DIGITAL HEALTH

Making sense with sensors: Self-tracking and the temporalities of wellbeing

Martin Berg

Abstract

Self-tracking devices and apps often measure and provide interpretations of personal data in a rather straightforward way, for instance by visualising the speed and distance of a run or the quality of sleep during night. There is, however, a growing number of devices claiming to support increased wellbeing by extensive data analysis to provide insights and algorithmic advice about unseen and neglected dimensions of our lives, bodies, and experiences. This article engages with two devices of this kind, namely the Moodmetric and the ŌURA which are two recently released 'smart' rings with associated smartphone apps that claim to measure emotions and rest, promote happiness and help users to perform better. Focusing on how certain values, visions and ideas are used to frame and explain the potential functionality of these devices, this article approaches the discursive underpinnings of their design as deeply intertwined with the temporalities of late modernity. Empirically, the article is based on a discourse analysis of blog posts, marketing materials and user guides from the ŌURA and Moodmetric companies along with video recordings of the public appearances and sales pitches of company representatives.

Introduction

The number of self-tracking devices and apps is growing continuously, and there is now a plethora of wearable devices available for tracking, measuring, and interpreting what is going on in and around people's lives, bodies, and minds. These devices are equipped with sensors of different kinds, through which physical activities and bodily data emissions are registered, algorithmically processed, and visualised through smartphone apps. Although the majority of such devices perform quite simple measurements and provide interpretive feedback of a modest kind, a growing number of devices aspire to collect and interpret data that are believed to be imperceptible to the human mind. These devices and their associated smartphone software often involve a certain degree of analytic imagination when transforming these data into insights and algorithmic advice to increase the wellbeing and self-knowledge of users, and to help them navigate through

the intense and complex temporalities of late modern everyday life.

This article engages with two devices of this novel kind, namely the Moodmetric and the ŌURA, that are 'smart' rings asserting to measure either mind and emotions or recovery from past activities. The Moodmetric ring is a piece of jewellery made from surgical steel, with a sleek and slightly traditional feminine design, which is presented as a tool to measure stress levels in real-time. It is a device aimed for 'people who want to understand their minds', as Chief Executive Officer Niina Venho puts it. The ŌURA ring is a somewhat similar device, albeit with a more sturdy and masculine

Malmö University, Malmö, Sweden

Corresponding author:
Martin Berg, Department of Computer Science and Media Technology, Malmö University, 205 06 Malmö, Sweden.
Email: martin.berg@mah.se; Twitter: @martinberg

design, that provides feedback on how the user's body responds to various lifestyle choices. It is a gadget for people with a desire to, as Chief Executive Officer Petteri Lahtela explains, 'improve their sleep and their performance through their sleep'. Reminding of the 1970's mood rings, these devices not only fit snugly around the user's finger to provide a sensory and inter-pretative 'algorithmic skin',[1] but also decode bodily data emissions, and transform them into actionable information. Claiming to provide a wearable dash-board to the body, which is framed as complex and perhaps even mysterious, these rings offer a particular precision in externalising, monitoring, and interpreting bodily processes that are assumed to be unavailable for experiential interpretation and management. These claims fall back on the idea that, as Ruckenstein and Pantzar propose, 'people need data streams and algo-rithms in order to reflect on, and engage in, self-discov-ery and self-exploration'.[2] The Moodmetric and the ŌURA are envisioned to assist users in understanding themselves in times when the increased pace of life is assumed to affect people and their ability to make informed choices about themselves and their lives. As such, these devices to answer quite specific and some-what paradoxical challenges in late modern society, namely how to perform better while at the same time improving recovery and avoiding stress. The descrip-tions of these devices reveal a complex set of assump-tions about our times, and how wearable sensors can assist users in navigating an increasingly demanding everyday life. Exploring and interrogating these claims while relating design imaginaries to the temporal-ities of late modern society, this article advances cur-rent understandings in the field of self-tracking studies by establishing an understanding of the discursive underpinnings of how wearable self-tracking devices are designed and marketed.

