Configuring selves through design: a critical study of self-tracking practices and digital inequalities in health insurance.

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Configuring selves through design: a critical study of self-tracking practices and digital inequalities in health insurance.

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Docteur ès Sciences en sciences du mouvement et du sport

Par

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Faculté des sciences sociales et politiques

IMPRIMATUR

Le Décanat de la Faculté des sciences sociales et politiques de l'Université de Lausanne, au nom du Conseil et sur proposition d'un jury formé des professeurs

- Fabien Ohl, directeur de thèse, Professeur à l'Université de Lausanne
- Francesco Panese, Professeur à l'Université de Lausanne
- Dorthe Brogaard Kristensen, Professeure à l'University of Southern Denmark
- Eric Dagiral, Maître de Conférences à l'Université Paris Cité

autorise, sans se prononcer sur les opinions du candidat, l'impression de la thèse de Monsieur Bastien Presset, intitulée :

« **Configuring selves through design : a critical study of self-tracking practices and digital inequalities in health insurance** »

Nicky LE FEUVRE
Doyenne

Lausanne, le 18 novembre 2022

Abstract

Self-tracking (ST) is progressively finding its' place in the health promotion programs of public health institutions, companies, and insurances. Going beyond technophilic discourses that present these innovations as neutral, my dissertation critically explores the reconfigurations of people's lives and public health practices that they entail.

I rely on Akrich's de-scription (1992) to follow a step-tracking application that distributes premium reductions upon daily completion of standardized objectives, from its development in a digital health laboratory financed by an insurance company to its laborious integration in policyholders' daily lives. My analyses are based on observations among the designers, and interviews (n=45) and questionnaires (n=818) with end-users.

In the first part of the dissertation, I follow designers as they attempt to translate the technological promise to change users' lifestyle in a technical architecture. I highlight their reliance on reductive cognitive models to configure users as 'rational' subjects (Woolgar, 1990). Doing so, I explore the cultural, technical, and organizational constraints that underpin the (re)production of the—criticized—'neoliberal' tracker (Lupton, 2016).

In the second part of the dissertation, I contrast designers' script of user-technology interactions with users' accounts of their actual encounters with the technology. First, I emphasize the negotiations and struggles that underpin the integration of physiological standards in daily life. Second, I demonstrate that digital divides are present both in the adoption and use of the technology, thereby challenging its public health ambitions, and strengthening health inequalities (Selwyn, 2004). Finally, I explore technology's role in shaping users' enactments of solidarity and thus question its disruptive effects on established models of insurance.

Résumé

Les mesures connectées (self-tracking) se sont progressivement imposées dans les programmes de promotion de la santé des institutions, entreprises et assurances. Ignorant les discours technophiles qui tendent à présenter ces innovations comme neutres ou anodines, ma thèse explore de manière critique les diverses reconfigurations qu'elles entraînent, tant au niveau de la vie quotidienne des individus que du fonctionnement du système de santé.

Mobilisant la méthode de la dé-scription développée par Akrich (1992), je m'intéresse à une application de mesure de l'activité physique qui distribue des réductions de primes d'assurance, de son développement dans un laboratoire de santé numérique financé par un assureur à sa difficile intégration dans la vie des assuré·e·s. Mes analyses sont basées sur des observations auprès de concepteur·rice·s d'applications, et sur des entretiens (n=45) et questionnaires (n=818) auprès d'usager·ère·s.

Dans la première partie de la thèse, je décris la tentative des concepteur·rice·s de traduire la promesse technologique de changer le comportement des individus en une architecture technique. Je souligne leur dépendance à l'égard de modèles cognitifs réducteurs qui configurent les usager·ère·s comme des sujets 'rationnels' (Woolgar, 1990). Ce faisant, j'explore les contraintes culturelles, techniques et organisationnelles qui sous-tendent la (re)production du modèle critiqué du 'sujet néolibéral' (Lupton, 2016).

Dans la seconde partie de la thèse, je contraste le scénario des concepteur·rice·s avec les données sociodémographiques et les récits d'expérience des usager·ère·s. Premièrement, je souligne les négociations qui sous-tendent l'intégration de normes physiologiques dans la vie quotidienne. Ensuite, je démontre que des inégalités sociales se reproduisent au niveau de l'adoption et de l'utilisation de ces technologies, ce qui remet en cause les ambitions de leurs concepteur·rice·s relativement aux enjeux de santé publique (Selwyn, 2004). Je termine en explorant, du point de vue des usager·ère·s, l'impact de ces technologies sur la solidarité en matière d'assurance.

Acknowledgments

Reflecting on scientific practice, Pierre Bourdieu highlighted the necessity to 'objectify the subject of the objectivation' (2001:88). In my view, he meant that scientific rigor emerges out of being clear about how, why, and with what researchers become entangled in their research. If many things are explored in this dissertation (methods, theories, data, etc.), a few significant beings are left outside of the picture or neglected, although they had a decisive influence on myself, and—consequently—on this document.

First, I would like to thank Fabien Ohl. It has been a real pleasure working under his guidance, which is not a light thing to say knowing how troublesome academic supervision can be. I am still amazed by his capacity to switch gears in seconds, which allowed him to be fully focused on my work as soon as I entered his office (sometimes unexpectedly). I have witnessed his conduct as a teacher, researcher, supervisor, and institute director, and it is fair to say that he taught me a great deal about each of these academic roles. More than anything, I remain fascinated by his ability to articulate constraint and enablement, structuring my endeavors while allowing me to affirm my scientific persona.

I would also like to thank Sally Wyatt, who supervised me during my one-year mobility in Maastricht. We were navigating amidst the troubled water of covid at the time, but she was always available to discuss my work, question my perspectives, and help me progress. Our discussions have been key to the articulation of my theoretical perspective.

I cannot but thank Tobias Kowatsch and Jan-Niklas Kramer enough for integrating me in their laboratory. Their openness to social sciences and their willingness to share their craft with me knowing that I was a critical scholar speak to the breadth of their scientific perspectives and their ambition to go beyond disciplinary silos. They were key actors of my research, and I hope that I have not misrepresented their work. My dissertation illustrates their rigorous attempts to produce both knowledge on and actual self-tracking technologies

I am grateful to my jury for taking the time to engage with my work. Research is a collective endeavor, and the current document has been significantly improved by the integration of Francesco Panese, Dorthe Brogård Kristensen, and Éric Dagiral's criticisms and perspectives. I have great respect for the ability they showed to provide insightful critique while remaining constructive and benevolent. I am convinced that such generous conduct is key to the growth of young scholars.

Research is not confined to the walls of the university and personal life does impact one's scientific endeavors. I would like to thank Charlotte Gaeng for sharing the ups and down of my dissertation journey with me, always finding time to discuss my failures and successes, and regularly challenging me to improve myself. I would also like to thank my family for their ongoing support all along my education. Finally, I would like to thank all the colleagues I shared an office with—notably Frédéric Stucky, Kevin Rosianu, and Céline Kosirnik—who made our working environment feel benevolent, fun, and intellectually challenging.

Table of contents

List of tables

List of figures

1. Introduction

1.1. On self-tracking in insurance

1.1.1. The modalities of running

> « Je voudrais, à travers cette histoire, vous permettre d'appréhender l'espace des positions et des prises de position à l'intérieur duquel se situe ma propre position (et vous donner ainsi un substitut approché du sens des problèmes propre au chercheur engagé dans le jeu pour qui, de la mise en relation entre les différentes prises de position – concepts en-isme, méthodes, etc. – inscrites dans le champ, surgit la problématique comme espace des possibles et principe des choix stratégiques et des investissements scientifiques) ». (Bourdieu, 2001: 19-20)

I like running, although I am not very good at it. I like the simplicity. And I enjoy the suffering too. I usually run within the charming Sauvabelin woods in Lausanne. I often start with a rough climb that passes alongside the red bricks of the Hermitage art collection. Sometimes, I chose a softer climb that goes around the huge Tridel recycling plant. Once I am up the hill, I run along the paths that intercross around the lake, the wooden Sauvabelin tower or the Flon river. I have been running since I was quite young. I remember running with my father—a sport teacher—on the Bussigny *vita parcours*[1]. It is only writing these lines that I realize that my earliest memories of running are of a health-oriented trail set up by an insurance company. An ironic twist since I use it as an introduction to a dissertation that tackles the entanglement between physical activity, insurance, and public health.

There are two modalities of running between which I oscillate. In the first, I typically leave the house with nothing more than my running gear and my keys. During these tours, I notice that I tend to leap over benches and obstacles, toy with the irregularities of the route, follow paths without really knowing where I am going, or how much I will run, and stop if I see a wild animal or would like to tip my toes in the river. My aim is mostly to perspire, loosely

[1] *Vitas parcours* are exercise trails set up by insurance companies.

exercise, and free my mind. In the second modality, I wear my Garmin Forerunner 245 watch. It is a sport watch that allows me to measure—a minima—heart rate, speed, time, pace and distance. I typically set up a specific training, based on my knowledge in sport sciences, on my computer.

I enjoy both modalities. Of course, they feel extremely different and produce contrasting results when it comes to my performance, mindset, and affective state. I guess I am here making two simple points (using my experience where I will later use STS and phenomenology): there are different ways to experience physical activities, and technologies play a part in mediating them (even in the first modality I use sport shoes which change how much and where I can run, and how it feels). A third modality was introduced to me around a decade ago, as I received an email from my supplementary insurance enticing me to use an application to measure my physical activities and gain rewards. I have received many similar emails since then. Here is an extract of a recent one:

> *Are you familiar with the Helsana Coach app? Download and discover now.*
> Dear Mr Presset,
> The Helsana Coach app will help you achieve your personal health goals.
> And it's easy to collect more valuable Plus points along the way. Interested?
> (Email received from news.plus@helsana.ch on the 27th of April 2021)

Yes, I am interested, but not to participate. I downloaded the app to check it out, but I never used it to go running in Sauvabelin's woods. I am interested because I believe that these seemingly innocuous emails are in fact laden with many hidden societal stakes and emerge out of new sociotechnical networks that seek to reconfigure the practices of insurance, the delivery of public health, and more generally people's lives.

This new modality to exercise, just like others, has its strengths and weaknesses. It brings together a particular web of things, bodies, affects, measures, knowledges, institutions, and values. This dissertation deals with the specificities of this network, notably the origins and consequences of its development. For now, let us note a few basic things about these new

insurance schemes. They focus on the measure of physical activities and are related to insurance plans. Users typically download an application on their Smartphones, Smartwatches, or Smartbracelets and start measuring physical activities. Whenever they reach an objective set by the insurance, they are rewarded. For example, this dissertation focuses on and application that offers a 0.20 CHF/0.40 CHF deduction on users' supplementary insurance premiums each day when they reach the objectives of 7,500/10,000 steps. I refer to these practices as self-tracking in insurance.

Self-tracking in insurance is currently being implemented all around the world (Jeanningros and McFall, 2020). It followed from the development of the internet of things, and particularly one of its branches: self-tracking. Self-tracking refers to 'practices in which people knowingly and purposively collect information about themselves, which they review and consider applying to the conduct of their lives' (Lupton 2016: 2). As self-tracking scholarship was still in its infancy, Pantzar and Shove referred to these technological tools as 'metering/measuring devices' (2005). The term 'quantified self'—coined in 2008 (Lupton, 2013: 26)—was also used in the early scholarship. It tends to be eluded now for it also refers to an organized group of self-trackers[2]. More recently, Lupton wrote that 'the terms for digital forms of self-observation are manifold, including "personal informatics systems," "living by numbers," "quantified self," "self-tracking," "personal analytics," "life-logging," and "self-monitoring"' (Lupton, 2014b: 78). In this text, I opted for the term self-tracking simply because it is the most popular among scholars.

1.1.2. The hidden stakes of 'mundane' self-tracking practices

Me running in the woods, tracking myself with a jogging app and transferring my data to a company like Garmin or an insurer like Helsana might seem mundane. It is, in the sense of

[2] The quantified self-movement was founded in 2008 by two founding editors of *wired* magazine. In 2017, the Quantified Self comprised more than 70,000 members around the world (Lee, 2014; Dudwahla, 2017).

being ordinary and commonplace. Many people do track themselves and commercials for physical activity tracking in insurance are an ordinary sight in a Swiss street (Guillaume, 2017). In other words, self-tracking in insurance is in a state of normalization. But it is not mundane in the sense of being devoid of interest. To the contrary, despite its mundane appearance self-tracking entails major societal stakes. Consequently, its normalization should not pass under the radar.

First and foremost, and as already hinted, these technologies transform people's relation to their selves, health, and physical activities. The technological mediation of physical activity fosters the diffusion of—questionable—standards and norms (Bowker and Star, 2000) and the instigation of a particular gaze on the self (Foucault, 2008). In other terms, both the very subjectivity of individuals and the functioning of social institutions are being re-shaped by self-tracking. Studying these processes from a social science perspective is therefore crucial, notably because these technologies are not neutral but the product of political and moral decisions (Lupton, 2016). What and who should be measured are thus tantamount questions, but forms of technological blackboxing (Rosenberg, 1982) usually preempt the formulation of public and democratic answers. Users are left with adopting self-tracking tools developed by private companies or groups of experts with little information on the way they were developed. It is thus one of social sciences' role to explore the blackboxes of self-tracking (Latour, 2008).

Second, exchanging digital flows of information with insurers, public institutions, and private companies entail major issues of commodification and surveillance (Till, 2014; Lupton, 2016; Zubbof, 2019). Indeed, when self-tracking data is shared with other actors, users have little control as to how their information is used, and by whom. Legal frameworks protecting self-tracking data do exist, but their implementation remains challenging to this day (Métille, 2017). Flows of information can thus be pooled, sold, or tracked for the benefice of various actors, often to the detriment of the producer of this data: the end-user. The omnipresence of

data-tracking and the ambiguity of its functioning are—according to certain authors—tied to the development of modern forms of 'surveillance capitalism' or 'data colonialism' (Zubbof, 2019; Couldry and Meijas, 2019). An important issue stressed by these authors is related to the asymmetry of power regarding the framing, ownership, and utilization of self-tracking data. Asymmetries that social sciences are particularly well-equipped to unpack.

These two—broadly sketched—stakes are by far the most explored by both scholars and medias. In my dissertation, I take follow slightly different—although related—perspectives and focus on the four following themes: (1) the design of self-tracking (whose role is implied in many critiques, but rarely engaged with empirically and analytically), (2) self-trackers' social backgrounds (or self-tracking's interaction with sociocultural patterns), (3) self-tracking's impact on health inequalities, (4) self-tracking's role in destabilizing health insurance models. This dissertation tackles these four interrelated themes, thereby exploring self-tracking's reconfiguration of insurance and public health practices.

1.2. About the dissertation

1.2.1. The pressure to publish

The aim of this section is to introduce the dissertation, with a focus on the four chapters that compose its core. Schematically, the whole document can be separated in two blocks. Chapters 5, 6, 7, and 8, which deploy and interpret the empirical results of the thesis, and chapters 1, 2, 3, 4, 9, 10, 11, and 12 namely the introduction, literature review, theoretical framework, methods, summary of results, limitations, avenues for further research and conclusion, which surround and reflect on the core chapters. In my case, the 'core block' was produced before the 'integrative block'. Indeed, during my time as a research assistant I was mostly preoccupied with writing articles. It is only later that I wrote the integrative chapters, reflexively considering 'the articles, the research that took place behind them, and the relationship between the articles

and the overarching project' (Nygaard and Solli, 2021: 7). However, if the reflection was formalized while writing the dissertation, it was already initiated in the selection of the themes, perspectives, and partition of the submitted articles.

I write these lines two years after the publication of my first article, and nearly three years after it was first sent to the editor. I published early for several reasons. First, I used an inductive approach (see the chapter on methods and data collection) which pushes one towards a recursive process of collecting data, interpreting it, formulating hypotheses, collecting new data, etc. (Bruscaglioni, 2016). Hence the fact that I published a first article early which led to new hypotheses, further data collection, and other articles. Second, having interacted mostly with Anglo-Saxon scholars at the beginning of my PhD, I was quickly entangled with a culture that leans towards publishing articles and away from focusing on monographies. These encounters were symptomatic of a growing trend to publish during the PhD (Lee and Kramer, 2008; Sharmini et al., 2015), and having witnessed the refusal of mobility grants to PhD students on the basis that they had not published enough strengthened my resolution to focus on articles. To put it simply, I encountered the pressure of the academic market to writing articles early and followed its injunctions (Nygaard and Solli, 2021). It must be noted that another motivation to do so is that article reviews provide independent expert feedback. Publication is not just a constraint; it is also an opportunity to cross fertilize different perspectives.

1.2.2. Writing a 'hybrid' dissertation

I am not alone in having had to channel an emphasis on writing articles into a single coherent document. A recent study among 1300 doctorate students noted that dissertations can be classified in three idealtypes: 'PhD by publication' which consist entirely of published articles; 'hybrid PhD', in which publications are 'inserted in lieu of some chapters of the monograph, with appropriate formatting to achieve a consistent style'; 'PhD with publications appended';

and classical monographs (Sharmini et al., 2015: 92). The authors demonstrate that half of the analyzed thesis are monographs, a quarter are 'hybrid', the last quarter being a mixture of the two last categories. Provided that we accept that typology, my dissertation is a 'hybrid thesis'. First, because my time as an assistant was mostly spent writing articles. Second, because parts of this dissertation are either copied or adapted from articles (the core chapters). However, some of its parts have been written for the sole purpose of the dissertation (integrative chapters). However, the articles have been largely adapted to fit within a global narrative and achieve a coherent formatting. Let me note that I point to the relevant article and clarify my contribution to it at the beginning of each core chapter.

This 'hybrid' structure and the research process that underpinned it had the following consequences. The core chapters tackled independent—although interrelated—research questions. An important consequence of this is that, in the process of answering to those research questions, I mobilized different theories and relied on different literatures. However, they are part of a single research project and follow a coherent thread, which—as will be presented shortly—can be articulated around a single narrative, that of technological description (Akrich, 1992; see theoretical framework). However, some elements (notably regarding methods and literature review) are included within the core chapters because they apply to a narrow subpart of the dissertation. Doig so, I aim to provide the reader with both an overarching view (in the integrative chapters) and a seamless reading experience (with the local delivery of specific information).

1.2.3. Presentation of the chapters

The integrative chapters: objectifying the dissertation

In chapter 2, I discuss the literature on self-tracking. The chapter focuses on the general theoretical underpinnings of the self-tracking literature, notably its role in bridging macrosocial processes and microsocial practices. This review identifies the shortcomings that my research

has addressed. Namely, (1) the general lack of empirical research on tracking in the context of insurance; (2) the necessity to explore how self-tracking's promises are translated in specific technical architectures by designers; (3) the neglection of self-trackers' sociocultural origins (which leads to the neglection of issues of inequality); and (4) the necessity to tackle self-tracking entanglement with the enactments of the moral and political underpinnings of insurance.

Chapter 3 deploys the conceptual architectures on which my research was built: notably the works of Akrich and Latour on one side, and Bourdieu on the other. It presents de-scription, the core conceptual framework followed all along the thesis and the dispositionalist concepts that I integrated to de-scription. The concepts of de-scription and dispositions originate from two sociological currents that tend to be opposed one to another. Thereby, I spend some time discussing why they are in tension, and how (if) these tensions can be overcome. Finally, I present my own solution to articulate both which pictures self-tracking practices as the product of iterative interactions between (malleable) technical prescriptions inscribed by designers within technologies and users' prescriptions that derive from the interplay between social determinants, socializations, and life trajectories.

Chapter 4 presents the methodological foundations of the dissertation, notably my appropriation of grounded theory and the different tools that I used to gather and analyze data. Among those are participant observations, technological de-scription, and semi-directive interviews. I also used quantitative data to perform a binary logistic regression. As this is related to one specific point addressed in chapter 7, it is presented within the chapter.

