



## Article

# Pedagogy as Possibility: Health Interventions as Digital Openness

Vaikke Fors <sup>1,\*</sup> and Sarah Pink <sup>2</sup><sup>1</sup> School of Information Technology, Halmstad University, Box 823, 301 18 Halmstad, Sweden<sup>2</sup> School of Media and Communications, RMIT University, GPO Box 2476, VIC 3001 Melbourne, Australia; sarah.pink@rmit.edu.au

\* Correspondence: vaikke.fors@hh.se; Tel.: +46-730-724-636

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**Abstract:** In this article we propose an approach to digital health tracking technologies that draws on design anthropology. This entails re-thinking the pedagogical importance of personal data as lying in how they participate in the constitution of new possibilities that enable people to learn about, and configure, their everyday health in new ways. There have been two dominant strands in traditional debates in the field of pedagogy: one that refers to processes of teaching people to do things in particular ways; and another that seeks to enable learning. The first of these corresponds with existing understandings of self-tracking technologies as either unsuccessful behavioural change devices, or as providing solutions to problems that do not necessarily exist. When seen as such, self-tracking technologies inevitably fail as forms of intervention towards better health. In this article we investigate what happens when we take the second strand—the notion of enabling learning as an incremental and emergent process—seriously as a mode of intervention towards health through self-tracking technologies. We show how such a shift in pedagogical understanding of the routes to knowing these technologies offer creates opportunities to move beyond simplistic ideas of behavioural change as the main application of digital body monitoring in everyday life. In what follows, we first demonstrate how the disjunctures that arise from this context emerge. We then outline a critical response to how learning through life-tracking has been conceptualised in research in health and human-computer interaction research. We offer an alternative response by drawing on a processual theory of learning and recent and emerging research in sociology, media studies, anthropology, and cognate disciplines. Then, drawing on ethnographic research, we argue for understanding learning through the production of personal data as involving emplaced and non-representational routes to knowing. This, we propose, requires a corresponding rethinking of the epistemological status of personal data and what kind of knowledge it can be claimed to produce. Finally, we take up the implications of this and advance the discussion through a design anthropological approach, through which we refigure the interventional potential of such technologies as lying in their capacity to create possibilities for experiential, and often unspoken, ways of embodied and emplaced knowing.

**Keywords:** pedagogy; design ethnography; health technology; embodied learning; data epistemology

## 1. Introduction

In this article we propose an approach to digital health tracking technologies that draws on design anthropology theory and methodology. This entails re-thinking the pedagogical importance of personal data as lying in how they participate in the constitution of new possibilities that enable people to learn about, and configure, their everyday health in new ways.

There have been two dominant strands in traditional debates in the field of pedagogy: one that refers to processes of teaching people to do things in particular ways, and another that seeks to enable

learning. The first of these corresponds with existing understandings of self-tracking technologies as either unsuccessful behavioural change devices or as providing solutions to problems that do not necessarily exist. When seen as such, self-tracking technologies inevitably fail as forms of intervention towards better health. In this article we investigate what happens when we take the second strand—the notion of enabling learning as an incremental and emergent process—seriously as a mode of intervention towards health through self-tracking technologies (see for example (Lupton 2017; Pink et al. 2017a)). We show how such a shift in pedagogical understanding of the routes to knowing these technologies offer creates opportunities to move beyond simplistic ideas of behavioural change as the main application of digital body monitoring in everyday life.

In what follows, we first demonstrate how the disjunctures that arise from this context emerge. We then outline a critical response to how learning through life-tracking has been conceptualised in research in health and human-computer interaction research. We offer an alternative response by drawing on a processual theory of learning and recent and emerging research in sociology, media studies, anthropology, and cognate disciplines. Then, drawing on ethnographic research, we argue for understanding learning through the production of personal data as involving emplaced and non-representational routes to knowing. This, we propose, requires a corresponding rethinking of the epistemological status of personal data and what kind of knowledge it can be claimed to produce. To conclude, we take up the implications of this and advance the discussion through a design anthropological approach, through which we refigure the interventional potential of such technologies as lying in their capacity to create possibilities for experiential, and often unspoken, methods of embodied and emplaced knowing, rather than solutions for societal problems.

