

# A post-phenomenological investigation into Consumer Health Tracking Technologies

Laura Weil

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Supervisor: H. Zwart

Advisor: W. Peden

Student number: 494453

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## Introduction

On January 3<sup>rd</sup> Elizabeth Holmes, CEO and founder of Theranos, was convicted for defrauding investors on the promise of a technology that allowed to detect diseases with just a few drops of blood. Being a Silicon Valley based start-up, Theranos epitomized the dream of revolutionizing an inefficient health care system through market forces. However, the scandal of 2015 placed the promises of consumer health technology in the realm of science fiction.<sup>1</sup>

Currently, scientific advances in biotech have revived trust in the tech-health field. This is expressed in the exponential growth of the market, ranging from large injections from big tech leaders, to an avalanche of emerging telemedicine firms and digital health start ups. Deloitte predicted that 320m consumer medical wearables will ship globally in 2022. This emerging industry symbolizes a shift from a health care centered around treating to a decentralized market that promises prevention. The Covid-19 pandemic has paved the way for this transition as people have become accustomed to self-diagnosing and digitally mediated care. As consumer technology disrupts healthcare, patients are slowly turning into consumers.<sup>2</sup>

Ethical analyses of this emerging commercial health-tech industry are mainly concerned with privacy considerations, the objectivity of data points and the normative dimension of scientific methodologies. These ethical critiques of consumer health-tech are limited as they tend to consider health tracking technologies and users in a vacuum. Specifically, they tend to neglect the relation between the technological artefact and the user, and hereby discard the impact of health trackers on users' experience and being in the world. In order to respond to this shortcoming, the aim of this thesis is to provide the missing link between the artefact as such and the ethical analyses of consumer health tracking technologies. Specifically, this study provides a framework for the way in which health trackers impact users' experience and actions by taking on a post-phenomenological approach to health tracking devices such as wearable fitness trackers, biosensors, and app based health tracking technologies. The central question of this thesis is in what way these devices influence users perception (of themselves) and their actions in the world. The post-phenomenological tradition uniquely allow to focus on the way technology influences users' relation to the world while relying on empirical analyses of concrete technologies.

In the first section the main framework for the evaluation of health trackers will be provided. Based on post-phenomenology of Don Ihde<sup>3</sup> and Peter-Paul Verbeek<sup>4</sup> central concepts including technological mediation and human-technology relations will be introduced. Having set the post-phenomenological framework, the second section consists of an evaluation of the particular relation between individuals and personal health tracking

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<sup>1</sup> "How health care is turning into a consumer product," *The Economist*, 2022, <https://www.economist.com/business/how-health-care-is-turning-into-a-consumer-product/21807114> (accessed on 10 March 2022).

<sup>2</sup> "How health care is turning into a consumer product," *Economist*, 2022.

<sup>3</sup> Don Ihde, *Technology And The Lifeworld* (Bloomington, Ind.: Indiana University Press, 1996).

<sup>4</sup> Robert Rosenberger and Peter-Paul Verbeek, "A field guide to Postphenomenology" in *Postphenomenological Investigations: Essays on Human-Technology Relations* (Lanham: Lexington Books, 2015), 9-41 (accessed on 14 March 2022).

devices. Based on papers of Bas de Boer<sup>5</sup> and Mira Vegter et al.<sup>6</sup> who applied post-phenomenology as proposed by Ihde and Verbeek in the context of health tracking technologies, the different ways in which the latter influences users' experience and actions are analyzed. Drawing on the post-phenomenological tradition the third part consists of a case study of Anura in which the main claims will be evidentially evaluated. It seems that Anura – and an avalanche of similar innovative devices – resemble Theranos with respect to their value propositions; fostering self-care by providing users with a holistic picture of their health. It will be concluded that these health mirrors induce a scientific 'quantified' understanding of the self, and that this particular understanding is materialized in users' everyday habits. Consequently, health trackers indirectly constitute the very same habits that they mean to objectively represent. This means that there is a tension between the self-reflexive and performative part of health tracking technologies. The ethical implications that this tension alludes to will finally be briefly touched upon.

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<sup>5</sup> Bas de Boer, "Experiencing objectified health: turning the body into an object of attention," *Medicine, Health Care and Philosophy* (2020) 23, 401–411, accessed at <https://doi.org/10.1007/s11019-020-09949-0> on 22 March 2022.

<sup>6</sup> Mira W. Vegter, Hub A. E. Zwart and Alain J. van Gool, "The Funhouse Mirror: The I In Personalised Healthcare", *Life Sciences, Society And Policy* 17, no. 1 (2021), doi:10.1186/s40504-020-00108-0 (accessed on 22 March 2022).

## CHAPTER 1: Technological Mediation

In this chapter I will introduce the post-phenomenological tradition and explore how technologies mediate our relationship to the world - and ourselves. In doing this, I will set the main framework for establishing the impact of personal health tracking technologies on users' experience and actions. First, based on Ihde's human-technology relations I will argue for a hermeneutic relation between personal health devices and their users. Subsequently, drawing on Verbeek's post-phenomenology I will discuss how technological mediation goes beyond the mere use of instruments and underlies how (human) actors and the world itself is constituted.

### 1.1 Post-phenomenology: from Technology to technology

When I got home from school last week I found my mother walking around the kitchen table swaying obsessively with her arms while holding her phone in her hand. When I asked her what she was doing she responded that her pedometer told her to complete another 1000 steps to reach her daily fitness goal. This experience perfectly illustrates how considering technological artefacts in a vacuum will yield a limited understanding of them. Evidently, in considering technology *as such* we discard the way in which technological artefacts are embedded in our daily lives. We neglect the way in which my mother's mobile phone – or the app based pedometer - bears a specific meaning *because of* the particular relation it has with my mother. Paradoxically, in order to gain an understanding of technology – and its ethical implications - we must take a step back, and evaluate our *experience* of it. This is where phenomenology comes in.

The phenomenological tradition brackets metaphysical questions in order to focus on the experiences of a subject in the world. Specifically, phenomenologists are focused on concrete experiences from the first-person perspective. Its main concern is appearances and intentionality.<sup>7</sup> The latter represents the idea that we are always conscious of something; our attention is always directed towards something. This assumption helps to overcome the Cartesian dichotomy between subject and object.<sup>8</sup> Namely, phenomenology assumes the latter two are always related, human beings cannot be thought of independently from the world, and the world cannot be conceived independently from individuals' relations to it. This overcomes the subject-object dichotomy because it implicates that there is no human consciousnesses in itself; human beings are always conscious-of-something.<sup>9</sup>

Post-phenomenology shares with phenomenology the emphasis on intentionality and concrete experiences but it introduces a focus on appearances on a local level in specific contexts.<sup>10</sup> Post-phenomenology discards the notion of the essence of Technology and instead focuses on the particular relations human beings have with technological artifacts.