After having described my position in the literature, my theoretical architecture, and the methods I used, I present my results in the 4 core chapters.

The core chapters: unfolding the script narrative

This thesis focuses on two self-tracking technologies developed in the context of insurance. The first, ALLY, was meant as a development prototype of the other: myStep. ALLY was developed and deployed as part of a scientific protocol. Its goal was to test the efficiency of new technical features that could eventually be implemented in myStep. myStep is an application currently available on app stores for the CSS insurance policyholders. Both technologies allow their users to measure their physical activity and, whenever they reach their daily objectives, reward them with financial incentives (premium reductions in the case of myStep). I gathered quantitative and qualitative data among users of these two applications. Moreover, I had the opportunity to join the lab that developed and deployed ALLY. I was thus able to gather data on designers of self-tracking technologies.

The narrative of the dissertation is articulated around the concept of script developed by Akrich (1992) and presented in chapter 3. This heuristic concept offers to picture the technology as a scenario imagined by its designers and mediated by material and technical features. In other terms, its focus is on the design of technologies. However, it emphasizes the role played by users in determining what a script becomes. For Akrich, a technology remains a 'chimera' if we ignore the—potentially wide—range of uses that may emerge from how users repurpose and adapt its script (subscription) or refuse to align with it (de-inscription) (1992: 208). Hence the necessity to follow the script from its inscription by designers to its interaction with users and society (and finally to its potential re-inscription by designers). Having gathered data on both designers and users allowed me to go back and forth between the two, between production and consumption, between the inside and the outside of the technologies (Akrich, 1992).

The narrative of my dissertation follows the aforementioned steps of de-scription. Figure 1 schematically represents the articulation of these steps within the dissertation: analysis of the way designers 'imagined' the technology (chapter 5); analysis of users' appropriation of the script which is subdivided in : active subscription and de-inscription within daily encounters (chapter 6), 'passive' subscription and de-inscription and the role of social determinants (chapter 7), subscription regarding the morals and politics of insurance pricing (chapter 8), and finally re-inscribing the technology (evoked in chapter 11).

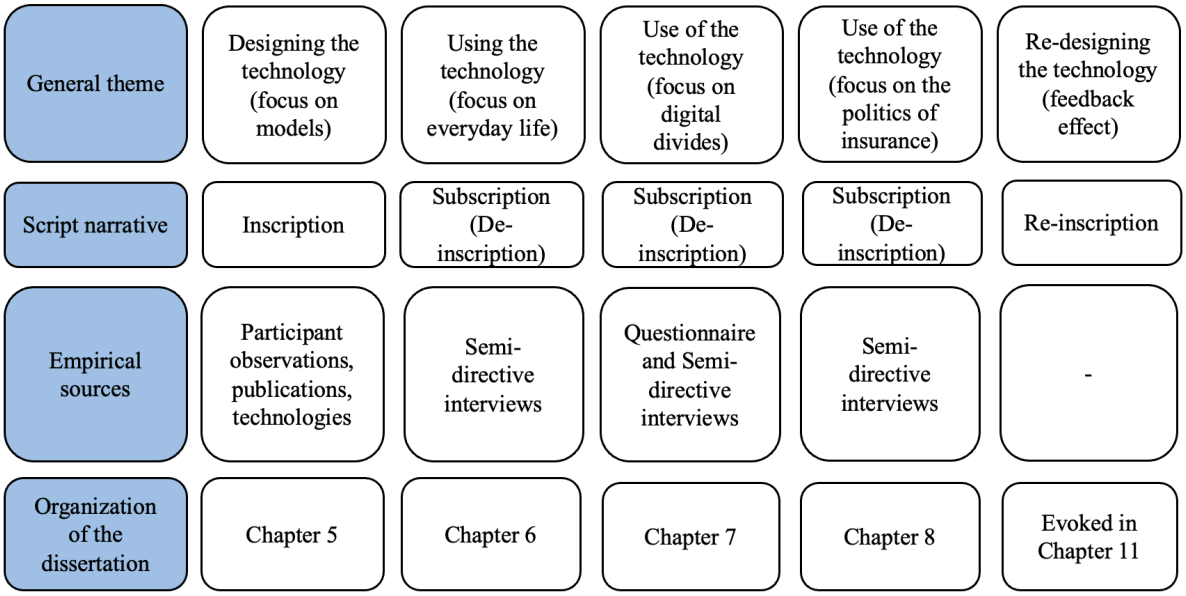

Figure 1: Schematic representation of the dissertation's narrative

In *Chapter 5: Scripting the rational subject: the design of mHealth interventions*, I use Akrich and Latour's method to analyze the design of self-tracking technologies. I draw from my observations within a mobile health research facility to analyze ALLY. I investigate the promises and goals that surrounded its development and their role in structuring designers' relations with public and private actors. I follow designers as they seek to 'materialize' the promise to change users' lifestyles. The chapter highlights the role of expert knowledge, namely cognitive theories, in the process, and opens a window on the configuration of 'rational' users.

I discuss the consequences of this script, notably with regards to scholars' depiction of self-tracking as a neoliberal technology.

This thorough de-scription of the technologies allows me to list the 'positive prescriptions' of the script. It is key to the chapters that follow. Indeed, in chapters 6, 7, and 8, the focus is on users' reception of this script and its prescriptions. Understanding how a script is conceived—and what it entails—is a crucial preamble to exploring how it interacts with users and how they co-constitute emerging practices, meanings, and values. Moreover, the script is key, all along the dissertation, to explore designers' successes and failures, and to determine whether they reach their goals and deliver their promises.

In chapter *6: Self-tracking in daily life, users' reception of a de-contextualizing script*, I turn to users' reception of the script as part of their daily routines. Based on users' interviews, I highlight elements of the script that force them to adapt (subscription) and likely led many of them to abandon the technology (de-inscription). I stress the invasive role of the hardware in the context of daily activities, I describe how the intervention design results in the participants feeling ill-represented by the reductive nature of the data they generate and highlight the inadequacy between biomedical standards and the messiness of everyday life. These analyses emphasize some limits of the script, which I refer to as 'negative prescriptions'. It must be noted, however, that the users I interviewed did stick with the application, meaning that the aforementioned difficulties are sometimes overcome.

If the script is entangled with daily life, it is also appropriated according to users' dispositions and lifestyles. I turn to this issue in *Chapter 7: Scripts and digital divides, the role of dispositions in adoption and use*. The chapter is based on both quantitative and qualitative data gathered from users and non-users of mySetp and ALLY. It describes four prototypical categories of users, *the meritocrats*, *the litigants*, *the scrutinizers* and *the good-intentioned*. It shows that patterned differences arise in both adoption and use of the technology. Poorer, older,

and less educated people are less likely to adopt the technology, a process that may reinforce health inequalities. Moreover, the use of the technology tends to reinforce the grasp of harmful trends on individuals. Globally, the technology reinforces detrimental approaches to health and wellbeing. Notably, normative views of health and optimization (Lupton 2016; Kristensen 2015) and the classification of individuals in responsible and irresponsible categories. Nevertheless, the chapter highlights that for some users, *the good-intentioned*, the technology may lead to beneficial transformations and changes in walking behavior.

The scripts of ALLY and myStep are appropriated within a particular environment, that of insurance pricing. I tackle the role of this environment in *Chapter 8: Scripts, politics, and morals, a policyholder perspective on solidarities*. Being part of an insurance scheme, the technologies are tied to the politics and economics of insurance, which they mediate. Based on interviews and a brief analysis of political controversies in the Swiss parliament, I analyze the enactments of solidarity that the use of myStep produces. This is an important theme for tracking programs in insurance have been conceptualized as threats to current regimes of institutionalized health solidarity in Europe (McFall, 2020; Meyers and Van Hoyweghen 2020; Jeanningros and McFall 2020; Tanninen et al. 2021).

The chapter highlights two different views of solidarity that are enacted in the use of myStep. The first one—*institutionalized solidarity*—refuses the individualizing logic of the program, whereas the other—*self-tracking in insurance solidarity*—emphasizes people's agentivity and strongly adheres to the logic of the program. The chapter illustrates how the technical script of myStep tends to obscure the first and enable the second. Once again, differences in appropriation are put under the spotlight. The chapter shows that such processes—by which a technology encompasses and then diffuses a view of solidarity—respectively lead to moral reinforcements and/or destabilizations (Swierstra, 2013). Self-tracking in insurance does not dismantle classical solidarity but enables reconfigurations,

negotiations, debates, and leads to the enactment of alternative forms of solidarity. In the long term, these may tip the balance towards new forms of institutionalized solidarity, which would have far-reaching consequences.

Table 1 summarizes the knowledge gaps, research questions, and claims addressed by the four core chapters. After having followed the script from its inscription by designers to users' subscriptions and de-inscriptions in the core chapters, I turn to summarizing my results, exploring the limits of my work, and suggesting avenues for further research, before I conclude the dissertation (chapters 9, 10, 11, and 12).

Table 1: List of the chapters, the knowledge gap they address, their research questions, methods, claims, and role in the de-scription.

	Chapter 5:	**Chapter 6:**	**Chapter 7:**	**Chapter 8:**
Title	Scripting the rational subject: the design of mHealth interventions	Self-tracking in daily life, users' reception of a de-contextualizing script	Scripts and digital divides, the role of dispositions in adoption and use	Scripts, politics, and morals, a policyholder perspective on solidarities
Knowledge Gaps	The paper addresses the following shortcomings of the self-tracking literature: lack of research on self-tracking design and lack of thorough analyses of the technologies.	The paper addresses a lack of empirical research about the use of insurance-based self-tracking by 'mundane trackers'.	The self-tracking literature fails to account for users' social backgrounds which leads to the neglection of social inequalities.	The self-tracking in insurance literature remains theoretical or based on insurers' perspective. Policyholders' perspective and actual enactments of solidarity have not been studied.
Research Question(s)	How are self-tracking technologies in-scribed?	How is an mHealth self-tracking application integrated in users' daily life?	Does a self-tracking intervention in the context of insurance reinforce inequalities among users?	Do self-tracking programs dismantle institutionalized forms of solidarity?
Empirical sources	Participant observations within a laboratory, analyses of technologies and publications.	ALLY interviews (n=23).	ALLY and myStep interviews (n=23;22) and myStep questionnaire (n=818).	myStep interviews (n=22).
Claims	– The technology revolves around a promise to change users' behavior. – Design relies on Social Cognitive Theory – The technology is arguably 'neoliberal'	– The obduracy of the hardware is a limit to appropriation. – The reduction of physical activity to steps is a limit to appropriation. – The bracketing of social rhythms is a limit to appropriation. – Some users change their behavior thanks to the technology.	– Older, poorer, and less educated users are less likely to adopt the technologies. – There are four different patterned categories of users. – There is evidence of both first and second order digital divides.	– The technology mediates a perspective on solidarity that emphasizes self-responsibility and obscures the social determinants of health. – The technology leads respectively to moral destabilizations and reinforcements.
Script narrative	The script configures users as 'rational' subjects. It entails responsibilizing prescriptions and a healthist neoliberal perspective.	The script entails de-contextualizing prescriptions in the sense that it obscures the messiness of social existence.	The script entails de-contextualizing prescriptions in the sense that it obscures the role of social determinants.	The script prescribes a responsibilizing perspective on solidarity in insurance.

2. Literature review

> « On doit échapper à l'alternative du dehors et du dedans; il faut être aux frontières. La critique, c'est l'analyse des limites et la réflexion sur elles ». (Foucault, 1994: 754)

The aim of this chapter is to review the literature on self-tracking to situate my own work. Mol has drawn our attention to the fact that reviewing the literature is not a neutral and evident process and highlighted the necessity to be clear about one's approach (Mol, 2002). Mine will be the following: first, I will highlight a common model of self-tracking that runs through most of the literature, i.e, that it is a mediator between macrosocial structures and micro practices (Pantzar and Shove, 2005). This model will be my skeleton. On that skeleton I will then put two layers of flesh. First by uncovering the main theoretical avenues that scholars followed when studying this mediation, namely post-Foucauldianism, post-phenomenology and STS. Second, by exploring how scholars have appropriated these traditions and what they taught us about self-tracking. From this triple understanding of how self-tracking is schematized, theorized, and analyzed, I will derive the shortcomings that my research has addressed.

One of the main strengths of this systematic and somewhat reductionist approach is that it will heuristically reveal the common thematic and theoretical threads that run throughout the literature. The first studies on digital self-tracking date from 2012 (Dudhwala, 2017). Since then, a considerate number of scholars have studied self-tracking, producing a wide array of research that Lomborg and Frandsen situate in the three different fields of human-computer interactions (HCI), health studies and critical social sciences (2016). My work is situated in the last one, on which my review will focus. Within that field, I will particularly focus on studies that rely on empirical evidence and focus on the practices of everyday self-trackers. As a result,

I will partly neglect studies on the quantified self-movement[3] (e.g., Nafus and Sherman, 2014; Barta and Neff, 2015; Sherman, 2016; Smith, 2016), discourses (Meißner, 2016; Ruckenstein and Pantzar, 2017) and socio-histories of self-tracking (Pantzar and Shove, 2005; Crawford, 2015). I must also note that—overall and notably because I publish in English—my review focuses on articles written in English. The only exception are some French studies that I could not ignore for they are particularly relevant to my research.

2.1. A common conceptualization of self-tracking

In the literature, self-tracking is—nearly unilaterally—considered as both the product and productive of what scholars variously call 'ideologies' (Moore and Robinson, 2015: 3), 'macro-societal performances' (Pantzar and Shove, 2005: 1), 'socio-cultural paradigms' (Kreminzska, 2021:33), 'political-economy landscapes' (Kristensen and Ruckenstein, 2018: 1) or 'social imaginaries' (Lupton, 2020: 1). This can be heuristically broken down in the following narrative (summarized by Figure 2): a) Self-tracking is 'produced' within sociocultural matrixes, b) that are thus embedded within it, c) and hence encountered by users whose perceptions, meaning and actions are transformed, d) in a way that allows some room for them to be creative and agentive (and sometimes to resist), e) thereby contributing to the co-production of new selves, bodies and practices, f) which feed back into the sociocultural matrixes. Alongside that process, the information that was produced may leak towards other actors (insurance, employer, state, etc.). Of course, there may be variations between how scholars conceptualize this process and frame their understanding of it. Nevertheless, these variations tie back to this common heuristic overarching model (by which I abide).

[3] Didžiokaitė (2018) rightly argued that trackers within the quantified-self are not representative of every-day trackers.

Figure 2 Heuristic representation of the agency-structure relations applied to self-tracking practices.

There is a dialectic within this scheme in the sense that—in classical sociology vocabulary—structure and agency are both productive of each other (Berthelot, 2012). As we will see, studies of self-tracking studies focus on this dialectic space where things are brought together, notably to emphasize the enabling and constraining couples that drives the logic of the interactions (more on that later). This space has been highly productive for social science and attempts at conceptualizing it are arguably a structuring axis of social science history (Emirbayer and Mische, 1998; Berthelot, 2012; Tan, 2011)[4]. This space is productive because

[4] The debates surrounding agency and structure are often synthetized – and thus reduced – to three steps. First, an opposition is drawn between social scientists who emphasized structure and others who emphasized agency. Durkheim's determinism is here often pitted against Weber's comprehensive sociology. Second, the focus shifts towards scholars who sought to overcome the opposition between agency and structure. Giddens structuration theory and Bourdieu's habitus are usually used as examples. In fact, all of the aforementioned thinkers variously tried to deal with the conundrum of agency versus structure, and none of them would have been likely – which is

it is where society and individuals become entangled with each other, and because it remains a point of intense debate. It involves the iterative crossing or bringing together of different things in a specific point of time-space, and the production of selves and societies (Giddens, 1986; Emirbayer and Mische, 1998). In the case of self-tracking, self-tracking tools play a mediating role in that space where users and designers (and the broader network of actors surrounding them) are brought together (Latour, 2008).

2.2. The theoretical underpinnings of self-tracking research

Although other thinkers have tackled the aforementioned dialectic space–e.g., Giddens (1986), Bourdieu (1977/2002), Schatzki (2001)—self-tracking literature has privileged Foucault. Why that is the case is beyond the reach of this dissertation. Let us simply note that self-tracking has rapidly been associated—in both scholarly and lay perspectives—with the 'control' of oneself or of a population. This may have facilitated the choice of Foucault, who is associated with these themes. Other factors relating to the history and symbolic economy of the self-tracking scientific field are likely to have played a role (Bourdieu, 2006). But this, again, is beyond the reach of my dissertation.

2.2.1. The role of Foucault in the self-tracking literature

Disciplining

A main concern of Foucault was to explore how modern decentralized power makes its way into individual's mind and bodies, transforming them in self-regulated modern subjects. His analysis of hospitals, school, military institutions, and prison, in which he analyzed the instruments by which a dominant discourse or ideology is diffused and imposed, are tantamount

also true of most scholars today – to choose one over the other in absolute. I am not interested to open this broad debate. I am only pointing to this dialectic space as the main source of analytical productivity in self-tracking scholarship.

examples of this endeavor (Foucault, 1963/2012; 1975). He pitted pre-modern brutal forms of punishments against modern disciplining tactics and techniques, thereby tackling the historical civilization process of power relations (Elias, 1939/2000; 1987/2001) that produced the 'iron cage' of the modern rationalized and bureaucratized subjectivity (Weber, 1905/2001).

In that sense, Foucault was interested in the aforementioned space where structures and individuals are brought together, and modern subjects produced. His work entailed detailed description of the techniques used within that space. For example, he described how the organization of time in the Gobelins' school in Paris was aimed at producing efficient upholsterers or how spatial organization, regular inspections, and labelling of individuals were key to disciplining a population during a plague. He globally referred to these discursive-material practices as 'dispositifs' and used the latter example as an empirical introduction to his famous conceptualization of modern surveillance as a panopticon (Foucault, 1975).

The panopticon—the architectural plan for a prison where prisoners are always under the gaze of a potentially present guardian—is used to exemplify how modern tactics of power lead to the incorporation of dominant discourses and to the production of a self-responsible citizen, who, 'subjected to a field of visibility… assumes responsibility for the constraints of power' and 'makes them play spontaneously upon himself' (1975: 202). Foucault articulated together truth discourses, strategies of intervention and processes of subjection/subjectivation (Rabinow and Rose, 2006) to account for the productivity of the dialectic space and its role in producing specific subjectivities.

The subjection/subjectivation dualism, which highlights the fact that subjects are constrained but also (in Foucault's later work) enabled (to resist and create themselves) is central to the self-tracking literature. Foucault's work is replete with similar dualisms, such as 'governmentality and critique' (Foucault 1978/2015: 39), and his posture has been adopted by many self-tracking scholars to explore the disciplining logics of tracking and their role in

producing specific kinds of subjects. Closely tied to measuring—and thus to standardizing—self-tracking has indeed many of the characteristic of a disciplining gaze.

Foucault was mainly interested into how power is exercised on life (birth, health, death). He referred to this as biopower (Foucault, 1975, 1978/2009). Rose has applied Foucault's analysis of biopower to the age of genomics and neoliberal medicine. Among others, he has been key to highlighting contemporary insistence on the responsibility of individuals in managing their health (Rose, 1989; Rose and Miller, 1992; Petersen and Lupton 1997, Ayo 2012) and on the prevalence of biological and genomic discourses, which he conceptualizes as 'molecular gazes'. These features of modern societies are central to self-tracking studies, for self-tracking often focuses on bodies, health, and wellbeing.

Resisting

Foucault's work is often (mis)understood as deterministic, as if subjects had no way to steer out of power, as if change was not possible (Michaud, 2000). However, his work is replete with examples of resistance and struggle. It is true that the 'resisting' side of his understanding of power became more visible in his later—and sometimes less known—works where he inquired what he called technologies of the self (Foucault, 1978/2015, 1984, 1980, 1988; Michaud, 2000). In these works, he became interested into how individuals rely on various 'techniques' and discourses to constitute themselves as subjects, and self-tracking is often considered as such a technique.