Late modern temporalities

Late modern society is often described with a particular emphasis on its specific temporalities. Echoing Simmel's[3] study of metropolitan spaces where the multitude of impressions and the increasing intensity of everyday life made individuals develop a 'blasé' atti-tude, several theorists have followed this trajectory by conceptualising late modernity as fundamentally related to time and time management. Through the advancement of technological development and consumer capitalism in late modern society, life has become increasingly hectic, complex, and intense. In consequence, late modern society has been described as a 'high-speed society'[4] or a 'speed culture'[5] where our lives become increasingly multi-tasked, instantaneous and time-compressed.[6] These efforts to think of late

modernity through its temporal specificities are most often rooted in an analysis of the interrelationship between the changing pace of life and technological development. Although several studies[5,7–12] have explored this relationship over the years, Hartmut Rosa's account of 'social acceleration' is notably the most significant contribution to this field of study.[4,13–16] Rosa argues that late modernity as such is characterised by three mutually reinforcing forms of acceleration, namely technical acceleration, acceleration of social change, and acceleration of the pace of life. In contrast to the widespread belief that technological innovations can make life easier by allowing people to spend time on tasks they find valuable, Rosa argues that they rather lead to further time shortages that, in turn, create an increased demand for technological innov-ation. In consequence, the desire for technological accel-eration as a means to slowing down life instead provokes an acceleration of social change which in turn increases the pace of life, and back around the circle again. Although these notions are typically macro-oriented, they have significant repercussions on the micro-levels of everyday life. As several researchers have shown, the increasing speed of late modern societies is closely associated with higher levels of stress followed by declin-ing levels of wellbeing.[17–19] Similarly, Rosa argues that the processes of social acceleration transforms the rela-tionship between individual and society as such, and provokes not only new forms of subjectivities, but also certain forms of alienation.[14]

Self-tracking and design imaginaries

Practices of self-tracking have gained an increased scholarly attention during the last few years, and stu-dies have mostly focused on how technologies for self-tracking and body monitoring become entangled with social practices of different kinds.[20–25] Whereas several studies have shed light on how users engage with self-tracking technologies, less attention has been paid to their makers, and how these technologies stem from imaginaries of designers and marketers.[26,27] Despite the relative lack of research within this particu-lar field of study, science and technology studies, con-sumer culture studies, and design studies offer a long trajectory of research into the processes through which technologies come to life in relation to certain 'designerly ways of knowing'.[28] Within these fields of research, it has been concluded that technologies are often created within particular social and cultural con-texts, and with distinct imagined user-groups in mind.[1,29–32] Hereby designs are invested with certain ideolo-gies, values and assumptions,[29,31,33–35] and depend on a whole range of processes, representations and regula-tions at various societal levels.[36–39]

In the specific case of self-tracking technologies, the common idea that people require sensors and continuous access to algorithmically processed data has been related to the emergent 'sensor society'[40] where the widespread late modern 'ontological insecurity'[41] is assumed to become technologically stabilised in and through a 'time-series self'.[42, 43] Self-tracking technologies in such a social context build on a particular epistemology that, as Dow Schüll remarks, 'concerns itself with time-series data rather than immediate experience; correlation rather than causation; patterns rather than events.'[43] This suggests that self-tracking technologies need to be further explored as part and parcel of the late modern social contexts from which they emerge, and in which they are used. Dow Schüll makes an effort to establish such a connection, and argues for an understanding of self-tracking technologies as helping users to shape their lives by pointing out a direction through the nearly endless array of choices in contemporary society. Along with the waning of traditional structures and institutions, these technologies and their built-in algorithms aspire to guide users through their everyday life in a highly individualised and personalised manner.[23, 44] The algorithms are built around models of behaviour that are used to predict and indeed affect how events, actions and everyday contingencies become entangled in future-making practices.[45] Dow Schüll argues that wearable devices are marketed as 'digital compasses whose continuous tracking capacities and big-data analytics can help consumers navigate the field of everyday choice making'[42] Furthermore, she maintains that self-tracking industries rely on the insecurities of late modern society when imagining potential users to be 'unsure whether to trust their own senses, desires and intuitions as they make mundane yet vital choices'.[42] This way, self-tracking devices are marketed as a means to bridge the 'epistemological lacuna' that divides 'the modern body and the knowing and acting self'.[46] As several researchers have pointed out, it must be acknowledged that the meaning of technologies of this kind 'is shaped by, and simultaneously shapes or reshapes our understandings and our knowledge of our bodies and its processes in specific ways'.[47] Although users do not interact with these technologies and their algorithmic advice as, 'blind, mindless dupes, but as active participants',[48] it is important to note that their participation takes place in mediated spaces where only certain forms of data are visible or presented as meaningful.[38, 49] This way, algorithms are always deeply embedded in everyday life as structures or processes that support and reinforce certain visions of the social world.[1, 50, 51] This state of affairs becomes particularly evident in the case of self-tracking technologies since their built-in algorithms are not only future-oriented, but also involve a set of assumptions regarding users' minds, bodies and lives.