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<sup>7</sup> Maren Wehrle, "Experience, Embodiment, and Technology," *Technology and Social change* (Class lecture 6, Erasmus School of Philosophy, Rotterdam, September 22, 2021).

<sup>8</sup> Robert Rosenberger and Peter P.C.C. Verbeek, "A field guide to Postphenomenology," *Postphenomenological Investigations: Essays on Human-Technology Relations* (Lexington Books, 2015), 9-41.

<sup>9</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 11.

<sup>10</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology" 11.

Specifically, post-phenomenologists use the term relational ontology to refer to how meaning is constituted within different technology relations. To illustrate, a piece of wood appears different to us, and has a different meaning, when we use it as a doorstep than when we use it to light a fire. Hence, the post-phenomenological tradition analyzes particular technologies in terms of their relations to human actors and technological artifacts, and how these different relations intertwine. In addition, relational ontology represents the idea that the subject and object, human and things, do not only co-shape each other but *constitute* each other in mediation. Contrary to Latour's relational ontology, post-phenomenology does appreciate the difference between subject and object, but it postulates their existence only after mediation; their respective roles are constituted only in their relation with each other, not a priori.<sup>11</sup>

Consequently, the most important way in which post-phenomenology differs from phenomenological traditions is its empirical turn. By descending to a micro-scale perspective, post-phenomenology goes back to the material technological artifacts themselves. Post-phenomenology departs from the romantic notion of Technology by taking its starting point in case studies and empirical analyses of actual technologies. Instead of Technology as abstract category post-phenomenology studies how specific concrete technologies influence our experience of the world.<sup>12</sup>

In the context of this thesis, a post-phenomenological approach enables us to conceive of health tracking technologies not as mere instruments that serve our goals but in terms of our relations with them, how these influence our perception, and how they constitute a specific understanding of the world – and ourselves. Specifically, the relational ontology of post-phenomenology uniquely allows to evaluate how personal health trackers and users mutually constitute each other as actors in the world.

## 1.2 Human-technology relations

Post-phenomenology thus focuses on the relations technologies have with their users and other artefacts. In order to understand this mutual relation between human beings and technology, experience is crucial. Ihde uses perception to understand the relation between human beings and their environment. He claims perception is key to understanding interrelations because in perception human beings and the world are always intertwined.<sup>13</sup>

In *Technology and The Lifeworld* Ihde explores the different ways in which technologies can shape relations between human subjects and the world. He inquires into the role of technology in the interrelation of humans and the world by analyzing these particular interrelations when technological artifacts are involved.<sup>14</sup> Specifically, Ihde distinguishes three ways in which humans can relate to technological artifacts; alterity relations, background relations and relations of mediation. Alterity relations represent the relation in which humans relate *to* the technological artifact, typically characterized as 'quasi-other'. This is for instance

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<sup>11</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 12.

<sup>12</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 12.

<sup>13</sup> Peter-Paul Verbeek, "Don Ihde: The Technological Lifeworld," in H. J. Achterhuis, ed., *American Philosophy of Technology: The Empirical Turn*, (Indiana University Press, 2001), 119-146, <https://research.utwente.nl/en/publications/don-ihde-the-technological-lifeworld> (accessed on March 22 2022).

<sup>14</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 124.

the case with computers which we may even attribute human characteristics (e.g. intelligent computers). Background relations occur when technological artifacts influence our reality but are blended in the background, such is the case with a thermostat that works automatically and does not require our attention.<sup>15</sup> This paper will build on relations of mediation, which represent the relations in which humans use a technological artefact to relate *to* the world. Contrary to alterity relations, users thus do not relate to technology but they relate to the world *via* technological artefacts.

Ihde suggests that the intentional relation between human being and the world is often mediated by technological artifacts. Specifically, this mediation as proposed by Ihde entails the idea that technologies transform a user's actual and perceptual engagement in the world. In fact, technological artifacts in relations of mediation are a *means* of experiencing rather than an object of experience.<sup>16</sup> Therefore, the relation between human beings and the world is not immediate but mediated by a technological artifact. Human beings relate to reality *via* an artefact. For example, when wearing glasses our perception of the world is not direct, but mediated by the glasses.<sup>17</sup>

Within these relations of mediation Ihde makes a further distinction with respect to how these human-technology relations mediate our perception of the world. Specifically, he distinguishes between embodiment and hermeneutic relations of mediation.<sup>18</sup> The difference between embodiment and hermeneutic human-technology relations is mainly concerned with transparency. In embodiment relations technological artifacts call attention to themselves, their mediation therefore resembles unmediated perception. This type of relation occurs for instance when someone is wearing glasses. The person is not aware of the glasses; they are transparent in the users' experience.

### *Embodiment relations: (I-technology) -> world*

Figure 1: Embodiment Relations <sup>19</sup>

This transparency does not occur in hermeneutic relations. In a (post)-phenomenological context, hermeneutics – traditionally understood as the meaning of interpretation – is used creatively to represent the idea that as a being-in-the-world a technological artefact does not speak for itself but must be embedded in a context in order to be understood. In hermeneutic relations technological artifacts mediate our relation to the world but – unlike embodiment relations – we are aware of them. The most distinguishable characteristic of such a relation is that the technological artifact provides us with a representation of the world, which requires our interpretation to make inferences about the world (hermeneutics). Hence, contrary to embodiment relations in hermeneutic relations the world is perceived *by means*, not through, the artifact.<sup>20</sup> To illustrate, a hermeneutic relationship can occur with artifacts as simple as a

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<sup>15</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 124.

<sup>16</sup> Wehrle, "Experience, Embodiment, and Technology."

<sup>17</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 125.

<sup>18</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 125.

<sup>19</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 127.