So where does Foucault locate room for creativity and resistance? There are competing understanding of Foucault's conceptualization of power, subjectivation and resistance (Heller, 1996), but self-tracking scholars—and myself—seem to share the following interpretation. In his later work, Foucault steered away from conceptualizing resistance as a negative force pushing against a dominant and more powerful force and articulated it as governmentality. He posited a dialectic between power and resistance (he often calls the later freedom) in the

following way: 'To conduct is, at once, the act of 'leading' others (in accordance with mechanisms of coercion more or less strict) and the way of behaving in a field of more or less open possibilities'[5] (Foucault, 1982: 789). This position relies on the following understanding of power:

> Power is exercised only over free subjects, and only insofar as they are free. By this we mean individual or collective subjects who are faced with a field of possibilities in which several ways of behaving, several reactions, and diverse comportments, may be realized. Where the determining factors saturate the whole, there is no relationship of power; slavery is not a power relationship when man is in chain (Foucault, 1982: 790)

I think that this is the point often overlooked—or deliberately misunderstood—by those who interpret Foucauldian power as rigid or all-determining. A society where everything is determined would be fixed, unmoving, impossible. The same can be said of a subject. This is central to Foucault's take on the dialectic space. He conceptualizes power and subjects as always entangled in a dialectical relation where the modes of action of power is that 'it incites, it induces, it seduces, it makes easier or more difficult' (1982: 789) and where subjects 'are faced with a field of possibilities in which several ways of behaving, several reactions and diverse comportments, may be realized' (1982: 790). If subjects are not free (Foucault eludes why they are), there is no power or governmentality as he conceptualizes them. This ambivalent position has been the source of much productivity, for it invites a constant re-articulation of the relational dynamics between constraint and freedom. In this perspective, one of the main tasks of the analyst is to describe the dominant discourses, the dispositifs that mediate them, the field of possibilities they produce and how subjects are both constrained and enabled by these.

It has been suggested that Deleuze's understanding of Foucault's work is more apt to describe self-tracking (Dagiral et al., 2019a). In a short text entitled 'Postscript on the societies of control' (1992), Deleuze advocated for a transition from the disciplinary societies (aptly

[5] Foucault uses the double meaning of 'conduire' in French.

described by Foucault) to societies of control. In the later, the molds of closure become the modulations of control, the eternal recommencement becomes a never-ending updating process, the pair mass/individual becomes dividual/bank and the walls of institutions are torn down and replaced by a continuous, unlimited and adaptative surveillance. In other terms, in Deleuze's control societies, power becomes even softer, and gains more grip by getting out of Foucault's closed institutions. This rationale easily applies to self-tracking, notably it tends to encompass, at least in discourses, the notions of ubiquity, big data practices, and continuous feedbacks.

2.2.2. Mediations

Foucault has had an important impact on the self-tracking literature because he allowed for the exploration of processes of subjection/subjectivation within specific 'dispositifs'. However, when it came to these 'dispositifs', his focus was mostly on institutions and discourses, whereas self-tracking scholars most often focus on technologies (in the lay sense of the term). To unpack technologies, scholars mostly rely on post-phenomenology and STS, two traditions that have a long history of conceptualizing and analyzing technologies' intertwinement with human experience, a topic that has been neglected by 'classical' sociology (Latour and Woolgar, 1996/2013; Barad, 2007; Latour, 2007; Bennett, 2010; Hodder, 2012). The sociology of 'mediation', which draws both from STS and post-phenomenology, focuses on the role played by objects in mediating experience.

Post-phenomenology

On the side of post-phenomenology, Ihde (1990) is probably the most influent scholar. Drawing mainly from Heidegger (1927/2010), Husserl (1913/2012; 1931/2013) and Merleau-Ponty (1945/2013), he closely studied how technologies and artifacts transform human experience. He started with the Heideggerian understanding of human life as 'technologically textured', that is embedded, enabled, and constrained by technologies. Ihde described two different forms of entanglement between a human, a technology, and the world. In the first one, called

embodiment relation, the technology transforms one's physical relation with the world (as in the case of glasses of telescope that magnify vision). In the second, called hermeneutic relation, technology's mediation is read or deciphered by the human (as in the case of a scanner or a heart monitor that reveal numbers or digital images).

More importantly for self-tracking literature, Ihde drew attention to the fact that a mediation always entails a positive and a negative side. For him, any technology tends to highlight certain things about the world while hiding others (Ihde 1990, 2002). He used the example of a microscope to make this point. Let us assume that I enter a room which contains a microscope, a microbe (prepared under the microscope) and a big plant in a pot. If I look around the room, I see the plant and the microscope but not the microbe. If I look into the microscope (the technology), I suddenly see the microbe, but not the plant and the microscope anymore. In that sense, while highlighting the microbe, the microscope hides the room. By magnifying vision on a focused point, it obscures peripheral vision, while enabling a new capacity to see microscopic things. This simplistic example stands true in more complex cases. Technologies do both highlight and obscure parts of reality at the same time. But how are we to explore these processes? An important question if we remember that all this is taking place within processes of subjection/subjectivation that may entail much more pressing stakes that seeing a plant (such as mediating neoliberal values to employees or a self-deprecating gaze to prisoners).

Science and technology studies

So far, post-phenomenology allowed us to dive into the dialectic space by revealing some of human-technology interactions processes and offering a dialectic logic of highlighting/obscuring. Phenomenologists went further, and some of them do offer interesting methodologies to dive into the actual mediation phenomenon (Verbeek, 2005; Rosenberger and Verbeek, 2015; Vermeersch, 2011; Bedin et al., 2019). But self-tracking literature has been

more reliant on STS. STS did indeed play a major role in developing an understanding of artifacts' transformative effects, notably with the concept of mediation.

Latour developed the concept of mediation as an attempt to move beyond purely materialist or sociological accounts of human-technology interactions. He presents the theory with the help of an example: that of debates around gun violence (Latour, 1994). According to him, on the one hand, materialistic account of the use of a gun means that only a gun does the killing, which is obviously wrong. Most people, even if they have a gun in their hands will not use it to kill someone else. On the other hand, it is also wrong to say that the gun plays no role, the killing of someone is obviously facilitated by the presence of a gun in a particular situation. Hence the fact that both situation, gun and human should be considered in the production of a murder. Once again, a simplistic example allows us to dive into a concept that is highly productive in understanding more complex ones: mediation.

For Latour, mediation involves a translation, a 'displacement, drift, invention, mediation, the creation of a link that did not exist before and that to some degree modifies two elements or agents' (Latour, 1994: 32). In other terms, nor the human neither the gun suffices to account for the responsibility for action, it is a combination of them, an entanglement or assemblage. Competences, actions, agency, and responsibilities are distributed between the various actants (human or nonhuman) that enter the situation. The mediating role of technologies is not only embodied or hermeneutic, but also ethical, material, agential, etc. which complexifies Ihde's framework.

> If I define you by what you have (the gun), and by the series of associations that you enter into when you use what you have (when you fire the gun), then you are modified by the gun - more so or less so, depending on the weight of the other associations that you carry' (Latour, 1994, p. 33)

The plot is then the following. At first, we have a human and a gun that do not interact with each other. Both 'carry' associations, which means that both are already part of further

networks, both have certain characteristics. At some point they interact, and thereby exchange some properties (characterized by an enabling/disabling dialectic) and produce a new network (human-with-a-gun). In other terms, the interaction between man and gun dynamically produces something that is partly determined by the characteristics that the two actants carried before. But the definition also refers to the detours, the openness of the interaction and highlights the fact that the result if often different than the sum of its parts.

So far, on the one hand Foucault allowed us to explore the dialectic space as a dynamic interaction between individuals and society, between subjection and subjectivation. On the other hand, Ihde and Latour provided us with basic tools to explore the mediating role of technologies within this interaction. However, more advanced tools exist to systematically explore the human and non-human components of the interaction, the 'associations that you carry' mentioned by Latour. In other terms, we need conceptual tools to increase the granularity of our analysis. Gibson's *affordances* (1979), Winner's *political qualities* (1980), Woolgar's *configurations* (1990), Pfaffenberg's *technological regularization* (1992) and Latour and Akrich's *scripts* (1992) are all concepts used to analyze the 'associations' that are carried by technologies. In other terms, they are conceptual attempts at describing the parts (associations) of the actants that are brought together in human-technology interactions. If the dialectic space was a particle collider, and if actants (technology and humans) were particles thrown at each other (interacting), the aforementioned concepts are aimed at describing the composition, trajectory and energy of the atoms before, during and after their collision, or interaction. In many ways, we keep zooming on the dialectic space.

Gibson *affordances* are the most used in the self-tracking literature (their use is still rare; scholars rarely zoom that far on the interaction). Gibson was a psychologist interested in human perception-environment relations and for him 'the affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill' (1979: 127). In that sense,

affordances are the ‘characteristics’ or ‘associations’ that an actant brings into an interaction. Thereby, the description of these affordances sheds light on what happens in the interaction. Gibson’s concept was used in a plethora of disciplines and was often brought far from its original use (Chong and Proctor, 2020).

Lupton, one of the most famous and prolific self-tracking scholar, uses the term as it is ‘often used in media studies to describe the opportunities for action that digital technologies invite, allow, demand, close off or refuse to human users’ (Lupton, 2019c: 18). Her endeavor is to ‘examine the interplay of human and nonhuman affordances associated with digital technologies—devices software and the digital data they generate—and the agential capacities that are opened or closed off as these things assemble’ (Lupton, 2019c: 18). This traces back to the scheme presented in Figure 2. Her aim—alongside most scholars—is to zoom on the dialectic space, revealing how emergent selves, values, meaning, and practices are produced as part of human-technology interactions that are partly determined by affordances.

What I have tried to highlight so far is a common thread that runs through the ST literature. To do that I simplified things and reduced scholarship to a single thread. In the following section, I will dive back in the complexity of self-tracking scholars’ frameworks, but from the vantage point that I gained in this current section. To summarize, self-tracking is most often understood as a practice that is at the interface between macrostructures and micropractices, a junction I referred to as the dialectic space. I have then highlighted the theoretical frameworks self-tracking scholars tend to use to explore that space. Namely an articulation of Foucauldian approaches to the production of subjectivities and STS and post-phenomenology’s takes on technological mediation.

2.2.3. The socio-cultural macrostructures of self-tracking

One of the goals of self-tracking scholars has been to identify the macrosocial structures or narratives that both produce and are circularly produced by self-tracking. Deborah Lupton

refers to these structures when she stresses that self-tracking software are 'the products of human decision-making, underpinned by tacit assumptions, norms and discourses already circulating in the social and cultural contexts in which they are generated, marketed and used' (Lupton, 2014: 607). Self-tracking has been tied to 'datafication' and 'dataism' (Kneidinger-Müller, 2018; Schüll, 2016), 'the sensor society' (Andrejevic and Burdon, 2015), 'the surveillant society' (Ruckenstein, 2014; Whitson, 2013), 'gamification' (Ellerbrok, 2011; Whitson, 2013), 'neoliberalism' (Kenner, 2016; Moore and Robinson, 2016), 'healthism', and 'liquid' or 'late modernity' (Berg, 2017; Schüll, 2016; Smith and Vonthethoff, 2017). I will now briefly touch upon each of these socio-cultural tropes.

Datafication is central to self-tracking scholarship for it relates to the process of translating a phenomenon in a 'quantified format so that it can tabulated and analyzed' (Mayer-Schönberger and Cukier, 2013: 80), of transforming qualitative aspects of life into quantitative information (Ruckenstein and Schüll, 2017). Datafication is not a neutral process, but a new scientific and social paradigm 'staked in ideological assumptions, which are, in turn, rooted in prevailing social norms' (Van Dijk, 2014: 200). Van Dijk argues that this paradigm is key to legitimizing the access, monitoring, and analysis of people's behavior via quantitative data. As many scholars in critical data studies, she points to the flaws of that ideology, to which she sometimes refers to as 'dataism'. Boyd and Crawford (2012) and Gitleman (2013) have tackled the hyperbolic discourse of dataism and deconstructed its claims for objectivity. According to them, the collection, use and analysis of data, however neutral and objective they are claimed to be, are always a matter of situated interpretation.

Closely related to datafication is the concept of 'sensor society'. It was developed to highlight the switch from a situation in which sensing and recording activities were exceptional and rare to one in which they became 'passive, distributed, and always on' (Andrejevic and Burdon, 2015: 24). This is evocative of Deleuze's postscript on the societies of control (1992).

Many (notably economic) modern activities do indeed rely on the constant—sensor enabled—collection of information to produce value (Zuboff, 2019). This proliferation is closely tied to the normalization of data collection, notably through self-tracking technologies.

The notion of surveillant society is highly prevalent in self-tracking literature and traces back to Foucault's work. Lyon (2010, 2018) insists that we are currently facing a culture of surveillance, and not a surveillant state. By this he emphasizes a shift from Orwellian forms of centralized or institutionalized surveillance to daily and individual surveillance, which he sometimes calls lateral surveillance (Andrejevic, 2006). According to Lyon, modern surveillance, mediated by mobile technologies, is taken up willingly and tied to a culture of performance and individualistic exploration that has replaced a culture of 'obedience, law and obligation' (Lyon, 2018: 11). In that sense, he points to a neoliberal culture of self-responsibility (Lupton, 2012; Lyon, 2010).

Self-tracking's role in producing a responsible and entrepreneurial subject is indeed central to ST studies (Ajana, 2018; Lupton, 2016; Lupton, 2012; Ruckenstein and Pantzar, 2017; Schüll, 2016; Sharon, 2017). Self-trackers are often pictured as subjected to the needs and requirements of the neoliberal market or health economy via the mediation of self-tracking's technologies of self-government (Foucault, 1975). For most scholars, self-tracking contributes to a capitalistic need for optimization and a displacement of responsibility from the state (or any other institution) to the individual (Couldry and Meijas, 2019; Zuboff, 2019).

Moore and Robinson (2015) studied tracking technologies in the workplace and argued that it led to the managerial metrics of performance becoming highlighted, at the expense of undermining welfare and health and raising the prevalence of anxiety, burnout, and overwork. Their analysis, which sometimes draws from Marxism, highlights self-tracking's role in the production of capitalist, even Taylorist selves and bodies. Within the same type of framework, Till (2014) argued that self-tracking transforms moments of exercise performed in private

contexts into forms of unpaid labor. This path was followed more comprehensively by Zuboff (2019), who analyzes the current datafication of life as a new economic order named 'surveillance capitalism'. According to her, this new order relies on the normalization and imposition of technologies that gather hidden streams of data (referred to as 'data exhaust') that are used to generate profit behind users' backs.

Tied to new forms of capitalism and the production of an entrepreneurial subject is self-tracking intertwinement with what scholars call healthism (Petersen and Lupton 1997; Rose 2004). According to them, current health policies, fueled by neoliberal individualism and speculative technological promises (Petersen 2019) tend to lean on self-tracking technologies and more generally digital health. This is analyzed as a 'period of retreat from welfare interventionism and of reaffirmation of the importance of "markets" as regulators of economic activity' (Petersen and Lupton, 1997: xiii). Entangled with a modernist belief in scientific and technological solutionism (Morozov, 2013), this paved the way for the use of tracking tools in public health. Within that framework, self-tracking mediates healthism, 'a moral enterprise, in that it involves prescriptions about how we should live our lives individually and collectively' (Petersen and Lupton, 1997: p.xii). These scholars analyze self-tracking from a Foucauldian perspective, picturing it as a knowledge/power dispositif that draws its strength from the legitimacy of science, produces an ontological sense of life as risky (Beck, 2000), and leads to the incorporation of a moral duty to by a responsible patient and citizen (Petersen and Lupton, 1997).

Analyses of self-tracking as a component of risk-society is an example of its conceptualization as belonging to postmodern, late, or high modernity (sometimes used interchangeably). Another example is provided by Berg (2017), who relies on Rosa's analysis (2013) of the acceleration of technical and societal change, and the acceleration of the pace of life to account for the development of self-tracking. According to Berg's analysis of emotion-

tracking devices, their promise is to alleviate the fear and incertitude triggered by societal acceleration, notably by anchoring one's experience in objective and stable measurements. However, their use paradoxically interweaves 'the experiential and emotional domain of our lives… with the general processes of social acceleration and thus lead to a further accelerated pace of life' (Berg, 2017: 8). Steering away from Beck, Berg mobilizes Giddens' analyses (1991) to account for a postmodern loss of ontological security. In this perspective, self-tracking and optimization are supposed to allow people to deal with the loss 'of religion and community, or from a stable sense of location in gender, class or age' by developing their individual self, body and lifestyle under the reassuring gaze of technological and scientific objectivity (Kreminska, 2021: 34).

2.2.4. ST practices, human-nonhuman entanglements

I have described the sociocultural matrixes that scholars identify around the development, diffusion, and use of self-tracking technologies. However, most of these analyses remain theoretical. I would now like to turn to scholars who have empirically tackled self-tracking as interactions between users and technologies. As argued before, it is within these interactions that the aforementioned dialectic space is situated. A crucial space within which 'matter and society exchange their proprieties' (Latour 2007a: 200), subjectivities are both reproduced and modified (Foucault, 1975), the 'human being and thinghood overlap' (Bennett, 2004: 349), and 'stories intersect to produce different kinds of complex and not very centered subjectivities' (Moser and Law, 1998: 210). Scholars' theoretical perspectives and vocabularies may vary. But they all seem to focus on that space, and it is not surprising that many of the most innovative concepts of the self-tracking's scholarship arose out of attempts to conceptualize it.

Sharon advocated for 'practice based' inquiries of self-tracking (2017). According to her, different contexts, different users, and different self-tracking tools are likely to foster different meaning, values, and practices, which calls for localized analyses. Authors studying

macrosocial structures tend to emphasize the coercive and constraining components of the interaction and neglect users' agency. On the other hand, more empirically oriented authors shed light on the active role of users. To structure my review of user oriented studies, I will focus on two conceptualizations of self-tracking practices, as *laboratories of the self* and *more-than-human assemblages*.

Self-tracking as a Laboratory of the self

In an article published in 2018, Kristensen and Ruckenstein sought to depart from the model of 'the ideal neoliberal citizen: the self-optimizing individual who voluntarily collects data on their own health and well-being, taking control of and regulating physiologies and everyday behavior' (3626). Recognizing 'that neoliberal and corporate forces are at play', notably with regards to self-responsibilization, their aim was to steer away from stabilized definitions of self-tracking—diffused by both scholars and self-tracking proponents—and focus on 'how people actively and consciously co-evolve with technologies' (3626). In many ways, they sought to move from a passive to an active user.

To do so, they used the concept of the 'laboratory of the self', which pictures self-tracking as 'human-technology inter-relationality', as forms of 'metric-enhanced self-experimentation and discovery' (3626-3627). This is based on the idea of an emergent, dynamic, contextual, and distributed self. Authors evoke the late Foucault and describe self-tracking as 'processes of objectification and subjectification, framing new possibilities as well as imperatives for self-exploration and self-improvement' (Kristensen and Ruckenstein, 2018: 3627). Self-tracking practices are understood as a laboratory where agentic forces and consciousness of the self are reworked amidst technologically mediated inter-relations. This laboratory is a space of junction between structures, discourse, and agential forces. Importantly, it is a space that can be accessed by other actants, such as market forces (Ruckenstein, 2017).