Methods and materials

This article builds on a discourse analysis of publicly available online materials in which representatives from the Moodmetric and the ŌURA companies explain and make sense of the devices' imagined functionality, and value for potential and/or existing users. The materials consist of blog posts, promotional videos and other marketing materials, along with user guides as well as a series of video recordings in which company representatives present and discuss their products. Following the principles of netnography, the materials in this study were systematically collected from publicly available online sources (such as the companies' webpages and YouTube channels) that are generally aimed at marketing the products to a broad audience (or, in the case of user guides, to explain the products' functionality to existing users).[52, 53] Since all of these materials are part of the companies' marketing strategies and social media presence, they are regarded as not only official presentations of the products, but also as naturally occurring empirical materials. Using this kind of empirical material involves certain ethical considerations regarding anonymity. Since the materials are publicly available online, and are used as part of the two companies' official marketing strategies, none of the persons appearing in these materials have been anonymised. In so doing, full credits are given to the involved representatives from the companies in order to respect their views, beliefs, and understandings, while acknowledging that these materials have been produced and circulated online with the purpose to inform about the products in question.[54, 55]

Although this study draws on wide range of materials of different kinds, only some of these materials are cited below in order to create a narrative that scrutinises and discusses how these devices are being imagined. This procedure is motivated by the fact that the devices are described and discussed in very similar ways across the different sources. The process of analysis started with initial explorative readings of the materials that allowed for a general understanding of the content to develop. During the initial readings of the materials it became clear that the same arguments, words, metaphors and phrases emerged over and over again, and the recurring narratives seemed to be, if not rehearsed, then at least firmly bound up with an interpretative repertoire. The analysis of the materials continued in a structured and systematic manner, with careful readings and re-readings of the materials, with the aim of establishing an understanding of this particular repertoire, while paying careful attention to how the relationship between human senses and digital sensors was framed. Adopting an interpretative frame that draws on discourse analysis, this article strives at relating

the interpretative repertoire that emerges in the online materials to general social and discursive processes.[56,57] Such an approach assumes that the explanatory accounts of these devices draw on available discursive resources in order to become meaningful, and most importantly the imagined relationship between technological advancement and the temporalities of late modern society. Particular attention has thus been paid to how certain discursive resources have been deployed in presentations and explanations of the imagined value and functionality of these devices.[58,59] The interpretive repertoire that emerge in the materials provides a basis for understanding the interrelationship between the technical affordances of the devices, the meanings attributed to the sensed data and the discursive framings of why these devices are supposed to make sense and become meaningful for users. A multi-dimensional understanding of this kind allows for analysis that goes beyond the specificities of the devices and instead regards them as cultural objects deeply intertwined with the structures and temporalities of late modern society.

Results

The first encounter with the Moodmetric and the ŌURA was made at the 2015 Biohacker Summit in Helsinki, Finland; a large event where 'the art and science of optimising your performance and wellbeing with biological and technological tools' were promoted and discussed on different levels. Under the heading 'better, faster, stronger', representatives from start-up companies as well as established health professionals and members of the quantified self-movement among others gathered for discussions and exhibitions of self-optimising technologies and practices. The event was said to be the place to encounter 'what is mainstream tomorrow'.[60] During the event, Niina Venho, at Moodmetric[61] and Petteri Lahtela, at ŌURA[62] participated in a panel called 'the future of wearables for health and wellness'.[63] Among other materials, the conversations that emerged during this panel discussion will be used as examples in the following where the two devices are presented and analysed.

