" tegenhangers in relatie tot waardendynamiek. De oorsprong van de mediatie-aanpak ligt in het pragmatische gedachtegoed van Dewey (1922, 1929, 1939). Hiermee leg ik het verband tussen de mediatie-aanpak en de waardendynamiek door uit te leggen hoe het morele bemiddelingsidee verder uitgebreid kan worden, voorbij de vormgeving van morele percepties en acties. Op basis van Dewey kan ik ook een waardenperspectief schetsen in het mediatieperspectief, waarbij waarden (1) beoefend en geleefd worden, (2) in relatie tot een socioculturele context staan die zowel voorwaarde is alsook door die waarden veranderd wordt, en dus (3) dynamisch is. Tegelijkertijd bekijk ik hoe de ethiek van de technologie een afspiegeling is van de gecompliceerde verwevenheid van waarden en technologieën. Ik bespreek specifiek de relatie tussen het mediatie perspectief en de techno-morele veranderingstheorie van Swierstra (2011) als aanpak die expliciet rekening houdt met de co-evolutie van technologieën en moraliteit. Dit stelt mij in staat om de ambitie en doelstellingen van de technologische mediatie te schetsen en de theoretische grondslagen voor het verkennen van de werking van de waardendynamiek af te ronden.

Het verkennen van waardendynamiek is in wezen een morele hermeneutische oefening die inhoudt dat verschillende interpretatieve lagen van mensen, technologieën en de wereld, die samen een moreel begrip vormen, aan het licht worden gebracht. In **Hoofdstuk 4** ontwikkel ik het conceptuele principe dat helpt om de constitutie van morele betekenis op een omvattende manier te begrijpen. Dat doe ik door uit te leggen hoe mensen zich de juiste technologieën eigen maken, zowel projectmatig als praktisch, en deze in hun bestaande interpretatieschema's inpassen. Ik verken het idee dat het proces van toe-eigening waardendynamiek aan het licht kan brengen en toegankelijk maakt voor reflectie. Het theoretische resultaat van dit hoofdstuk is de hermeneutische lemniscaat als het principe van technologisch gemedieerde interpretatie dat ten grondslag ligt aan de manier waarop mensen zich technologieën eigen maken. Navigeren door het lemniscaat laat zien welke waardenoverwegingen aan de oppervlakte komen bij het overwegen van specifieke technologieën en hoe deze opnieuw gearticuleerd worden. Het lemniscaatprincipe omvat op deze manier een relationele visie op waarden en een onderling samenhangende visie van mensen, technologieën en de wereld in de betekenisgeving.

Nadat ik het theoretische begrip van waardendynamiek heb ontwikkeld, ga ik verder met het identificeren van de manier waarop ik het in de praktijk kan bestuderen met behulp van een mix van empirie en filosofie. In **Hoofdstuk 5** verken ik de geschiktheid van IFA (Smith, Larkin en Flowers, 2009) als empirische methode om de zingeving in relatie tot technologieën te bestuderen. Dat doe ik met betrekking tot de methode van

Conversation Analysis (te Molder en Potter, 2005) die Verbeek (2015) voorstelde als een geëigende methode om morele bemiddeling te bestuderen door de focus op de moraliteit die zich toont in de manier waarop mensen praten. Het vergelijk van de twee methoden stelt mij in staat om de IFA-methode voor de studie van technologische bemiddeling en morele hermeneutiek te onderschrijven, gezien de hermeneutische achtergrond en de specifieke focus op betekenisgeving. Ik stel voor om de oorspronkelijk psychologische IFA-methode uit te breiden, om deze aan te passen aan de empirische filosofie die ik nodig acht om waardendynamiek te bestuderen. In de volgende hoofdstukken pas ik de IFA-methode toe om technologische toe-eigening en waardendynamiek te bestuderen.