<sup>20</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 125.

clock. When looking at one's watch, a person 'reads the time' not directly by relating to time, but by interpreting the representation of time that the watch offers. In other words, interpretation in a hermeneutic relation is twofold; a user interprets the world through the readout of a technological artefact, but the same readout represents an interpretation of the world established by the technological artefact.<sup>21</sup>

### *Hermeneutic relations: I -> (technology-world)*

Figure 2: Hermeneutic Relations <sup>22</sup>

Hence, in a hermeneutic relation the user encounters the world via an interpretation of the world. The world that is experienced in this encounter is transformed by the technology already; the user interprets a technology's readout and based on this makes inferences about the world.<sup>23</sup> Hence, the particular understanding that arises in a hermeneutic relation is based on a users' interpretation of an image that is in turn representative of a particular phenomenon. I argue that the relations between health tracking technologies and their users may be considered hermeneutic. Health tracking technologies allow users to make inferences about the world – in this case users' bodily activity – based on the representations they provide. Specifically, health trackers allows users to perceive, make sense of, otherwise imperceptible physiological and psychological phenomenon. For instance, users cannot sense their blood pressure, but fitness trackers enable them to create an understanding based on a representation of blood pressure. Similarly, users can make inferences about the state of their digestive system based on CO<sub>2</sub> levels in breath, as provided by metabolism trackers.

There are two conditions for making inferences with such a hermeneutic relation; the language of the readout has to be correct and the user needs to be fluent in the language. Ihde explains the understanding in such a hermeneutic relation with an analogy of written language. The degree to which one 'knows' what is written depends on the degree to which one is familiar with a particular language. The capacity of a book in representing a story depends on the extent to which the reader knows the language of its interface.<sup>24</sup> Hence, the degree to which an individual can create an understanding of one's body by means of a health tracker depends largely on one's fluency in the parameters the health trackers adopts to represent certain bodily phenomena. To illustrate, an ECG technology is adequate for users to interpret the condition of their hearts only if they have a sufficient understanding of cardiovascular electrical activity, and the diagrams, units of measure (millivolts), etc., used to represent it.

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<sup>21</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 125.

<sup>22</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 127.

<sup>23</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 17.

<sup>24</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 17.



### 1.3 Non-neutrality of mediation

A challenge in relations of mediation is that technologically mediated perception is never identical to naked perception, as it is by definition transformed. Ihde emphasizes this notion of non-neutrality of mediation. In hermeneutic relations this discrepancy between naked and mediated perception is especially striking because the transformation is of high contrast; the mediated perception makes present something that was not perceptible before. However, this revealing of phenomena is biased and never complete. The technological artifact in a hermeneutic relation determines what aspect of reality is made perceptible and what not. To illustrate, with a telescope our experience of the world is reduced to vision; only that what is perceptible for our eyes is made present to us.<sup>25</sup> And in addition, by looking through the lense of the microscope, we sacrifice the perception of our immediate environment. The disproportionate focus on one aspect of reality in mediated perception is what Ihde calls an amplification and reduction structure.<sup>26</sup> In mediated perception certain aspects of reality are strengthened and others are weakened.

Hence, personal health trackers condition users' experience of their bodies, by highlighting certain aspects at the expense of others. Drawing on the post-phenomenological tradition Peter Paul Verbeek too aims to depart from the 'functionalization' of technology to a view in which technologies are not mere instruments but also meaning makers. In line with Ihde's hermeneutic human-technology relations he shows how technologies mediate human experiences by influencing perception, shaping the way in which human beings encounter reality, and hereby inducing a non-neutral understanding of the world. However, Verbeek argues that Ihde's analysis of the non-neutrality of technology is too narrow because it is limited to the hermeneutic aspect of technological artifacts. Verbeek adds an existential perspective to non-neutral mediation by claiming. Namely, technological artifacts not only constitute a particular framework for understanding, but also for *acting in* the world. In non-neutral mediation technological artefacts actively shape the lifeworld; they influence how human actors and the world itself are constituted.<sup>27</sup>

Verbeek thus claims that technological intentionality is twofold; technology mediates both perception and action; mediation has a hermeneutic and pragmatic direction. Technological artefacts actively shape both our experiences and practices.<sup>28</sup> Consequently, the design of technologies is always directed at a specific use. They have a certain 'intention' that they promote among their users.<sup>29</sup> Verbeek illustrates this idea based on an analogy of an echo of an unborn child. This echo does not merely function as a way to make visible the baby and its health. In fact, it largely shapes the way in which this baby is perceived, and consequently, also influences the choices and actions the future parents undertake; the ultrasound mediates the relation between the unborn child and the expecting parents. The ultrasound constitutes the fetus in a specific way; the fetus is constituted as a future patients and the parents of the fetus are constituted as actors responsible for the unborn child's health.<sup>30</sup> Hence, a post-phenomenological perspective allows us to establish that technological mediation shapes the

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<sup>25</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 142

<sup>26</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 16.

<sup>27</sup> Verbeek, "Don Ihde: The Technological Lifeworld," 142.

<sup>28</sup> Wehrle, "Experience, Embodiment, and Technology."

<sup>29</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 21.

<sup>30</sup> Rosenberg and Verbeek, "A field guide to Postphenomenology," 19.

subjectivity and objectivity of the actors involved. It is *in* technological mediation – not a priori- that the parents and unborn child are assigned their respective roles.

Conclusively, technologies in hermeneutic relations are not neutral instruments that provide users with an understanding of the world because they condition this understanding in a non-neutral way. Returning to the example of my mother's pedometer, the latter was meant to serve as an indicator of her physical health. But by emphasizing one specific parameter (completed steps per day) the application neglects other crucial attributes of physical health such as diet, sleep, psychological wellbeing etc. Hence, following Ihde's amplification-reduction structure, the specific understanding of physical health the pedometer provides my mother with is not neutral.

This non-neutrality is not limited to the conditioning my mother's understanding of physical health, but extends to the framework of her daily life. Remember how I found my mother walking determinedly around the kitchen table, to reach her health goal of the day. The pedometer imposed a specific script, informed a choice in her to walk 60 rounds around the kitchen table. And in addition, one might argue that the pedometer constituted my mother in a specific way: as the agent responsible for maintaining her physical health. Hence, the health tracker not only conditioned a specific understanding of health in my mother, but also conditioned her actions, in (post)-phenomenological terms: her way of being-in-the-world. The next chapter will discuss the twofold mediation of personal health trackers in depth. Specifically, I will discuss what specific understanding of the self health trackers enforce, and what pragmatic script they impose on their users.

## CHAPTER 2: Non-neutral mediation of Personal Health Trackers

Having established the twofold mediation of personal health tracking devices this chapter evaluates the particular interpretative and pragmatic framework health trackers impose on their users. This will be done based on papers of de Boer, Vegter et al., and Wehrle, who have adopted and built upon post-phenomenology as introduced by Ihde and Verbeek. First, I will highlight the notion of eccentricity, which explains why there is need for interpretive technologies in the first place. Then, I focus on the self-reflective aspect of these technologies, analyzing the particular understanding of the self that is enforced. Specifically, I argue that health tracking technologies induce a quantified understanding of the body and make explicit habits that used to be transparent in our experience. In addition, I analyze how this hermeneutic lens constitutes a particular pragmatic framework and how a tension arises between the self-reflexive and performative nature of health tracking devices. Finally, I suggest that the particular way in which the self is revealed with personal health trackers implies an emphasis on an explicit sense of time.