## 2. Disjunctures

Self-tracking with wearable devices often involves quite different expectations by consumers and producers of what the produced data can do and what insights it could possibly provide. One consequence of this mismatch of expectations is shown statistically: people tend to quit using the devices after a certain amount of time. In 2014, Endeavour Partners' research on self-tracking revealed the "dirty secret of wearables" which is that "more than half of U.S. consumers who have owned a modern activity tracker no longer use it. A third of U.S. consumers who have owned one stopped using the device within six months of receiving it." (Endeavour Partners 2014, p. 4). These tendencies have been discussed in numerous blog posts. One example is Carolyn Thomas who writes in her blogpost "Self-tracking device? Got it. Tried it. Ditched it" about how she could not see that her Fitbit tracker gave her any relevant information in addition to what she already knew. By comparing her own account of her Saturday morning with the data produced by her Fitbit during the same period of time she came to the following conclusion:

*Will knowing what my Saturday morning looks like on a Fitbit graph change at all what I do or how I do it on Saturdays? Will I now start jogging through the farmers' market to try to boost that moderate intensity walk up to high intensity? Will I stop buying all those heavy veggies that seem to slow me down on the walk home?*

*No. No. And No. (Thomas 2014).*

This example reveals the disjuncture between the expectations of the designed data-world produced by a Fitbit and the lived experience of the performed activities of the user, for whom, in this instance, this mismatch became too great to be reconciled. The ideas that self-tracking technologies might tell us something additional to what we might already know, as in the example of Carolyn Thomas's blog post, or the idea that they might provide us with information and awareness about our activities that will lead to health-related behavioural change, follow the same logic: that new knowledge that we can somehow utilise will be produced *about us* by such technologies.

Our work is connected to an emerging research agenda that focuses on these disjunctures by critically investigating the design intentions and promotion of body monitoring devices. Work in

this field includes analysis of how pedagogical imperatives are embedded in the design, promotion, and marketing of body monitoring devices (Berg 2017; Lupton 2015; Schüll 2016), how historical and socio-technological concepts and ideas guide contemporary body monitoring communities (Ruckenstein and Pantzar 2015), and critical perspectives on the development of digital health conceptualised as public pedagogy (Rich and Miah 2014). This research strand achieves this through studies of people's actual use of body monitoring devices in their everyday life to create deeper understandings about the future of these technologies (see for example (Nafus 2016; Lupton 2016)). In this article we contribute to this field by calling for a shift in perspective, which re-thinks the pedagogical elements of self-tracking, away from the question of what we might *know about* our activities through self-tracking technologies, towards that of what we might *learn with* them. This means taking a different pedagogical lens, which explores how self-tracking technologies can become resources for learning within our lives (not about them) and that highlights what it is that we actually learn when using them. As we elaborate below, we advocate for the use of learning theory that articulates how knowing is embodied (Merleau-Ponty 1962), emplaced (Howes 2005), situated in everyday activities (Lave and Wenger 1991), and part of how these activities are perceived (Ingold 2000). We argue that these theories are helpful for understanding the disjuncture between the built-in intentions in the devices and their actual use, because they acknowledge how the data that is produced by health technologies is not new information for the user, but rather creates new routes for the users' already-existing embodied knowledge to develop.

Design anthropology methodology is particularly pertinent for such an examination precisely because ethnography, as interpreted in this field, involves similarly doing research *with*, not *about*, research participants and sees ethnography as a process of learning together (Ingold 2008). Moreover, as we return to in the final section of this article, design anthropologists regard collaborations between anthropologists and designers as a process of working *with*, rather than *about* design. This means that in such an approach ethnography is not seen simply as a method of finding out about society and users in order to inform the making of better designs. Instead, in the case of our discussion here, it implies the benefits of closer integration of theories of learning and knowing into the theory and practice of technology and of the use of technologies for health interventions.