In **Hoofdstuk 6** exploreer ik de toe-eigening van een technologie die een korte blootstelling aan de markt had en die momenteel wordt herontworpen – Google Glass. In tegenstelling tot Hoofdstuk 2, richt ik mij hier op de toe-eigening van de Google Glas door de ontwikkelaars en ontwerpers die impliciet en expliciet betrokken zijn bij de ontwikkeling ervan. De IFA-studie biedt samen met het lemniscaatprincipe een breed scala aan waarderingen en laat zien hoe deze verschuiven in de loop van de toe-eigening. Dit gebeurt bijvoorbeeld met betrekking tot het opnieuw prioriteiten stellen en verschuivingen in betekenissen in persoonlijke en professionele waarden. Dit zet mij ertoe aan om na te denken over de relatie tussen de technologische bemiddelingsaanpak en het vakgebied design als een dominant thema dat zich zowel via de verkennende studie in Hoofdstuk 2 als de IFA-studie in dit hoofdstuk manifesteert. Daartoe reflecteer ik op de ontwerpbenadering van Value Sensitive Design (VSD) als een poging om filosofische inzichten over waarden in design te integreren (Friedman, 1999). Ik schets verschillende sterke en zwakke punten van de aanpak, waarbij het laatste vooral te maken heeft met een te nauwe conceptualisering van waarden en de beperkte stadia van het conceptuele en empirische onderzoek. Ik stel voor dat de theoretische bevindingen met betrekking tot waarden en toe-eigening (Hoofdstuk 3 en 4), in combinatie met de IFA-studie, de bestaande VSD-inspanningen kunnen aanvullen en verdiepen en de waarden die het beoogt te ontwikkelen tot technologieën voor ontwerpers, technologieën en eindgebruikers.

Vervolgens verken ik het geval van een technologie die nog in de maak is en grotendeels bestaat in de vorm van technologische visies, terwijl de eerdere versies ervan al op de markt zijn. De seksselectie nanochip zou het mogelijk maken om het geslacht van een kind, voorafgaand aan bevruchting, op een niet-invasieve en goedkope manier te selecteren in de privacy van het eigen huis. In **Hoofdstuk 7** verken ik anticiperend de mogelijke toe-eigening van deze technologie in Nederland. Hoewel het IFA-onderzoek geen voorspellingen oplevert over hoe technologie zal bemiddelen in waarden, wijst het wel op de gebieden van morele zorg die uiteindelijk in de een of andere vorm tot stand kunnen komen. Daarom moet de IFA-methode verschillende voorzorgsmaatregelen

nemen om ongegronde speculatie te voorkomen. Om het IFA-onderzoek te onderbouwen, voer ik eerst een grondige analyse uit van het ethische debat rond de bestaande seksselectietechnologie en de sociale praktijken eromheen, waarbij ik schets hoe de nieuwe materiële configuratie van de seksselectiechip correleert met de geïdentificeerde normatieve aandachtspunten en welke nieuwe aandachtspunten zich in dat verband kunnen voordoen. Vervolgens voer ik een IFA-onderzoek uit naar de mogelijke toe-eigening van de nieuwe seksselectietechnologie in Nederland, met specifieke aandacht voor methodologische reflectie. Ik concludeer dat een toekomstgerichte toeëigeningsstudie ook inzicht kan geven in waardendynamiek. Het lemniscaat principe in combinatie met de IPA-methode is vooral nuttig om de interpretatieve lagen van zowel de onderzoeker als de deelnemers bloot te leggen, waarbij rekening wordt gehouden met de actieve rol die de sociaal-culturele setting speelt bij de opbouw van betekenis, bovenop de bestaande kaders van begrip.

Tot slot, reflecteer ik in **Hoofdstuk 8** op de resultaten van het onderzoek naar het uitgebreide perspectief op morele mediatie. Ik kom eerst terug op de empirische studies om te bespreken hoe de combinatie van het lemniscaatprincipe en de IFA-methode het mogelijk maakt om waardendynamiek te verkennen door toe-eigening. Sommige van de beperkingen hebben betrekking op de tijd en moeite die een dergelijk onderzoek kost, hoewel het uiteindelijk de moeite waard is om onder de omstandigheden die dit mogelijk maken, door te gaan. De IFA-methode navigeert door het lemniscaatprincipe van toe-eigening, waarbij de manier waarop waarden worden onderbouwd met betrekking tot een technologie die wordt bestudeerd, herbevestigd, beoordeeld op hun voorheen dominante betekenissen, of in geheel nieuwe waardenoverwegingen materialiseert. Vervolgens reflecteer ik op de bevindingen van het proefschrift met het oog op het bredere veld van de ethiek en specifiek met betrekking tot het ethisch geherformuleerde Collingridge dilemma (1980). Volgens dit dilemma kunnen we nog niet weten hoe waardenkaders beïnvloed zullen worden door technologie op het moment dat die technologie nog in ontwikkeling is. Maar als we eenmaal de ethische impact van technologieën kennen, dan zijn deze al geïntregerd in de maatschappij en dan moeilijk meer te veranderen. Ik zal het dilemma onderzoeken vanuit de invalshoek van drie benaderingen die te maken hebben met de verwevenheid van waarden en technologieën: de bemiddelingsaanpak, de socio-technische experimentenaanpak van Van de Poel (2013) en de techno-morele veranderingsaanpak van Swierstra (2013). Ik laat zien hoe de theoretische en empirische bevindingen in dit proefschrift de bemiddelingsaanpak voorbij het dilemma laten gaan en de twee benaderingen aanvullen door op een bescheiden, empirisch en filosofisch onderbouwde manier te anticiperen op waardendynamiek.