### 2.1 Bridging the self; eccentricity

Phenomenologically, the human body is an interesting phenomenon as it is both the subject and object of intentionality. The body allows us to perceive while at the same time it is a perceived object, which is perceived by itself. Consequently, human embodiment, or the relation the self has to the body, is twofold; we are always both an ‘experiencing body’ and a ‘perceived body’.<sup>31</sup>

The phenomenological distinction between the subjective and objective body originates in the notion of Leibkörper coined by Husserl.<sup>32</sup> Husserl uses the former to refer to the body through which a subject experiences the world. The subjective body is the body that perceives, the subject of intentionality, that what links us to the world. It constitutes our understanding of the world around us, it is ‘the vehicle of being in the world’. It can therefore only be accessed through the first-person perspective. Husserl uses the objective body to refer to the body as the object of intentionality, the body that appears in geometrical space. It is the body that can be observed and measured. In other words, the body that can be an object of attention. The objective body is the body that is reflected on from a third person perspective.<sup>33</sup> Hence, constituting both a subjective and objective body, we are lived as well as material, extended and physical, subject and object of experience.<sup>34</sup>

In his philosophical anthropology Plessner coined the term eccentric positionality to explain this twofold embodiment of humans. He argues that the reason humans can reflect on their bodies, and experience, is the eccentric positionality of human beings. The latter entails

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<sup>31</sup> Maren Wehrle, “Being a body and having a body: The twofold temporality of embodied intentionality,” *Phenomenology and the Cognitive Sciences* (2020) 19, 499-521, <https://doi.org/10.1007/s11097-019-09610-z> on (accessed on March 25 2022).

<sup>32</sup> Bas de Boer, “Experiencing objectified health: turning the body into an object of attention,” *Medicine, Health Care and Philosophy* (2020) 23, 401-411, <https://doi.org/10.1007/s11019-020-09949-0> (accessed on March 22 2022).

<sup>33</sup> Boer, “Experiencing objectified health,” 402.

<sup>34</sup> Wehrle, “Being a body and having a body,” 500.

that we are always distanced towards the world – and ourselves. This allows us to experience, reflect on, and relate to ourselves, from an external position.<sup>35</sup> However, given we never coincide with ourselves, we need to find ways to bridge the distance to ourselves in order to make sense of ourselves. Plessner points to technology as a means to bridge this distance.

Thus, we conceive of health tracking technologies as means to bridge the distance to ourselves; they are a way of overcoming our eccentric positionality. With the use of personal self trackers users explicitly experience their bodies as objects. Personal health technologies make present our objective bodies from a third person perspective. Specifically, they invite users to relate to themselves, bringing forward the body as object of intentionality.

Traditionally, phenomenologists argue that the objective body becomes transparent only when the harmonious relation between subjective and objective body is disrupted.<sup>36</sup> Under normal circumstances, in case of a healthy body, the subjective and objective body are aligned and the latter is a ‘tacit medium’ in our experience. To illustrate, when you are going for a – non-professional – run you do not pay attention to the way your heart is pumping blood, or the way your muscles are contracting in order to for you to move. It is only when health is disturbed that the objective body becomes present to us. Imagine you twist your ankle during your run. From that point, your attention will shift to the pain in your ankle and your body becomes an object of attention.<sup>37</sup>

Similarly, personal health technologies disrupt the harmonious alignment of the objective and subjective body and make present the body experientially. As discussed in the first section, personal health technologies allow to reveal features of our body that were before imperceptible, such as body mass, blood pressure, and chemical balances. But also traditional technologies that can be as simple as a mirror allow to make present the objective body. To illustrate, when looking at ones reflection in the mirror one sees his or her body as an object that can be observed from the third-person perspective, something out in geometrical space. One perceives their body as if it was an outsider.<sup>38</sup>

However, it can be argued that technology or a disruption of health do not uniquely allow the appearance of the objective body. In fact, the disruption of the harmonious alignment of our subjective and objective body occurs many times in our everyday experiences without the intervention of technology. To illustrate, a way in which the alignment of the subjective and objective body may be disrupted is simply by paying attention to ones body. For instance, one may look at his nails and consider if they would look nicer if they were cut. Or, one may observe that the color of his skin changes with the seasons.<sup>39</sup> Hence, there are many instances in which we do not live but experience our bodies.

Hence, the use of technology does not uniquely allow to bring forward the objective body. What is the difference between these everyday encounters with the self and encountering the self with the use of modern health tracking technologies? In order to answer

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<sup>35</sup> Mira W. Vegter, Hub A. E. Zwart & Alain J. van Gool, “The Funhouse mirror: the I in personalised healthcare,” *Life Sciences and Social Policy* 17, 1 (2021), <https://doi.org/10.1186/s40504-020-00108-0> (accessed on March 22 2022).

<sup>36</sup> Boer, “Experiencing objectified health,” 402.

<sup>37</sup> Boer, “Experiencing objectified health,” 402.

<sup>38</sup> Boer, “Experiencing objectified health,” 402.

<sup>39</sup> Boer, “Experiencing objectified health,” 402.

this question I refer to the particular relationship between users and health trackers that was established in the first chapter.

Based on Ihde's human-technology relations, it was established that health trackers mediate users' relation to the world in a specific way; they provide users with a representation of bodily phenomena, which in turn requires users' interpretation to make inferences about these phenomena.<sup>40</sup> In other words, the relation between health trackers and humans is hermeneutic. Technological mediation suffices to explain the difference between the appearance of the objective body through technology and through 'naked' perception. When I study my fingernails, my perception is unmediated by technology. Consequently, the appearance of the objective body is unconditioned by technology, or 'neutral'.

However, technologically mediated perception does not suffice in explaining the difference between the appearance of the objective body in health tracking technologies relative to traditional health technologies. Namely, simple reflexive technologies like mirrors also mediate perception, and therefore condition a user's perception of the body. The representation of the body in a mirror is non-neutral because it is transformed and partial; the body is reversed and incomplete because the reflection reveals only the parts of the body faced towards the mirror. Instead, the difference between modern health trackers and traditional interpretive technologies resides in the *extent* to which the body is transformed. In case of perceiving oneself through a reflection in the mirror the encounter with oneself is significantly immediate; you can see and relate to yourself immediately. For instance, when you raise your arms you can directly follow your movements. Consequently, the mediation of is low contrast; in case of a mirror (of sufficient quality) the reflection is very similar to reality.