What happens within that space? In the laboratory, the self-tracker encounters numbers and visualizations which transform actual life into controllable 'life slices' (Kristensen and Ruckenstein, 2018: 3629). This hermeneutic move away from the actual embodied self is supposed to give access—according to self-tracking proponents—to a more authentic self. This is a form of dataism, which is sometimes referred to as mechanical objectivity (Pantzar and Ruckenstein, 2017), but does not tell the whole story. Indeed, according to Kristensen and Ruckenstein, trackers themselves recognize the situatedness of numbers and tracking, and their entanglement with daily life's messiness. Moreover, they seem to test, explore, and toy with the process. In that perspective, the authors argue that self-tracking may sometimes—somewhat paradoxically—be the opposite of the 'clinical gaze' of mechanical objectivity which detects, dissects, and localizes parts. It may sometimes be a holistic approach of 'situated objectivity' geared towards emerging selves (Pantzar and Ruckenstein, 2017).

For the authors, self-tracking is tied to an expansion of the self, a broadening of awareness and agentic capacities derived from the inter-relations between life and data. Steering away from a representation of the tracker as passive and blindly trusting data and metrics (Smith and Vonthethoff, 2017), the authors lean towards the notion of 'intro-sensing' (Mol and Law, 2004) and the production new knowledges and experiences around the body. In a study on HRV stress tracking, Pantzar and Ruckenstein showed that trackers were led beyond what they initially expected. For example, they discovered that expected stressful situations did not trigger physiological stress markers. This led them to 'amazement, doubt, self-reflection, and the re-evaluation of familiar situations' (2017:5). Far from imposing generalized and universal views of health, well-being or performance, self-tracking can thus be a means to reframe these as idiosyncratic, situational, and distributed (Nafus and Sherman, 2014; Danesi et al., 2020). A perspective that the authors recognize as probably overly optimistic. Other scholars have followed similar routes, picturing tracking practices as spaces where seemingly objective

measurements entangle themselves with subjective lifeworlds, where visualizations and numbers are key to re-ordering selves (Nafus and Sherman, 2014; Schüll, 2016, Sharon and Zandbergen, 2016).

Finally, Kristensen and Ruckenstein also describe how people gradually detach from the 'laboratory of the self', notably when self-tracking starts to be experienced as limiting, hardware malfunctions, battery die, goals are not reached, and users hit dead ends. For dedicated and savvy trackers, these dead ends may lead to expanding their tools further or developing new ways to use them, whereas others may simply abandon them. If engineers and companies perceive this as a technological failure, the authors picture it as a progressive dissolution of a laboratory that has done its job. Awareness and agentic forces have been created and may carry on their own lives without the tools that where sources of their re-organization.

By stressing the active work of trackers and their dynamic and emerging intertwinement with technologies, self-tracking scholars successfully steered away from the vision of alienated users channeled towards certain ideals by assistive technologies. However, they do not suggest that trackers are completely free, but that they experience various forms of autonomy alongside a continuum, which remind us that in the end, 'the personal and societal consequences of metrics and tracking technologies depend on what is learned from the gathered numbers, who is allowed to do the learning and who decides these issues' (Kristensen and Ruckenstein, 2018: 3637).

More-than-human assemblages

Another articulation of self-tracking's dialectic space comes from Lupton's use of 'vital materialism theory' which emphasizes the more-than-human aspect of user-technology assemblages and insists on their agential, affective, and relational dimensions (Lupton and Watson, 2021). In an article on people tracking their bicycles ride—co-authored with Pink, Summartojo and Heyes La Bond—Lupton developed the concept of 'mundane data' which

refers to the production of self-tracking data in everyday life (2017). The authors focused on how people 'make sense with data', highlighting self-tracking's role in developing 'affective capacities for regular cycling' (Pink et al., 2017: 10). They conceptualized data as 'lively', for it is part of changing and open configurations from which affect, and meanings emerge. In that perspective, self-tracking and the data it generates are not considered as utilitarian behavior modification technologies, but as complex and changing entities that entangle themselves with people's lives and take part in the production of selves and embodiments (Lupton, 2016; 2019c).

Lupton frames the liveliness of everyday tracking as part of more-than-human assemblages. In these assemblages of humans and technologies, affect, agency, and potentialities are distributed and emergent (Lupton, 2019b). These more-than-human user-technology assemblages are to be understood as possessing 'the ability to create effects and affects that can be enabling or disabling' (Lupton, 2019b:4). Drawing from Bennett (2010), Lupton finds a way to articulate Foucault and STS to account for self-tracking's role in re-configuring selves.

According to her, self-tracking is understood by users in an 'experiential-emotive sense, but also with regard to social and cultural expectations' (2017: 8). In her recent work, she articulates affordances of technologies and affordances of human beings, which—according to me—is the closest a self-tracking scholar came to systematically articulate the dialectic junction. In one of her later articles, Lupton mentions 'contextual features', also called 'relational dimensions' (2019a) such as 'past experiences, current life stage, and social relationships' (Lupton, 2019b: 11) as factors contributing to the assemblage. These are not systematically studied and mostly refer to seemingly idiosyncratic things such as becoming a parent or developing a chronic illness. This is interesting for me, for it points to one of the main arguments of my dissertation, which is that people's past should be considered more systematically in self-tracking's studies.

Among the things produced within more-than-human assemblages, Lupton identifies agential capacities (a sense of control over a life perceived as chaotic, an ideal of 'being responsible', motivation to sustain a habit directed at improving health, a sense of achievement or confidence, the development of new knowledge and awareness, a sensation of feeling better) and affective forces (Lupton 2019a; Lupton 2019 b).

> human-app health assemblages generate a range of relational connections, affective forces and agential capacities, responding to and working with the affordances of the technologies and the fleshy affordances of human bodies (2019b: 12)

Self-tracking is thus co-constituted by human and technological affordances that lead to the emergence (via an enabling/constraining mechanism) of affective and agential capacities.

Both 'laboratories of the self' and 'more-than-human assemblages' are elaborate ways to conceptualize self-tracking technologies' role in producing—among other things—subjectivities within the dialectic space. Both highlight the enabling-constraining role of technologies as part of human-nonhuman assemblages (STS influence) and the re-configuration of selves amidst societal constraints (Foucauldian influence).

2.2.5. The landscape of self-tracking in insurance

> In the last decade Discovery has reached around 17.8 million customers in 19 countries through arrangements including a 2010 equity partnership with Ping An in China; a 2013 partnership with AIA operating in Australia, Sri Lanka, Taiwan, Thailand, South-Korea, Hong Kong, Singapore, Malaysia, Vietnam and Philippines; partnerships in the US initially with Humana then through a 2016 partnership with John Hancock; a 2016 partnership with Generali operational in France, Germany and Austria; a 2016 arrangement with Manulife Canada and most recently a 2018 partnership with Sumitomo Life in Japan' (McFall and Jeanningros, 2020:7).

Discovery is a branded program owned by Discovery Limited, a South African finance company. It is a leader in the implementation of incentive-based insurance via self-tracking tools. Its main product is Vitality, a 'health promotion program designed around a system of financial and non-financial incentives and rewards' (McFall and Jeanningros, 2020: 7). The

program is adapted according to each country or company that implements it, but its core mechanisms remain stable: it offers insurance customers the possibility to earn points by performing certain types of (health oriented) activities (among which self-tracking) and exchange them against rewards. It is a telling illustration of the global development of self-tracking in insurance (McFall et al., 2020).

These new technological developments in the insurance landscape have drawn critical scholars' attention. Some authors focused on the 'biopolitics' of these schemes. Based on Foucault, Charitsis et al. explored firms' self-tracking strategies , arguing that they are meant to 'tame, capture and appropriate value from different aspects of consumers' lives, including—and combining—their social behaviors, cognitive capacities and bodily conducts' (2019:1). In a similar vein, Lupton frames these programs as forms of 'surveillance capitalism' geared towards the production of 'biocapital' (2016). She stresses the fact that insurers may be creating value by transforming bodies and activities into digital data that is then either sold, or used to create profits (marketing, profiling, etc.).

It is commonly admitted—within the critical literature—that such programs could indeed lead to an intensification of surveillance, which is sometimes called dataveillance (Van Dijk, 2014). These perspectives on the insurtech market easily make the connection with the Foucauldian branch of the self-tracking literature discussed earlier (Gidaris, 2019). In the insurance context, the biopolitics of self-tracking become entangled with insurance pricing. In the context of insurance, 'customers' lives are part of the product that is sold' (Tanninen et al., 2021: 451), and self-tracking provides insurers with a new access (potentially constantly updated) to people's daily activities. As a consequence, the very principle of insurance pricing becomes customizable (McFall et al., 2020).

Self-tracking's role in allowing more personalization in the context of insurance programs has triggered critical scholars' attention. However, recent studies suggest that there

is a gap between discourses and practices, that fears of a fully individualized premium are likely hyperbolic. McFall and al. underlined that insurers have 'far, far greater range of "behavioural" data sources than connected devices to draw upon', and that the use of connected device data is more nuanced that expected (2020:3). In addition, authors suggest that personalizing prices and refining risk classifications via self-tracking data—because it is a costly endeavor—my simply not be financially worth it. Finally, they explain that innovating in this field is risky for all efforts may be turned to dust by changes in anti-discrimination regulations. These comments, although pragmatic, are based on indirect empirical evidence, such as car insurance (Meyers and Hoyweghen, 2020) or analyses of branding mechanisms (Jeanningros and McFall, 2020). It is currently difficult to study self-tracking in insurance because it remains an uncertain market in its infancy, a 'Not-yet Market' (Meyers, 2018).

With regards to insurance, authors remind us that Europe 'prohibits the use of genetic information (Blasimme et al., 2019), race and ethnicity (Gellert et al., 2013), and gender (Rebert and Van Hoyweghen, 2015)' (McFall et al., 2020: 4). With regards to discriminatory pricing algorithms, current antidiscrimination laws remain underequipped, with scholars calling for a better integration of data protection and ant-discrimination laws, and adaptations to the general data protection regulation (Drechsler and Benito Sanchez, 2018; Marelli et al.,2020). This lag in regulations may represent an opportunity for insurances, but also a threat that future changes in the regulations may ruin their efforts. Moreover, the issue remains debated among scholars whether the anti-discrimination laws are currently unsatisfactory or are already sufficient to discourage most insurances to invest in self-tracking (McFall, 2019). In general, scholars have mitigated the supposed disruptive role of self-tracking in transforming insurance.

Of course, all these discussions remain prospective. We will only know in the future whether and how self-tracking proved to be disrupting for the insurance landscape. In a rare field-oriented study, Tanninen and al. went beyond biopolitics and regulations to study self-

tracking's role in insurance. Their study is based on interviews with insurance employees working on behavior-based products and ethnographic observations of some of their professional meetings (2021). Drawing from these rare empirical sources, they provided us with a window on how insurers perceive their programs. First, insureres genuinely believe that self-tracking can raise people's awareness and change their behavior. In that perspective, the goal is to prevent diseases and accidents before they happen, which may be beneficial for the insurance. Additionally, insurers hope is that, via self-tracking technologies and other wellness interventions, they will become partners with their customers. Behind this lies a marketing strategy to penetrate customers life, present the company as innovative and invested in client's lives, and thus raise customers' fidelity. Authors argue that the 'most distinctive disruptive feature of the new policy is the technological mediation of the customer relationship' (Tanninen and al., 2021: 460).

2.3. Shortcomings of the literature

I will now point to some shortcomings of the aforementioned body of work. First, and as was suggested before, focus has often been set on certain groups of self-trackers. Many studies have focused on the 'Quantified-self' movement, which comprises highly motivated trackers with technical skills. Based on STS critical perspective on users-oriented research (Henwood et al., 2003; Wyatt, 2003) Didziokatie and al. highlighted the dangers of 'focusing on keen users, such as those participating in peer-to-peer online health groups and ignoring users who confine their use of technologies or reject them' (2018:1472; Gerahrd and Hepp, 2018). Moreover, they criticized the fact that most of the literature is either based on analyses of discourses (market, proponents, medias) or purely theoretical. According to them, this led to many accounts of self-tracking over-emphasizing the transformative and novel aspects of self-tracking. Their work reveals that 'mundane tracking' by 'ordinary man and woman' greatly departs from the self-tracker pictured by the social science literature (1476).

These criticisms still hold true for some studies, but times have changed, and I would argue that, in 2022, they are slightly unfair to the literature as a whole. As was evidenced in the previous sections, more and more empirical studies of 'mundane trackers' have been published, steering away from theoretical work and from the Quantified-Self movement. However, very little has been published on institutionalized forms of self-tracking. Most research has been on idiosyncratic uses, people who use different types of tools, in different contexts. In institutionalized contexts, self-tracking becomes entangled with specific regulations, structures, and values. In the case of insurance, self-tracking is tied to the financialization of risk, insurance contracts, the legal regulations of these contracts and legal and moral principles such as the principle of solidarity in Switzerland. Moreover, in institutional settings, all users use the same technology in a similar context while idiosyncratic settings entail the use of different technologies in heterogenous contexts.

This is a problem, for institutionalized forms of tracking (by an employer, an insurance company, a state, etc.) are at the center of the arguments of many critical studies (notably those focused on surveillance). Scholars thus tend to derive lessons on institutional tracking from evidence gathered in non-institutional settings. Moreover, I argue that studying idiosyncratic practices led to a neglection of users' social backgrounds. In other terms, if all users use dissimilar technologies in varying contexts, it becomes difficult to account for the role of users' social characteristics (such as age and gender for example) in the emerging practice. I do not mean to say that it is not feasible, but it is more complicated, and I hypothesize that it is less visible. On the other hand, if the setting is similar, then patterned variations among users might appear more clearly. Another way to phrase this is that institutional settings allow the researcher to 'control' the technological variable, bringing the focus on variations attributable to users.

Didziokaite et al. have pointed to certain shortcomings of the literature, to which my research answers for it empirically focuses on 'mundane trackers' within an institutional

context. But I argue that there are other important blind spots. I have previously described the elaborate frameworks developed by scholars to study the interactions between sociocultural trends, self-tracking technologies, and users. But as I discussed, the granularity and systematicity of those analyses is often lacking. Little is known of how technologies are analyzed, which is a serious methodological issue. This did not keep scholars from making important contributions, but my work aims to fill that gap. My research relies on Akrich and Latour's *de-scription*, which is a systematic and canonical method used to explore technological 'affordances', or 'prescriptions'.

I argue that an even more serious problem has to do with how users are conceptualized in self-tracking studies. Self-trackers are typically presented in an ahistorical social vacuum, as if their gender, age, education level, or secondary socializations did not affect their uses. The prevalence of post-Foucauldianism, post-phenomenology and STS may have played a part in obscuring the role of social factors. These frameworks do indeed tend to neglect—sometimes even to refute—the role of so-called social determinants. Previously cited methodological aspects are also at stake. As explained, homogenous samples that allow for the exploration of differences that are attributable to user characteristics are rare. Many studies of self-tracking studies include different tracking technologies that are used in different contexts and rely on forms of snowball sampling, making it difficult to move beyond idiosyncratic analyses.

Let us note that studies of the Quantified-Self movement did sometimes point to certain sociocultural factors that seem to increase the likelihood to join the movement, notably being a man and an engineer (Pharabod et al., 2013; Kristensen and Ruckenstein, 2018). With regards to more idiosyncratic uses, French research has produced some of the rare quantitative-qualitative research that emphasizes structural variables. Dagiral et al have studied the impact of age (life-stages) on self-tracking practices, revealing that physical activity tracking is more likely for middle-aged people, and that step tracking is more likely for women whereas sports'

tracking is more likely for men (2019b). Drawing from interviews, authors provided life-stage related ideal-types. In short, younger individuals tend to track with bodily aesthetics in mind but, as they age switch the focus of their tracking practices to the necessity to balance one's life with injunctions regarding health and health prevention. Alongside few quantitative studies that I will discuss further, Dagiral et al. have thus paved the way towards much needed research on the sociocultural profile of self-trackers (Régnier and Chauvel; 2018; Findeis et al., 2021).

The general neglection of users' social origins and institutional contexts has kept scholars from comparing users of similar applications. Consequently, patterns of differences in adoption and use remained under the radar. Even though these are consistently revealed by quantitative scholars who focus on digital technologies (Selwyn, 2004). Within the self-tracking literature, this led to an empirical neglection of issues related to reproduction and inequality. Issues that are particularly pressing when self-tracking becomes part of institutional practices and is presented as neutral—or egalitarian—solutions by their proponents. This is the case in the insurance context on which this dissertation focuses.

In my work, I have thereby attempted to address empirical, methodological, and theoretical blind spots. Notably, I have tackled the following entanglement: the prevalence of certain theories coupled with unsystematized users sampling, unsystematized analysis of technologies and users' backgrounds, neglection of institutional contexts led to downplaying inequality issues. This is one of the central blindspots that my dissertation addresses. It is important to note that this perspective arose from inductive and empirical bases (not from a theoretical a priori), as will be explained in chapter 4. Aside from that central point, my research addresses the following things. First, the lack of systematic explorations of the design of ST technologies. Second, the lack of empirical studies of ST's integration in people's daily lives (this was true when I started my PhD, but, as discussed before, is not true anymore). Third, my work has addressed the neglection of policyholders' perspective with regards to the

implementation of behavior-based insurance schemes and tackled self-tracking's role in the enactment of solidarities. Each chapter will remind the reader of the shortcoming it addresses and will sometimes provide additional information on the literature concerned (notably with regards to solidarities and insurance schemes). Table 1 identifies the aforementioned shortcomings and identifies the chapter(s) that tackle them.

3. Theoretical framework

> « La plupart du temps, l'obstacle qui empêche les concepts, les méthodes ou les techniques de communiquer n'est pas logique mais sociologique ». (Bourdieu, 1984 :26)

In this chapter I lay down the foundations of the theoretical architecture that runs throughout this dissertation. To understand what happens when a user adopts an app, we could, as is quite common, focus on the technologies to understand their effects on the activity of individuals, or focus on the individuals and their idiosyncratic use of the technologies. However, this would be reductive for the characteristics of the designers, the technologies, the users, the contexts of use, and their interactions must be considered (Akrich, 1992). In addition to focusing on the effects of the technologies, it seems relevant to also take an interest in the complex system that produced them and made them available and the no less complex systems that underpin the (patterned) way in which they are appropriated. This is why my theoretical framework attempts to reconcile user-oriented and technology-oriented frameworks. Namely Akrich and Latour de-scription and Bourdieu's dispositionalist frameworks.

My perspective relies on the script approach developed by Akrich and Latour. They harness Greimas semiotics and narratology to explore the emergence of self-tracking practices at the interaction between designers, technologies, and users. Let me note right away that their semiotic perspective is not limited to signs and has a broad approach to 'meaning' (see below). In addition, I draw from Bourdieus's dispositionalist framework to (re)inscribe the aforementioned actors in broader networks that include organizational and structural constraints. This is done by injecting Bourdieusian concepts, notably dispositions, in Akrich and Latour's framework.

I introduce de-scription's model in the next section, which is divided in two parts, the first focusing on the design of technologies, the second on their use. However, de-scription has some limits, notably regarding its conceptualization of users, which I present in section 3.2. In

section 3.3, I present the Bourdieusian framework that I used to patch these limits and account for the role of users' pasts. In section 3.4, I discuss the compatibility of the two approaches (de-scription and Bourdieu) and, eventually, in section 3.5, I present the articulation of the two frameworks that I used in my research.

3.1. Technologies as scripts

Apps have become a mundane and pervasive element of contemporary life, with some scholars referring to them as 'software commodity' (Morris and Elkin, 2015). The domain of wellbeing and health is no exception, with reports of more than 100'000 health and medical apps in the two major app stores in 2014 (Lupton, 2014). But despite their mundane aspect, apps are neither neutral, 'simply there, irrelevant, or designed in only one way imaginable' (Gillespie 2015:1). To the contrary, apps convey meanings and values, and partly structure users' enactments of those (Lupton, 2014). In that sense, apps can be conceptualized as mediators within sociotechnical networks that bring together—among other things—designers and users (Latour, 1994).