Ook breng ik de conceptuele en empirische bevindingen van dit proefschrift terug naar de gebieden van technologische ethiek en design. Ik herzie de beleidsambities van de technologische mediatieaanpak op het gebied van Technology Assessment en suggereer dat de bevindingen van het proefschrift de twee dicht bij elkaar kunnen brengen. Ik stel ook voor dat het concept van waardendynamiek, ontwikkeld in deze studie, kan helpen om de benaderingen van technologische bemiddeling en techno-morele verandering, constructief met elkaar in gesprek te brengen – iets wat tot op heden maar beperkt gebeurd is. Tot slot verbind ik de bevindingen met de ontwerpbenadering van VSD, waarbij ik suggereer dat de toeëigeningsstudie de filosofische ambities kan versterken en de empirische onderzoeken kan onderbouwen. In dit hoofdstuk identificeer ik ook de potentiële uitdagingen van de toepassing van de toeëigeningsstudie en schets ik verdere onderzoeksrichtingen. Het conceptuele en praktische kader om waardendynamiek te verkennen dat ik in dit proefschrift heb ontwikkeld kan bijdragen tot een beter geïnformeerd gebruik, ontwerp en regulering van technologieën, omdat rekening wordt gehouden met de intieme verwevenheid van waarden en technologieën.

Анотація

У даній дисертаційній роботі я досліджую складні взаємодії між етикою та технологіями. [Під словом “технології” я розумію конкретні технологічні предмети та засоби, від повсякденного вжитку до інфраструктурного середовища.] Більш конкретно я розглянула роль технологій у осмисленні та трактуванні людських цінностей, цінностей, що задають моральний напрямок нашому життю і за допомогою яких ми оцінюємо ці самі технології. Я назвала це явище “ціннісний динамізм,” або “плинність цінностей,” що охоплює як технології виводять на поверхню існуючі цінності, стверджують їх, спричиняють їх переоцінку або ж сприяють утворенню нового розуміння цінностей. У розрізі цієї проблематики я розглянула декілька питань: Як технології взагалі можуть впливати на зміст моралі? Які трактування моралі, етики та цінностей дозволяють нам дослідити припущення щодо плинності цінностей? Як концептуально зрозуміти та врахувати ціннісний динамізм? Як зробити моральну герменевтику, що невід’ємно поєднана з ціннісним динамізмом, видимою та доступною для філософського осмислення? Яка емпірична методологія підходить для цього завдання? Чи можна поєднати емпіричний і філософський аналіз на практиці? Чи буде відрізнятися вивчення існуючих технологій і технологій на межі впровадження щодо емпірично-філософського аналізу? Яке значення матиме дослідження плинності цінностей за участю технологій для ширшої сфери етики? Що це може означати для практичних напрямків технологічної розробки та оцінки технологій? Загалом, ця дисертація намагається забезпечити всеосяжний погляд на феномен плинності цінностей та посередницьку, чи пак “медіативну” роль технологій у ньому.

У дисертації, я розглядаю взаємодію технологій і цінностей з точки зору підходу технологічної медіації. Технологічно медіативний підхід виник в області постфеноменології та розглядає технології з точки зору відносин, де технології є активними посередниками між людиною і світом (Айді, 1993; Вербейк, 2005). Технології не є нейтральними об’єктами в руках незалежних людських суб’єктів, а сприяють формуванню сприйняття себе та навколишнього світу, що відповідно впливає і на людські вчинки. Етичним наслідком розуміння технологій як медіаторів є те, що технології також впливають на моральні перцепції та дії людей. Наприклад, у дослідженні ультразвукової технології (УЗД) Вербейк (2008) показав, що те як УЗД робить плід видимим на екрані опосередковує моральні інтуїції батьків щодо подальшого піклування про ненароджену дитину. Впливаючи на формування моральних схильностей та інтуїцій людей, технологічні предмети медіують мораль.

