

# Strava: the race towards the best self

Digital mediation of self-tracking application Strava and self-tracking data on body articulation

## Abstract

This thesis explores technological mediation on body articulation. By using two complementary analytical approaches, an interface analysis and interviews, this thesis examines self-tracking application Strava and its users to determine how body articulation might be mediated by Strava and the self-tracking data. Drawing on the concept of *human-data assemblages*, which describes how humans and technology form a co-constitutive relationship in which both have agency, it is examined how agency is distributed within this relationship. Data analysis revealed that fitness data positions body in a certain way, namely focussed on output and improvement. Strava as a knowledge mediator can determine what knowledge is presented to its users. Additionally, Strava's emphasis on its social aspects increases the possibility for mediation by facilitating competition and peer surveillance. The thesis concludes that fitness data as a digital materiality mediates how Strava users articulate their body through implicit norm-setting.

## Keywords:

Self-tracking, technological mediation, Strava, body articulation

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## Introduction

Have you walked 10,000 steps already today? The 10,000 steps-a-day regime is one of the most well-known physical exercising goals (Cox, 2018). Why the exercise would be beneficial is still unsure, but it remains one of the most recommended exercises for a healthier life (Cox, 2018; Hammond, 2019). All new smartphones already have a feature which counts your steps for you. All you have to do, is walk!

We live in a new cultural environment that is transformed by global media and computer technologies (Kellner, 2002). As Lupton (2015, p.2) claims: ‘we live in a digital society’. Digital technologies are a part of everyone’s life, whether it is explicitly (smartphones, computers, social media etc.), implicitly, or unobtrusive (digital images uploaded by others or interaction with people who do use digital technologies). Computer technologies shape present age, which is why perspectives on the intersection of technology, culture, and everyday life are needed (Kellner, 2002). Theorists of the Frankfurt school were among the first with critical studies of mass communication and culture, in the 1930s. They coined the term ‘culture industries’ to describe the process of the industrialization of mass-produced culture and its commercial imperatives. They were the first social theorists to identify importance of culture industries in the reproduction of contemporary societies. Additionally, throughout the 20<sup>th</sup> century, the Frankfurt school focussed on the linkage between culture and technology. They argue that ‘technology produces mass culture that habituated individuals to conform to the dominant patterns of thought and behavior, and thus provided powerful instruments of social control and domination’ (Kellner, 2002, p. 2). Their model of media culture articulated important social roles of media culture, and it provided a model of ‘highly commercial and technologically advanced culture that serves the needs of dominant corporate interests, plays a major role in ideological reproduction, and in enculturating individuals into the dominant system of needs, thoughts, and behavior’ (Kellner, 2002, p.3).

Media have been a driving force of the ‘on-the-move life’ of the twentieth century, resulting in ‘mobile media’ (Farman, 2015, p.xi). Increasingly, digital technologies are inseparable from their owners. Smartphones are an example of devices that can be worn all times. One of the features that smartphones bring, is the possibility to track physical activities. This is called self-tracking; the individual’s use of technology to record, monitor and reflect upon features of daily life (Lupton, 2014). Self-tracking involves ‘practices in which people knowingly and purposively collect information about themselves, which they then review and consider applying to the conduct of their lives’ (Lupton, 2016, p.3). Apart from your steps, you

can track a variety of personal data: physical exercise, food, sleep, menstruation cycle, et cetera (Lupton, 2016, p.12-13). Thus, self-tracking is the activity through which the metrics of one's health and body are tracked (Lupton, 2016). This is not a new phenomenon, but the introduction of digital technologies has provided new opportunities for such tracking. Apps, Fitbits, Apple watches, and numerable other wearable tracking devices, can quantify most aspects of one's exercise and make it easily accessible and insightful. Wearable fitness trackers are even defined as a type of mobile media (Gilmore, 2015 in Pink and Fors, 2017a). Mobile media and communication, and wearable technologies and devices are increasingly entangled in everyday life and technological systems (Pink and Fors, 2017a). Hence, mobile technologies create new forms of 'everyday presence', and activities and self-tracking are part of the *digital materiality* of everyday worlds (Pink and Fors, 2017a, p. 221). Pink and Fors (2017b) use the term *digital materialities* for digital devices that are implicated in ways of moving through and perceiving the world. Technologies participate in the experience and the constitution of the everyday. Consequently, the digital and material are not separated but entangled and inseparable as part of the environments people move and navigate their lives through. The material body becomes a source of data, creating a 'data double' in the digital (Haggerty and Ericson, 2000). The data, however, is accessible and portrayed to its owner through the self-tracking devices, resulting in a feedback loop between the self-tracker and the self-tracking device. This illustrates the entanglement but also the inseparability of the digital and the material with self-tracking practices.

At the same time, under neoliberal conditions, humans can be seen as the 'homo economicus' (Read, 2009). The homo economicus is the neoliberal subject, which is primarily focused on enhancing its human capital, mostly through self-investment (Hamann, 2009; Kenny, 2015; Read, 2009). Neoliberal governmentality is the environment (socially, culturally, politically) in which subjects are to make 'good' and 'responsible' choices (Mayes, 2015). In relation to health, Lupton (2016) argues that unhealthy bodies are perceived as belonging to a subject who is not able to manage its own health. Healthy people get, for example, discounts and bonuses on health insurance. Within such contexts, there are always certain hidden assumptions about which bodies are deemed healthy (Spruijt, 2021). Bodies are shaped by infrastructures such as gender, race, ability, class, et cetera. These infrastructures and their embedded power relations affect who is deemed as able to manage its own health. Crawshaw (2012) identifies self-tracking as a consequence of health governmentality, since subjects are promoted to manage their own health and wellbeing. Self-tracking is the consequence of the body as 'project' of the human (Ajana, 2017). This illustrates that the linkage that the Frankfurt

school made in the 20<sup>th</sup> century between culture and technology, is only increasing with the intensification of technology in everyday life. The digital is not only inseparable of the environment that people live in, as Pink and Fors (2017a) argue, but that environment may also carry implicit norms with it. Self-tracking is situated within this environment.

This thesis further examines this linkage between the digital and the material. How does self-tracking data affect the self-tracking subject? The thesis engages with the following research question: *how do people articulate their body through the mediation of online fitness data?* Previous studies on the topic of self-tracking mainly focussed on individual responsibility for health (Ajana, 2017; Brown, 2016; Catlaw & Sandberg, 2018; Cranshaw, 2012; Flew, 2012; Hamann, 2009; Kenny, 2015; Read, 2009), on the Quantified Self movement specifically (Barry, 2020; Lupton, 2016; Whooley, Ploderer & Gray, 2014), or on data doubles (Bode & Kristensen, 2015; Kitchin and Lauriault, 2014, Lupton, 2018). This thesis departs from earlier research since it focusses on how self-tracking applications and data mediate the articulation of the body of the self-tracker. This angle combines the insights of earlier studies and adds to the understanding of the relationship between humans and technology. An interface analysis and interviews are conducted to gain deeper understanding of the co-constitutive relationship of self-trackers and the self-tracking data and how this mediates the articulation of bodies.

# Theoretical framework

## Assemblages

This thesis is inspired by studies on science, technology, and society (STS), but specifically by Actor-Network Theory (ANT), since this emphasises the role and agency of both human and non-human factors. The concept of an ‘assemblage’ derives partly from ANT, which is a very useful concept for understanding the mutually constitutive relationship between humans and digital technologies (Lupton, 2015). Haggerty and Ericson (2000), from the perspective of surveillance studies, coined the concept ‘surveillant assemblages’ to understand the relationship between humans and technology. They theorised how assemblages produce a virtual doppelganger of the user, the so-called data double. Critical Data Studies (CDS) further developed the concept of the data assemblage. CDS also applies a sociomaterialist perspective which acknowledges the co-constitutive relationship between humans, digital technologies and data (Lupton, 2018). Scholars within CDS sought to (re-)politicize Big Data instead of the positivistic data science that was dominant. They also use the sociotechnical concept of data assemblages, which is ‘the technological, political, social and economic apparatuses and elements that constitutes and frames the generation, circulation and deployment of data’ (Kitchin and Lauriault, 2014 in Iliadis and Russo, 2016, p.2). Whereas data is the product of the assemblage, the assemblage manages and produces data; they are mutually constitutive (Kitchin and Lauriault, 2014). The authors also describe how data infrastructures (data assemblages) are never neutral, they always exist within institutions that have aspirations and goals and operate within wider frameworks. Klaus and Albrechtslund (2014) also emphasise the subjectivity of ordering and sorting data. Classification depends on codes, which often constitute of invisible processes of classification and prioritisation.