The Moodmetric

The Moodmetric was launched in 2014, at the annual international start-up and investor event Slush in Helsinki, Finland.[64] Niina Venho, and her colleague Henry Rimminen, who was dressed in an excessive amount of wearable devices, entered the stage together to perform a sales pitch. As part of their performance, Rimminen raised his arms showing a chest strap and numerous wristbands, while explaining to Venho,

who was looking at him with curiosity, that this is what wearables look like. 'Everybody should be measuring themselves and improving themselves', he explained while adding that wearable devices generally encourage their users to engage in some sort of physical activity. The Moodmetric is a different kind of device and to explain why this is the case, Venho instructs a technician to turn on an infomercial. On the large screen, the audience is presented with a pair of hands taking out a Moodmetric ring from a jewellery box. A woman is sitting down on a sofa, and despite being seemingly relaxed, she checks her mood in the Moodmetric app. She looks happy and content. Various characteristics of the Moodmetric ring are demonstrated through moving images from what seems to be a normatively heterosexual family life around the kitchen table, along with partners hugging heartily, pale environments from a yoga studio and walks in the autumn forests of Finland. All of these images are accompanied by a Moodmetric meter showing the current 'emotional state' of the wearer. A speaker's voice explains what this device is all about:

> Moodmetric is the world's smallest wearable mood monitor, integrating with your smartphone to give detailed feedback on your emotional energy and helping you to successfully manage your emotional world. Designed as a beautiful piece of jewellery in its own right, the ring quietly records the ups and downs of your busy life, and presents information via an app where you can track, plan, share and train to help improve your emotional intelligence.

The scene quickly shifts and psychotherapist Mikael Saarinen is given the opportunity to share his expertise and to frame the Moodmetric through a more scientific language. He follows up on what was said about emotional intelligence and explains that the term is about 'how you handle your emotions, how you regulate them, how you express them, and how well you understand the dynamics of your own emotions'. Rimminen explains that the built-in technology and sensors measure the 'reactions of your autonomous nervous system by detecting small changes in your skin conductance'. The Moodmetric is portrayed as a 'piece of top Finnish jewellery design' that 'is not just for show' but rather, as Venho says, a device that 'gives you back something, it takes care of you'. She continues to present different affordances of the ring and explains that the ring 'helps you to increase your capacity and to reduce your stress levels, to cope with difficult situations in life and helps you to form better social relationships'. Rimminen adds that a better 'self-knowledge' together with an increased 'emotional intelligence' can improve nearly all areas of one's personal life. Venho agrees and concludes in a personal way saying that 'me and my

emotions and my beautiful ring, they really do much together.'

The Moodmetric is marketed with the trademark slogan 'Master your mind', and it promises to be the 'simplest solution to measure stress and recovery'.[61] These aspirations were evident when Venho participated in the above-mentioned panel discussion at the 2015 Biohacker Summit. During the entire session, she had a tablet on her lap showing the audience her current mood level as it was measured in real-time by the Moodmetric ring. She was asked by the moderator to present one slide about her product and said:

> Moodmetric gives live data to you on your emotional level, whether you are feeling high, intense, stressed, anxious or you are calm. And now during this event you can follow my numbers going up and down, mostly up. /.../ We offer laboratory-level technology to measure emotional arousal. What are the reactions, how you feel, can you meditate well, that's what we offer.