### 3. Personal Data Epistemologies

To understand why self-tracking technologies have often been considered unsuccessful for improving health, it is necessary to understand how they have been implicated in behavioural change interventions, and the epistemologies that inform these approaches. It is, we argue, in the approach and ideas that inform it that the failure to engage self-tracking technologies for health improvement lies. As reviewed elsewhere (Lomborg and Frandsen 2015; Lupton 2016), existing research developed at the intersection of computer science and health studies treats personal self-tracking data as already having predetermined meaning and value, which can be mobilised in order to change the user's behaviour. The concerns in this field of research, therefore, have two key foci when it comes to user-oriented studies: the deployment of self-tracking for improving health through lifestyle interventions (see for example Turner-McGrievy et al. 2013; Wang et al. 2014); and how self-tracking technologies might be designed to motivate behaviour change on the basis of particular user experiences (see for example Kranza et al. 2013).

The pedagogical ideas that underpin body monitoring as a tool for people to change their behaviours into healthier lifestyles in such ways that rest on the belief that learning is achieved through the production of objective bodily data that then can be re-configured into information through technologically-mediated representations for the user to reflect upon and thereby build self-knowledge. In these lines of research, body monitoring devices are regarded in this process as neutral observers that keep track of bodily activity, and the 'problem' of users not being able to, or not being interested in, interpreting personal data is addressed with a technology-centred approach. The solution is framed as a matter of providing the best and the most user-friendly human-technology

interface (Li et al. 2010; Rapp and Cena 2016). The kinds of pedagogies built into the devices are evident in, for instance, Li et al.'s (2010) five-stage model of how to understand how people make sense and meaning of life-tracking. Here, meaning-making is described as happening as “reflection” and “action” at stages four/five after people have prepared how they will collect data, gather data, and integrate and transform the data. That is, personal data is understood as nothing more than pre-reflective evidence of how the body has functioned and moved around during physical activity. Within this model learning can only be the cognitive process of a rational human actor, who uses information *about* their body and acts on it. Generally, in informatics and human–computer interaction (HCI) research, about “what people decide to track using consumer products, what trackers they decide to use, and how they use them over days, weeks, months, and potentially lifetimes remains understudied” (Rooksby et al. 2014). Those that do take such issues forward tend to focus on questions of human agency (Rooksby et al. 2014) or motivation (see for example (Stragier et al. 2013)), therefore, still leaving a theoretical gulf between the notions of learning implied by the logics of such approaches and pedagogical perspectives learning as something that we do *with* technologies.

Recently some scholars have pushed this perspective further to account for the affective and lived aspects of self-tracking technologies. For example, media scholars Lomborg and Frandsen (2015) see meaning-making in self-tracking as involving the users’ cognitive and affective capacities through a focus on the communicative affordances of self-tracking. Rooksby et al. have suggested approaching personal data as *lived* informatics, using Ingold’s concept of wayfaring (Ingold 2007) to see self-tracking as a mode of dwelling in data a ‘wayfaring in information’ (Rooksby et al. 2014, p. 1171). However, while these works begin to acknowledge the affective and processual elements of living with data, their approach is still imbued in notions of learning as cognitive and mental processing of personal data into knowledge. Such approaches are notably disembodied and, as we show below, attention to the sensorial, embodied, and emplaced ways in which we learn with self-tracking is fundamental to understanding how and where it becomes meaningful and valued in everyday life.

In the next section we elaborate on learning perspectives that move beyond cognitive ideas of learning and its focus on the acquisition of propositional knowledge through data. Such approaches, instead, highlight embodied and emplaced dimensions of learning and, thus, can be used to further investigate how health pedagogies can be formed around people’s life-based learning strategies with digital body-monitoring devices. By doing this, we contribute to a growing body of research that both situates the use of digital technology devices in relation to the body, and investigates how this use becomes part of people’s ongoing and ever-changing embodied relationship with the digital-material and experiential surroundings (see for example (Fors 2015; Lupton 2017; Pink et al. 2016a)). This involves engaging a processual theory of learning that draws on Merleau-Ponty’s (1962) notion of knowledge as an embodied way of being-in-the-world. This perspective informs our ethnographic approach to understanding people as sensory and emplaced learners (see for example (Fors et al. 2013)) whose ways of learning, knowing, and moving through the world are entangled with their uses of digital body monitoring devices and the environments of which people and technologies are both part. Here, learning and knowing become incremental, contingent, and situated, rather than predetermined or possible to detach from the knower.