Ця дисертація робить наступний крок у розвитку моральної медіації технологій, припускаючи, що окрім впливу на формування моральних уявлень, технології також опосередковують інфраструктуру моралі: значення цінностей. Я підходжу до явища технологічно опосередкованого динамізму цінностей висвітлюючи витоки постфеноменології в прагматизмі Джона Дьюї. Це дозволяє мені прояснити інтимний взаємозв'язок технологій і цінностей, запропонувавши розглядати цінності з точки зору відносин [“реляційний підхід,” від англ. relations – відносини, стосунки], де вони одночасно уможливають і є результатом соціально-матеріальної діяльності людей. Таким чином, цінності постають як живі реалії, інтерактивні зі своїм соціально-матеріальним оточенням, а отже динамічні та потенційно здатні змінюватися.

Я розглядаю плинність цінностей через призму технологічного освоєння, тобто як люди надають значення та смисл новим та існуючим технологіям, у перспективі та на практиці. Моя інтуїція підказує, що процес смислотворення активно задіює системи цінностей, ідентифікуючи та переосмислюючи те, що є важливим. Щоб пояснити освоєння технологій теоретично, я поєдную підхід Гадамера про “герменевтичне коло” (1975/2004) з підходом Айді про “матеріальну герменевтику” (1998). Я показую, як обидва підходи доповнюють один одного: принцип герменевтичного кола не враховує посередницьку роль технологій, тоді як матеріальна герменевтика оминає плинний і зустрічний характер інтерпретації. Обмірковуючи обидва погляди, я розробляю всеосяжний принцип розуміння, що лежить в основі того, як люди освоюють технології. Я назвала його “герменевтичною лемніскатою,” пропонуючи принцип, що враховує активну роль людей, технологій і соціокультурного середовища в процесі розуміння. Принцип лемніскати дозволяє досліджувати технологічне освоєння з будь-якої точки витоку [від окремої людини, технологічного предмета чи оточуючого середовища], при цьому враховуючи їх взаємозалежність і плинність встановленого значення. Таким чином, принцип лемніскати робить доступним для критичного обговорення прояви окремих цінностей, що стають видимими в процесі освоєння.

Окрім концептуальної моделі, я також запропонувала новий підхід до емпіричної філософії, щоб поглибити теоретичне розуміння та дослідити прояви технологічного освоєння та динамізму цінностей на практиці. Я вважаю, що метод Інтерпретаційного Феноменологічного Аналізу (ІФА) найкраще підходить для розкриття моральної герменевтики в процесі освоєння, за супроводу філософського аналізу технологічної медіації. Я випробувала такий емпірично-філософський аналіз на випадках існуючої технології – окулярів змішаної реальності Google Glass (Гугл глас), і новітньої технології, яка дозволяє обрати стать дитини до зачаття.

Протестувавши придатність принципу лемніскати в поєднанні з методом ІФА у дослідженні плинності цінностей дозволило мені проаналізувати труднощі щодо його практичного застосування та окреслити подальші наслідки.

Теоретичні та практичні результати цього дослідження, представлені принципом лемніскати та методом ІФА у супроводі аналізу технологічної медіації, дозволяють всеосяжне вивчення динамізму цінностей. Вони дозволяють досліджувати як технології в нашому оточенні співформують значення сучасних цінностей, а також надають можливість передбачати можливі медіації цінностей у майбутньому поінформованим та емпірично обґрунтованим шляхом.

Етика традиційно пов'язана з людськими справами, і роль технологій у ній далеко неочевидна. У **Главі 1**, я проблематизую взаємозв'язок між технологіями та цінностями. Я в основному зосереджуюсь на підході технологічної медіації, згідно з яким конкретні технологічні предмети опосередковують мораль шляхом співформування моральних інтуїцій і вчинків людей. Однак я вважаю, що моральна медіація технологій набагато ширший феномен, адже технології також співформують саме значення цінностей якими ми керуємось, стверджуючи чи переоцінюючи їх, зміщуючи акцентів між ними або пропонуючи нові ціннісні категорії. Я називаю це явище динамізмом або плинністю цінностей і ставлю за мету прояснити активну роль технологій у цьому процесі. З цього явища випливає, що цінності, якими ми керуємось у повсякденному використанні, розробці та регулюванні технологій опосередковуються цими ж самими технологіями. Ця проблема спонукає до всеохоплюючого дослідження динамізму цінностей, що я й виконую в ході цієї дисертації.