The slide that was displayed during her presentation deviated slightly from her words but nevertheless, it revealed a set of notions that were neatly packed in bullet points. The first bullet explained that '[w]hat makes one tick, is now obvious' since the Moodmetric offers 'a unique possibility to monitor and understand emotions'. The company had noticed that there was no 'wearable device to measure emotional level with live data' and 'very few biosensors designed for sporadic or one-off use'. For these reasons, the Moodmetric was created and it is said to provide users with a 'possibility to see [an] instant reading of their mind', be it during short periods of time or a more long-term 'emotion follow up'. The ring is supposed to continuously record different phases of everyday life and provide feedback to users on how to 'track, plan, share and train to help improve [their] emotional intelligence.' The device is said to have three ways of being used: users can log their emotional past, track their emotional levels and learn to calm their mind. In the accompanying app, users will find a real-time reading of their stress levels that are visualised through what they call the 'Moodmetric index' that is a score ranging from 0 to 100 that is supposed to indicate the current stress or calmness level.[65] Using the measurements from the Moodmetric, it is argued that users can develop an understanding of themselves, 'whether it be the clear links between physical and mental health, improving your interactions with others or more personal focus on mindfulness and wellbeing, Moodmetric helps you understand and balance the precious resource of your emotional energy'.

The Moodmetric is presented as an instrument that can help users understand themselves in times and situations that are busy to such a degree that they cannot trust their own experiences. As have been pointed out in the above, the device is assumed to 'take care' of users, and to help them understand themselves in their 'busy' lives. The data feed from the device is presented as a direct reading of the users' minds and is considered to be both accurate and reassuring in times where external factors tend to disturb embodied experiences. Given that the imagery used to frame the device often points at moments and situations where life should be slow and support mindful activities, it is clear that this device is crucially related to time management. There is an assumption in these presentations that life in contemporary society is moving so fast that it is nearly impossible to trust one's senses and experiences. The body, as it seems, is simply too slow to keep up with an increasingly accelerating society, and needs technological assistance to keep track of how it reacts to its surroundings.

The ŌURA

In a promotional video, the ŌURA ring is described through images and videos showing the daily lives of four people in different situations. From waking up and stretching a seemingly well built back before having glass of orange juice, buttoning a white collared shirt and heading to the metro, or hailing a taxi and then on to work, yoga practice, family life and, what seems to be a spontaneous dance between a heterosexual couple on a waterfront pavement. The ŌURA ring is shown only occasionally in the video and it tends to blend smoothly with the seemingly upper-middle-class lifestyle depicted in the footage. A speaker's voice accompanies the imagery and explains what 'the world's first wellness ring and app' can do:

> The ŌURA ring combines insightful design and ultimate wearing comfort with top-tier science and technology. With ŌURA, you learn how your activity and lifestyle choices affect your sleep and how the quality of the sleep affects your ability to perform during the day. ŌURA is a ring-sized wellness computer that measures your pulse wave form and the exact time between your heart beats. From these, it calculates your heart rate, respiration rate, and other parameters necessary for precise analysis of your body signals. The ŌURA ring detects even the slightest movement and monitors changes in your body temperature. The ring automatically knows when you go to sleep and when you wake up, when you are active, and when you are sitting. The ŌURA app tells you what health benefits you get from specific activities and gives you actionable recommendations on how you can improve your sleep and adjust daily activity towards better balance and performance. You know when to challenge yourself,

and when to rest. You can use ŌURA anywhere, any-time. It works without getting in your way. Incredibly easy to use, and comfortable.

The imagined functionality of the ŌURA ring was fur-ther explained during the above-mentioned panel dis-cussion where Chief Executive Officer, Petteri Lahtela turned to the audience and explained that 'this ring helps you to improve your sleep' and based on an assessment of daily activities it 'tells how well you have recharged during your sleep'. These two dimen-sions are then used as routes to 'eventually improve your performance'. Subsequently, he explains some of the reasons behind designing the ŌURA while showing a slide with a structure similar to the one from Moodmetric that we were presented with earlier:

> We wanted to solve something meaningful, which is that we wanted to provide a solution so that you can simply understand how well you recover from your daily mental and physical load. And then, what you can do to improve your performance through that. So, therefore we developed this ring where we stressed three different things: design, wearing comfort to make it really convenient to wear, and then to access rich data and also long data so that we can get long-term understanding [of] what happens in our body. And then the third thing is that we provide actionable guidance − what you can do to help yourself − to improve your sleep, and perform better.