Conversely, the hermeneutic relation that underpins technological mediation of personal health trackers is of high contrast; it lacks the immediacy of perceiving the objective body with unmediated perception or simple tools such as loops or mirrors. This means the reality I encounter through technology is considerably different from the reality I perceive in unmediated perception. The lack of immediacy can be explained because health trackers tend to make present physiological and psychological phenomena that were before imperceptible. To illustrate, when interpreting the condition of our heart based on the ECG diagram a fitness, it is impossible to compare this particular representation of the heart with a 'naked' perception of cardiovascular activity.

Hence, because of high-contrast mediation, the representations of bodily phenomena health trackers uphold to users are highly transformed and highlight only particular parts of reality – parts that are difficult to determine because they are generally imperceptible to us. Crucially, as personal health trackers provide users with a partial image of reality, they inevitably devalue other aspects of the body that might be equally relevant for one's health. In what way does this non-neutral mediation influence users' relation to the self?

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<sup>40</sup> Boer, "Experiencing objectified health," 402.

## 2.2 The Quantified self

It is established that health tracking technologies are transformative mediators of users' experiences; they transform otherwise imperceptible bodily phenomena into forms that are comprehensible for human cognitive capacities. This transformation is non-neutral because it highlights only specific parts of reality. For instance, a heart rate monitor provides an image of our heart rate, a blood pressure monitor is an indicator of our blood pressure, an ECG reveals the electrical activity of the heart, and a cardiac MRI allows to map the anatomy and function of various parts of the heart. These instruments all mean to indicate cardiovascular activity but they highlight different aspects of the heart. Indeed, one can argue that innovative medical technology allows to combine multiple of these features into one device, hereby providing a sufficient holistic indication of cardiovascular health. Nevertheless, this representation of the heart remains incomplete. Imagine a hypothetical device that allows to integrate all available scientific measures for cardiovascular health. This device will still be biased because it only allows to reveal features of the heart that can be expressed in quantifiable measurable parameters, precluding other interpretations of the heart.

Following Ihde's amplification-reduction structure health trackers thus amplify certain aspects of the human body while neglecting others. The design of personal health tracking technologies determines in what way our body becomes present to ourselves. Specifically, health trackers reveal the body in terms of medical scientific phenomena expressed in quantifiable parameters such as heart rate, electrical activity, chemical levels and daily steps taken. These particular parameters form the interpretive framework the user uses to understand their bodily activity.<sup>41</sup> Hence, it is argued that personal health trackers emphasize a scientific interpretation of the body at the expense of other interpretations. Certain aspects of the body, that allow for quantification and measurement are emphasized, while others are weakened. In this sense, the objective body is quantified.

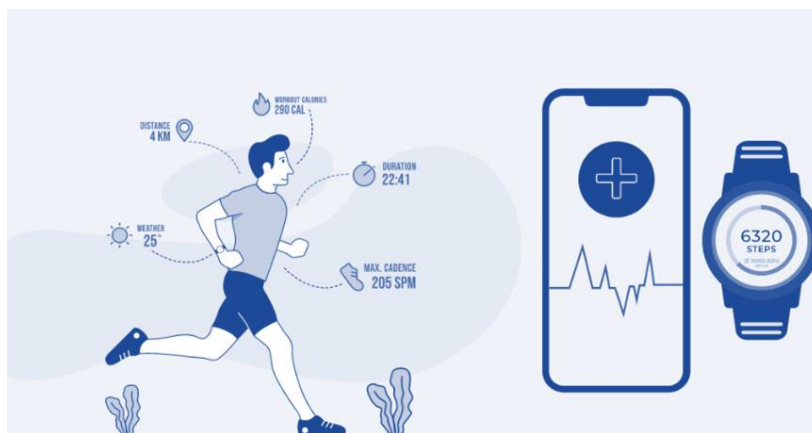


Figure 3: Scientific Interpretative Framework of the Health Tracker <sup>42</sup>

Crucially, also within this scientific framework there is an avalanche of ways the body can be presented to us. The process of fitting these different representations of the self back

<sup>41</sup> Boer, "Experiencing objectified health," 401.

<sup>42</sup> Figure 3, "Health Tracking Apps – Business Model, Features, Development Cost and All You Need to Know About", illustration, June 3, 2022. <https://www.apptunix.com/blog/health-tracking-apps-development/> (accessed on 13 June 2022).

into our lifeworld can be challenging. Namely, each of the health trackers – or different features within one device - holds a specific ontological claim, concerning what the body is. Vegter et al. (2021) introduce the metaphor of the funhouse mirror in order to describe how self-perception through health trackers is informed by many different, competing images, each of them representing a particular ontological claim. In order to maintain a coherent sense of embodiment these different mirrors, that each highlight a specific aspect of reality, need to be fit back into users' lifeworld. This inevitably leads to prioritization of one reality over another. As a result, particular aspects of the body are emphasized at the expense of others. Different health trackers reveal to user different aspects of their bodies; the body that travels (steps count), the body that breaths (air quality), the body that eats (calorie intake). These different interpretations of the self need to be negotiated by the user in order to maintain a coherent sense of embodiment.<sup>43</sup>

Although health trackers highlight only a specific part of reality, one might argue that the health tracking technologies still allow for 'objective' representation of these parts. Namely, the scientific methodologies that underlie modern health trackers allude to an 'objective' reflection of bodily phenomena, hereby reducing data points to mere descriptive representations. Consequently, health trackers, as well as traditional reflective health technologies such as weight skills, are built on the same promise; they offer objective knowledge of the body, in contrast with subjective, experiential knowledge of the body, which is for instance created when keeping a diary.<sup>44</sup> Crucially, for both health trackers and traditional technologies, this objective knowledge carries a normative dimension. Namely, the measure points that they provide users with are not merely descriptive because they are interpreted in reference to past or future states of the body. For instance, someone will interpret his or her weight in reference to a past state or a desired weight in the future. In this sense, measures of health technologies are value laden because they implicate a 'yet to be' or 'used to be', referring to progress or decline.