Перед тим як поринути в глибоке теоретичне і практичне дослідження, я прагнула емпірично перевірити ідею моральної медіації, розширену тезами про плинність цінностей. У **Главі 2**, я перевіряю свою інтуїцію щодо технологічної медіації значення цінностей у попередньому відкритому емпіричному дослідженні. Я спираюсь на перший емпіричний випадок у даній дисертації, окуляри Гугл, для того, щоб зрозуміти, що саме люди мали на увазі під “приватністю” як цінністю важливою для них у всьому що стосується цієї технології. Я поєднала цифрову етнографію та контент-аналіз, щоб простежити динамізм цінностей у тому, як люди висловлювалися в коментарях на (ЮТ'юб) YouTube, коли обговорювали Гугл глас. За допомогою попереднього емпіричного дослідження я змогла розглянути приватність як пористу, багатоваріаційну цінність, значення якої чуттєво до того, як люди використовують окуляри Гугл. На додаток, дане дослідження допомагає обґрунтувати напрямки подальшої роботи у даній дисертації, викладені в Главі

1, а також дає уявлення про концептуальні та практичні проблеми, які я повинна врахувати при дослідженні плинності цінностей.

Далі, я роз'яснюю теоретичні припущення підходу моральної медіації, розширеного ідеєю про динамізм цінностей. У **Главі 3**, я пояснюю значення термінів «моральна» та «медіація» щодо феномену динамізму цінностей. Я висвітлюю витоки медіативного підходу в прагматичній думці Дьюї (1922, 1929, 1939), щоб пояснити зв'язок між медіативним підходом і динамізмом цінностей, і таким чином розширюю ідею морального посередництва за межі співформування моральних уявлень і вчинків. Звернення до філософії Дьюї також допомагає мені окреслити позицію медіативного підходу щодо цінностей, визначивши їх як (1) втілені в людську діяльність і таким чином живі; (2) співвіднесені до соціокультурного середовища, що водночас і керується ними, і уможливорює їх інснування; а отже і як (3) динамічні. Паралельно я розглядаю, як складний взаємозв'язок цінностей і технологій знаходить відображення у сфері етики технологій. Я детально розглядаю зв'язок між медіативним підходом і підходом техноморальних змін Свіерстри (2011), як тим, що предметно розглядає взаємозалежну еволюцію технологій і моральності. Це дозволяє мені окреслити амбіції та цілі підходу технологічної медіації та підсумувати теоретичні основи, необхідні для вивчення процесу плинності цінностей.

Вивчення плинності цінностей по суті являє собою вправу з моральної герменевтики, яка передбачає розкриття декількох інтерпретативних шарів, закладених людьми, технологіями та світом, і які разом утворюють моральні поняття. У **Главі 4**, я розробляю концептуальний принцип, який допомагає всеосяжно зрозуміти утворення морального сенсу. Я роблю це, пояснюючи, як люди освоюють технології, перспективно та практично привласнюючи їх [трансформуючи з невідомого в відоме] та вписуючи їх у існуючі схеми розуміння. Я розглядаю ідею, що процес освоєння технологій може виявити динамізм цінностей та зробити його доступним для осмислення. Теоретичним результатом цієї глави є герменевтична лемніската як принцип технологічно опосередкованої інтерпретації і що лежить в основі того, як люди освоюють технології. Детальний розгляд лемніскати дозволяє простежити як поодинокі цінності виходять на поверхню при розгляді конкретних технологій і як вони піддаються (пере)осмисленню. Таким чином, принцип лемніскати втілює реляційний погляд на цінності та взаємопов'язаний підхід до людей, технологій та оточення у смілотворенні.

Розробивши теоретичне розуміння цінносного динамізму, я переходжу до визначення того, як вивчати його на практиці з поєднанням емпіричної філософії.