The main headline on the slide stands out in its forceful simplicity when presenting the ŌURA as a means to 'Improve sleep. Adjust activity. Perform better.' According to the presentation given by Lahtela, before the ŌURA was introduced, there was 'no simple and comfortable way to know how to improve recovery from daily mental and physical load to main-tain good performance' and also be provided with 'actionable and personalised insights.' In one of the company's promotional videos, these notions are fur-ther discussed by Hannu Kinnunen, Chief Scientific Officer at ŌURA. He demonstrates the ŌURA app by flipping through the various tabs and pages as if it was a dashboard to the body being measured and says that 'the detailed view shows sleep architecture, sleep patterns and long-term trends.' Furthermore, he explains that the ŌURA helps users to adjust their daily activity levels based on how they have slept and 'recovered'. Kinnunen explains that the 'ŌURA uses a Readiness Score to tell you which days are good for challenging yourself, and which days are better for rest and recovery'. The 'Readiness Score' lies at the heart of the ŌURA technology and how it transforms the data registered by sensors into understandable and actionable data. In one of the support documents, this score is described as follows:

> Ranging from 0−100%, the Readiness Score is a simple measure designed to help you identify days that are ideal for challenging yourself, and those that are better for taking it easy. The score, which is displayed as a percentage, is generated using all of the sensor data, physiological signals, sleep and activity patterns that are monitored by ŌURA. /.../ A Readiness Score above 85% indicates that you're well recovered. A score below 70% usually means that an essential Readiness Contributor, such as your body temperature or previous night's sleep, falls outside your normal range, or clearly differs from recommended, science-based values.

As the quote above indicates, this score is calculated through a series of parameters (or Readiness Contributors) that are supposed to indicate the overall readiness of the user. In the case of some parameters, it is described in detail what score is needed for the par-ameter to contribute to the score at a maximum (the sleep score needs to reach a staggering 88% for instance). Through these parameters the users' bodies are described and interpreted in a mechanistic way, as if the body was a machine navigating through its sur-roundings without external input.

The ŌURA is presented as a device that not only becomes entangled with the users' bodies but rather emplaced in the background of their everyday lives. With an alleged precision it is assumed to calculate bodily data emissions and decipher their meaning to help users understand themselves. On one hand, poten-tial users of the ŌURA are depicted as machine-like entities that can be fine tuned, optimised and digitally understood. On the other hand, they are understood as vulnerable beings in need of assistance, advice and actionable guidance. It is clear that the ŌURA only makes sense in a social context where external factors make it difficult for people to trust their personal experiences, and where they carefully have to strive at keeping a 'balance' in their lives. The idea of finding a balance is key to the ŌURA since it points towards a difference in the temporalities of the body and the sur-rounding social and physical life. It seems to be the case that external events are assumed to outpace the internal life of users, and that the ŌURA becomes an interpret-ative mechanism that tells users when to slow down in a life that is increasingly speeding up.

In place of embodied experiences

As we have seen in the above, the efforts to make sense of the products through various forms of materials

rarely discuss whether the devices serve a purpose apart from providing measurements that could be self-reflexively used.[66] Rather, it is often assumed that users, to some extent, are disconnected from their bodies and minds to a degree that requires technological assistance. Instead of acknowledging a complex experiential interplay between mind, body, and social contexts as the basis for human existence, a unidirectional relationship between individual and society is often assumed. Such an understanding supposes that body and mind react to external stimuli yet lack the ability to make sense of their meaning. Despite the recurring idea that these devices can assist users in learning about themselves and to take command of their lives, the human body is most often presented as incapable to decipher embodied experiences. This notion was further discussed during the panel discussion where the moderator became increasingly annoyed listening to the presentations of Venho and Lahtela. Suddenly he threw the following question at the participants: 'Why should I know what my feelings are? Is it not a little bit, not so natural, you know, to have a ring on your finger to tell you how you feel?' Both Venho and Lahtela seemed to agree that something is missing in either the individual sensory register or at least our general possibility to effectively decode and understand the various emotions and experiences in the complex swirls and twirls of everyday life in contemporary society. The moderator was obviously not fully satisfied with the idea that sensors can provide a sensory experience, or comfort perhaps, that is more reliable and favourable than the human senses. Challenging the participants' responses, he elaborated the question: 'So is your sales argument in a way that people can't recognise their own feelings?'