I have already discussed the mediation of practices, meanings, and values in section 2.2.2. It is indeed central to the self-tracking literature for it allows scholars to explore human-technology entanglements. In sections 2.2.4, I suggested that systematic tools to unpack these mediations were lacking in the literature, which mostly relies on timid uses of the concept of 'affordance' (Gibson, 1979). In my dissertation, I opted for the concept of script and its associated method of de-scription. This approach allowed me to systematically explore technological mediations while remaining attentive to the role of both design and use in the 'shaping' of the technology (Bijker and Law, 1992).

3.1.1. De-scription's take on design

According to Suchman, 'the design of technical systems is a process of objectification, of the inscription of knowledges and activities into new material forms' (1993: 36). In other terms, designers tend to inscribe meaning into technologies. Akrich and Latour's de-scription is aimed at analyzing this process. Its aim is to study design's role in the constitution of meaning, which the authors understand in a 'nontextual and nonlinguistic' way and picture as the process by which one particular path is carved out of an 'indefinite number of possibilities' (1992: 259). This is evocative of Woolgar's proposition to conceive of 'machines as texts' (Woolgar, 1990: 70). Akrich and Latour thus deploy a relational semiotic framework that is not limited to signs in order to gain the 'ability to move from signs to things and back' (1992: 259). The semiotics of de-scription are a heuristic lens that allows researchers to circumvent classical oppositions between humans and nonhumans, signs and matter, or subjects and objects and to study—among other things—the design of technologies.

Woolgar famously studied designers' attempt at 'configuring users' (1990). That is, how they mobilize representations of imagined or conceptualized users during the development of a technology. He described how designers of a microcomputer 'struggle to configure (that is, to define, enable and constrain) the user' (1990: 69). In other terms, he studied the difficult translation of knowledge and expertise into an artifact. In his case-study, this knowledge consisted mostly of stories that circulate among designers about how users used (interpreted) the technology and on usability trials where simulated users are observed as they experiment with prototypes.

Like Woolgar, Akrich brought our attention to how designers 'objectify (user) representations in technical choices' (Akrich, 1995: 168). Her work on scripts provides two important additions to Woolgar's configurations. First, in collaboration with Latour, she developed a whole conceptual vocabulary to explore the translation of designers' visions (of

users) into technical apparatuses (1992), which they call the *inscription* of a *script* in an artifact. Second, her concept of script bridges the gap between designers and users, highlighting the role of the latter in the shaping of the technology. Let us first turn to the vocabulary that focuses on designers.

De-scription is the analysis of a *setting*, which is an assemblage of 'human and non-human actants where the competences and performances are distributed' (Akrich and Latour 1992: 259). The analyst's job is to try and discern what the various actants are 'doing to each other' in the setting (Akrich and Latour 1992: 259). Here, STS insistence on moving beyond the aforementioned classical oppositions is reaffirmed as a refusal to classify things *a priori*. According to the authors, an epistemological epoché is necessary for the de-scription to be feasible. A classic example of this is a technological breakdown. University servers may remain quite invisible to the researchers up until they stop functioning. Once this happens, their role in constraining and enabling research becomes undeniable, the sociotechnical network (technical employees, costs, energy, etc.) that surrounds them is revealed and might become questioned. In my case, I used two other forms of epoché. First, I deliberately put myself in an outsider position, that of being a social scientist in a digital health lab. Me being a 'foreign' observer allowed me to question what often goes unquestioned for the locals (the designers), to take a 'diagonal' look at what they were doing. Second, and as will be explained further below, I used the misalignments between the imagined script of the designers and its implementation in users' lives as empirical indicators of the script's content. These two forms of epochés are present in Akrich's text (1992).

De-scribing a technology means being on the lookout for *prescriptions*, or what a 'device allows or forbids from the actors—human and nonhuman—that it anticipates' (Akrich and Latour, 1992: 261). Programs of action are narrative programs that such prescriptions lead the users toward (Latour 1992). Latour and Akrich use the example of hotel keys and show how

the program of action ‘PLEASE BRING BACK THE KEY’ may be variously inscribed via prescriptions such as writing the injunction on a sign in the hotel lobby, writing it directly on the key, or attaching a big chunk of wood to it (1992). Finally, *pre-inscriptions* refer to competences or skills that are expected from users and *circumscription* refers to the limits that the technology sets to its functioning. In the case of self-tracking technologies that generally attempt to get people to be more active, our focus will be on how the program of action ‘WALK MORE’ is prescribed.

Beyond de-scription, scholars have also inquired how constraints impact designers attempts at inscribing a technology. Oudshoorn and al. famously studied the dynamics of two design teams and emphasized the influence of cultural constraints, such as gendered biases, on their work (2004). In a similar vein, Mackay and al. highlighted the cultural and organizational grounds of design by exploring how organizational architectures, local methodologies or expectations related to specific social milieux constrained the configuration of users (2000). In other terms, scholars reminded us that designers do not inscribe in a vacuum, which is what Lupton highlights when she writes about tracking apps that they are ‘the products of human decision-making, underpinned by tacit assumptions, norms and discourses already circulating in the social and cultural contexts in which they are generated, marketed and used’ (2014: 607).

To summarize, Akrich and Latour offer to designate the vision that designers inscribe in a technology a script. De-scription refers to an analytical attempt at disentangling that script, revealing the role of the various actants it incorporates, notably finding the prescriptions inscribed in the technology. Overall, this dissertation aims to do exactly that, to de-scribe ALLY and myStep. It starts by analyzing designers’ inscription of their vision in the technology in chapter 5. However, de-scription does not end with design. As is discussed in the following section, users play a major role in the shaping of the technology.

3.1.2. De-scription's take on uses

In the case of ALLY, the app was developed by scientists without them interacting with actual users. This was confirmed by ALLY's main designer in an interview. Only after the technology was stabilized as a software available on app stores did the app encounter its actual users. The focus of chapter 5 is on designers' work before the deployment of the technology. However, end-users play a major role in shaping a technology (Akrich, 1992; Fallan, 2008) and them and designers are part of a broader network of mutual constitution (Suchman, 2007). Designers may attempt to establish boundaries between them and external forces and keep users at a distance via the establishment of a 'detached engagement' (Suchman, 1993), which was the case in my research, but users eventually 'kickback'.

Akrich goes as far as saying that the artifact remains a *chimera* as long as users' perspective is not taken into account (Akrich, 1992: 208). What she means by that is that if we ignore the—potentially wide—range of uses that the artifact will be put to, and if we ignore how users resist, or repurpose it script, we are left with an untested prototype, with designers' hypotheses about the world. In certain cases, that might really be the end of the process. Certain artifacts may never encounter actual users and remain in labs. But this was not the case of ALLY and myStep. To the contrary, the two have been deployed, and have been integrated in users' daily lives.

Being interested in exploring the failures and successes of designers attempts at changing reality, I needed to pursue my analysis of the scripts by enquiring how it interacted with users. This whole endeavor was grounded in the STS insight that both the script and users contribute to co-producing practices and meanings. On the one hand, I had to analyze how the initial inscription of ALLY and myStep constrained and enabled users' practices, meanings and values. On the other hand, I had to analyze to what extent users reshaped (both actively and passively) and transformed ALLY and myStep, or simply decided not to use them, or stopped

using them. Such movements across the boundaries between the 'inside and the outside' of the technology mitigate the risk to articulate either technological or sociological determinisms (Akrich, 1992: 206; Latour, 1992).

To explore these boundaries requires us 'to find circumstances where the inside and the outside of objects are not well matched' (Akrich, 1992: 207). In other terms, the world imagined by designers—the script—is never perfectly aligned with the 'actual' world of users. To study the successes and failures of the script, we need indicators of the mismatches between both 'worlds'. In my case, I relied on users' feedback—via interviews and questionnaires. As we will see, users' feedback tend to provide important clues regarding the script of the technologies (notably regarding failures).

Akrich and Latour offer to name *subscription* and *de-inscription* the two possible reactions of users when they interact with the script. Subscription refers to users who either completely follow the guidance of the prescriptions or—more likely—adapt to them. De-inscription refers to the process of users wavering from the guidance of prescriptions. In both cases, the reception of the technology is done according to what Akrich and Latour call an *antiprogram*. Antiprograms are the programs of actions of users (or other actants affected by the device) that are at odds with the programs of the device that is at the center of the analysts' interests. In an attempt to remain symmetrical (Bloor 1991), Akrich and Latour remind us that 'what is a program and what is an antiprogram is relative to the chosen observer' (1992: 261). In my research, I refer to ALLY and myStep prescriptions as programs and to users' reactions as antiprograms.

Now, this binary approach may seem to lean towards exclusion and reductive dualisms. I would argue that—paradoxically—it heuristically relies on binary oppositions to go beyond them. The approach is geared towards describing the product of the intertwinement of programs and antiprograms, recognizing that what we study are 'assemblies of humans and nonhumans

actants where the competences and performances are distributed' (Akrich and Latour, 1992: 259). However, to understand 'what the various actors in the setting are doing to one another' it systematically deconstructs and reduces (Akrich and Latour, 1992: 259). It goes back and forth between entanglement and disentanglement, reduction, and complexity, setting and actants. As was explained before, the approach is particularly efficient to study crisis, moments where the separation between actants is unstable.

Finally, the de-scription framework entails a form of feedback loop. Indeed, to the reaction of actants, designers may also react. This is called *re-inscription*. It is a feedback process by which designers re-configure their script as a way 'to cope with the contradictory demands of many antiprograms' (Akrich and Latour, 1992: 262). This is the last step of de-scription's back and forth movement between users and designers, between forms of production and forms of consumption. In other terms, a new cycle may start with re-inscription.

De-scription provides few information regarding the processes by which subscription or de-inscription occur. Certainly, the analyst can simply analyze the processes by which users appropriate a script based on empirical observations. However, I will later argue that this is not sufficient, that systematic tools are required to enquire these processes. Before I turn to Bourdieu's framework, which is the perspective I eventually used to account for users' antiprograms, I would like to mention the domestication approach which is focused on the entrance of technologies into users' lives (Haddon, 2011; Silverstone et al. 1992).

I mobilized this approach to write the article on which chapter 6 is based early in my research. It offers an analytical framework that emphasizes the symbolic work that users must perform to either adopt, reshape, or reject the meanings inscribed in technologies and the practical work needed to incorporate them in everyday routines (Sorensen, 2006). Domestication acknowledges not only the work performed by users but also the impact of the embedded meanings of the medium on domestication (Berker, 2006). Moreover, domestication

draws attention to the transformations or resistances that can occur. In this framework, the domestication of technology can both enable and constrain the 'performances of identities and negotiations of status and social position' (Oudshoorn and Pinch, 2008).

Domestication is analytically divided into four phases, namely, appropriation, objectivation, incorporation and conversion (Haddon, 2007, 2011; Hirsch and Silverstone, 1992). Appropriation describes the negotiations and considerations through which individuals decide to buy and adopt a technology. It has been described as the construction of a desire for the technology and can take the shape of a 'desire for difference and social meaning' (Hynes and Rommes, 2005: 128). In the process of objectification, the technology is given space both materially and symbolically in the individuals' moral economy. Incorporation focuses on temporality and the ways in which users fit the technology into their everyday routines. Finally, conversion occurs when individuals recast the meanings that they have created with the technology to themselves or other people and thus participate in the public definition of the technology.

Domestication offers one solution to fill in the theoretical and methodological gaps that Akrich and Latour left—intentionally? —missing with regards to antiprograms. The first article that I published (on which chapter 6 is based) relied on domestication theory and systematically harnessed its four phases (Presset et al., 2020). It provided a fruitfull lens to tackle integration of the technology in daily life. However, in the context of the dissertation, I decided to relinquish domestication theory. The main argument for this is that the thesis as a whole is articulated around de-scription and dispositions, with the goal to bridge the gap between design and use by following prescriptions from their inception in design to their impact on adoption and use. As a result, it felt awkward and cumbersome to force domestication theory in this overarching framework, and much more seamless to address everyday use via prescriptions. However, I decided to mention domestication in this section to be transparent about my

endeavor, and because it directs our attention to important aspects of subscription and de-inscription.

3.2. Shortcomings of the script approach

Akrich and Latour's work is essential to my understanding of technologies. However, I argue that it entails a blind spot, which is related to the type of user it encompasses. It is indeed slightly asymmetrical in the sense that it emphasizes devices and technologies. Figure 9.2 from Akrich and Latour's paper is representative of this asymmetry, with the programs (technology) changing but the antiprograms (users) remaining passive and unchanging (Akrich and Latour 1992, 263, see Figure 3). Similarly, Latour's paper on mediation, although highly instructive with regard to technological scripts, presents users as passive (Latour 1992). Akrich's paper, on the other hand, portrays users as actively reshaping technology, thus avoiding the passivity trap.

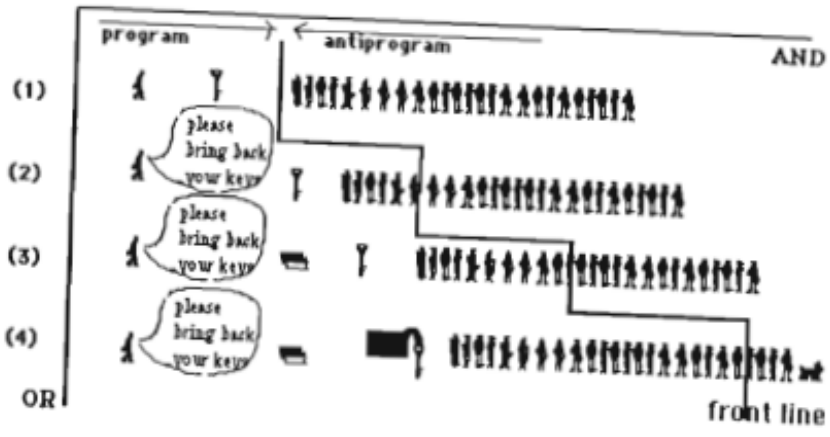

Figure 3: Programs and antiprograms.
Copied from Akrich and Latour (1992: 263). On the left, the program. On the right, the antiprograms. The demarcation line changes as the program evolves (from 1 to 4). However, users are presented as similar and unchanging (except for the fact that they progressively adhere to the program). In other terms, the focus is on the devices and how their program can differ, whereas users' antiprograms are left unaddressed.

However, Akrich situates the source of users' activity in their present environment and its inadequacy with technological prescriptions (Akrich 1992). This is important, but not sufficient. I should make clear where my objection to this model of user come from, and this forces me to do a slight jump further in the dissertation. The inductive analysis of my first interviews led me to the following observation: users' appropriation of the technology seemed to be partly constrained by their experiences, by their social origins, by their pasts. In other terms, depending on their social positions (trajectories, socializations, etc.), conditions (level of education, health, etc.), and experiences (with disease for example) users appropriated the script differently.

This role of users' pasts is neglected by the de-scription framework. I do not mean to say that de-scription negates it, or makes it impossible to integrate, but it draws the attention away from it. Consequently, patterned variations related to users' pasts is systematically neglected in most STS accounts of user-technology interactions (more on the cause of these neglections in 3.4). De-scription entails 'antiprograms' and 'pre-inscriptions' that are perfect candidates to encompass users' pasts. However, this remains unaddressed in Akrich and Latour's paper (and in most studies harnessing de-scription) and understudied. Many crucial developments have been made in the sociology of use, notably bringing the active role of users to the fore. However, the same portrayal of users as ahistorical beings has been widely reproduced to this day, as is exemplified by two important overviews of the extant scholarship: Oudshoorn and Pinch (2008) and Hyysalo,et al. (2016).

Users' past remains a blind spot, only briefly touched upon in introductions but never systematically engaged with in the analyses. Domestication theory has drawn our attention to people's positions within the household (Silverstone et al. 1992; Haddon 2011), but focuses on the moment of interaction itself, not on past experiences. It has interactionist more than structuralist roots. Some scholars have already offered actualizations of de-scription, but these

have mainly focused on broadening its use to other disciplines (Fallan 2008) or theories (Verbeek 2005) and have not contributed to filling the gap that I identify. Sure, studies that broadly originate (theoretically) from cultural studies point the existence of patterned appropriations associated with users' pasts but are unequipped to explore technological mediation. In general, the data we have on patterns of adoption and use comes from quantitative and descriptive studies, generally neglected by critical scholars, which encompass no theoretical framework and are published in medical or engineering journals (Bhuyan et al., 2016; Carroll et al., 2017; Bol et al., 2018).

So how can we open the black box of users' pasts from an STS point of view? How can we bridge the gap between descriptive studies of adoption patterns and theoretically informed critical studies? How are we to explore patterned antiprograms? In their summary of the use scholarship, Oudshoorn and Pinch briefly refer to a few studies that have attempted to 'extend actor-network theory to include the study of subject-networks' (Oudshoorn and Pinch 2008, 551). In most of these articles, the user/human black box is indeed opened but not in relation to users' pasts. The subject is either influenced by other actants (such as the price of fuel, the growth of cities or alterations in iron production) in the network (Cowan 1987), entangled with the a specific 'function' such as being a parent, nurse, manager in a hospital or baby (Oudshoorn and van Oost 2005) or characterized by his or her capacity to resist tight networks (Callon and Rabehariosa 1999). In sum, the subject/user–network is engaged with in interesting ways but not as an aggregate of past experiences. However, one small collection of articles by Ingunn Moser and John Law stands out.

From the perspective of those authors, parts of the subject (the desires) are presented as parts of a network, which also includes technologies. For example, desires are seen as produced in 'materially heterogenous places between the human and the machinic' (Moser and Law 1998: 208). The authors draw from Guatarri and Deleuze, arguing that stories 'get themselves

embodied in people, their habits, and their sense of who they are' but also in objects such as 'technologies, buildings and, more generally materials of all sorts' (Moser and Law 1998: 208). Here, we recognize the power of semiotics, as in de-scription, but applied with symmetry in mind. In a later article by Ingunn Moser, stories become discourses that 'distribute properties and ascribe qualities among subjects and objects, enabled and disabled, humans and non-humans' and are 'performative and get embodied in people and embedded in institutions and technologies' (Moser 2000: 201).

Therefore, the proposal is clear: let us regard everything as stories (including our own work as a scientific narration). There are stories embedded in technologies and users, and an interaction is a place and time where 'stories intersect to produce different kinds of complex and not very centered subjectivities' (Moser and Law 1998: 210). This analysis shares many similarities with de-scription but avoids the trap of asymmetry. I would also argue that it shares a similar point of view with ST scholars' frameworks discussed in section 2.5.2. Unfortunately, while these perspectives deconstruct and flatten the world in a consistent way, they lack systematic methodological tools to unpack the stories. I have already shown that de-scription is a useful tool for examining technology, and I will argue below that Bourdieusian sociology offers tools to unpack users' stories—or users' 'dispositions'. In other terms: users' prescriptions that underpin antiprograms. Basically, my aim is to build upon Moser and Law's perspective to construct an updated form of de-scription (reintegrating users and drawing from Bourdieu) to frame stories (prescriptions).

3.3. Bourdieu and the role of dispositions

As was said, my research is based on the following empirical observation: users' pasts influence the adoption and use of ST technologies. Once again, this is something that arose from empirical data. Of course, as will be elaborated in the methodological chapter, my knowing about Bourdieu and forms of social reproduction was key to me perceiving patterns in the data. But I

would like to stress the fact that I did not attempt to 'force' a framework into my research. Witnessing the role of patterns that seemed to originate from users' past experiences (the professional or sport environment they had been socialized in, the economic or cultural capital that they had, etc.) led me to draw from the work of Pierre Bourdieu. Steering away from certain rigid applications of his framework my aim is to conceptualize a user's past as a collective and continuous process of inscription—through socializations—in the form of dispositions that are exteriorized as lifestyles. Now, let us unpack this.