#### 4. Ethnographies of Learning *with* Self-Tracking

In this article we draw on examples from ethnographic research undertaken in Sweden by Vaike Fors, although these examples were part of a wider ethnographic study by both authors across Australia and Sweden, which supports the insights that we demonstrate here (see for example (Pink and Fors 2017a, 2017b, Pink et al. 2017a)). In total we undertook research with sixteen participants and we also conducted an autoethnographic study while wearing activity wristbands for one month each (Pink et al. 2017b). The autoethnography played two roles in our work: to produce first-hand accounts of the experience of self-tracking and the learning this entailed, and to enable us to empathetically apprehend the experiences of participants in our research and, as such, to collaborate

with them in the constitution and interpretation of affective and sensory embodied experiences of self-tracking. This meant we developed a mode of doing ethnography *with* participants (Ingold 2008) which sees ethnographic knowing and learning as a shared and empathetic process, between researcher and participant, that seeks to understand both sensory and verbalised forms of experience (Pink 2015). Our encounters with participants involved two modes of learning with them: sensory ethnography interviews (Pink 2015), which explored participants' biographical, present, and imagined future experiences, activities, and feelings around self-tracking and data; when they agreed, participants took us on video recorded 'tours' of their technologies and apps, including, in some cases, demonstrations of their use. These enabled us to gain a deeper understanding of their embodied, sensory, and affective experiences of the devices, the apps and data visualisations, and how these were implicated in participants' situatedness in their everyday environments. These encounters also generated discussions with participants that are cited below in which they express the sentiments and meanings that emerged from their engagements with self-tracking technologies. In this sense we saw and sought to imagine a sensory, as well as a verbalised, sense of their uses of the technologies, and the processes through which they learned with them as embodied and 'emplaced' (Howes 2005). That is to understand these as being part of a mind-body-environment relationship, which is continually shifting in relation to everyday movement through the world. Learning is a crucial element of this for both the ethnographer and participant, since this view of ethnography sees both researcher and participant as moving through everyday worlds learning incrementally as they go (see Pink 2015 for an expanded discussion of this).

Such an approach enabled us to explain why the disjunctures that we outlined in the previous section come about. Specifically, they showed us how, when self-tracking technologies are treated as interventions for health, but do not attend to how self-tracking is entangled with the body, they are unlikely to be valuable to their users. For example, one participant, Josefine, was an established user of body-monitoring devices that tracked her steps and heart rate when exercising. She liked putting up goals for herself, tracking her steps and then following her progress. She had also tried to measure what she ate to lose some weight, but never managed to keep up this kind of food tracking for more than a week in a row. Although she always failed to keep tracking her food intake, she repeatedly tried again, with the sense that "this time it will change my life". It never did. Her explanation was that, somehow, she knew "deep down [that she] didn't want to live like that" and because the gathered data "is still not the truth since I don't weigh the food [before registering it in the app], that is way too tiresome and messy". As such, while the myth that the app could help change her life was appealing, it was, in fact, once put into practice, quite meaningless.

Ann-Christine, another research participant, also talked about tracking that she found useless or just tiresome since it did not create new directions in her everyday life. During our interview, she described how she had used her Apple watch and Jawbone activity wristband to track her bodily activity, then took us into her app to show the data visualisation, that she still kept, of how her data had appeared every day in the app until it suddenly stopped when she quit. She explained that self-tracking apps gave her insights into how she slept and how she moved during the day, and that she was fascinated by the fact that she almost did not move at all when she worked from her home office. While she identified this as an "eye opener" as her following comments show, the meaning of this stopped there, rather than serving as an intervention towards changing her behaviour for improved health:

"[laughing]. And then I thought, well what should I do. It is not like it motivates me to move more, or maybe it might make me think about taking the stairs instead to produce some more steps because I am aware of that the fact that I don't take enough steps. But it is not like, 'oh my God, I walk this little, now I must start to train'. It doesn't motivate me at all. —I think that is really interesting, because I thought it would motivate me, or that I would get more . . . I already knew that I didn't move enough.—When I saw it [in the app] I said to myself that I need to do something about this, and I asked myself what to do about it, well I don't know and then it didn't take me further—and the push notices [that you get



from the app that gives you suggestions of what to do] they are just like [putting the phone away on the table with a shrug of the shoulder] for me. They don't tell me anything. Some people are like that they will put in training sessions into their calendar and then they do it. My calendar has no impact on me whatsoever." (Quote from interviews).