Venho's mood meter quickly raised to a 43, and she explained that one of Moodmetric's goals is to help 'people to learn about their mind and emotions'. Wearing the ring allows users to know when they are stressed and to find out about the moments that make them calm, she maintains and points to the possibility for users to engage in a process of learning in which senses and sensors become entangled. Her argument is that the majority of people have difficulties in recognising their feelings:

> You think you feel something but it's something else actually. But most people understand: yes, I'm really stressed now, but most people don't know what to do about it. That's why people go on long leave, because they can't handle it all at work.

The moderator was seemingly confused by these explanations and asked: 'Can't you just know? When I wake up in the morning, I exactly know when I'm ready and when I'm not, and it is typically a function of how well the kids have been sleeping.' Lahtela quickly responds with a slightly nervous chuckling:

> That's a good point. That's the fact of life for all of us. So, most of us don't know what's happening in our body. Eh, really, so it's not easy to follow what kind of changes, physiologically are happening, because people are so adaptive. For example, sleep depth over for example several days. It has a huge effect on your physiology, but you lose to, feel, lose to eh, connect to that feeling. So you think that you are performing well, but it seems like you're drunk, basically.

In a similar vein, Venho relates the need to use wearables of this kind to the increasingly hectic life of urban settings and the temporalities of late modern society, by arguing that people have lost their 'connection with nature'. The social conditions under which people in contemporary society live do not allow for a particularly well-developed self-knowledge and provides insufficient means to solve 'mind problems', as Venho puts it. The sensors and the associated data processing provide a feature that is apparently needed in our times, namely the possibility to know, as she puts it, 'how hectic it is for you and find ways to wind down'. These devices are assumed to, as Lahtela comments, allow users to 'connect with their body better to build up their own understanding' of how, for instance, lifestyle choices affect their bodies over time. In fact, the ŌURA is presented as a means to 'open a window to the body' that helps the user in seeing, tracking, analysing and understanding changes over time. Talking about the importance of rich data and to focus on what is 'happening in your body', Lahtela argues that these devices should do more than simply telling 'how much energy you have wasted with your steps', for instance, and instead illuminate 'how your body is reacting to that and what would be good target for your activity today based on how well you have slept'. The same kind of argument resurfaces in Venho's words when further developing the idea that the Moodmetric should help users learn something about themselves. She explains that she wants 'people to know something more' and hopes that her product could 'help people find out something about their minds'. Interestingly, there is a tension here between saying 'what' user should learn and some sort of general unspecified learning outcome of the uses of these devices, that most likely cannot be explained better than when Venho says 'you might notice something' from using these devices. As devices that are assumed to provide nearly divinatory insights, the ŌURA and the Moodmetric rely on an understanding of the human body and mind as difficult to understand without

technological assistance. This view of the human as both machine-like and impenetrable is often grounded in a view of external factors as conditioning self-knowledge and reflexivity. They fall back on an idea that contemporary society is intense and speeded up to such an extent that there are no means available, as Venho said in the above, to solve certain 'mind problems'.

Discussion

The above presentations of the Moodmetric and ŌURA rings both illuminate how the promises of wearable sensors are imagined from the perspective of producers and indicate that something is believed to be missing from the human embodied sensory experience. Be it that they measure emotional intelligence or physical and mental recovery through the allegedly exact indexed measurements, they both draw on data produced through an algorithmic concoction of data points derived from finger-worn sensors of different kinds. Although the empirical materials mainly consist of presentations aimed at commercially marketing the products, they also involve moments of uncertainty where the company representatives try to make sense of the products they offer. When making sense of the sensors and the algorithms that process the registered data, they most often return to the idea that these devices can assist users in learning about themselves and to gain knowledge that is otherwise difficult or impossible to achieve in other ways. The reason behind the assumed inability to gain such knowledge experientially is most often implicitly located outside of the user by referring to the intense and hectic life in contemporary society or by claiming that reflexively knowing and feeling oneself in and through the body is time-consuming and not sufficiently precise.