Data assemblages that exist of the diverse forms of data from our digital interactions, are always shifting and changing (Lupton, 2015). The data double sends information back to the user (the physical human) in ways that encourages the user’s body to act in a specific manner. This creates a continual loop’ of production of bodily related data and the response of the body to this data. The data double thus creates a reflexive, self-monitoring awareness of the body. Therefore, the concept of a dynamic human-data assemblage is necessary to understand the co-constitute manner (Lupton, 2018). It provides a framework for this thesis which emphasises the distributed agency of the assemblages. The human-data assemblage introduces an alternative way of knowing and enacting bodies and selves. This allows us to gain more insights in the way that ‘digital technologies and data they generate are part of human

embodiment and selfhood' (Lupton, 2018, p.9). As she argues: 'living with data is a mode of being and becoming' (Lupton, 2018, p.9).

## **Distributed agency**

As mentioned above, human-data assemblages include distributed agency. Lupton (2018) describes the agentic capacities of personal data as *thing-power*. Thing-power entails that personal data can shape people's embodied responses and actions, their sense of selfhood and their relationships with other people and other things (Bennett, 2004, in Lupton, 2018, p.6). To understand how thing-power of technology can mediate the articulation of one's body, we look at technological intentionality.

For the understanding technological intentionality, Latour's concept of translation is helpful (Latour, 1994). Translation is when a link or relationship that did not exist before, is established and which, to some degree, modifies the two elements or agents in the relationship. In the case of self-tracking apps, this means that the person using the app and the app itself have formed a relationship and that they are different entities because of this relationship. Delegation as interpretation of translation is particularly interesting. Latour describes delegation as the reciprocal relationship between the social and the technical, when the social and the technical co-constitute each other (Cressman, 2009; Latour, 1994).

To understand the human-technology assemblage, this thesis uses Verbeek's notion of technological intentionality (Verbeek, 2011). Technological intentionality is partly inspired by ANT, since Verbeek also pleads that we must move beyond the demarcation between humans and nonhumans, and 'hybridize' them. Verbeek follows a post phenomenological approach to move beyond the subject-object dichotomy and moves towards thinking about human-technology associations as co-constitutive relationships. Verbeek (2011) therefore states that technological artifacts mediate perceptions with technological intentionalities. Technological mediation can shape our practices and interpretations, based on which decisions are made. Technologies in this way can play an explicit role in moral actions of people. As Bode and Kristensen (2015) also argue, the datafied digital self is a relational actant in a performative process.

Kristensen and Prigge (2018) have developed a typology for self-tracking specifically to understand how distributed agency works within different relationships that human-technology assemblages can take on. The four relationships (enactment, experience, entanglement, and integration) as concepts help with illustrating the extent of thing-power

within the human-data assemblage. The first relationship, enactment, entails that self-tracking technology provides a representation of the physical activity through visual representations and feedback loops. This enactment ‘mode’ of technology is about representation, understanding, and interpretation (knowing and acting), through the data double. Users engage with and relate to the self through the access to, and interpretation of, data. Technology can thus mediate how users perceive their own physical activity and engagement with the tools and visualisations (the interface) becomes a way to get to know oneself through the data. The second relationship is experience in which the technology merges with the physical self. Technological devices are taken into experiences and broaden the ‘sensitivity and sensory apparatus of their bodies’ (Kristensen and Prigge, 2018, p.8). The technological device provides a means which can alter and intensify the experience of the self and the body. Within this constellation, visualizations do not only allow engagement with data (as with enactment), but they also mediate ‘the perceptions and experiences of the performance, activity, and well-being of the subject’, resulting in increased self-awareness (Kristensen and Prigge, 2018, p.9). The sense of self becomes partly based on the data double. With the third relationship between technology and self-tracker, called entanglement, the self-tracker becomes aware that the technology might ‘amplify, restrict, reduce, or contradict the subjective experience of the self’ (Kristensen and Prigge, 2018, p.11). This might be the result of functionality issues, disappointment of feedback or a lack of alignment of goals and values. The self-tracker becomes very aware of the tracking technology and might even decide to stop using it. The final relationship, integration, is the result of the integration of the technology into the background of everyday practices. For example, when all insights are gained and the interest in the technology diminishes.

The terms human-technology association (Kristensen and Prigge, 2018; Verbeek, 2011) and human-data assemblage (Lupton, 2018) are both terms which are used in this thesis to describe the co-constitutive relationship between people and self-tracking technology. For this reason, these terms are used interchangeable in this thesis. The concept of human-data assemblage is helpful to illustrate how thing-power affects self-trackers through dynamics of the human-data assemblage.

## **Participatory surveillance**

The notion of subjectification is particularly interesting since with self-tracking the user actively decides what to track and post. To engage with this aspect, the *surveillant assemblage* of Haggerty and Ericson (2000) is helpful. One important attribution of the authors is their emphasis that surveillance is never static, and never from one institution or technology. With



self-tracking the user provides the data her/himself, so instead of simply being an object of surveillance, the individual can be seen as an ‘active initiator of surveillance’ (Klauser & Albrechtslund, 2018, p.284). This is called ‘participatory surveillance’ (Albrechtslund, 2008).

The concept of participatory surveillance, or self-surveillance, can give insights to the self-monitoring and/or self-censoring of content of an individual. Self-surveillance moves to a performative mode, resulting in an ethos of self-improvement (Lupton, 2016). People may have different ‘online bodies’, relational to the presentation of the body/self they want to share/upload (Lupton, 2015, p.176). Discourse of self-tracking promotes the idea that self-monitoring and self-surveillance can improve individual health (Kent, 2018). Self-tracking data is thus human-made and customised. Self-trackers produce their own data assemblage, within a project of self-hood (Lupton, 2015, p.183). It is, however, important to emphasise that both self-surveillance and peer surveillance play a part in the censoring of self-tracking data (Lupton, 2016). With peer surveillance, the self-tracker is also an active initiator of surveillance but specifically as a result from the awareness of peers who can view the activity and data. Peer surveillance can thus be seen as a specific form of self-surveillance.

## Methods

This thesis investigates how the body articulation of self-trackers is affected by technological mediation. To gain more understanding of the co-constitutive relationship of the human-technology assemblage, a self-tracking app and its users are examined. This thesis uses Strava, a mainstream self-tracking app, as data source. Strava offers the possibility of tracking multiple physical activities, but also places the emphasis on the social part of the self-tracking. This is an interesting feature considering the surveillance aspect. When the digital engagement entails a social aspect, such as Strava, people present themselves online. Part of this presentation of oneself entails self-monitoring or self-censoring, hence the participatory and peer surveillance. When people share data, it becomes valued that other people are watching (Lupton, 2015). Therefore, it is interesting to use a self-tracking app with a social aspect, to see if that aspect also has an additional effect on mediation of the body articulation.

### Interface analysis

To investigate how the thing-power of a self-tracking app can mediate the articulation of bodies, I first analysed the interface of Strava. This way, I could analyse the tracking app as a communication device that addresses users in particular ways (Fotopoulou & O’Riordan, 2016). As Mohr (2019) argues, the interface of an app or device can articulate a specific kind of intended user. The construction of the intended user can become clear by the interface and its functionality. How is the ‘default body’ portrayed? What aspects of the body are highlighted? Through an interface analysis, the affordances of the digital devices, which construct and perform the users’ identities through the technology, were identified. Interface is where the rational organization of content and an intuitive way of using content come together (Drucker, 2011). This duality of an interface illustrates how the interface itself is information instead of solely a ‘means to access to it’ (Drucker, 2011, p.10). The interface of an app determines which information can and must be shown frontstage (MacLeod & McArthur, 2019, p.825). *Affordances* are cues that suggest the function and operation of an object (MacLeod & McArthur, 2019). McArthur, Teather and Johnson (2015, p.233) refers to affordances as ‘*action possibilities* offered by a tool, environment, or user interface, to give clues to its usage’. They argue that interfaces, through affordances, co-construct an online identity. Affordances therefore describe the opportunities for action of digital technologies, whether it is inviting, allowing, demanding, closing off or refusing certain actions (Lupton, 2020). Technologies produce such detailed knowledge about the self, which is presented through affordances, that technologies are producers of expert knowledge (Lupton, 2016, p.105). Burns (2014) asserts

that knowledge is always negotiated and legitimized in ‘knowledge politics’. He further argues that in the context of technology, such as an interface, these knowledge politics can become embodied and temporarily fixed. An interface could thus disable or enable certain knowledge politics. Affordances of an interface therefore are always meaningful, and the meaning is dependent on the context and intentions of the subject (MacLeod and McArthur, 2019). The affordances thus mediate the agential capacities of digital technologies (Lupton, 2020).