3.3.1. The classical Bourdieusian framework

Dispositions are central in Bourdieu's work. They are embodied culture, 'schemes of perception and appreciation deposited, in their incorporated state' (Bourdieu 1977: 17), shaped by education and dependent on social positions and conditions. Bourdieu's idea is that there is a process of incorporation by the individual of his experiences with the environment. Once stored, bundles of incorporated experiences tend to lead the individual to perceive the world in a specific way and tend to structure her actions and reaction to the world. In other terms, dispositions form an incorporated repertoire from which the individual draws to perceive, act, and react in daily life.

Bourdieu uses the term habitus to refer to bundles of dispositions. Habitus is classically defined by Bourdieu as 'systems of durable, transposable dispositions, structured structures predisposed to operate as structuring structures, that is, as principles which generate and organize practices and representations' (1990: 53). The habitus is central in Bourdieu's attempt at going beyond the opposition of agency and structure because, as is evident in that quote, things are both structured and structuring. In this, Bourdieu's attempt shares similarities with Giddens dualistic approach (1986) and address the dialectic space mentioned in the literature review.

Dispositions orient taste, to which Bourdieu refers to as a 'system of schemes of perception and appreciation' (Bourdieu, 1979: 171). Tastes are coalesced bundles of dispositions, structuring the individual's perception of her environment. However, and as Bourdieu aptly notices, they also generate distinctive practices (such as self-tracking). In other terms, tastes are patterned (because they depend on dispositions, and hence on past experiences) and reproduce these patterns by structuring sets of practices. Tastes are bundles of dispositions, but they can themselves be bundled together as lifestyles. Hence the fact that lifestyles reflect the practices and patterns of living of specific social groups (for Bourdieu social classes). Bourdieu thus offers us varying degrees of zoom on the patterned organization of social life.

From micro to macro, one can focus on dispositions, tastes, and lifestyles. Figure 4 summarizes the relation between habitus, tastes, practices, and lifestyles.

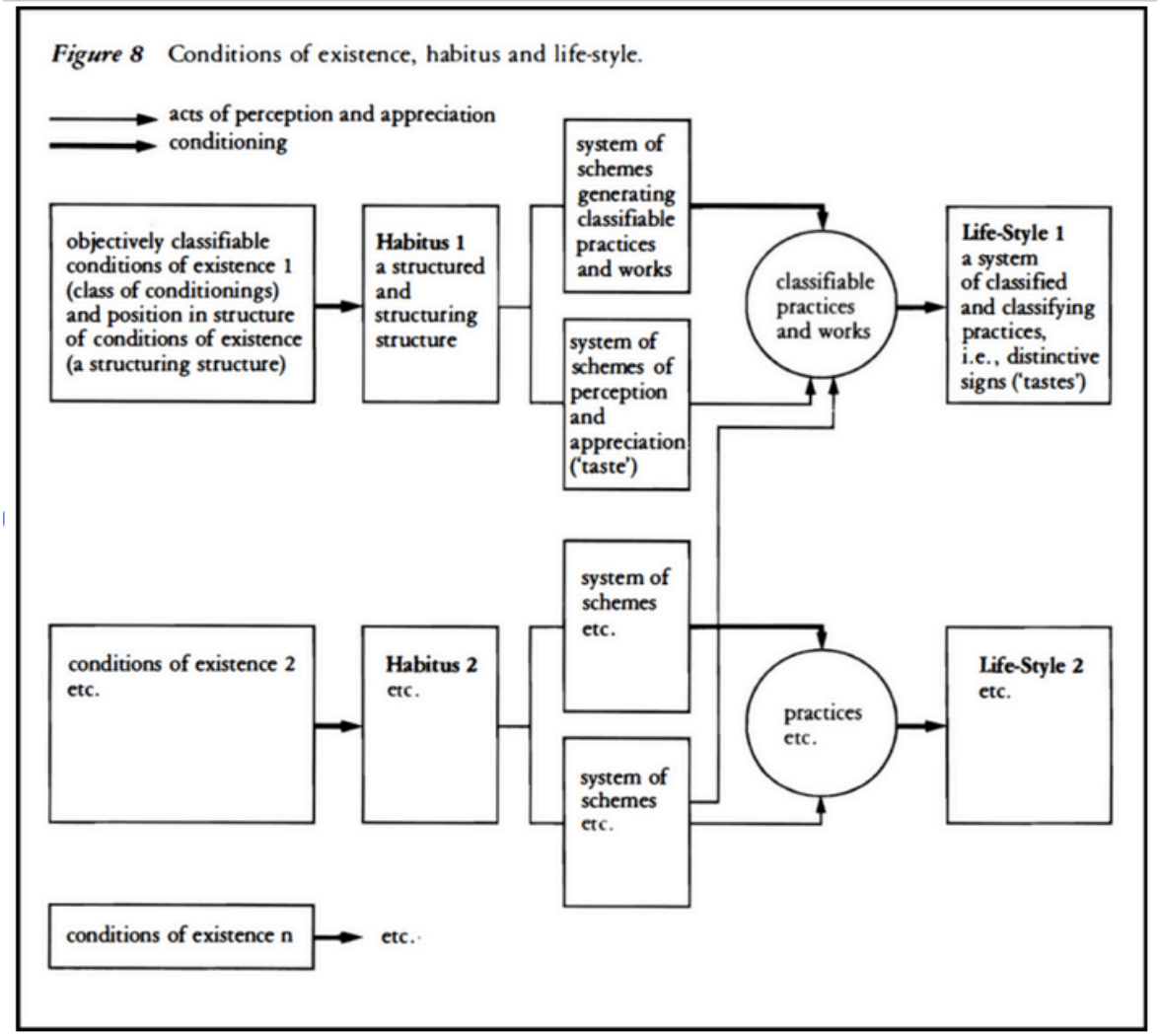

Figure 4: Bourdieu's dispositionalist framework.
Copied from Bourdieu (1979: 171). Social conditions and position (on the left) structure habitus and tastes, which are enacted in distinctive practices (middle) and coalesce in Lifestyles (right).

As the figure suggests, 'conditions of existence' and 'positions in structure of conditions of existence', which are often referred to as social conditions and social positions, are at the root of the whole system. The conditions of existence typically refer to resources (economic, cultural and social) and variables such as age, sex, nationality. According to Bourdieu, they tend to 'determine materially, socially, and culturally what is possible, or impossible' for an individual (Cockerham, 2013). They are the basis of one's internalization of the habitus, for

people who share similar conditions are ‘more likely than any member of another class to have been confronted with the situations most frequent for members of that class’ (1977: 85). This explains why objective life conditions usually result in patterned forms of experiences which translate into patterned incorporations of dispositions (habitus), patterned tastes and patterned lifestyles. Bourdieu uses the term ‘homology’ to refer to the fact that patterns tend to be reproduced alongside his framework.

The other thing that conditions dispositions is social position (in structure of conditions of existence). Bourdieu does not ignore that conditions of existence are related. Being rich, for example, means being richer than those that are less rich. In other terms, Bourdieu’s framework incorporates the fact that patterned conditions of existence are in relation with each other. Therefore, his scholarship is often described as relational (Schinkel, 2007; Nelson, 2014). In his work, these relational underpinnings are encompassed in the concept of ‘field’. For Bourdieu, practices and lifestyles are enacted within ‘fields’ which are ‘networks or configurations of objective relations (domination, subordination, etc.) between social positions’ (Cockerham, 2013). For him, a field is a social space (arena) in which people compete, drawing from field-specific cultural, social, and economic capital to navigate positions.

3.3.2. Precisions about the Bourdieusian framework

I have now sketched the general Bourdieusian framework. In my case I drew from a variation of this framework which is used in the sociology of health: the health lifestyle theory. This theory, developed by Cockerham (2013), takes a slightly updated stance on Bourdieu's framework. It focuses on dispositions to act, which translate into practices and eventually in lifestyles. Tastes and habitus are slightly neglected, or at least less used. This makes for a slightly more straightforward vocabulary. Moreover, instead of conditions of existence on one side, and position on the other, the roots of dispositions become an interplay between social determinants, socializations, and life trajectories. The grounds of one's position are more dynamic and intermingled, which may be a better representation of the messiness of social existence. Figure 5 summarizes this updated model, which sets the focus on dispositions.

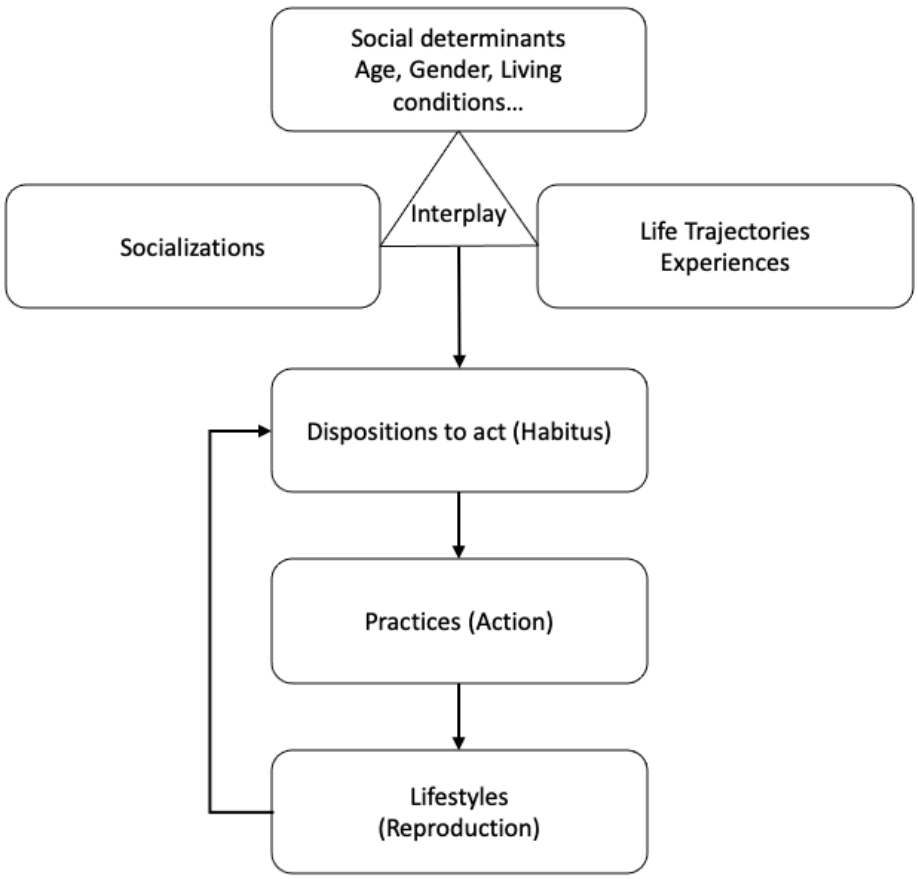

Figure 5: Updated dispositionalist framework.
Adapted from Bourdieu (1979:171) and Cockerham (2013:57)

That being said, I would like to emphasize some components of my appropriation of Bourdieu's framework. First, I refute—alongside others—the classical critique that Bourdieu's framework is deterministic and rigid (Faber, 2017). Bourdieu makes it clear that dispositions may both evolve and be plural. They can even be contradictory—in that case he calls them 'cleft'—and are activated in relation to certain contexts (Lahire 2014). According to him and Wacquant, the habitus 'is an open system of dispositions that is constantly subjected to experiences, and therefore constantly affected by them in a way that reinforces or modifies its structures' (1992:133). In other terms, dispositions change. They are in a constant state of reconfiguration in response to external feedbacks. However, they tend to reproduce themselves. Because they were often acquired at a young age, and as part of long periods of socialization, it takes a long exposition to another environment or a dramatic event to change them. Their drastic alteration is rendered even more unlikely because people tend to be drawn by environments, discourses, or people that align with their dispositions. Nevertheless, nothing in Bourdieu's conceptual framework precludes dispositions to be altered.

Moreover, Bourdieu's framework has to be understood from a probabilistic point of view. He often refers to the 'probabilistic logic of social laws' (Bourdieu, 1972/1977:2). This is a crucial point. The relations of homology between the different components of the theory are relations of enhanced likelihood, not pure causal relations (Faber, 2017). If they were pure causal relations, then the framework would be completely deterministic indeed. However, the claims that Bourdieu is fully deterministic and that his framework precludes any form of social change can only be understood as rhetorical arguments, *reductio ad absurdum*, mobilized to affirm one's own position against a major figure, or to emphasize a particular point of critique. It cannot be articulated based on Bourdieu's work (Faber, 2017).

Individuals can steer away from their deterministic tendencies, but this is less likely than sticking to them. Sure, Bourdieu has often been interested in social reproduction, which led him

to emphasize the stable aspects of social reality instead of its volatility. However, his studies highlight all the work that is required for things to remain stable. Stability must be produced. Moreover, if he focused on stabilities, his work is built upon a critique of Levi-Strauss's structuralism which he found too deterministic. In some of his earlier work, being interested in how practices often differ from the 'official rules' they are supposed to follow, he stated that 'even in cases in which the agents' habitus 'are perfectly harmonized and the interlocking of actions and reactions is totally predictable from outside, uncertainty remains as to the outcome of the interaction' (Bourdieu, 1972/1977:9).

3.4. On articulating theories

The two theoretical pillars of this dissertation are Akrich's de-scription and Bourdieu's dispositionalist framework. Now let me address the elephant in the room. It is no secret that STS (which Akrich and Latour represent) is often pitted against Bourdieu (Nelson, 2014; Halford and Savage, 2010). In many ways, Latour's perspective has been articulated against Bourdieu's, and the two scholars had rough words against each other's. Therefore, in addition to clarifying my own articulation of the two perspectives, I found it important to tackle the question of their compatibility. Let me first look at the tensions between the two, before I explain how I articulated them in my dissertation.

3.4.1. Scientific disputes

I remember that four years ago, a 'Bourdieusian' PhD visiting my office said in a condescending tone that there was 'an awful lot of Latour' in my bookshelf. On the other hand, I have been in STS workshops where the mention of Bourdieu prompted sighs and irritated head shakes. These mundane experiences point to the crystallization of tensions that arose from Latour's harsh criticism of Bourdieu, and from Bourdieu's—also harsh—answer to those. As Bourdieu aptly

expressed, the barriers between concepts and theories are often more sociological than theoretical, and this is certainly partly true of tensions between him and Latour.

The field of sociology in France—which according to Bigo was (is?) particularly prone to encourage processes of intellectual distinction and discourage synergies (2011)—has certainly played a role in freezing the two authors' opposition. If Latour's work has not always been in opposition with Bourdieu—the former notably published in journals 'involving' Bourdieu (1997)—he quickly opposed himself to the mainstream sociology of the time. In Bourdieusian terms, Latour's attacks on Bourdieu can be analyzed as a tactic to gain symbolic capital in a field that valorizes antithetical stances (Nelson, 2014). Latour recently admitted that 'the reason I did this argument against sociology was to make [my argument] clearer, and one way to be clear is to be mean. But I'm not too proud of that, I have to say' (Block and Jensen, 2011: 160). I do not aim to dive into the sociological analysis of their intellectual relations, but it seemed important to remind the context from which the theoretical tensions emerged.

Let us also note that both Latour and Bourdieu contradict their own selves within their work. Bourdieu vividly stated that his sociology steered away from picturing agents as 'epiphenomena from structure' (Bourdieu, 1998: viii) but leaned towards this when discussing the role of journalists in the mediatic field. On the other hand, Latour, who refutes social constructivism, often ended up providing social constructivist definition of society (Nelson, 2014). What I aim to suggest here is that it is difficult to talk of incompatibility between positions that are not themselves fully coherent. Moreover, it is important to point to the fact that both authors relied on caricatural representations of the other's theories. As noted by Bigo, 'For Latour, Bourdieu is a structuralist, a Durkheimian or an Althusserian, while for Bourdieu, Latour is a methodological individualist denying politics. Both narratives are of bad faith' (Bigo, 2011: 236. In Nelson, 2014). By implying that there are sociological underpinnings to Latour and Bourdieu's opposition, that their works are not fully coherent or that they are of bad

faith, I am not trying to articulate a nihilist or relativist discourse. Neither am I implying that there are no theoretical contradictions between their works. But I would like to suggest that worries around the articulation of the two theories may sometimes be predicated on the false assumption that the authors' works are coherent wholes, and that their arguments against each other are both solid and logically sound.

That being said, I will now turn to the lines of tension between their works. However, I would like to point to the fact that I have a specific goal which is to determine whether something prevents us from articulating Akrich and Latour on the one hand, and Bourdieu on the other, in the analysis of human-technology interactions. As a result, I will only discuss the parts of their works that are relevant to this question. For example, one of the main tensions between the two authors has to do with their sociologies of science, which I will not discuss.

3.4.2. Latour's critique of the 'sociology of the social'

Latour's main contentions with what he calls 'the sociology of the social' (Latour, 2008:8) or sometimes 'critical sociology' (Latour, 2008:9) are that it treats the social as an *explanans* instead of an *explanandum*, that it neglects the role of nonhumans, and that it places the social scientist in a hubristic position of reflexivity. I start from Latour's criticism because he is the one that criticized Bourdieu, not the other way around, even though Bourdieu partly answered to these criticisms. Moreover, Latour's critique—although dispersed in his texts—is fully articulated, whereas Bourdieu only provided partial answers.

According to Latour, the main failure of 'the sociology of the social' is that it tends to naturalize terms such as 'social' and 'society', blurring the fact that what they designate is in fact an heterogenous bundle of associations between things as diverse as animals, materials, discourses, technologies, buildings, etc. (see Callon, 1984, for a canonical example of the various elements that a 'sociology of the social' may sometimes elude). For him, this leads to anthropocentric accounts and to the exclusion of other beings, a process he refers to as

'sociologism'. However, he believes that the problem goes beyond a 'simple' neglection of other actants. Indeed, he argues that it progressively leads to the establishment of the social as an explanans, a quasi-ontological and unquestioned category, instead of an explanandum, something that needs to be explained. In other terms, centration on and naturalization of 'the social' has a pernicious 'blackboxing' effect, that of leaving what the social is made of, and how it is constituted, aside.

The last step in Latour's critique of the 'sociology of the social' is to argue that the transformation of the social into a blackboxed explanans lead scholars to falsely attribute themselves an overarching view of reality. According to him, sociologists of the social consider that 'since ordinary agents are always 'inside' a social world that encompasses them, they can at best be 'informants' about this world and, at worst, be blinded to its existence' (Latour, 2007: 4). Sociologists of the social thus arrogate to themselves the privilege of being the only actors capable to see social mechanisms to which other actors remain blind. To summarize, he accuses Bourdieu (for Bourdieu is always his main target) of practicing a sociology that establishes balckboxes around the social, with the consequence of excluding nonhumans, bypassing explanations of what the social is made of, and providing the analyst with a false position of epistemological—and by extension political—power.

3.4.3. Limits of Latour's critique

Latour's critiques are relevant, and the aforementioned dangers do manifest themselves. Bourdieu—along with other sociologists, Latour included (Nelson, 2014)—does sometimes fall into those pitfalls. However, I will now argue that—although the critique applies to some part of Bourdieu's scholarship—it does not render his framework untenable. Yes, Bourdieu may sometimes have naturalized the social, formulated his vision as somewhat peremptory, and exaggerated the powers of sociological insights. However, it is extremely hard to argue that he uses the social as a pure explanans, that his framework cannot account for nonhumans, or that

it necessarily leads to ignoring the voice of social agents by replacing it by sociological jargon. My argument is that, so far, Latour provided an important critique of some of the abuses that Bourdieusian analyses can sometimes lead to, but that he did not point to fundamental theoretical flaws.