As has been pointed out in the above, it is very rare that any specific explanations are given as to why these technologies are needed. Instead, there are implicit assumptions of how these technologies can provide a remedy for a broken relationship between individual and society, as well as an increasing inability to trust embodied experiences due to the accelerated pace of life. It is frequently suggested in the empirical materials, albeit sometimes in quite subtle ways, that the sensorial capacities of the human body are distorted through the effects of late modernity. These technologies are said to help users with handling or perhaps overcoming the effects of late modern society by providing insights on what they 'actually' feel and what is 'actually' going on in their bodies and minds. The devices are supposed to help users optimise themselves and allow them to focus on what is important in life by providing feedback based on time-series of different kinds. This implies that the devices aim at providing the benefits of a slow life but without losing momentum. In light of Rosa's argument, it seems that these devices result from the social acceleration processes that characterise late modern society and this insight challenges the idea of self-tracking as a useful tool to measure ourselves in order to increase our self-understandings and as a means to make everyday life more liveable. As have been discussed in the examples above, both the ŌURA and the Moodmetric claim to measure what would otherwise be regarded as prime examples of subjective feelings or experiences. Feeling insecure or perhaps stressed in particular situations or being tired during periods of intense work are both experiences that, by the very definition of the term, are both produced and interpreted in and through the body as such. However, the designs of the two devices being studied here are underpinned by an assumption that there are dimensions of our lives, bodies and experiences that cannot be easily accessed. It is assumed that our ability to know and understand ourselves and our feelings and experiences is limited. Bodily experiences are thus positioned as remote, intangible and perhaps even impossible to make sense of without proper guidance from a technology that interprets, categorises and visualises these experiences in ways through which they are rendered measurable, precise and comparable. In addition to these ideas, there seems to be quite a fundamental tension here between the body as an object for accurate metrics and quantification, on the hand, and the body as a complex and indeed ambiguous entity, on the other.

The sensors that have been studied here strive at providing a sense of comfort through speeding up experiences and presenting them as precise data that is comparable over time. The wellbeing that is thereby supposed to appear is very much a question of feeling assured that one's experiences have been technologically validated through unquestionable and precise data. What happens, however, is that the experiential and emotional domain of our lives become interwoven with the general processes of social acceleration and thus lead to a further accelerated pace of life. The examples presented above often fall back on an idea of life and society as being increasingly accelerated, followed by an argument that this acceleration involves a general sense of alienation that, in turn, can be overcome through the use of technological devices that, curiously enough, speed up things even further instead of trying to slow down the general pace of social change. Both of these devices rely on an understanding of body and mind as objects that can instantly be measured as long as the correct metrics and sensors are in place. The reason for doing so is often framed in terms of optimisation, but it must be acknowledged that such an optimisation is inherently bound up with a certain

temporality. Becoming optimised seems to be a question of avoiding the unnecessary delay that the senses and bodily experiences would add to the equation. An optimised body is a timely and efficient body that enjoys the benefits from a slow life, but without losing momentum.

Conclusion

At the outset of this article, it was said that the devices that have been studied here claim to provide a wearable dashboard to the body and mind, through which it is assumed that extensive knowledge can be gained about our bodies and minds. The Moodmetric and the ŌURA are devices with sensors that are consistently described as better, more trustworthy and offering a raised level of exactness than the human senses. It is commonly argued, however implicit, that the human senses are not sufficiently reliable and thus in need of digitally mediated support. The devices and their claimed ability to measure emotions, recovery and other forms of sensory data are not only characterised by a certain exactness but also with an imagined possibility to foresee and handle the futures and contingencies of everyday life. The materials in this study express an understanding of the technologies as allowing for an acceleration and intensification of the sensory experiences when being mediated and interpreted through these devices. Health and wellbeing are thereby provided through a speeding up of the otherwise slow, by making precise the otherwise vague, and by making digital what is otherwise deeply analogue. As has been argued in the above, the technological acceleration of the human senses might have undesired effects, since such an acceleration tends to go hand-in-hand with an increased pace of life and thus further reinforce the modern sense of being disconnected from oneself.

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