An interface analysis can identify the micro practices through which mediation of digital technologies on knowing oneself works (Fotopoulou & O’Riordan, 2016). The customization of an interface therefore affects identity construction and self-representation of the user (MacLeod and McArthur, 2019). The interface analysis granted insights in which, and how, metrics and visualizations (the cues) were used to articulate the digital body. The Avatar Affordances Framework (AAF) is a tool to systematically study affordances of Character Creation Interfaces (McArthur, Teather, and Johnson, 2015). The framework facilitates an analysis of what choices are present (or absent), what the default configurations are, and how users can modify these configurations. Whereas their framework is focused on identity and character articulation, it is well suitable to analyze the affordances of the articulation of one’s body in an app. MacLeod and McArthur (2019) have partly adapted the AAF, namely they have replaced the hierarchy component with a ‘convergence’ component, which indicated whether the widget provides the opportunity to import values from another media channel, and whether the value can be adapted in the widget. This was useful for the research of this thesis since Strava puts quite some emphasis on its social media aspect. Social media apps can also be seen as a replication of the self in digital spaces (MacLeod and McArthur, 2019), thus the ability to link Strava with social media apps is an interesting feature of the interface to include in the analysis. The following six components were used to analyze the interface widgets (a widget is an interaction element within a graphical-user interface (McArthur, Teather and Johnson, 2015)).

- Function – the purpose(s) of the interface widget
- Behaviour – attributes derivable from the widget (e.g., choose 1 of n options, etc.).
- Structure – a technical description of the interface widget (e.g., slider, button, etc.). Where the quantity of choices is derivable from the widget, this number is indicated in round brackets immediately following the structure’s name.

- Identifier – what text and/or icons are used to convey the widget’s purpose? (e.g., text: select a gender).
- Convergence – possibility to import values from social media and whether these values can be changed
- Default –whether the widget consistently defaults to a particular selection

(MacLeod and McArthur, 2019, p.826; McArthur, Teather and Johnson, 2015, p.233-234).

To add to the analysis of the affordances, I included additional screenshots of Strava. These screenshots do not fit within the Framework but are of added value to the understanding of the app.

## **Interviews**

The second part consists of interviews of Strava users, to gain insight in how people articulated their own body, and how this is mediated by Strava. I made use of semi-structured interviews, which offer the framework to gain insight in the topic (via the interview guide), but which also granted enough reflexivity to include participants’ experiences and perspectives (Bryman, 2015). A phenomenological approach to qualitative interviewing was taken up, which means that the emphasis was put on the understanding of body articulation as a social phenomenon through the perspective of the participants themselves. Their perception of reality and the experienced meaning of their lived everyday world was central (Brinkmann and Kvale, 2015). The participants were selected through snowball sampling (Bryman, 2015). There were no constraints on the age/ gender/ type of physical activity of the participants. I selected three people from my personal network (each in different social networks), and from there other Strava users were reached. I chose this method to avoid having participants from only one social network. The final sample consisted of 11 participants (5 women, 6 men). This research will not be generalizable, but this is not the aim. As Law, Ruppert and Savage (2011) argue, it is never possible to gain a representational sample of a certain population. This thesis is meant to illustrate if, and in what ways, fitness data and self-tracking technology mediate body articulation. The selected participants will help illustrate whether and how this is the case but are not meant to be a representational sample. Due to Covid-19, the interviews will be held mostly online. All interviews lasted about approximately 20 minutes.

An interview guide with central questions regarding the topic was used to ensure that the interviews would cover the same grounds (see appendix I). The questions were framed in such a way that they are as open as possible, to avoid ‘desirable’ answers. However, I am aware

that methods are performative of the social and that with semi-structured interviewing I only gave room for certain realities of the participants. Doing this, I defined situations and thus affected the meaning that participants gave to their lived world (Law, Ruppert and Savage, 2011). Brinkmann and Kvale (2015) also elaborate on the *construction* of knowledge through interviewing. This epistemological perception of knowledge production in interviews emphasises that the interviews and the analysis are two ‘intertwined phases of knowledge production’ (Brinkmann and Kvale, 2015, p.49). This epistemological approach results in the necessity to have a reflexive positioning as interviewer.

The interviews are transcribed to be able to analyse them. Subsequently, for the analysis of the data, the programme ATLAS.ti was used for coding. ATLAS.ti can elicit meaning from the interview data in a systematic matter (Smit, 2002). Brito et al. (2017) also emphasise the added value of ATLAS.ti as an effective instrument to organise, capture, and analyse data. Coding will be applied to generate connections between concepts and categories. The codes were derived from the concepts in the theoretical framework (appendix III).

### **Ethical considerations**

All the participants have signed an informed consent document (see appendix IV). The names of the participants are known by the researcher but in the thesis different names are used for anonymity purposes. All interviews were conducted in Dutch. To be able to use the quotes in this thesis, they were translated into English, using the exact translations of the participants’ quotes. In the screenshots used from the Strava application, all information regarding personal details is blacked out.

## Results

### Strava's interface

In the following paragraphs, the results of the interface analysis will be discussed. The results of the interface analysis (appendix II) form the basis for the following results. At first some general remarks are made, followed by an analysis regarding community-feeling and competition.

When you register as a Strava user, you must submit some personal details such as weight, length, age, and gender. These settings have no default settings, so there are no implications regarding a standard body. After the creation of an account, you can change your profile settings. In this menu you also find some settings that are already set, which you can change if you want to. Something interesting to mention about how Strava positions bodies, is that all privacy settings have a default setting of 'everyone'. If you do not manually change this, everybody can see your profile (also outside the Strava app, on the web), follow you, and see your activities. This indicates that Strava prefers its users' profiles to be easily accessible for all. With the default setting, all bodies are displayed.

### Community-feeling

One of the most re-occurring aspects of the interface that I found, is an emphasis on community. Many widgets use identifiers that use this sense of community. With the installation of the app, the pop up keeps appearing whether you want to connect with friends. The word 'friends' is used every time, instead of something more impersonal. When selecting the preferences of notifications, the identifier also includes notifications about the 'Strava community'. These textual references hint towards an amicable sphere, instead of an impersonal individual sport app.

When looking specifically at the 'convergence' affordances, they show that Strava often offers the possibility to upload data from other social media or contacts on the phone. Yet, it is only with two widgets that this possibility is given, namely the 'follow athletes' and in the beginning at the 'synchronise contacts' widget. The 'follow athletes'

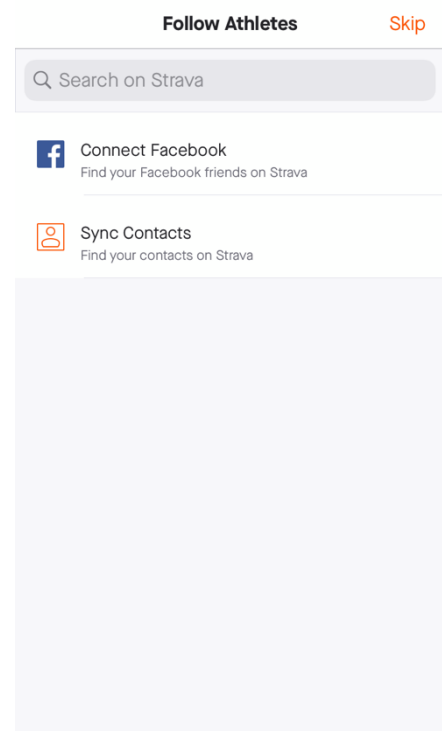


Figure 1. Follow Athletes widget

widget, however, is shown that often as a pop-up screen (see figure 1), that you get the idea that the social aspect is the core of the app. Also, when opening the app, it immediately opens on the feed on which you can view the activities of others. Instead of your own tracking activities, which you would think is the reason of why Strava users use Strava, the focus in the app is put on the social aspects.