У **Главі 5**, я досліджую придатність Інтерпретаційного Феноменологічного Аналізу (ІФА) (Сміт, Ларкін і Флауерс, 2009) як емпіричного методу для вивчення смілотворення пов'язаного з технологіями. Я роблю це відносно методу Конверсаційного Аналізу (те Молдер і Поттер, 2005), який Вербейк (2015) запропонував як гідний для вивчення моральної медіації з огляду на зосередженість методу на моралізованості людських розмов і говоріння. Порівняння цих двох методів дозволяє мені обрати метод ІФА для вивчення технологічної медіації та моральної герменевтики з огляду на його герменевтичні витоки та спрямованість на вивчення атрибуції сенсу. Я також пропоную як розширити та пристосувати первинно психологічний метод ІФА до мого трактування емпіричної філософії, необхідної для вивчення динаміки цінностей. У наступних главах я застосовую метод ІФА для вивчення технологічного освоєння та плинності цінностей.

У **Главі 6**, я вивчаю освоєння технології, яка деякий час перебувала на ринку, а зараз знаходиться на стадії редизайну—Гугл глас, або ж окуляри Гугл. На відміну від Глави 2, тут я зосереджуюся на освоєнні окулярів Гугл розробниками і дизайнерами, які частково або безпосередньо займалися їх розробкою. Дослідження ІФА разом з принципом лемніскати демонструють широкий спектр цінностей і те, як вони змінюються в процесі освоєння, наприклад, щодо перегляду пріоритетів і зміщень у тлумаченні особистих та професійних цінностей. Це спонукає мене розглянути зв'язок між підходом технологічної медіації та сферою дизайну як домінуючою темою, яка проявляється як у попередньому дослідженні в Главі 2, так і в дослідженні ІФА в даній главі. З цієї метою, я розглядаю підхід до розробки технологій під назвою Ціннісно Чуттєвий Дизайн (Value Sensitive Design) (VSD) як той, що намагається впровадити філософські ідеї щодо цінностей у дизайн технологій (Фрідман, 1999). Я окреслю декілька сильних і слабких сторін підходу, де останні пов'язані в першу чергу з вузькою концептуалізацією цінностей і обмеженими етапами концептуальних і емпіричних досліджень. Я вважаю, що теоретичні висновки щодо цінностей і технологічного освоєння (Глави 3 та 4) у поєднанні з дослідженням ІФА можуть доповнити та поглибити існуючі зусилля у VSD, роблячи цінності, що даний підхід має на меті закласти у технології співвідносними з розробниками, технологіями та кінцевими користувачами.

Далі, я досліджую випадок технології, яка все ще перебуває у стадії розробки та існує в основному у вигляді технологічних бачень, тоді як більш ранні версії її вже існують на ринку. Наночип з вибору статі обіцяє уможливити вибір статі дитини неінвазивним і дешевим способом у приватній середі свого дому. У **Главі 7**, я вивчаю потенційне освоєння цієї технології в Нідерландах. Незважаючи на те, що дослідження ІФА не має на меті передбачення того, як певна технологія

буде опосередковувати цінності, воно тим не менш вказує на сфери морального занепокоєння, які так чи інакше можуть проявитися. Таким чином, для запобігання спекуляції у ІФА необхідно застосувати декілька запобіжних заходів. Щоб поінформувати дослідження ІФА, я спочатку проводжу ретельний аналіз етичних дебатів щодо існуючих технологій вибору статі та соціальних практик які вони спонукають, вказуючи, як нова матеріальна конфігурація чипу з вибору статі співвідноситься з окресленими нормативними проблемами та які нові проблеми вона може спричинити. Далі, я проводжу дослідження ІФА щодо потенційного освоення нової технології вибору статі в Нідерландах, приділяючи особливу увагу методологічним спостереженням. Я підсумовую, що дослідження техногічного освоення з елементами передбачення також може поглибити розуміння ціннісного динамізму. Принцип лемніскати в поєднанні з методом ІФА особливо корисний для розкриття інтерпретативних пластів як дослідника, так і учасників дослідження, паралельно враховуючи активну роль соціокультурного середовища та існуючих рамок розуміння у смислотворенні.