As both of these examples show, self-tracking data tends to be understood in relation to what people already know through their bodies. The connections participants made between the data and what they already knew made the app or device meaningful or meaningless in the user's lives. However, even when the data felt meaningful, this did not mean that it enabled them to make changes in their lives. The examples also reveal how users struggled to reconcile the expected and desirable outcomes that they understood as being intended through use of the apps, and what they already know through embodied and emplaced experience. These experiences correspond with the disjunctures highlighted above and reveal how the epistemologies of technologically-driven behavioural change do not correspond with life as lived.

The alternative approach we take here develops an emerging field of pedagogical research that critically departs from the idea of body monitoring as a linear learning process whereby personal data engenders self-knowledge through cognitive reflection on visual representations and digital interfaces. Instead, to better understand the disjunctures we described above, where people find both the registering and representations of personal data meaningless and too far away from the experienced life-world of embodied knowledge, we suggest that a thorough investigation about the knowledge we produce with personal data and how this process can be described is needed. We argue that thinking about personal data as a representation of the body, without recognising its relationship to already-existing forms of embodied knowing and ways of being in the world, will continue to create disjunctures between what is perceived as possible by the designers and the users and between the imaginations and aspirations the user has when they get these devices and what they actually experience when they start using them. In contrast, a perspective that emphasises the interdependency of the mind-body-environment relationship offers an understanding of self-tracking as part of our embodied and emplaced experience. This is something that personal sensor-based data can only be connected to through and *in* the experience of the user, that is, its meaning cannot be detached from the ways that the users learn *with* the technologies and data. Therefore, while much effort has been put into creating health pedagogies around how sensor-based computerised knowledge can be used as a tool for learning about the self, the gap that this leaves needs to be filled by an acknowledgement of how embodied knowledge forms part of the basis of what is translated and visualised through life tracking devices.

The relationship between the pedagogy of self-tracking and the embodied nature of knowing with self-tracking technologies has been little discussed in existing literatures, including our own work. For example we have elsewhere argued for an approach to self-tracking that understands the human-technology relationship as one that plays out as part of continually-emergent everyday environments that we continually experience sensorially and affectively, and where digital data is equally part of the environment as is the weather and the ground underfoot (Pink and Fors 2017a). A possible reason for this is that while existing research in the social sciences has indeed attended to the embodied, lively (Lupton 2016, 2017), emplaced (Pink and Fors 2017a), and affective (Pink et al. 2017a) elements of self-tracking, these have not tended to be explored in relationship to pedagogies for behaviour change, even when they have developed critical perspectives on design for behaviour change (e.g., Pink et al. 2017b). In the next section we take this discussion further by demonstrating how an approach to self-tracking as embodied, affective, and emplaced can be advanced further through a learning perspective. Following this, we bring this discussion together with a design anthropology perspective to examine the implications for understanding self-tracking as a pedagogy of the possible, rather than a behavioural change solution.

## 5. Embodied Data Pedagogies—Opening up for Alternative Routes to Knowing

Above we have argued for an interrogation of how self-tracking participates in, and develops through, a different form of pedagogy to that assumed to be afforded through the use of body monitoring devices in conventional behavioural change or solution-based approaches. In this section we elaborate on what these life-world-based pedagogies can look like, when personal digital data is approached and understood by the users as part of a continuing, emerging, and expanding embodied method of knowing about their everyday lives. Instead of being treated as factual knowledge about their bodies, the data became entities through which people learn and imagine with their bodies, often in ways that are not articulated verbally, but are experienced sensorially and emotionally as they move through their everyday environments. For the participants in our ethnographic research, these ways of experiencing data become part of personal pedagogies that created opportunities to re-enact senses of well-being from previous experiences and, at the same time, articulate the embodied affordances that construe these experiences.