This emphasis was also clear after conducting my first bike ride on Strava. When I stopped the recording, before I could see the data of my activity, I first received a subscription ad for Strava premium to see how I did, related to other users (see figure 3). I will discuss this further in the next paragraph. The next pop up was an invitation to search for a friend on Strava. Strava prompted with the identifier whether someone had told me about Strava and gave the option to search for them to ‘get connected’. This identifier also hints towards a sense of community. The text also could have been ‘add another Strava user’ but instead is framed as ‘connect’ with a ‘friend’. In this widget the ‘search’ attribute is in orange and has a larger font than the white ‘maybe later’ attribute, resulting in ‘search’ being the visual logical option. The next screen is also a ‘follow athletes’ widget, again prompting the possibility of searching for other users in Strava, through Facebook or in your contacts. Only when you skip this option, you arrive at the feed in which your ride is portrayed (see figure 2). Something to remark is that I rode with someone who I had not added on Strava. However, in the ride summary afterwards it said, ‘with Victor W.’ and ‘manage group’. Strava recognized that our rides were similar and added this to my ride summary without my interference. This is a feature which Strava calls ‘Group Activities’. It is an automatic feature which detects whether an activity is recorded at the same time as other users on the same route. When other users are nearby (within few hundred meters or more flexible for longer distance activities) for more than 50% of the time, you are ‘matched’. The fact that this feature is automated, again emphasizes the drive towards a community feeling. You can leave the group but, as shown in appendix II, the default setting is that you are part of the group. Within the app, your body is positioned among all the other users’ bodies. Considering the entanglements of the human-technology assemblage, this digital relationality might have an effect in the ‘physical’ sphere of the self-tracker.

## **Competition**

A more specific corollary of the emphasis on sociality, is the aspect of competition. A feature which Strava emphasises quite a lot are segments. Each segment has leaderboards of which you can be King or Queen of the Mountain (KOM/QOM). The segment competitions are about how you are ranked on a specific segment, related to all other people who have crossed that particular

segment. There is a competition regarding the Fastest Time and of the Most Efforts. See figure 3 for the screen that appeared after my first bike ride on Strava, emphasizing the leaderboards. The leaderboards of Fastest Time can be filtered by All-Time, All-Time (Women), This Year (Women), This Year, Today, Following, By Age (20 to 24), and By Weight (55 to 64 kg) (see figure 4). Interesting about these filters is that you can select a specific category for women, but not for men (I checked this with the Strava account of a male participant). This shows that the affordances in this widget are not neutral, but indeed that classification is of importance. How the interface is designed and which classifications are used, show certain presuppositions about gendered bodies of Strava users and their health/fit-ness. Why is there no specific leaderboard for men? Is that because men are supposed to be faster than women, so it does not matter if women are included in the ‘male’ categories? What is the reason that the interface designers choose the categories as such? Affordances and their categorisations, such as leaderboard filters, have an impact on who is deemed (and believed) to achieve which results. A form of normalisation of bodies can be identified, since the male body is the norm and the female body is the ‘different’ body. Strava mediates this normalisation by providing the data in this specific manner. As Mohr (2019) argues, a default body is portrayed within the interface. In Strava’s interface; the male body.

Another competition is about Most Efforts; the Local Legend. The person who rides/runs a certain segment the most, is ranked highest. This competition can also be split up into All Athletes and Women. Again, men do not have their own category but are only included in All Athletes, whereas women do have ‘their’ own category. This reaffirms the normalisation of the male body as norm.



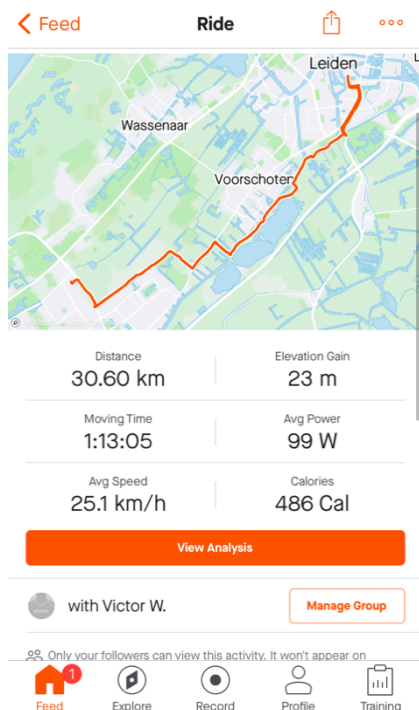


Figure 2. Ride summary

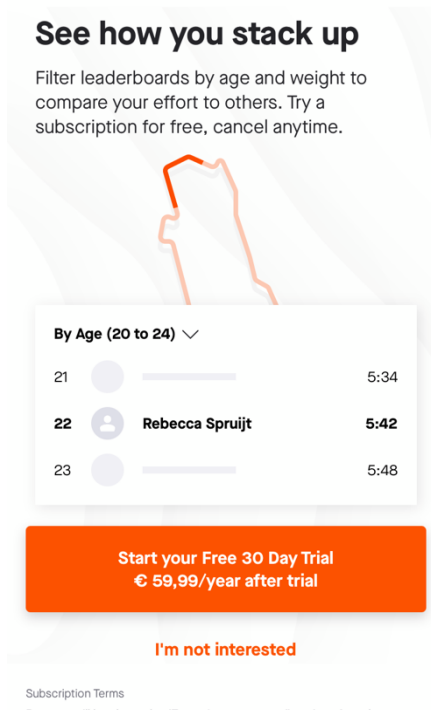


Figure 3. Pop-up after bike ride

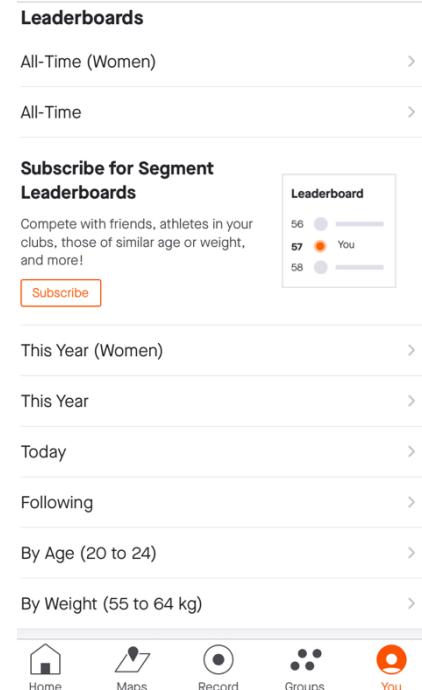


Figure 4. Leaderboard filters

## Strava users

The interviews were analysed according to the concepts that were introduced in the theory section. The typology of relationships of human-technology assemblages that Kristensen and Prigge (2018) constituted (enactment, experience, entanglement, and integration) is the framework for the first part of the analysis. Subsequently, social aspects are discussed with the appliance of the concepts of participatory and peer surveillance. See appendix III for the operationalisation scheme.

### Enactment

Enactment as relationship is found with all the participants. Strava is used to have an overview of all the exercises, and as many participants say, an overview of themselves. Strava has the role of knowledge mediator (more on this in the discussion section), which affects how it can mediate the body articulation. This aspect of ‘knowing’ oneself is for example by Lupton (2014) described as one of the main features of self-tracking. The participants in this research seem to back this claim, since many of them argue that Strava provides them a good overview of the activities. Strava ‘helps’ the participants to gain insights in what their body is capable off. When asked why they use Strava, all participants say they use Strava to know what they are doing.

The quote below shows the sentiment that was apparent with all participants; that tracking is just what you do.