In addition, in both traditional health technologies and modern health tracking devices the hermeneutic relationship between the user and the technological artifact is not dual for another reason.<sup>45</sup> In combination with frameworks that identify 'normal' bodily standards the interpretation of the objective body always occurs in reference to 'normal' standards. As a result, both the weight scale and the health tracker present the quantified body which users interpret relative to a 'normal' benchmark. Hence, there is always a third external party involved; the user's past or future body and/or the external 'normal' body.<sup>46</sup>

What distinguishes modern health trackers from traditional technologies is that they amplify habitual patterns of the body. To illustrate, with respect to calorie trackers, they make explicit users' habitual eating patterns. A habitual activity such as eating is integrated in our daily lives; it is part of the way we are in the world. Put differently, eating (calories) is an activity that is transparent in our daily lives. What personal health trackers do is make these habits that are implicit but constitute the way we are in the world, explicit. They reveal our habitual patterns that were initially transparent as objects that can be related to. Hence, unlike

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<sup>43</sup> Vegter et al., "The Funhouse Mirror," 13.

<sup>44</sup> Boer, "Experiencing objectified health," 407.

<sup>45</sup> Vegter et al., "The Funhouse Mirror," 19.

<sup>46</sup> Boer, "Experiencing objectified health," 410.

traditional reflexive technologies modern health trackers unique reveal users' habits in a quantified way, such that they can be related to, instead of lived *through*.<sup>47</sup>

### 2.3 Twofold mediation of health trackers

Paradoxically, the same habits that are made present by health tracking technologies are constituted in the mediation of personal health trackers. In the first section it was established that the mediation in a hermeneutic relation is twofold; it concerns both interpretation and action. Hence, personal health trackers do not merely have a hermeneutic dimension, influencing human perceptions and interpretations of reality, but through an existential they also shape a users' way of being in the world. Consequently, the particular design of a technological artifact is not only non-neutral because it determines how reality is revealed to us but also because it constitutes a particular framework concerning action.<sup>48</sup>

Inde's amplification-reduction structure does not only affect the hermeneutic but also the pragmatic direction of mediation. For instance, with respect to glasses, their design is directed at enhancing eyesight, but this is done at the expense of other features such as flexibility and mobility when doing sports.<sup>49</sup> Similarly, the particular design of a health tracker will emphasize particular actions at the expense of others. Pedometers induce people to walk somewhere instead of taking the bike, sleep trackers motivate people to go to bed early, metabolism trackers influence what people eat and what not, etc. Hence, the mediation of the tracker constantly re-constitutes the user according to its specific interpretative framework. As a result, each of these health trackers does not only present users with different ontological claims but also with different performative claims, concerning how the body should *behave* in the world. In this sense, the funhouse mirror does not only represent the different interpretive frameworks that health trackers impose on us, but also different performative claims they represent. Consequently, users do not only have to negotiate different ways in which the body *is*, but also different ways in which the body should *be* in the world, in order to maintain a coherent sense of embodiment.<sup>50</sup>

Hence, the images provided by our tracker are not only the outcome but also the source of our habits.<sup>51</sup> When users are confronted with data concerning their habits and bodily activity, they will try to adjust their behavior according to a preset personal goal or external 'normal' standard. The corrective measures users take in turn influence objective body that appears in mediation. Hence, a feedback loop occurs. In this sense, the objective body of the tracker is both recursive and reflexive. The body health trackers reveal is both constituted by the users and in turn serves to reconstitute the user.<sup>52</sup> This effect is magnified as most health trackers provide feedback based on user activity. When confronted with concrete feedback, users will be inclined to correct their behaviors, and by doing so shape the objective body that

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<sup>47</sup> Boer, "Experiencing objectified health," 407.

<sup>48</sup> Vegter et al., "The Funhouse Mirror," 13.

<sup>49</sup> Vegter et al., "The Funhouse Mirror," 6.

<sup>50</sup> Vegter et al., "The Funhouse Mirror," 12.

<sup>51</sup> Vegter et al., "The Funhouse Mirror," 8.

<sup>52</sup> Deborah Lupton, "You are Your Data: Self-Tracking Practices and Concepts of Data Self-tracking and automatized bodies," *The Sociology of Risk View project* (2016) 82, accessed at [https://doi.org/10.1007/978-3-658-13137-1\\_4](https://doi.org/10.1007/978-3-658-13137-1_4) on 24 March 2022.



the health tracker will reveal to them. Conclusively, the non-neutral mediation of health trackers imposes on users what Verbeek named a 'script'; a specific pragmatic framework that determines users' way of being in the world.

### 2.3 Temporalization; the objective body and explicit time

The particular way in which health trackers represent and shape users' habitual activities also influences users' temporal experience of being in the world. Specifically, in making present the body as object of attention health trackers constitute an explicit sense of time. I suggest that the distinction objective and subjective body is parallel, and intertwined with the distinction explicit and implicit time. I further argue that the constitution of explicit time, or temporalization of our experience, in turn reinforces the experience of the objective body.

Drawing on Husserl's phenomenology concerning time experience, Fuchs distinguishes between implicit and explicit temporality. The former represents the experience of time as transparent in our experience. Time is implicit, and it occurs when we are absorbed in what we are doing. The latter is the negation of implicit time. It occurs when we conceive of time not as merely unfolding but in terms of a time horizon. Explicit time refers to a past, present and future. Explicit time is therefore closely connected to feelings of desire, and longing, but also mourning and grieving. It refers to the 'not yet' or 'not anymore'.<sup>53</sup>

Fuchs argues that this distinction is closely connected to Husserl's Leibkörper distinction. He argues that implicit temporality and tacit performance of the body, as in the subjective mode, are nearly synonymous. Namely, the more we are engaged in our activities, the more we are 'inside time', the more we forget about time as well as the body. On the other hand, when time is experienced explicitly, the body often appears objective as well. When the body is made explicit, and the objective body appears, time is temporalized.<sup>54</sup> For instance, when you twist your ankle during running you are no longer absorbed in running, and you can notice the slowing down of time.

Similarly, by being confronted with one's physiology with the use of personal health trackers, users experience an explicit sense of time. Clearly, 'tracking' in itself presupposes temporality; health must be tracked in a certain time frame. For instance, when I use an application to track my calorie intake my personal goal is usually to improve or maintain a healthy weight. This goal may represent desiring the weight I used to have, or working towards a particular health goal. Time is thus experienced explicitly, we are conscious of it. Throughout the day, 24 hours, I have to limit my calorie intake to x, hoping that in a month I will have lost y kilograms.

Clearly, explicit time is epitomized in the tracking part of technologies. However, I suggest that the mere objectification of the body alone will lead to the temporalization of time. To illustrate, when measuring one's BMI the objectification of the body goes in hand with a temporalization of experience. When one perceives his or her body one may think about how it used to be, normatively, creating desirability for a certain characteristic in the future.