Нарешті, у **Главі 8** я обговорюю результати дослідження розширеного підходу моральної медіації. Спочатку я повертаюся до емпіричних досліджень, щоб розглянути, як поєднання принципу лемніскати та методу ІФА дозволяє досліджувати динамічність цінностей через призму освоення технологій. Деякі з обмежень такого дослідження стосуються часу та зусиль, яких воно потребує, хоча в кінцевому рахунку результат вартий цих зусиль за обставин, що можуть дозволити такі обмеження. Метод ІФА досліджує як принцип лемніскати проявляється в процесі технологічного освоення, зображаючи як під час розгляду досліджуваної технології абстрактні цінності конкретизуються, набувають глибшого контексту, а їх до цього домінантні значення підлягають ствердженню, перегляду або ж поступу місцем для утворення цілком нових ціннісних категорій. Далі, я обговорюю результати дисертації в контексті ширшої сфери етики, а особливо стосовно етично переформульованої дилеми Коллінґріджа (1980). Згідно з цією дилемою, коли технології знаходяться в стадії розробки, ми ще не знаємо як вони впливатимуть на ціннісні категорії, але як тільки ми зрозуміємо етичний вплив технологій, вони вже глибоко вкоренилися в суспільстві і змінити їх дуже важко. Я розгляну дилему спираючись на три підходи, які вивчають співвідношення цінностей і технологій: підхід медіації, підхід соціотехнічного експерименту Ван де Пула (2013) і підхід техноморальних змін Свієрстри (2013). Я показую, як теоретичні та емпіричні висновки цієї дисертації дозволяють медіативному підходу вийти за межі дилеми та доповнити два інші підходи, надаючи помірні передбачення динаміки цінностей у майбутньому з огляду на емпіричне і філософське обґрунтування.

Я також повертаю концептуальні та емпіричні висновки цієї дисертації до сфери етики та дизайну. Я розглядаю амбіції технологічно медіативного підходу у сфері оцінки технологій і пропоную як результати дисертації можуть поєднати їх ближче. Я також пропоную, як напрямок плинності цінностей, розроблений у цій дисертації, може допомогти конструктивно поєднати підходи технологічної медіації та техноморальних змін, які до цього часу говорять різними мовами, попри багато спільних припущень. Нарешті, я пов'язую висновки з дизайнерським підходом VSD, пропонуючи як дослідження технологічного освоення може поглибити його філософські амбіції та обґрунтувати його емпіричні дослідження. Впродовж цієї глави я також визначаю потенційні проблеми, пов'язані з дослідженням технологічного освоення, та окреслюю напрямки подальшого дослідження. Концептуальні та практичні рамки для вивчення плинності цінностей, які я розробила у цій дисертації, можуть посприяти більш поінформованому використанню, розробці та регулюванню технологій, враховуючи тісне поєднання цінностей та технологій.

Biography

Olya (Olga) Kudina (1990) was born in Vinnytsia, Ukraine. She completed her primary and secondary education in Ukraine, spending one year as a high school senior in the United States (2005-06, Michigan) after receiving scholarship from the Future Leaders Exchange program. Olya initially graduated with a bachelor and master degree in International Economic Relations in Kyiv, Ukraine. During her studies, she worked at the Parliament of Ukraine (2010-11) in the Committee of Agrarian Policy and Land Relations, consulting on trade deals and engaging in legislative analysis; and at the Council of Europe (2011-13), where she contributed to establishing the field of privacy and data protection in Ukraine to address the rapid spread of digital technologies.

Triggered by the role of technology in transforming society and legislation, Olya chose to extend her academic background by pursuing a second master degree—in European Studies on Society, Science and Technology—in Maastricht, the Netherlands (2013-14) (for which she received a G. Soros Open Society Foundation scholarship). As part of the program, she was a visiting researcher at the CRIDS research center in Belgium (2014), joining the EU FP7 project developing the surveillance and security technology of virtual fences. To help formulate the ethical implications of this technology, Olya collaborated with engineers, designers, policy makers and critical infrastructure managers. The results of her research were used in a final report to the European Commission. She further fueled her interest in the ethical implications of technology during a research internship in the philosophy of technology at the University of Maastricht, anticipating the ethical impact of nanomedicine (2014-15).

Olya completed her PhD degree in Philosophy of Technology at the University of Twente, the Netherlands (2015-19). During her PhD, she participated in the Sherwin B. Nuland Summer Institute in Bioethics at Yale (2017), where she conducted a part of her research related to the sex selection technology. Subsequently, Olya was invited to design and teach a course on Philosophy of Technology at the Institute (2018, 2019). As of March 2019, she is a postdoctoral researcher at Delft University of Technology, exploring value change in relation to technology with a focus on AI applications.