“I think that's just part of it, that I know what I've done myself.” (Imane)

Henk referred to this aspect in the follow way:

“It's very rare that someone doesn't track with Strava so to speak. No, can you imagine cycling without Strava? Not anymore. I guess, it's a part. it's just part of it somehow.”  
(Henk)

This ‘being part of it’ kept coming back in the interviews. Self-tracking does not seem to be an option, if you exercise, you just do it. This normalcy, however, only seems to exist with so-called cardio exercises. Participants who do other types of sport, often do not track those. I will go into further detail about this in the entanglement paragraph.

All participants use Strava to check the data of the activity they are tracking. Almost all participants even check it while exercising. Most participants who cycle, use a bike computer to provide data real-time and the only participant who does not, uses her Strava app to receive real-time feedback. Participants who run also use self-tracking to access their real-time data, using self-tracking watches or Strava, only one participant does not access her data until the run is over. The other participants argue that the ability to check the tracking data while exercising helps them make the most of the exercise. For example, as Lily states:

“So that's more for when running, that you know ok I'm on 3 now or 4 now.” (Lily)

The real-time feedback helps the participant with how many kilometres she has had. However, many respondents say that they alter their exercise due to this feedback, so I will discuss this tendency in the experience paragraph. Additionally, all participants check the data after a self-tracking activity to see how it went. The data that Strava offers after the exercise, affects how the participants view the exercise. As Imane remarks:

“I do think if I have cycled a fast lap for example and that is also stated on Strava that I think, oh nice”. (Imane)

Strava also offers an overview of all exercises. Although it differs per participant why they look at this data, everybody does examine it. Some use it simply as a log, while others use that data to benchmark themselves and use it to improve. The output helps them with this process. The following quotations underline this:

“Well, at least the possibility to improvement. That I track how it goes and that when I want to, or when I feel like it, I can challenge myself.” (Rosa)

“But I just really always want to be a little better than I've done. I often race against myself, you know, that I have to go a little harder, faster, longer.” (Flip)

“And I also just like to look back where exactly I have been. that you can scroll back like oh last month I cycled this round and, I don't know, cycled thirty kilometres and then you think oh yes. that you can just check a bit and see progress or something.” (Thomas)

These quotes show how the self-tracking data can help participants to improve. In the discussion chapter, it is addressed what ‘improvement’ means.

Another feature that the participants use, is the ability to see the route of the exercise visually. All participants indicate that they use this visual overview to plan other routes or to see how they went in hindsight. The data provided by Strava thus mediates how the participants experienced their exercise since the visual representations add to their sensorial experience.

## **Experience**

Whereas in the enactment mode, Strava mediates how users perceive their exercise, in the experience mode, the technology can alter or intensify the experience of the self, thus enhancing the mediating role of Strava. One of the most occurring aspects is that the participants alter their exercise due to feedback from Strava. In the last paragraph, I shortly mentioned how most participants use real-time data to know how they are going. Most participants, however, also adapted to the data. This quotation shows how Rosa used the data to alter her exercise.

“Suddenly we saw like oh we only did 3.5 km, we can do six, let's do that. So, we kind of started working out more intensely because of that, because we suddenly saw what we were doing.” (Rosa)

Because of the data feedback, they realised that they could go further, thus adapting their exercise. Isis uses the feature of Strava that you can have a voice give you real-time feedback. She described how this encourages her to go faster on her run:

“So, if I notice, okay, I'm comfortable with it, I could go faster and I also hear from my feedback that you do this slower than the km before, that's what he says, so you can increase your pace a bit again. That's nicer than when you think afterwards of okay, I've done my 5 kilometres, but I could have gone faster, but yeah shit now I've already done

five so I'm going to stop and take a shower. While, if you already hear on the road that, well, your body feels good and you could go even faster, then you can already adapt to that.” (Isis)

For Elias, the combination of data on his speed and cycled kilometres, makes that he decides to maintain that speed.

“And then I just go cycling and then at some point I see my average and then when I've had two-thirds of the ride and then that's pretty good, then I want to hold that until home.” (Elias)

While without Strava he might have slowed down, with access to his real-time data, he decides to maintain his current speed. These examples all show how the technology has become an ‘extension’ of the body, since it adds to the sensory apparatus. Strava’s data is used to complement the feedback of the body itself.

As a result of the technology being an extension of the body, the data also affects how the participants think about themselves and their body. Rosa remarked that “the better I did on Strava, the fitter I thought I was”. Tobias also mentioned that the tracking data, apart from the exercise itself, is a way of feeling good about yourself.

“You can see it all very easily, how you did it. So, if you do a lot of sporting, then it can all be seen and then you will have a positive experience, and then you are proud of yourself. And if you don't keep track of that, then you have no idea.” (Tobias)

When I asked a participant how he ‘measures his fitness’, he replies:

“Yes, I measure that very much on my body indeed. but also in data, because the moment that the exercise is easier for me and I can go further, faster, and I see from Strava that there is progression, then it is nice to see that okay you are fitter.” (Flip)

After this, he describes that whereas on a certain point, you can no longer see the progression in your body, you can keep seeing it in the data. the body shows quite some progression in the beginning, but after a while when the changes are not that significant, the data helps. The ‘dependency’ on Strava also occurs since the participants want to track every single exercise, to have a complete picture. This aspect came up often in the interviews. Only two participants left their Strava deliberately at home sometimes, while all the other participants told me that they want to have all their cycling/ running exercises tracked.

## Entanglement

The third relationship was found in all the interviews. The entanglement relationship entails that the self-tracker suddenly becomes aware or hindered by the technology. This is valuable since it indicates that the technology normally is taken for granted. The sudden awareness points the self-tracker towards the role that Strava has in the relationship.

The aspect that I heard most was that the output was not in line with the subjective experience of the tracker. All participants indicated that they had experienced this. However, they all said that while their first reaction was one of disappointment, they immediately saw past it because they attributed more importance to their subjective feeling. Sometimes the output was not in line with the subjective experience due to circumstances such as wind, rain, traffic lights et cetera.

“Yes, it happens sometimes because you sometimes have a ride that you cycle fast the whole time and you try to ride 30 km and you pound all the time and then you stop at a traffic light for a while you know, well and then at the end of the ride you suddenly have 27 average and then you think where does that come from.” (Flip)

The participant follows with saying that in moments like that, he realises that he indeed does care about the output. Whereas some other activities, which he does not track, are not output driven, when he goes cycling by himself, it is output driven. This participant also told me about his ‘negotiations’ with the output when his output differs due to circumstances:

“Yes, on the one hand I always try to pretend I don't give a shit but it's not exactly.. So, I almost feel the need, because you can give a title to your ride, so then to give a title like, ‘guys I went riding half power’, you know.” (Flip)

Another participant told me, about using the text as a ‘disclaimer’:

“No yes then so for example that my legs were tired or if there was a strong headwind something like ‘a strong wind but nice sunny’ but I try not to be so negative because I find it annoying when others say things as the bridge was open or the traffic light was red, then I think yeah whatever. That disclaimer, I try not to do that because I find that annoying with others when they look for a reason for their slow time.” (Sarah)

This shows that the participants act differently when circumstances affect their output.

Another reason that output was not in line with the experience, was when the technology was not working properly. Problems with the GPS, the phone, or the uploading of the data also

resulted in a mismatch. What is interesting, is that all respondents could remember a time when the technology was not working as it is supposed to. This emphasises that technology is viewed as ‘just there’ until it breaks down. Only when it breaks down, do people become aware that it indeed is there. However, most subjects quickly accepted and moved on. Some indicated that they were annoyed when the output was not correct due to technical errors:

“Because then I thought I actually want to see my total because maybe I went very fast at the end and then my average speed is higher.” (Imane)

Another participant also mentioned this type of annoyance, about Strava’s analysis of when he was in his ‘fittest shape’:

“I think that's weird. I wonder how they measure that? And I secretly find it annoying. Then I suddenly see that and I think fuck this I am fitter than then, how does it say here that I am less fit than then?” (Harun)

The data that Strava provided, did not match his own experience and insights. This led to him questioning how they measure his fitness, because based on his own knowledge about his body he is fitter at the time of the interview than when Strava says he was.

The third reason that the output would differ from the subjective experience was that the activity itself did not go as the self-tracker felt it went. The response of the participants with this was mainly one of acquiescence, as the following quotes show:

“If my speed is less fast, well that is a pity, but after 10 seconds I have put myself over it and then it is done.” (Tobias)

“Yeah, when it doesn't match, yes, that is especially when I think yes okay, they are in that respect just numbers. I think the most important thing is that you try to be fit and that you have run, and you can be most proud of that. And if it's slower than you thought, well yeah.” (Sarah)

It appears that the specific reason for the difference between data and subjective experience, matters to how accepting the participants are of the difference.