Richard used his body-monitoring devices for limited periods and only for monitoring his training, usually when he felt that he needed to lose weight. He did not maintain these practices for longer periods since he found that the data from them only confirmed what he already knew. He also found it a bit boring, even though he still felt that using it made a difference for him. He explained that following the recommendations given by the design and digital interface in the apps, was similar to playing the card game *Patience*, whereby the only reason for playing was to win the game and the only skill needed was persistence. However, this was not enough to motivate Richard to maintain his body monitoring and sometimes, particularly when he was using his food tracking app, he quit when he realised that he was starting to cheat too much by not registering everything he ate. The one thing that was worse for him than cheating was to make it obvious that he was cheating through the app. During the interview he returned to his point that he perceived the apps he was using as pointless since they simply showed him things that he already knew. At one point he stopped when scrolling through an app because one of his step counter apps also produced a map over where he had been walking and something caught his eye.

“[He shows one of the apps that creates maps where he has walked] I use it very randomly, the times I have used it I have mostly listened to audiobooks and walked around—[he stops at one of the registered walks and opens it by clicking on it] you see the result here [pointing at the numbers], sure I can feel some differences blah-blah-blah, but this is what counts as a result. Here are some numbers, it shows I burned 447 calories and that I walked for an hour, 6.5 km, so then you know that. But it does not mean so much. Hey, I actually can remember walking this round. I walked around to look at houses, and I walked around in the same block just to see if there were any cool houses and architecture. When I look at the map I remember that specific round.” (Quote from research interviews).

Richard was continuously referring to what you are expected to do with the apps he was using while simultaneously describing these expectations as something that he could not live up to because he found the “result” (which he refers to as the data shown on the screen) as meaningless in the sense that he already knew it. However, sometimes when he could not live up to the app’s expectations he did become aware and learned something about himself; significantly, it was when the body-monitoring practice coincided with things that he normally did (looking at houses) that he could relate to the numbers as more than facts and part of what he experienced while producing the data.

Our second example brings two issues to the forefront. First, it shows the implications of the extents to which body monitoring is experienced as meaningful. Second, it reveals how body-monitoring can become part of a pedagogy that not only expands the user’s own life-world, but also moves into their social life as a result of this. Above, we introduced Ann-Christine, whose example showed how registering her bodily data in an app that later gives her feedback only told her what she already had embodied knowing of. She continued talking about how she had been thinking really hard

about why she did not follow up on the facts the devices served her with to change to her behaviours, but she had not come to any conclusions. She was specifically interested in the fact that she had one app that actually had changed her life “completely” and even got her up at five o’clock in the morning to do a training session. She could not see why this app worked and the other ones did not. This was a yoga app that both contained filmed yoga classes and opportunities to track your own yoga practice. She described this as a “life changer” that had expanded the way she understood her body and it had made her look further by following people who showed yoga postures on Instagram and YouTube. It had also made her start to talk about new things during coffee breaks and other parts of her social life in relation to training, which was a subject she never touched upon before.

“You get curious on what other people do, I maybe ask questions or tell somebody that I train [yoga] and start to talk about that, start to talk with Micke [a janitor at the workplace] at the caretaker’s office about yoga and you sort of get ‘connections’ when I talk about that, and that is something new for me”. (Quote from research material).

The pedagogy she had developed in relation to her use of the yoga app was clearly made meaningful to her through the way it made her to connect with people outside of the app. She was not interested in connecting through the app, with other yoga practitioners, she was more interested in how her practice had emerged and become intertwined with her everyday life and how it had made her “see things differently” in her surroundings, talk about new things during her coffee break, and get in touch with people in new ways.

Our third example of how people created pedagogies of well-being based on the embodied knowledge they associated with personal data was related by Josefine, who named every run that was registered in her app so that she could easily remember its time and place. Afterwards she would go through the list created by her app to re-live the feeling of the runs. She did this because she was both interested in observing her progress in reaching her distance and steps goals, and in order to recreate the feeling of wellbeing she experienced during certain runs. She concluded that she was much more interested in body monitoring that helps her to re-enact things that made her feel good and where she had succeeded.