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<sup>53</sup> Thomas Fuchs, "Implicit and Explicit Temporality," *Philosophy, Psychiatry, & Psychology*, Volume 12, Number 3 (2005) 195-198, <https://doi.org/10.1353/ppp.2006.0004> (Accessed on April 2 2022).

<sup>54</sup> Fuchs, "Implicit and Explicit temporality," 195.

User are constantly confronted with a past and a future. Hence, when objectifying the body, one constantly projects a specific past and a specific future onto one's body.<sup>55</sup>

In explaining the interconnectedness of the objective body and temporality Fuchs claims that implicit time corresponds to optimal time synchronization, which implies that there is no gap between body and external processes. The body is in time, functioning in the background of our experiences.<sup>56</sup> We may draw a parallel here to the alignment of the subjective and objective body, as discussed in the first section of this chapter. When an individual is absorbed in an activity, there is harmony between the objective and subjective body, reducing the physical body to a mere tacit medium.

Reversely, when the subjective and objective body are unaligned – and the objective body appears – time is no longer implicit; it is 'desynchronized'. Fuchs claims desynchronization typically occurs in case of a lack, shortage or imbalance. Desynchronization occurs when there is retardation and acceleration of one's time in relation to surrounding processes; it represents a state of being too late and too early respectively, and is often connected with displeasure or suffering. In case of retardation, one may experience feelings of melancholia and in case of acceleration one may feel strong impatience or even anxiety for the future. Fuchs also draws a parallel between these states of desynchronization and the objective body. To illustrate, in melancholia one becomes obsessed with the past. He experiences time as painfully passing by and the body is corporealized. It becomes a heavy, material obstacle rather than a tacit medium. In case of acceleration, or a constant longing or anticipation for an impending future, the body becomes explicit as well.<sup>57</sup>

Hence, the emotions health tracking induces in users (i.e. desiring, longing etc.) seem to be closely connected to the emotions associated with time desynchronization. The projection of a specific state into the future, or reminiscing to an old state, seems to represent the same retardation and acceleration of time in relation to the environment that occurs in desynchronization. This would imply that the use of health trackers induces in users the same negative emotions, related to feelings of lack or imbalance, that are associated with states of desynchronization.

Following the interconnectedness of embodiment and temporality, I postulate a feedback loop between explicit time and objective mode of the body. Both health tracking as such and the corresponding objectification of the body desynchronize time, hereby inducing feelings of a lack or imbalance, a 'not yet' or a 'not anymore', nostalgia or desiring. These emotions in turn enhance the explicit experience of ones body, or 'corporealize' the body, further disrupting the harmony between the subjective and objective body. This disharmony in turn magnifies an experience of explicit time, strengthening the emotions related to time desynchronization.

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<sup>55</sup> Boer, "Experiencing objectified health," 410.

<sup>56</sup> Fuchs, "Implicit and Explicit temporality," 195.

<sup>57</sup> Fuchs, "Implicit and Explicit temporality," 195.

## CHAPTER 3: Case Study Anura

Launched by the Toronto based tech firm, NuraLogix, Anura is an AI based app that allows users to contactless track their health. Through their patented transdermal optical imaging technology, Anura provides users with a holistic picture of their health status. Using machine learning, Anura extracts facial blood flow information from a 30 second recording. With a simple selfie Anura allows people to measure over ten physiological and psychological indexes, including blood pressure, stress levels, heart rate, cardiovascular disease risks and BMI. This makes Anura the worlds first application for contactless blood pressure monitoring.<sup>58</sup> Moreover, Anura is developing an innovative feature that allows users to measure their glucose levels based on a simple selfie. Recent developments have shown a possibility of using statistic and spectral analyses of ECG signal for monitoring blood glucose in a non-invasive manner.<sup>59</sup>

Anura delivers value to its customers by promising to provide a holistic picture of their health. By inviting users to interpret a wide range of bodily phenomena, Anura responds to users' need to reflect on themselves – on their physiological and psychological processes specifically. Anura is thus built on the promise of overcoming users' eccentricity; it offers a way to bridge the distance to oneself. Following Ihde's human-technology relations, the relation between Anura and its users is hermeneutic; individuals use Anura to interpret their bodily phenomena.

Anura's readout consists of parameters that indicate a wide range of bodily phenomena. For instance, cardiovascular activity is inferred with measures of heart rate, blood pressure and electrical activity. And a users' psychological state is indicated with a stress index. Additionally, Anura provides users with various risk statistics including risk on cardiovascular diseases and strokes. Based on 11 measures users are finally assigned a general wellness score. Evidently, Anura provides users with quantitative parameters. Heart rate is expressed in beats per minute, breathing in breaths per minute, body mass index in units of kilograms per squared meter, and the stress index is based on an ordinal scale ranging from 1 to 5. Anura thus exemplifies how the objective body appears to users in a scientific quantitative framework.

Crucially, this specific interpretive framework does not reduce Anura's representation of the body to a mere descriptive reflection. The non-neutrality of Anura's representation of the body is epitomized in the 'General Wellness Score', which is disproportionately based on a range of cardiovascular values including heart rate, blood pressure, cardiac workload and heart rate variability. In emphasizing cardiovascular activity as attributes of health it indirectly devalues other constituents of health such as nutrition and sleep patterns.

In addition, the quantitative parameters that represent user's body, and ultimately constitute the General Wellness Score, add a normative dimension to the use of Anura in another way. Namely, they invite users to conceive of their bodies in reference to external standards such as 'average' statistics or desirable statistics. Additionally, Anura's measures are value laden because they are interpreted in comparison to previous measures or future desired measures. The non-dual relationship between users and Anura invites users to conceive of the body in terms of progress or decline. An increase of the General Wellness Score represents improvement, and a decrease decline, of one's health.

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<sup>58</sup> NuraLogix, "Anura™: World's first app allowing for contactless blood pressure measurement, without the need for cuffs or other wearables", *Cision PR Newswire* (2021), <https://www.prnewswire.com/news-releases/anura-worlds-first-app-allowing-for-contactless-blood-pressure-measurement-without-the-need-for-cuffs-or-other-wearables-301206636.html> (accessed on April 4 2022).

<sup>59</sup> Igbe Tobore et al., "Statistical and spectral analysis of ECG signal towards achieving non-invasive blood glucose monitoring", *BMC Medical Informatics and Decision Making* 19, 266 (2019), accessed at <https://doi.org/10.1186/s12911-019-0959-9> on 4 April 2022.