The final aspect entanglement that emerged throughout the interviews, was when a contrast between the nature of sporting and the quantification happens. Whereas some participants indicate that they exercise mainly for the output to focus on their performance, others indicate that the tracking changed the nature of the exercise. One participant for example told me that she sometimes leaves her phone at home on purpose:

“Or if I spent a whole day on my phone, for example, then I'm done with it and then I think ah I'll leave it at home.” (Rosa)

Another participant explains why he tracks his cardio exercises, and not his climbing and tennis exercises:

“I think the output is important to me. I think cycling and running, cycling is something I really enjoy going out into nature, I think that's fantastic. But if you go cycling alone, it is often output driven. When I run it is also output driven. [...] yes, I think it is different, because I also think that if I do not track, it is less output driven, and you are more enjoying the sport itself.” (Flip)

### **Integration**

There were only a few indicators of integration, in which the self-tracking technology blends into the background. This could affect the degree of mediation of Strava since self-trackers depend less on the input of Strava to articulate their body.

Two participants indicated that they gained all the insights and did not need Strava to know how their exercise went. These two participants were also the most extensive users, since they used Strava for many years and on average once a day. Elias said he had gained all insights since he has been training for many years, therefore he knows instinctively how his exercise goes. He only uses Strava for monitoring all his activities. He developed a habit of checking Strava, but this was focussed on the social aspect since he checked the feed multiple times a day. Harun explained something similar:

“And I also have so much sport experience now, that I know easily and very clearly. I can train very much by feeling. If I don't look at my things, I just know what kind of wattage I've pedalled. And also, what kind of heart rate I have been on.” (Harun)

The other participants did not show any signs of an integration relationship with the technology.

### **Social**

Now that the concepts of Kristensen and Prigge (2018) allowed for insights regarding the human-technology relationships, we move towards perspectives on social aspects of Strava. Strava's social media side adds to the ways in which it could mediate how its users articulate their bodies. The presence of a social aspect turns self-tracking and the sharing of tracking data into a performative mode (Lupton, 2016). Self-trackers become aware of the presentation of the body or the self that they want to share with others, resulting in self-surveillance (Lupton, 2015).

All participants showed awareness of the social aspect of Strava, however, it differs per participant how this affected them in their use of Strava. Some participants argued that while it did not change their activities, the social features are a motivating addition. A different participant indicated that while at first, she did not mind very much, but that after a while she started to feel pressured:

“Well not at all at first, but there has been a kind of hype that everyone is suddenly on Strava and posts all kinds of things and then also with photos and so and faster etc. So then I was a bit lost because of the competitiveness. Because I don't find that so interesting on Strava. So, on Strava you can also keep track of not publishing, I do that very often now. Because I'm doing it for myself and not to show how many miles per hour I'm running or anything.” (Rosa)

Elias told me that he felt quite aware of what type of activity he posted, and that he did not post his yoga activities because he felt that people would wonder why he would post that.

“And now I think, ‘I don't care’, so I just put it on there. And if it really bothers you, then unfollow me. But I did have moments when I occasionally put it on private.” (Elias)

The awareness of other people who can view your activity also returned in answers about how the participants selected their followers. Some people had very strict criteria on who could follow them and had everything in private, while others had a public account without restrictions.

The presence of others on Strava also resulted in the inclination of self-trackers to relate themselves to the other sporters. Some said it was unconsciously, while others told me that they compared their speed, distances, etc to people of similar ‘fit-ness’. However, it differed what effect it had on them. Some told me that they felt very aware of their relative stance and that sometimes they tried to be a bit faster because of it. Others said that while they did feel aware of other people, it did not affect their exercise at all.



## Discussion

In the following paragraph, the empirical findings of both the interface analysis and the interviews are discussed together in relation to technological intentionality.

### Relationships of human-technology assemblages

In the enactment mode, Strava mediates by letting users access data about their physical activity. Strava as a knowledge mediator has agency in the process of knowledge politics; what knowledge will be available and what knowledge is positioned as valuable? The available knowledge can affect how users perceive their exercise, but also their body. The ability to monitor and receive feedback grants the users the possibility to engage with the data. This is found with all the participants, that they use Strava ‘to know’ how their activities went. Whereas many participants indicated that they thought that Strava did not affect their activities, the access to the data did provide them with the metrics about their body which they used for improvement. The plain presentation of output alone, already creates a baseline. This shows that Strava, in a way, does shape how the participants articulate their body, namely as a body which could be improved. The articulation is mainly about the body as a ‘project’, as Ajana (2017) argues. It illustrates that the participants consider their bodies through the app, as a body which they can improve by means of self-tracking data.

The enactment mode quickly passes into experience mode, since participants often make the link between the data and aspects of themselves. They use the data to articulate for themselves how fit they feel, thus articulating their body in terms of ‘fit-ness’. Strava mediates this articulation process by providing the data, through the interface, on which they base their articulations. This is illustrated in the empirical data by the ways that the participants adapted their exercises due to the tracking data. Strava enables the participants that they can ‘make the most’ out of their training (as they put it themselves). But ‘making the most’ their training is an interesting notion since it reduces the physical activity to an activity which is focussed on improving the fitness of the body. The answers of the participants show that they are quite focussed on this, which sometimes even creates a tension with whether they can enjoy their exercise. The entanglement mode illustrates this tension, since participants suddenly become aware of the self-tracking technology and what they use it for. Whereas they state that they only use Strava for monitoring, when it breaks down it becomes apparent that they are dependent on it for their exercises and their sense of self (in terms of fit-ness). Instances of entanglement show that whereas on the surface the users use Strava simply for knowing their output, unconsciously they depend quite a bit on the output to articulate themselves and their bodies.

An interesting distinction to be made, is that participants who have been using Strava for some time and more regularly, seem to be less dependent on the output for their articulation of their fit-ness. When users have an integration relationship with the technology, it seems that they have internalized the ability to track their exercises. These participants do not need the app to enable them to articulate their body, since they are able to do it themselves. However, it is the result of regular and intensive use of self-tracking that provided them this ability. That would indicate that while Strava can mediate how its users articulate their bodies in terms of fit-ness, after intensive use the mediation could diminish since users can track their fitness independent from Strava. After the internalization, it is mainly a tool to keep track of the data without needing it for feeling fit.

### **Context of exercise**

Another way in which Strava seems to mediate the articulation of the participants' bodies, is through how they use Strava. With a physical activity, it can differ in what context you use your body in that activity. The interviews led me to believe that there are multiple contexts of exercising, in which the body plays a different role. The participants seemed to distinguish between activities that are achievement based and activities that are about being outside, stepping outside of 'regular' life. Many participants indicated that it differs how they track their activity, depending on 'how' they are exercising. When they exercise while being focused on improvement (achievement-based), they articulate their body through the output. With this 'mode', the output mediates how the participants articulate their body and how they feel about it. Strava enabled them to connect their body to their output and draw conclusions about their fit-ness. However, when participants exercised as a way of making their head empty, breaking their day, et cetera, they would focus less, or not at all, at the output. In this context, their body was simply used to get some relaxation, get into nature. The articulation of their body is in this instance far less mediated by Strava.

### **Social**

Strava also mediates articulation of bodies by facilitating connections with other people, which results in relating bodies and outputs to each other. This enables Strava's users to compare their body with that of others.

What came out of both the interface analysis and the interviews, was the focus on social activity. To start with, profiles are by default accessible by all Strava users (and even non-Strava users since the profiles are accessible through the web). This creates a sphere of openness that indicates a sense of community. The option to search other Strava users and add them is often

given, and all the participants indicate that they indeed follow other people and have other people follow them. It differs how the participants feel about this. Some said that they find it motivating to have other people liking and commenting on their activities, yet others indicated that they found it overwhelming and have put all their activities on private. These differences aside, it does tell something about how Strava positions the bodies of its users; on display.