“There are so many feelings connected to it [running data] I talked about it with my husband yesterday, we only ran five kilometres yesterday in a very slow pace, and it’s a challenge for me not to think that I should run 10 km because my body can’t handle it—then we ran on a trail and we started to talk about how we had felt when we had run this trail before. Somehow there are so many feelings attached to it [the trail], the smells, how it felt physically, it’s like a kind of euphoria for me. I can drive past somewhere and start thinking about how it felt when I was running a lot, how then I ran here and then turned back, and I know I have been driving my car here and it feels really far away, and there are a lot of lovely feelings and memories attached to that experience that come back to me when I go back into the statistics [in the app]—and in the history. There are no feelings attached to sitting on an exercise bike in a gym but there are totally different feelings attached to places, smells, time when the elderflowers every year in a particular place and the feel of that smell, I can still evoke that feeling because it is charged with so much positive energy”. (Quote from research material)

She continued to both show in the app and describe verbally how she re-enacted that feeling of wellbeing by scrolling through the history of the laps in the app, specifically in June when the elder blooms.

As the examples we have developed in this section show, there is no direct transformation of self-data to self-knowledge. Instead, it becomes clear that the feeling of the data produced differs in terms of the perspective a person takes on what the numbers and graphs stand for and what kind of knowledge they believe can be learned from these data visualisations. The examples suggest that the



links between the computerised data and life-based embodied knowledge can open up possibilities for alternative outcomes and pedagogies for well-being if they are appreciated and acknowledged by the user. This happens despite the desired outcomes being conceptualised differently by the built-in pedagogical ideas mediated by the technological interface. The idea of creating interventions that lead to open possibilities, rather than seeking to create closed solutions is at the core of recent thinking in design anthropology. It is to this literature we turn next in order to situate the findings of our ethnographic research in relation to this field of practice and scholarship and in doing so to propose a new paradigm through which to understand self-tracking technologies as a design intervention.

## 6. Design Anthropological Implications

In the previous sections we have shown how the relationship between data and knowledge has been both constructed and problematised in recent literatures, as well as demonstrating, ethnographically, how the ways that the data-knowing relationship plays out is central to explaining why self-tracking interventions have ‘failed’ in the past. We have proposed that an embodied and emplaced learning perspective can overcome some of the challenges in this field by acknowledging how knowing and learning are implicated in how people use self-tracking technologies, and by demonstrating how, when people learn and know with technologies in ways that are meaningful to them in their lives, they are more likely to improve their health or sense of wellbeing through these engagements. In this section we build on this to propose how recently-developed design anthropological approaches (e.g., (Gunn et al. 2013, Pink et al. 2015, Smith et al. 2016)) rooted in phenomenological understandings of making and creativity (Ingold 2013) enables a deeper understanding of how meaning is incrementally created through people’s everyday engagements with personal data, through their improvisatory ways of being with, and learning with, self-tracking technologies. We reiterate, particularly with an interdisciplinary readership in mind, that design anthropology is not, as is considered of some versions of design ethnography, simply a method that is used to provide qualitative data about users in order to inform the making of better designs, but an approach to understanding and situating human creativity in the world. In common with processual approaches to learning, as outlined above, the tradition of design anthropology we develop here sees everyday knowing, making, and creativity as always contingent, ongoing, emergent, and improvisatory (Smith and Otto 2016, Pink et al. 2015). Such ways of knowing, learning, and generally proceeding through life are often experienced as sensory, embodied, and emplaced with and constitutive of the environments in which they emerge. These environments, in a contemporary context, include social, material, climatic, and digital elements, and are part of a digital materiality that is equally emergent in ways that are not predetermined (Pink et al. 2016a).

In the context of this discussion we are particularly interested in the implications of a design anthropology approach in relation to its focus on emergence and intervention (Smith and Otto 2016). Since, as we have argued elsewhere, self-tracking personal data is continually emergent from our everyday relationships with our environments (Pink and Fors 2017a) but, simultaneously, self-tracking technologies constitute interventions of a kind in our everyday lives. Indeed, as noted above, they have often been seen in the context of health behavioural change initiatives to offer interventions towards creating healthier ways of living. The pedagogy of such interventions tends to seek to create new awareness, prompts and targets in order to teach users how to behave correctly, and often to reward this through gamification methods.