As was said before, there is some bad faith, some exaggeration in both scholars' accounts. Nuance might not be the best way to be recognized in the scientific field, but it is necessary if we are to understand the depth—or the shallowness—of the tensions between Bourdieu and Latour. Let me first turn to the use of the social as a blackboxed explanans. Yes, Bourdieu sometimes leans towards using 'habitus' or 'dispositions' as blackboxes. However, this is in latter texts, or late within a specific text. In other terms, blackboxes are used after they have been systematically built on empirical evidence. In most texts, the blackboxes are not really blackboxed, even though they may sometimes lead to reductive statements. Distinction, a book that largely relies on concepts such as socializations, habituses, or fields—terms abhorred by Latour—is anything but a blackbox. It is a highly empirical account that closely describes the types of associations that make up the so-called social explanans (Faber, 2017). I recognize the importance of Latour's point—and agree that Bourdieu may sometimes be used by others in a particularly blackboxed and reductive way (something Bourdieu noticed himself in *Science of science*)—but refute that this creates ontological or logical incompatibilities between their frameworks.

Second, Bourdieu does indeed neglect objects and technologies, and Latour is right in reminding us that they play a major role in society. However, once again, nothing prevents us from including them in Bourdieu's framework. In fact, Bourdieu himself recognized their participation, while still maintaining a tendency to exclude them from his accounts. The following quote, articulated in the context of discussing how objects, texts, and spaces

contribute to shaping social scientists' points of view, shows remarkable overlap with Latour's analyses:

> … think for instance of all those things that have become so common, so taken for granted, that nobody pays any attention to them, such as the structure of a court of law, the space of a museum, a voting booth, the notion of 'occupational injury' or of a 'cadre,' a two-by-two table or, quite simply, the act of writing or taping. History thus conceived is inspired not by an antiquarian interest but by a will to understand why and how one understands. (Bourdieu and Wacquant, 1992: 238)

Lastly, although Bourdieu rarely expresses it, dispositions are open to other actants. The following quote, taken from a late publication, suggest that objects, notably technologies, can take part in the process of transforming one's dispositions.

> The habitus solicits, questions, and makes the object speak, which, in turn, seems to solicit, call upon, and provoke the habitus (Bourdieu, 1998: 521)

Of course, the distinction between object and subject seems to be reproduced, and we remain far from the entanglements and cartographies of responsibility described by STS scholars. And it is true that Bourdieu generally neglected the role of technologies. However, this quote suggests that dispositions can be 'networked'. In other terms, nothing theoretically prevents us from providing an active role for technologies in the emergence of dispositions. Dispositions can be conceptualized as evolving networks that encompass discourses, bodies, and materials. Latour is right to say that Bourdieu—and more generally critical sociology—did tend to obscure the role of objects. However, once again, I fail to perceive an irremediable incompatibility.

Finally, I turn to Latour's criticism that sociologists of the social fail to take their informants to their words, transform their narratives into abstruse vocabularies, and picture themselves as those who perceive the true nature of social reality. Once again, this fails to account for Bourdieu's methodological and empirical apparatuses, which—by the way—Latour never addresses. If we follow my previous argument that Bourdieu's theories are grounded in

empirical data and built upon elaborate and accessible methodological architectures, then it becomes more difficult to argue that he betrays his informants. In many ways, an honest Latourian account of Bourdieu's work would follow the lines of Latour's fascinated and respectful accounts of Pasteur's or Guillemin's endeavors (Latour, 1984/1993; Latour and Woolgar, 1996/2013). We can arguably say that Bourdieu is a scientist who closely transforms the world, empirically and methodologically, into solid arguments and powerful networks. Provided that we can—and I argue that we can, notably because Bourdieu's empirical and methodological foundations, however criticized, remain highly regarded by the scientific community—follow how Bourdieu went through progressive mediations in his scientific research, why would we so harshly doubt that he can articulate a solid discourse on reality that may differ from his informant's or from other scientists? Bourdieu's *Distinction* arguably provides enough traces of how it composes the 'blackboxes' it then uses, which puts his author in a situation to make informed propositions about the social.

3.4.4. Bourdieu's answer

I will be brief regarding Bourdieu's critique of Latour, for it is mainly articulated in a brief section of *Science of science and reflexivity*. Moreover, it mostly treats Latour's sociology of science. However, Bourdieu addresses the following things that are of interest. First, he accuses Latour of being a radical constructivist, claiming that he and Woolgar 'intimate [that facts] are fictitious, not objective, not authentic' (Bourdieu, 2001/2006: 26). A brief look at a text like 'the pedo-fil of boa-vista' (1995) in which Latour gives a clear account of his stance on science and constructivism show that he does the exact opposite. Bourdieu's critique simply does not stand and is likely to have been formulated without close consideration of Latour's body of work.

Further in the text, Bourdieu suggests that this radical constructivism comes from Latour and Woolgar's reliance on semiology. Here is probably the source of Bourdieu's—in my

opinion false—understanding of Latour's work. According to Bourdieu, Latour falls into the trap of '*textism,* which constitutes social reality as text*'* (Bourdieu, 2001/2006: 28). Here Bourdieu mixes two of Latour's use of semiotics. First, Latour emphasizes the role of inscriptions in the scientific world, reminding us that they are key to gathering evidence and that, eventually, laboratories produce 'papers and texts' (Latour and Woolgar 1996/2013). Second, Latour relies on the metaphor of (machines) as texts, which is central to de-scription (Latour and Akrich, 1992). In one of these, Latour truly points to the material roles of texts, in the other, he uses semiotics as heuristic tool. Bourdieu mixes the two, confounding ontological statements on the one hand and heuristic epistemologies on the other. The last point of Bourdieu's critique is that Latour refuses to seek 'the principle of actions where it really lies, in positions and dispositions' and 'try to find it in conscious (even cynical) influence and power strategies' (Bourdieu, 2001/2006: 29). This is an important point of contention, which I treat in the next section.

3.4.5. Reproduction and uncertainty, two different spaces for conceptualizing 'action'

A major point of contention between the two theories is their conceptualization of action. Latour's conception of action relies on his interpretation of Greimasian semiotics. As was suggested before, Latour's use of semiotics mostly derives from his ambition to develop an 'observational language […] whose role is to indicate only the relationships between entities' (Høstaker, 2005: 7). In other terms, a heuristic plane of immanence in which classical boundaries are circumvented. Latour draws from structural linguistics to argue that 'material entities are significant only in relation to other entities' (Beetz, 2013: 14). However, where Greimas was concerned with how actants acquire competences (create new associations) throughout the narrative, Latour—who focuses on scientific discoveries—is interested into how competence is derived from trials and performances. Their focus differs.

> ‘in Latour’s reading of Greimas the meaning of a text is accounted for without any recourse to a referent outside the text (nature, the real world), the social context of its production or the intentions of the author; the intuition, socialization or ideological position of the reader is equally ignored’ (Beetz, 2013: 4).

Two limits of Latour’s framework can be identified in this quote that are related to his specific (limited?) interpretation of Greimas. First, his insistence on performance before competence and second, his refusal take external references into account. The origin of these limitations is not to be found within Greimasian semiotics themselves. Greimas’s does account for the progressive constitution of actants as aggregated bundles of competences. ‘Subjects are defined not only as subjects but by the position occupied in a narrative journey, a journey characterized by the acquisition of competences’ (Lenoir, 1995:123) Moreover, in Greimas’s framework, the concept of ‘enunciation’ tends to feed pre-existing structures back into semiotics’ plan of immanence (Greimas and Courtès, 1982: 103). However, this remains a grey—in the sense of broadly defined—area. As noted by Høstaker, regimes of enunciation are also present in Latour’s work as ‘historically constituted [entities], but the extra-contextual relationships keeping [them] in existence do not seem to interest [him]’ (2005:20).

So far, I have presented some tensions between the two theoretical orientations, while insisting on the fact that they did not represent unsurmountable incompatibilities. However, I recognize that both theories have tendencies to foster blind spots (for example Bourdieu’s views tend to invisibilize the role of objects while Latour’s tend to minimize the role of human actants’ pasts). As is often the case, one’s strength is also one’s weakness. In the case of Latour, the epistemological fruitfulness of his refusal to recognize ‘stable conventions’ and his insistence on a principle of irreduction that refuses ‘any prealable definition of the beings that compose the world and their relations’ (Chateaureynaud, 1991:467) are counterbalanced by a major risk : that of a form of ‘endogenization where the setting closes itself around the events taking place’ (Høstaker, 2005: 18). In other terms, if the centration on the situation provides important lessons

on what is being reshuffled or created within particularly unstable settings such as user-designer-technologies interactions, it fails to account for more stable networks (Bourdieu, 1998). As noted by Chateaureynaud, this shortcoming is evidenced by the fact that, from the inception of his framework, Latour paradoxically relied on a stable definition: that of science and techniques as an object of research (1991). A mirrored critique applies to Bourdieu.

This suggests that the major difference between both theories has to do with when—or on which type of situations--they can be applied. In short, Latour's perspective has been developed to account for 'situations where innovations proliferate, where group boundaries are uncertain, when the range of entities to be taken into account fluctuates' (Latour, 2008: 11). On the other hand, Bourdieu's sociology is efficient at accounting for more stable entities such as dispositions, social stratifications, or social fields. Even Latour recognizes this when he writes that:

> It's true that in most situations resorting to the sociology of the social is not only reasonable but also indispensable, since it offers convenient shorthand to designate all the ingredients already accepted in the collective realm (Latour, 2008:11).

In many ways, Latour suggests that the so-called blackboxes of social sociology can be useful. He simply warns us not forget that they are blackboxes, and that we should always be able to trace back how we constituted them. This is what he means by saying that

> 'It would be silly as well as pedantic to abstain from using notions like 'IBM', 'France', 'Maori culture', 'upward mobility', 'totalitarianism', 'socialization', 'lower-middle class', 'political context', 'social capital', 'downsizing', 'social construction', 'individual agent', 'unconscious drives', 'peer pressure', etc.' (Latour, 2008:11).

3.5. Articulating de-scription and dispositions

I have described my perspective in the preceding sections, but in a somewhat scattered manner. The current section is meant to clearly articulate it. In my research—and similarly to Moser and Law (1998)—I consider that both the technology and users carry something(s) prior to their

entanglement, and that these things partly constrain and/or enable the practices, meanings and values that emerge from their interactions. Following de-scription, I heuristically consider these as 'prescriptions'. This traces back to the Greimasian framework which pictures beings as progressively acquiring (or sometimes being laden with) competences. The technology is laden with designers' script, which may encompass material, ideological, ethical, agential, etc. components. I align myself with Suchman in considering that the script may mediate things that are beyond designers' considerations (such as cultural norms, gendered biases, etc.). On the other hand, users carry dispositions, a specific form of prescription that results from the interplay between social conditions, social positions, and life trajectories, and may evolve and be contradictory.

In this perspective, the concept of disposition benefits from its integration in de-scription because the latter suggests that dispositions are in a constant state of (re)inscription and that their inscription is a collective process. Under the semiotic light of de-scription, dispositions become prescriptions and are opened to the influence of—among other things—technology or nonhumans. However, this does not mean that these are either stable or homogenous or that they ignore contextual cues.

On the other hand, de-scription benefits from the adjunction of this new form of prescriptions that are dispositions. The main aim of de-scription—as it was canonically presented—are technologies and Latour and Akrich's 'vocabulary to describe persons is not as solid as the one [they] introduce for statements and objects' (Chateaureynaud, 1991: 478). I see no benefit in using different terms for technologies and humans. In my framework I use prescriptions for any prior in-scription that plays a role in the setting. This allows me to explore the assemblage while considering any possible prescription and foster symmetry (Bloor 1991). The entry of dispositions or shared norms in the equation helps de-localize de-scription, opening it to power issues and structured inequalities (Harraway, 1992; Lenoir, 1994).

How the analyst conceptually engages with users' prescriptions should depend on the research questions at hand. Bourdieu's scholarship is particularly useful in accounting for social patterns, which could not be ignored in my case. First, because they emerged from my inductive analyses (see chapter 4). Second, because they are consistently revealed by statistical research on mobile health technologies (Bhuyan et al., 2016; Carroll et al., 2017; Bol et al., 2018) and more recently on self-tracking (Régnier and Chauvel; 2018; Findeis et al., 2021). This might be the main difference between my endeavor and that of Moser and Law who focus on a few individual case studies.

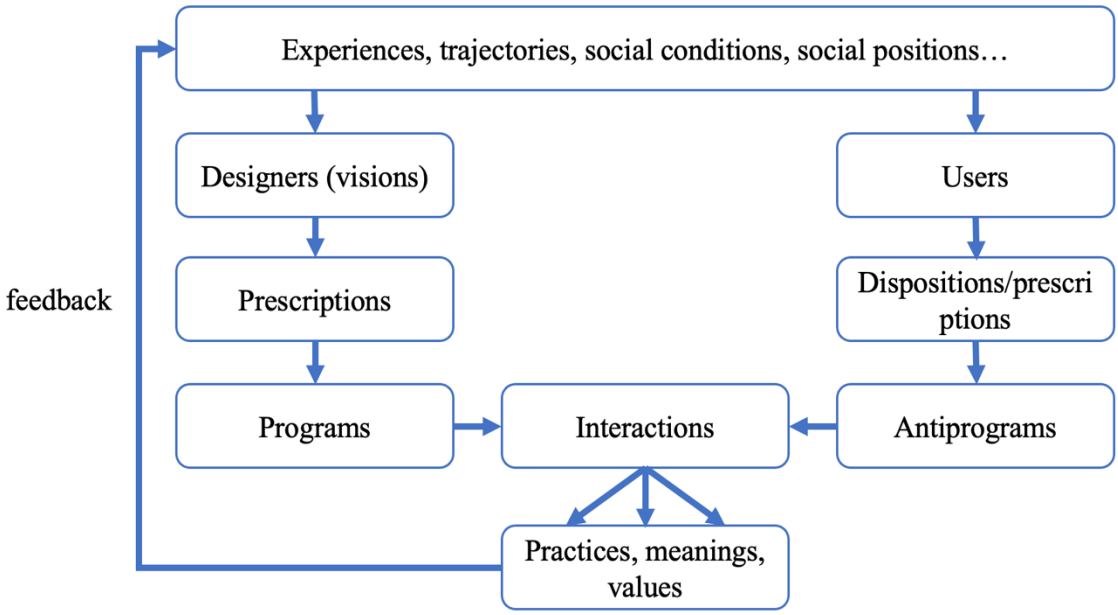

Figure 6 Schematic representation of users' appropriation of designers' script

I consider the patterned differences that emerged from my analyses as the product of iterative and contextual interactions between (malleable) technical prescriptions inscribed by designers within a technology and a set of plural and contextual user prescriptions. In this perspective, the patterns emerge from a limited (but still broad) field of possibilities or, in other words, are partly—and I insist on partly—determined by both types of prescriptions and their interaction. Figure 6 summarizes this position.

3.6. Digital inequalities

3.6.1. On the 'digital divide'

I have now laid the theoretical foundations of my approach to human-technology interactions. In the context of this dissertation, this approach is harnessed to tackle the design and use of self-tracking technologies. As has already been hinted, the dissertation focuses on patterns and recurrences, such as the over (or under) representation of certain categories of population in self-tracking programs, or the presence of archetypal ways to use the technology. Patterns that, as I have argued before, remain understudied in the self-tracking literature. In the context of this final theoretical section, I will review scholars' approach to such patterns, which they sometimes refer to as 'digital inequalities', but more generally as 'digital divides' (Ragnedda and Munschert, 2018). The terms are often used interchangeably, notably by Ragnedda (2017). However, Halford and Savage suggest that the digital divide is one approach —'the most influential'—to digital social inequalities (2010: 937). As will become apparent in the following sections, there is such a variety of approaches to digital inequalities, and (concomitantly) a variety of conceptualizations of the digital divide, that the two concepts cannot—in my opinion—be used without a local contextualization. In other terms, one cannot appeal to such concepts 'in general' but must explain how they are conceptualized and operationalized in the research concerned.

Patterned appropriations of technologies are often entangled with sociodemographic factors, and generally lead to different (more or less beneficial/detrimental) outcomes. Scholars thus refer to these patterns as sources for 'inequalities', acknowledging the fact that such 'digital divides are forms of stratifications' (Muschert and Gunderson, 2015:11). If there is little doubt as to the presence of such patterns—Halford and Savage argue that 'it is widely recognized that (ICTs) are implicated in social inequalities associated with class, gender, race, ethnicity and age (among others) (2010)—there are debates as to which concepts are the most relevant to analyze

them. As will become apparent in the following sections, the concept of digital divide was brought to the fore at the end of the nineties in reaction to the progressive realization that digitalization (referred to as the rise of 'information society' at the time) bore the risk of strengthening—or transforming—existing inequalities.

Scholars were quick to adopt the concept, but not without a fair share of criticism and conceptualization. My understanding of scholarly appropriation is that—at the time I write these lines—the term is used in two different ways. On the one hand, a group of critical scholars use it reflexively, shaping its appropriation with elaborate theoretical architectures. On the other hand, it is used—beyond critical scholarship—in a more descriptive manner. Hence the confusion that sometimes arises among scholars regarding whether it should be used or discarded (Halford and Savage, 2010). As is often the case (let us think of the Latourian critique of the sociology of the social mentioned before), the relevance of the concept of digital divide largely depends on how it is conceptualized, and for which purpose it is used. In the following section, I do my best to unpack the various appropriations of the concept.

According to Selwyn, the notion of 'digital divide' has gained prominence around 2000. It was popularized by 'an unusual alliance of academics, IT industry executives, politicians and social welfare organizations, all pursuing the ideal of widespread use of ICT—albeit for very different reasons' (Selwyn, 2004: 343; Strover, 2003). At first, the digital divide—which, according to Selwyn, was developed as part of 1980-1990's 'inclusive society' agendas (2002)—referred mostly to supranational inequalities. It underlined differences between countries in terms of access to information and communication technologies. Use of the concept then 'quickly gravitated towards the issue of technological inequalities within individual countries' (Selwyn, 2004: 344). That is, differences between 'connected' and 'not connected' citizens. In both political and academic discourses, the digital divide referred to an obviously reductive dichotomy between 'have' and 'have not' (Wresch, 1996).

Scholars were quick to criticize that reductive nature, arguing that it did obscure the diversity of positions with regards to access and use of technologies and lacked 'sociological sophistication' (Webster, 1995: 97). Since those early criticisms, the term has gone through a myriad of re-conceptualizations, as will be explained hereunder. If some critical scholars remain cautious around it—which is a sound reflex—it would be dismissing a broad array of interesting studies to suggest that it is still under-conceptualized today. If anything, we could say that the term, as many others, can be read under a variety of theoretical lights, which makes it unusable without proper contextualization. The recent publication of a collective volume entitled 'Theorizing digital divides' that offers multiple perspectives on the subject (Ragnedda and Munschert, 2018) attests to its liveliness. Let me now review early criticisms of the digital divide, before I turn to its various re-conceptualizations.

The first type of criticism that scholars addressed to the notion of digital divide was its reductive and binary understanding of 'access' (to technologies). They viewed access as an umbrella term that needed to be defined to elude rough simplifications and consider more subtle inequalities (Selwynn, 2004, Halford and Savage, 2010). Sure, the possession of physical hardware is a key element, but things like the presence and the quality of a mobile network, the quality of the technology itself, the environment in which it is used, the ease and cost of access, and concerns regarding privacy all mediate people access to technologies (VanDijk, 2017). Having a private computer with a large screen and a seamless internet connection at home is not like having limited access to a small computer in a public library with a poor connection. Scholars thus refined the definition of access, with van Dijk offering to subdivide it into four elements: motivation to use, possession of hardware and permission to use them, possession of digital skills necessary to use, and number and diversity of technologies accessible (VanDijk, 2005).