This is clear from the moment you open the app, since the first screen you open is the feed. This is the place where you can view the activities from all users that you follow. By immediately having access to their output, the possibility arises to relate your own output to that of your peers. Whereas most participants told me that this does not actively affect them, they also said that they do feel aware of the eyes of others. Most of the participants could also tell me where they ‘stood’ relatively, regarding their average speed. This illustrates that while they think it might not have an active effect on them, unconsciously they all relate themselves to the other users. This way, peer surveillance results in implicit norm-setting. An interesting remark regarding the implicit norm-setting, is that only one participant put her tracking data on private. All other participants shared their data with others, thus actively enabling the possibility to be checked upon. This notion of self-surveillance is striking since it facilitates the context of self-improvement and competition. Participants thus actively choose for this context, since it is an option to not add any friends and put your data on private.

A different way in which Strava enables the comparison of bodies is with QOM/KOM and Local Legends. With these competitions, Strava facilitates a sphere in which an individual activity (self-tracking) is turned into a competition in which bodies are to be improved to be the fastest or most active. The behavior of sporters is channelled through the app in a particular way; focussed on output.

A critical note that I already mentioned at the results paragraph of the interface analysis, is that the output of users can be split into two categories: all users and female users. This reflects how Strava views gendered bodies. The fact that women have a separate category, but that men are only classified as ‘all users’ without a separate category, shows that male bodies are deemed as the standard and that female bodies are not supposed to interfere with the competition between men. This demarcation could also mediate the articulation of bodies, since it articulates female bodies as inherently less than men, at least in terms of fastness and activeness. It shows that bodies are never neutral and that seemingly ‘apolitical’ spaces such as a self-tracking app also entail hidden presuppositions regarding bodies. What is a ‘female’ body and what is a ‘male’ body and what does this mean for the output of the bodies? Whereas Strava does offer a choice in the profile settings between ‘male’, ‘female’, and ‘other’, it is not as

inclusive and open with its categorizations regarding ranking. As Klaus and Albrechtshund (2014) argue, classification is a subjective process with invisible processes of prioritisation.

When applying a gender lens to the interview data, there do not appear to be striking differences between men and women. Overlap in considerations and/or ideas could not be classified according to gender.

## Conclusion

This thesis examined the following research question: how do people articulate their body through the mediation of online fitness data? To this end, a multi-method research was conducted to analyse the self-tracking app Strava and its users. The results showed that Strava users articulate their body mostly in terms of fit-ness, Strava mediates this by focussing on output, creating competitions, and making use of peer surveillance.

As discussed in the last section, the participants articulated their body as something that needs to be improved, and Strava offers the output to help them with this process. The data double provided them with the awareness of the metrics of their body, opening the possibility to improve these metrics. It is striking that all participants indicated that they use the data to gain knowledge about their performance and to use this knowledge to improve their body. The results are in line with Ajana's (2017) claim that self-tracking is the result of perceiving the body as a project. Digital materialities carry implicit norms with them (Pink and Fors, 2017a; 2017b) and this thesis concludes that Strava is complicit in this process of implicit norm-setting by emphasizing competition and peer surveillance. Strava users are encouraged to become quicker and more active, in relation to themselves and to others. The combination of an interface analysis to research the app itself and the interviews to research its users, have granted more insights than each of them separately could have done.

As results showed, all participants used the output to improve their body and fit-ness. But apart from this, as the interface analysis illustrates, Strava seems to amplify the ability for comparisons by emphasizing the feed and segment competitions. The interview data backs this claim, since all participants indicated to be aware of peer surveillance. Whereas some argue that this did not affect them, many said that they thought that it mediated their behaviour and thoughts unconsciously. This is in line with the implicit norm setting that digital materialities can entail. Digital materialities participate in the experience and articulation of one's body. The technology and the data from the data double have agency within the human-data assemblage. This thesis argues that Strava does not stand on itself with this type of norm-setting but that is indicative of tendencies that are quite common in 21<sup>st</sup> century culture. In a society in which people are encouraged to increase their human capital, it is a logical corollary that people seek to optimise their body and self-tracking applications such as Strava offer the tools for this. Yet, it is too short-sighted to solely point to our neoliberal society. To understand the role Strava plays in this, it is necessary to perceive Strava as a knowledge mediator. As Burns (2014) argues, technologies can disable but also enable certain knowledges. With the production of

knowledge, self-tracking applications are not simply tools which provide assistance, but they can actually mediate how knowledge is presented. They carry implicit norms which mediate how people articulate their body. What is healthy, how bodies are supposed to be, who is a successful sporter, et cetera? As scholars of the Frankfurt school already argued in the 20<sup>th</sup> century, technology can produce mass culture and be deployed as an instrument for social control (Kellner, 2002). The scholars indicated that a commercial and technologically advanced culture could be deployed to serve the needs of corporate interests and strengthen ideological reproduction. With the case of Strava, it appears to be the case that the application indeed enculturates its self-trackers into certain systems of thoughts and behaviour.

Additionally, bodies are positioned within societies in which strong assumptions exist about bodies regarding their gender, age, race, class, ability et cetera. It would be short-sighted if these structures are not considered when talking about norm-setting regarding bodies. The interface analysis uncovered some assumptions Strava holds regarding gender and gendered bodies. However, my participant sample was far from sufficient to be able to distinguish how bodies are perceived differently and how social structures impact this since all my participants were able bodied, white, and middle class. Further research should be conducted with taking these intersections into consideration. Another venue for further research, is that one of the findings of this research was that it differs per type of exercise whether people want to track it. Most participants indicated that they solely track cardio exercises. Whereas this had no particular relevance for this thesis, further research could investigate these tendencies. Also, self-tracking can be applied in far more extensive usage. Using self-tracking devices such as Fitbit or Apple watches, allows people to track every aspect of their life; sleep patterns, heart rate, menstruation cycle, et cetera. The surveillance aspects would be far more extensive in that case than with solely tracking cardio exercise. Differences between the amount of self-tracking and how this affects the mediation, would be an interesting angle to explore. Another aspect of self-tracking data that could not be investigated in this thesis is the data collection executed by commercial companies. Behavioral data is quite valuable in modern day ‘information capitalism’ (Zuboff, 2019). The data that self-trackers upload, can be used by companies to extract value from it and personal behavioral data becomes monetized. Strava stores all the data that is collected, which is accessible through their Strava Labs global datasets (Strava Labs, 2021). Further research into this intersection could investigate how this commercial imperative affects how Strava goes about as a company in relation to their users.

Since technology and data are often viewed as inconceivable ‘black boxes’, more sociological research would add to the understanding of these topics and their societal

implications. This thesis illustrates some of the effects that self-tracking technology and fitness data can have. In a ‘digital society’, it is important to get a grasp of the impact of technology, especially since it is often portrayed as a neutral tool. As Kitchin and Lauriault (2014) argue, data infrastructures are not neutral, but always embedded within certain institutions and frameworks. Awareness of technological intentionality is of importance to understand how it might help shape people in both their ideas and actions, and in their very bodies.

# Appendix I

## Interview guide

### Guiding questions for the interviews

- What do you use Strava for?
- When did you start using Strava?
  - o Why? How often?
- How do you use Strava?
  - o What do you do with the app?
- Do you always use Strava when conducting physical activity?
  - o How do you feel if you do not track?
- Do you change your activities for Strava/ self-tracking activities?
  - o How? Why?
- Does the self-tracking data affect how you feel about your physical activity?
- Do you actively choose who to follow and who may follow you?
  - o Do you experience competitive aspects?
  - o Does this affect how you feel about yourself? In what way?
- Have you had the experience that the output does not match with your own experience of the activity?
  - o Do you value the output or your own experience more?