As stressed above, we wish to turn around this suggestion, to propose that we see self-tracking technologies not as instruments through which to intervene to make specific, predetermined outcomes of change, with measurable, auditable results in terms of health improvements, but instead as technologies and techniques for opening up new possibilities. A design anthropological approach to intervention is particularly relevant here, as developed by Halse and Boffi, who see design interventions as creating ‘dialogues about possibility’ and to relate to ‘people’s concerns, aspirations and imaginative horizons’ (Halse and Boffi 2016, p. 101). In this sense, as an intervention in a design anthropological

sense, we can see personal data technologies as offering their users new ways of knowing, learning about, and imagining themselves and their bodies which are more coherent with their existing ways of being, knowing, and feeling comfortable and, therefore, likely to be more meaningful. This is because rather than intending to change people's behaviour, they seek to expand what it is *possible* for people to know, do, and imagine. Insights towards such an approach have been proposed elsewhere by Pink, Sumartojo, Lupton, and Heyes La Bond through their research into self-tracking cyclists' relationships with their personal data. They found that 'self-tracking can enhance people's affective engagement with cycling because it relates to the way that people are able to accomplish routines, and self-tracking can be a central enabler of these routines' as such, showing how self-tracking and personal data encourages people to cycle because it increases their sense of wellbeing in ways that are already suited to them. As they show, 'mundane data' produced through self-tracking intervenes as part of complex entanglements of digital materiality, involving 'people, things, affects, and temporalities' as they move forward in the world. In this sense it contrasts starkly with behaviour change interventions that seek to motivate people to live more healthily (Pink et al. 2017a). They conclude that 'any interventions for change that involve data need to always account for (1) how data becomes part of the generative processes of everyday life, and (2) how data is engaged in any particular context as affective technologies' (Pink et al. 2017b). Here, we have advanced this discussion further through an interrogation of how learning—conceptualised above as a similarly emergent and ongoing process—is implicated in this process.

## 7. Conclusions

Learning to live with self-tracking technologies, seen in the way we have outlined above, does not entail learning how to use them as intended by their designers or by health improvement schemes. Rather, it entails learning how they can become part of life as it is lived already, and what possibilities they open up for people to learn and know differently about elements of their lives that they are already familiar with. That is, how do self-tracking technologies and personal data become valuable to people because they become part of the processes of learning and knowing what they are already engaged in, and enable them to continue to participate in the incremental modes of learning and knowing that happens as we move through our everyday world. In this sense our interest is not in how people's behaviour can be changed through the use of technologies, but in how these technologies are valuable to people because they create new possibilities that connect with, and enable, people to proceed into their everyday futures with activities, feelings, and meanings that are *already*, or are *emerging* as important for them. Merleau-Ponty (1962) reminds us of that as beings-in-the-world we are in an open dialogue with the world we inhabit. What comes out as an important feature of a health pedagogy based on people's life-based learning strategies is to open up and acknowledge possibilities for people to rediscover the world through the devices, and as Stolz (2015) puts it, "by 'relearning' the way we look at the world so that we may come to a clearer understanding of how things relate to each other and to ourselves in the world" (Stolz 2015, p. 485).

Conceptualised as technologies whose intervention is to participate in opening up people's lives and health to new possibilities—which might mean, for instance, their experiencing their bodies, health, and other aspects of their lives differently—offers a new perspective on how and why self-tracking technologies become meaningful, and how people learn with them. Therefore, we argue that self-tracking technologies can be seen as participating in a different form of pedagogy to that assumed in conventional behavioural change or solution-based approaches. Instead they are technologies through which people learn and imagine with their bodies, often in ways that are not articulated verbally, but are experienced sensorially and emotionally as they move through their everyday environments. It is in this capacity that their potential to create new forms of health and wellbeing might most appropriately and effectively be accomplished.

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