Anura's specific interpretative framework also becomes materialized in the lifeworld of its users. Although Anura does not come with a feedback function the latter is implicit in the use of the application. Namely, users will be inclined to maintain, or improve their health. For instance, when Anura indicates increased irregular heartbeats, users may be inclined to reduce stress by undertaking less action throughout the day. In this sense, Anura's design is directed at a specific way in which users should be in the world. Namely, with a 'healthy' BMI, cardiovascular values, or stress levels.

Anura thus exemplifies that eccentricity is both a condition and outcome for technological developments.<sup>60</sup> The objective body that is revealed by Anura is both recursive and reflexive. Anura invites users to reflect on the same habits that it constitutes with its use. And this feedback loop might not even be beneficial for users' overall health. Evidently, seeing your risk on heart attack increase with only 1 percent point may give you an uncanny feeling already, which results in more stress, and in turn increases the cardiovascular risk rate disproportionately. Consequently, the same feelings of anxiety and stress that Anura measures may be enforced by using the application.

In this way, Anura also illustrates the interconnectedness of embodiment and temporality. By making present the objective body as an object that can be interpreted relative to previous states or external standards, Anura temporalizes users' experience. The feelings associated with this explicit sense of time, typically concerning a 'not yet' or a 'not anymore', cause users to be less absorbed in their daily activities. For instance, when one aspires to reach a certain BMI he or she may be explicitly aware of consumption throughout the day, or the amount steps one takes in a day. And an emphasis on habitual activities throughout the day makes the body less of a tacit medium and more of an object of attention. This emphasis on the objective body then further increases feelings of time desynchronization including uneasiness and even anxiety.

Thus, the vicious circle between the appearance of the objective body and temporality implies that with the use of Anura users' sense of time becomes increasingly explicit. Anura helps users overcome eccentricity and bridge the gap between the first-person and third-person experience, but this seems to be accompanied by an estrangement from being a subject of intentionality in the world. Put differently, with the use of Anura - the constitution of the user as a temporal object of intentionality specifically - the body becomes more and more a vehicle rather than a tacit medium that is 'lived through'. Conclusively, Anura exemplifies how health tracking technologies are not mere reflexive but impact users way of being-in-the world.

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<sup>60</sup> Vegter et al., "The Funhouse Mirror," 9.

## Conclusion

In this thesis I have aimed to provide a post-phenomenological foundation for future ethical analyses of consumer health tracking technologies. Precisely because ethical analyses emphasize the normativity of health trackers it is crucial to investigate (post)-phenomenologically how these technologies impact users' lifeworld. In order to form the bridge between the health tracker as such and its ethical analyses the central question in this thesis was how health trackers influence users' perception and being-in-the-world.

The response to this question was mainly concerned with the non-neutral way in which health tracking technologies mediate users' relationship to the world. As illustrated with the Anura case study, the mirror health trackers uphold to users has a normative dimension. Quantitative parameters invite users to interpret their health in reference to past or future states of their bodies, or to external 'normal' standards. In addition, Anura exemplified how the reflection of the body highlights certain aspects of reality at the expense of others. In disproportionately emphasizing cardiovascular activity in its General Wellbeing image Anura devalues other crucial constituents of health.

Moreover, Anura exemplified how a specific interpretative framework does not only shape users' understanding of the self but also becomes materialized in the lifeworld of users. Health trackers promise to provide an objective representation of users' psychological and physiological activity while simultaneously shaping these very same processes in their mediation. With respect to this pragmatic framework, it was established that what distinguishes innovative technologies such as Anura from traditional technologies such as simple mirror is that modern health trackers shape users' habitual activities. The intimate nature and innovative features of modern health trackers such as smartwatches or phone based applications allow them to measure users' 'everyday' way of being in the world. By quantifying habitual ways of being in the world that used to be implicit in experience, health trackers have turned aspects of the body that used to be transparent in experience explicit.

By allowing users to relate to, and track, a wide range of habits that each influence health to some degree, health trackers thus emphasize the objective body on a continuous basis. Consequently, the subjective body, the body that is a mere tacit medium in our lives, is increasingly replaced by the body that is explicitly experienced. In this sense, the body is no longer lived through but instead a vehicle for our everyday functioning. A vehicle that can be conceived of in terms of progress and decline, and is significantly sensitive to the slightest changes in behavior. The constant feedback personal health trackers provide confronts users with how their everyday habits influence their way of being in the future. As a result, with every minor choice – be it walking an extra 500 steps or ordering a pizza instead of a salad – users are held accountable for the state of their bodies. People will feel responsible to correct their behavior, to *manage* their bodies, by correcting habitual activities that used to be implicit in their experience but are made explicit by health trackers, such as eating, walking or even breathing correctly.

Hence, the specific mediation of modern health trackers imposes a significant sense of accountability on users. But, the corresponding stress and anxiety that might arise with it in turn deteriorates health. Moreover, these negative emotions are reinforced by a changed experience of time. Namely, an increased awareness of the body's functioning throughout the day has a large impact on someone's temporal experience of being in the world. Given I am constantly confronted with how my behavior influences the future state of my health my sense of time becomes more explicit along with my experience of the objective body, further inducing feelings of uneasiness or anxiety.<sup>61</sup>

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<sup>61</sup> Boer, "Experiencing objectified health," 405.

Thus, there appears to be a tension between the interpretative and pragmatic dimension of health tracking technologies. The reflexivity health trackers offer comes at the expense of simply being in one's body. Health trackers allow users to overcome their eccentricity but the third person perspective they place users in disassociates them from being *in* time and *in* one's body. As a result, the phenomenological body that *is* in the world increasingly becomes an object that can be related to, rather than the subject of intentionality. And because health trackers reveal the objective body to us in quantitative parameters, it can also be conceived of in terms of decline and progress. In other words; the body can be managed. Crucially, managing the body is challenging when there is an avalanche of technologies, each associated with a specific ontological claim, concerning what the body is, and performative claim, concerning how the body should be managed. In order to maintain a coherent sense of embodiment users need to negotiate all these different mirrors, that each highlight a specific aspect of reality. One of the main challenges for ethical analyses of the consumer health tracking industry is therefore to highlight the normative dimension of health monitoring. Users need to understand that health tracking is both recursive and reflexive; health trackers both represents and constitute the physiological and psychological phenomena they intend to measure. In addition, a starting point for ethical discussions should be the tension between the reflexive and estranging nature of health tracking. A crucial question concerns whether this estrangement counteracts the original promise of consumer health tracking technologies; fostering self-care.

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