## Appendix II

**Table 1. Avatar Affordances Framework**

Widget	Function	Behaviour	Structure	Identifier	Convergence	Default
Create your profile.	Insert information to create Strava profile	3x enter data (First name [..]/ last name [..]/ Date of birth [..]) and 1x choose 1 from 3 options (male, female, other).	2 text-fillable fields; 1 date fillable field; 1 list (3)	Your profile is your home page with all your activities. Here your friends can also find you on Strava. It is set to public by default, but you can always change that in your privacy settings/ Next	None	None
Contact	Grant permission to Strava to contact you	Choose 1 of 2 (No/ Yes)	Buttons (2)	Can we contact you? / We would like to send you emails and notifications about the following;; Your monthly statistics / New challenges and clubs / stories from the Strava community	None	Yes
Synchronise contacts	Grant permission to Strava to sync contacts	Choose 1 of 2 (Sync your contacts/ I will do this later)	Buttons (2)	Discover routes your friends enjoy	None from social media but convergence from contacts on phone	Sync your contacts
Find friends	Search specific friend on Strava	Choose 1 of 2 (Search; Maybe later)	Buttons (2)	Did someone tell you about Strava?; if a friend told you to join Strava, search for them to get connected	None	Search
Follow Athletes	Search for friends and contacts on Strava	Choose 1 of 3 (Sync contacts/ Find your contacts on Strava; Skip)	List (2) and button (1)	Connect Facebook/ Find your Facebook friends on Strava	First affordance allows to pull contacts from Facebook	None

Profile is created; following widgets are options you can adapt with settings

Follow Athletes	Connect with other Strava users	Choose 1 of 3 (Sync contacts/ Find your contacts on Strava; Skip)	List (2) and button (1)	Connect Facebook/ Find your Facebook friends on Strava	First affordance allows to pull contacts from Facebook	None
Edit profile	Add personal information					
Primary sport	Select which sport is primary	Choose between two options	List (2)	Running; Cycling	None	Running
Weight	Set weight	Enter kg	Number-fillable box	0	None	None

Privacy settings

Profile page	Choose who can search for and view your profile page and activity summaries.	Choose 1 of 2 options (Everyone/ Anyone on Strava can search for and view your complete profile page and activity summaries, as well as follow you. Anyone on the web can search for and view certain profile information.; Followers / Members who follow you can see your complete profile page. Anyone who can search for and view certain profile information, and you can approve who follows you	List (2)	Your profile page displays information about you, such as your name, activities, followers, photos and stats. Parts of your profile page will always be publicly available; Learn more about Profile Pages [link to new widget]	None	Everyone
Activities	Choose who can view your activities	Choose 1 of 3 options (Everyone/ anyone on Strava can view your activities. Your activities will be visible on segment and challenge leaderboards, and other Strava features.; Followers/ Only your followers will be able to see your activity details. Your activities will not appear on segment of challenge leaderboards, and may not count toward some challenge goals. Members who do not follow you may be able to view your activity summaries depending on your other privacy settings.; Only You/ Your activities are private. Only you can view them. If they count toward a challenge, your	List (3)	Activities are workouts, races or events you record or upload to Strava. What you choose below will be your <b>default</b> , but you can change settings for each individual activity [original emphasis]. You will appear in group activities of Flybys unless you adjust those controls.; Learn more about Activities [ link to new widget]	None	Everyone

Group activities	Choose who can view your group activities	followers may see updates on your progress. No one will see your activity pages, and your activities won't show up on leaderboards or elsewhere on Strava, including group activities or Flybys.) Choose 1 of 3 options (Everyone/ your group activities will be visible to anyone on Strava; Followers/ your group activities will only be visible to athletes who follow you and athletes you follow.; No One/ Your activities will not be displayed as part of group activities)	List (3)	This feature detects if athletes recorded activities together. If they have, the activities are grouped and displayed according to the options below.; Learn more about Group Activities [link to new widget]	None	Everyone
Flybys	Choose who can view your activities in Flybys	Choose 1 of 2 options (Everyone/ Your activities are accessible to you and anyone on the web using Flybys. Only activities marked as visible to 'Everyone' will be displayed in Flybys.; No One/ Your activities will not be visible on Flybys to you or anyone else.)	List (2)	Flybys provide in-depth activity playbacks to anyone on Strava or the web. Flybys allow you to rewatch any activity minute by minute, and see athletes who were nearby and where you crossed paths.; Learn more about Flybys [link to new widget]	None	No One

#### Following widgets appear when finished a ride

Subscription ad	Ad for trial for subscription	Choose 1 of 2 options (Start your Free 30 Day Trial €59,99/year after trial / I'm not interested)	Buttons (2)	See how you stack up; Filter leaderboards by age and weight to compare your efforts to others. Try a subscription for free, cancel anytime.; By Age (20 to 24) / 21 (blank) 5:34/ 22 Rebecca Spruijt 5:42/ 23 (blank) 5:48	None	Start your Free 30 Day Trial €59,99/year after trial
Find friends	Search specific friend on Strava	Choose 1 of 2 (Search; Maybe later)	Buttons (2)	Did someone tell you about Strava?; if a friend told you to join Strava, search for them to get connected	None	Search
Follow Athletes	Search for friends and	Choose 1 of 3 (Sync contacts/ Find your contacts on Strava; Skip)	List (2) and button (1)	Connect Facebook/ Find your Facebook friends on Strava	First affordance allows to pull	None

contacts on  
Strava

Overview of  
data on your  
ride

Tap on sections for further details; tap to view analysis

contacts from  
Facebook

Ride

## Appendix III

**Table 2. Coding scheme**

<b>Enactment</b>	<b>Experience</b>	<b>Entanglement</b>	<b>Integration</b>
Overview via feedback	Technology as extension of body	Mismatch data & subjective experience of self	Integrated into background
Overview via visualization	Data urges user to relate to own bodily self	Output different than self (mismatch instead of representation)	All insights are gained
Knowing	Data urges user to relate to own and wellbeing	Negotiation with technology/ data	Data storage
Draw conclusions from data	Transformation of perception of self	Tensions between technology and self	Routine of checking
Technology mediates how users perceive exercise	Change in how body is experienced	Tension ‘flow’ of experience and quantification	
Representation of body	Link data with aspects of self Reliant on technology for sense of self (‘complete picture’) Technology provides evaluation of data. Values are perceived/interpreted by user Mediates users’ experience of performance	Contrast with nature of sport and living	
<b>Participatory surveillance</b>	<b>Peer surveillance</b>	<b>Other</b>	
Edit ride	Norms	Focus on output	
Awareness of uploading data	Relating activity to others	Goal activity	
Presentation of the self	View activity through eyes of others Criteria friends Social contact	Effect output Improvement focus Effect of Strava	

## Appendix IV

### Informed consent document

This research is being conducted by Rebecca Spruijt (550077rs@eur.nl), as a Master Thesis research at the Erasmus University of Rotterdam – the Erasmus school of Social and Behavioural Sciences. I am inviting you to participate in this research project about the self-tracking app Strava. The purpose of this research project is to gain understanding in the workings of self-tracking applications.

By signing this form, you give me permission to use the data that you share with me.

You will participate in an interview lasting approximately one hour. You will be asked questions about your experience with Strava. Sample questions include: “What do you do with the Strava app?”.

There are no obvious physical, legal or economic risks associated with participating in this study. You do not have to answer any questions you do not wish to answer. Your participation is voluntary and you are free to discontinue your participation at any time.

Participation in this study does not guarantee any beneficial results to you. As a result of participating you may better understand your own experience regarding a self-tracking app. The broader goal of this research is to gain understanding surrounding self-tracking apps and their users.

Your privacy will be protected to the maximum extent allowable by law. No personally identifiable information will be reported in any research product. Moreover, only trained research staff will have access to your responses. Within these restrictions, results of this study will be made available to you upon request.

This research project involves making audio recordings of interviews with you. Transcribed segments from the audio recordings may be used in published forms (e.g., journal articles and book chapters). In the case of publication, pseudonyms will be used. The audio recordings, forms, and other documents created or collected as part of this study will be stored in a secure location on the researchers password-protected computers (which only the researcher has access to) and will be destroyed before 01-09-2021. For further questions about data protection or to file a complaint, you can contact the EUR data protection officer (privacy@eur.nl)

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. You may withdraw your consent at any given time. You are allowed to access to the data and you have the right to rectify, erase or restrict the processing of your personal data.

You consent to me asking about and processing your data related to your health.

If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the primary investigator: Rebecca Spruijt

Your signature indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree that you will participate in this research study. You will receive a copy of this signed consent form.

For research problems or any other question regarding the research project, please contact the coordinator of the Master's Thesis Program Dr. Jennifer Holland ([j.a.holland@essb.eur.nl](mailto:j.a.holland@essb.eur.nl)).

Name:

Name researcher: Rebecca Spruijt

Date:

Date:

Signature:

Signature:

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