A second point of criticism targeted the belief—often shared by technology promoters, public institutions, and private companies—that availability and access translate into use (Selwyn, 2004). Certain actors do indeed suggest that releasing a technology free of cost—think of the covid tracing apps for example—will easily translate into general use. This is an obvious mistake, or false promise, as is evidenced by most of the literature on digital divides (see Lythreatis et al., 2021 for a recent review). Parts of this belief are also found in certain academic arguments that point to different 'phases of technological diffusion', in the sense that they generally picture a progression from 'early adopters' to 'generalized use'. Such arguments suggest that the digital divide is 'merely a temporary stage of societal adoption, and that in the end, only those who consciously refuse to use technologies will by non-users' (Selwyn, 2004: 348). Scholars have argued that such viewpoints obscure the complex relationship between access and use (Selwyn, 2004; Van Dijk, 2005).

Access does not, indeed, tell the full story, and there are also inequalities related to how people use a technology. In Selwyn's terms, 'use of ICT does not necessarily entail 'meaningful use of ICT' (2004: 349). Of course, this requires defining what a 'meaningful use' is. Referring to the work of Pierre Bourdieu (see discussion on capitals hereunder), scholars often focused on whether the type of use increased users social, cultural, or economic capitals (more on that in the next section). In other terms, some uses increase life chances more than others, which, according to scholars, largely depends on 'information and strategic internet skills' (van Deursen and van Dijk 2010: 908). Because these are often entangled with sociodemographic factors, scholar point to a 'structural usage gap' (Sparks, 2013: 36). Attention has thus been set, beyond access, on inequalities in use, skills, motivation and purpose of uses (van Deursen and van Dijk, 2014). More recently, scholars have shown growing interest for differences in the consequences or returns of technology use. In other terms, such research points to 'the mechanisms through which (technology) usage is converted into offline benefits' (Van Deursen

and Helsper, 2015: 31), highlighting another complex phenomenon that more reductive appropriations of the digital divide obscure.

3.6.2. Re-conceptualizing the digital divide

Based on the previously mentioned limitations of the original concept—its limited understanding of access, the relation between access and use, use, and outcome of use—scholars attempted to reconstruct the digital divide so that it integrated a more complex understanding of digital inequalities. Generally, they agree to heuristically subdivide the concept into three different and interconnected levels, usually referred to as first, second, and third order (sometimes level) of digital divide. First order digital divide refers to differences in access to technology; second order digital divide refers to differences in the use of technologies; and third order digital divide refers to differences regarding the consequences of use (DiMaggio et al.,2004; Selwyn, 2004; Van Dijk, 2006; Ragnedda and Muschert, 2018).

Tri-partitioned this way, the digital divide offers a useful categorization that allows analysts to systematically unpack digital inequalities. It brings light on some of the major mechanisms that lie behind (patterned) differences related to the diffusion and appropriation of technologies. However, this framework—as long as it remains devoid of further conceptualization—leads to certain shortcomings. Notably, as was noted by van Dijk, digital divide studies that focus on individuals and their sociodemographic characteristics tend to produce 'useful data, but they do not automatically result in explanations, as they are not guided by theory, or by hypotheses derived from theory' (2005: 10). This led scholars to progressively re-conceptualize the digital divide, notably drawing from the various works of Tilly (Van Dijk, 2005), Simmel (Munschert and Gunderson, 2017), Bourdieu (Halford and Savage, 2010; Regnadda and Ruiu, 2017), Weber (Ragnedda and Muschert, 2015; Neves and Mead, 2018; Ragnedda, 2017), or from various theories such as the social construction of the technology (SCOT) and the social shaping of technology (STT) (Fuentes-Bautista, Straubhaar, & Spence,

2003; Dixon et al, 2014; Kretchmer, 2018), disability theory (Goggin, 2018), or de-colonialism (Moyo, 2018). The digital divide has been used prolifically and I have certainly missed some of its uptakes in certain spheres. In the next sections, I briefly review its conceptualization alongside what I would generally call 'sociological' frameworks. I conclude by explaining how I used the concept in this dissertation.

Early on—in 1998—Van Dijk offered to re-conceptualize the digital divide around a relational viewpoint. Doing so, he hoped to draw the attention to the role of structural power relations, something that—according to him—'individualistic' approaches of the digital divide obscured. Notably, he offered to separate personal (age, sex, personality…) and positional factors (labor, household, nations…) and defined social exclusion, exploitation, and control as the three main mechanisms by which differences in personal and positional factors become 'unequal access' or inequalities. Drawing from Tilly's work on inequalities (1998), he brought together an interactionist understanding of positions, personal categories (sociodemographics), resources and technological properties of ICT to account for differences in access and use of technologies. Van Dijk made a crucial contribution to the analysis of digital divides by highlighting the lack of theoretical grounds in the literature and by designing a solution based on Tilly's conceptual architecture. However, in the context of this dissertation, I aim to draw the attention to the role of people's past in the adoption and use of technologies. Van Dijk's framework does provide clues as to how to integrate this factor, notably via personal categories, but in a somewhat reductive way compared to a dispositionalist framework.

Some authors have called for a re-conceptualization of the digital divide along the theories of SCOT and the STT (Fuentes-Bautista, Straubhaar, & Spence, 2003; Dixon et al, 2014; Kretchmer, 2018). SCOT seeks to replace the use of technology in its contexts of use, drawing attention to the fact that human action shapes the technology, and relies on the concept of interpretative flexibility to explore how technologies are co-constituted by designers and

users. In addition, it posits that 'flexibility distills to a dominant consensus and stabilization about the design, purpose, meanings, and "success" or "failure" of the technology'. (Kretchmer, 2018: 89; Pinch & Bijker, 1984; Bijker, Hughes, & Pinch, 1987; Bijker, 1995). Similarly, STT steers away from both social and technological determinisms and emphasizes the mutual co-constitution of social contexts and technologies. Regarding the digital divide, these theories have been harnessed to study the active role of users in interpreting technologies according to their own—localized—meanings and values. Generally drawing from qualitative data, scholars have provided 'a micro-level window into the world of marginalized groups in order to understand the impact of the digital divide for them' (Ketchmer, 2018:96). The co-constitutive relation between designers, users, and technology is a central element of my approach. However, as was discussed before, I address it from the perspective of de-scription, which, in my opinion provides more vocabulary and concepts to unpack the technology itself than SCOT and STT.

Drawing from Simmel's work on secrecy and money (Simmel, 1900; 1906), Muschert and Gunderson have attempted to develop a series of sensitizing principles regarding the digital divide. Doing so, notably conceptualizing digital information as 'an object of value whose flows are similar to that of money', they have drawn the attention to the fact that digital information acts as a stratification resource (2018: 16). Picturing it as a resource puts the active work of users and structural power relations under the light, thereby extending the digital divide beyond mere demographic descriptions. However, as we will see hereunder, others have—in my opinion—gone further in a similar vein, notably with regards to 'digital capital'.

I now turn to two last approaches of the digital divide—which are sometimes conflated—that of Weberian and Bourdieusian sociologies. In 2004, Selwyn opened the path to using the work of Bourdieu to reconceptualize the digital divide. Alongside other authors, he drew from the concept of technological capital, 'both a subset of, and an addition to, Bourdieu's

cultural, economic and social forms of capital in the information age', to account for the causes of digital inequalities (354). Authors have developed various types of capital related to the use of technologies: technological capital (Selwyn, 2004; Gilbert, 2010), technical capital (Yardi, 2010), and digital capital (Ragnedda, 2018). All these terms have been tied to the digital divide, tackling it from different perspectives, and with different goals.

Let me provide a brief overview of the common use of the notion of capital in digital divide studies based on the latest, and in my opinion most elaborate, version of it (Ragnedda, 2018). For Bourdieu (and quite synthetically), capitals are 'actually usable resources and powers' (Bourdieu, 1979/1987: 114) that contribute to the production and reproduction of people's life chances. Thus, according to Ragnedda:

> Digital capital is the accumulation of digital competencies (information, communication, safety, content-creation and problem-solving), and digital technology. As with all the other capitals, its continual transmission and accumulation tend to preserve social inequalities. In bourdieusian terms, we may define digital capital as "a set of internalized ability and aptitude" (digital competencies) as well as "externalized resources" (digital technology) that can be historically accumulated and transferred from one arena to another. (2018: 2367).

Using such a capital-based approach allowed researchers to significantly broaden their understanding of the digital divide. Building from non-digital capitals (social, economic, personal, political and cultural capitals in the case of Ragnedda), scholars explored the various ways inequalities are transformed or reproduced across the digital-nondigital or offline-online worlds. They enquired first and second order digital divides by describing how previous non-digital capitals interact with digital capital and impact online activities. On the other hand, they explored third order digital divides by describing how the digital capital impacts online activities and how 'these are converted into externally observable social resources (better job, better salary, bigger social network, better knowledge etc.)' (Regnadda, 2018: 2367). Let us note that critiques have been raised towards the multiplication of capitals (Neveu, 2013), and

that the focus on digital capital (which is generally defined as a form of cultural capital) tends to draw the focus away from the role of non-digital capitals. As explained before, I built my analysis around dispositions rather that capitals (although I acknowledge the interrelations between both). This allowed me, similarly to these authors, to explore how other types of capitals (for example related to sports) are mediated by self-tracking technologies.

Finally, some authors have drawn from Weberian sociology to tackle digital divides (Schroeder and Ling, 2013; Blank and Groselj, 2015; Ragnedda, 2017; Neves and Mead, 2018). These authors harnessed Weber's interpretive framework to explore 'types of use and non-use, barriers to technology use and appropriation, social identities, status, practices, structured and unstructured contexts, and a better understanding of the societal impact of technology in the daily lives of different users and non-users' (Neves and Mead, 2018: 49). Weber's framework offers possibilities to integrate and contextualize the meanings that individuals project on the use (or non-use) of technologies. This allowed scholars to 'explore identities, performances, embedded social distinctions, and inequalities' (Neves and Mead, 2018: 49) by drawing the focus on the values and meanings that affect people's choices, practices and interactions. Authors heuristically drew from ideal types—which highlight certain elements of reality to facilitate its understanding (see section 4.2.6)—to explore digital divides from a Weberian perspective. As Neves and Mead argue:

> the ideal type strategy is useful to conceptualize digital divide(s) because it helps explain what motivates, shapes, and characterizes uses and non- uses (whether voluntary, involuntary, or mixed) without rigid classifications that (1) do not represent the complexity of social and digital contexts and (2) neglect the contextual understandings of different social agents (Neves and Mead, 2018: 53).

This is another example of scholars attempt to go beyond superficial uses of the digital divide. By tri-partitioning the digital divide in first, second, and third order, scholars have provided us with a schematic lens to observe digital inequalities in specific loci. However, they have also

gone beyond this mere descriptive framework and offered various and elaborate ways to theorize it. As a result, once injected with appropriate conceptual content, the digital divide can be fruitfully used to unpack patterned differences in the appropriation of digital technologies, or, in other terms, digital inequalities. Sure, many studies are published, even to this day, that rely only on the a-theoretical structure of the original digital divide. This makes critique of the concept relevant and highlights the necessity to be clear about one's use of the concept.

Finally, I would like to point to a last line of criticism against the use of digital divide. In some ways, this critique can be applied to all the previously mentioned appropriations. It is a meta-critique in the sense that it targets the digital divide, but via a re-conceptualization of technology and inequalities alongside a non-essentialist perspective. Drawing from feminist STS, Halford and Savage have criticized digital divide studies for appealing 'in a tired all way to pre-formed categories of the social such as race, gender and class (Harraway, 1997 cited in Halford and Savage, 2010: 951). Doing so, they drew the attention to the fact that 'rather than the assumption that pre-formed social groups 'use' (or do not use) technologies, we can identify a more complex process of mutual interaction and stabilization' (Halford and Savage, 2010: 952). Let me note that this critique, although important and true on many occasions, neglects the fact that some appropriations of the digital divide are relational and do take technological affordances into account (VanDijk, 1998; Fuentes-Bautista, Straubhaar, & Spence, 2003; Dixon et al, 2014; Kretchmer, 2018). This critique does not negate the digital divide approaches. To the contrary, this non-essentialist sensibility should rather 'scale the agenda' and foster new routes for understanding, analyzing and conceptualizing 'the evolving nature of digital social inequalities' or digital divides (Halford and Savage, 2010: 952).

3.6.3. My approach to the digital divide.

Based on section 3.5—in which I presented my conceptual approach to human-technology interactions—and the previous discussion on digital divides, the reader may have formed an

understanding of how I aim to tackle inequalities. I share most of the previously mentioned critical scholarship's understanding of digital inequalities (the tri-partition in three orders and the critiques against its potential reductive understanding). I also share critical scholars' insight that digital inequalities are co-constituted by both designer, users, and technologies (an inter-relation that was already discussed at length in the chapter).

Where I slightly differ from the literature is in the framing of users' role. Not that I tackle something radically different, I rather take a slightly different conceptual focus. I argue that my own approach stands in-between Bourdieusian and Weberian understandings of the digital divide. I share with both a focus on structural factors (I use categories such as income, education, or gender, and more generally dispositions) and on the situated meanings and values that structure users' practices of self-tracking. As was already expressed, my main interest is in understanding the role of people's past in the (co-)production of self-tracking practices. To do so, I used an adapted Bourdieusian framework that emphasizes dispositions more than capitals (while recognizing that both are intermingled). I found it to be the most efficient and relevant way to tackle my research questions and hypotheses. It obviously led to some limitations which are discussed in chapter 10.

In my framework, patterned differences are the product of iterative and contextual interactions between (malleable) technical prescriptions inscribed by designers within a technology and a set of plural and contextual user prescriptions (see Figure 6). Applied to analyses of the digital divide, this framework leads to conceptualizing first, second, and third order digital divides in the practice of self-tracking as byproducts of localized entanglements between technological descriptions (analyzed from the point of view of Akrich and Latour) and user prescriptions (analyzed from the point of view of Bourdieusian dispositions).

My aim in this dissertation is generally to explore how these interactions lead to first (patterned differences in adoption of the technology), and second (patterned differences in use

of the technology) order digital divides. Of course, it would have been possible to elude the concept of digital divide and simply refer to these patterns as digital inequalities in the adoption and use of technologies. However, in the context of the dissertation, I decided to rely on the digital divide and inscribe myself in the field of research that it—sometimes chaotically—structures. First, because this term is—in my opinion—still relevant to both academics, private, and public actors; and second, because it offers—as was demonstrated before—a systematic approach to digital inequalities.

4. Methods and data collection

> « Je ne puis jamais vérifier la ressemblance de mon esprit et du monde, mais je puis, en payant le prix, étendre le réseau où circule, par transformation constantes, la référence avérée ». (Latour, 1995: 224)

The aim of this chapter is to give an overview of the empirical and methodological grounds on which this thesis was built. It is articulated chronologically around the whole data collection process, which took place in three successive waves and was framed by a mix of induction and deduction.

4.1. Grounded theory as a methodological background

As I started my research in 2016, my supervisor and I decided to opt for an inductive approach. Mobilizing a hypothetico-deductive perspective—which requires the formulation of hypotheses prior to data collection—in a domain we did not know well seemed presumptuous. Little had been published on self-tracking design or self-tracking in insurance (it remains scarce today) and my experience in academic research was—obviously—limited. We decided to rely on grounded theory, a method developed by Glaser and Strauss that emphasizes empirical induction and which felt adequate for this situation (Corbin and Strauss, 1990; Strauss and Corbin, 1997)

Glaser and Strauss developed grounded theory to steer away from what they diagnosed as an overemphasis on the verification of theories in sociology. Consequently, grounded theory privileges the collection of data prior to the establishment of hypotheses and favors induction/abduction to develop new ideas and hypotheses (Glaser and Strauss, 1967). Scholars identify American pragmatism as the main influence of grounded theory and generally present it as the result of Glaser and Strauss's fierce opposition to deduction (Bryant, 2009; Morgan, 2014; Age, 2011). Now, this calls for a brief reminder of the pragmatist approach to logic.

According to Peirce (1974), scientists (and human more generally) perform three types of inferences: deduction, induction, and abduction. In deduction, 'the conclusion is in fact completely included in the premises and has an informative content equal to (or less than) that of the premises' (Bruscaglioni, 2016: 15). Peirce uses the following example:

'DEDUCTION.

Rule. –All the beans from this bag are white.

Case. –These beans are from this bag.

Result. –These beans are white' (Peirce, 1974: 2.623).

The case at hand and the results are perfectly described by a rule. This is exactly what Strauss and Glaser wanted to steer away from, because it leaves little to no room for the emergence of new knowledge or concepts, and confines research to the limited range of rules (theories). To the contrary, in inductive inferences, the premises contain the results only partially. An interpretative or creative input is required from the researcher. Peirce uses the following example:

'INDUCTION.

Case. –These beans are from this bag.

Result. –These beans are white.

Rule. –All the beans from this bag are white' (Peirce, 1974: 2.623).

In that case, we infer 'as a probability, or as a fair guess' (Peirce, 1974: 2.263). In the case of induction, the researcher generalizes 'from a number of cases of which something is true and infer that the same thing is true of a whole class' or finds 'a certain thing to be true of a certain proportion of cases and infers that it is true of the same proportion of the whole class' (Peirce, 1974: 2.624).

Grounded theory is often presented (included by me) as an inductive method. This mostly stems from the fact that—classically—scientific textbooks rely on a binary opposition

between deductive and inductive research frameworks. However, scholars interested in grounded theory tend stress the importance of abduction, a subclass of induction (Bruscaglioni 2016). Abduction is a third form of inference described by Peirce, where the observation of surprising cases pushes the researcher to recollect a rule that would explain these results. In other terms, abduction is an inductive process that feeds hypothesis and rules back in the equation. I will come back to Glasser, Strauss, and Corbin's understanding of the difference between induction and abduction later.

Grounded theory's main aim is to allow inductive/abductive inferences while keeping them on a leash. The leash being a partially standardized procedure that allows systematicity and control. So how does grounded theory foster new findings while controlling the interpretative process? First, with systematic coding. With coding, the gathered data is systematically and progressively transformed into linguistic categories (open coding), conceptual categories (axial coding) and theories (selective coding) (Glaser and Strauss, 1967). This process of transformation, here applied to texts (ethnographic observations and transcribed interviews mostly) is central to most scientific endeavors. In a classic text, Latour (1995) depicts how a team of scientists attempts to answer a question about the progression of the desert on savanna. He follows their endeavor, from formulating the research question, to going on the field, gathering data, analyzing it, and producing a paper. His empirical description of science—by which I abide—is that of the progressive, step by step, transformation of reality into data that can be analyzed and articulated as discourse (text). With each step, reality is slightly transformed. However, scientists describe (in methodologies), keep track, and try to control these transformations. Grounded theory formalizes these steps and attempts to keep transformations to a minimal in the context of inductive social science research.

Globally, this approach calls for a theoretical *epoché*. Otherwise, theories re-enter the stage when the goal was to keep them at bay. Of course, one cannot become a blank slate, and

many a theoretical or hypothetical bias still enter the analysis. But an effort is consciously made to keep them at bay (more on that later). All along my research, I went back and forth between gathering data (in three successive waves), analyzing it, producing hypotheses, and reading—or going back to—the literature. Reflecting on this open-ended process, I think that it is part of the reason why my theoretical framework has evolved along with my articles. Retrospectively, I think it was a good thing for it allowed me to explore certain paths that may have remained hidden, had I just drawn too directly from the literature. It allowed me to position myself at a slightly different angle, as was explained in the literature review.

One last thing before I present my data collection and my analytical architecture. Grounded theory is now used in a myriad of disciplines, and is operationalized based on diffent interpretations. But a major schism happened early on when Corbin and Strauss published *Basics of Qualitative Research: Grounded theory Procedures and Techniques* (1990/1998). Glaser reacted to this book, largely disagreeing with how it presented grounded theory (1992). One of the important differences between grounded theory as Glaser would now conceptualize it and Strauss and Corbin's new version has to do with the theoretical epoché. Let us briefly review the three stances with regards to this topic: Strauss and Glaser's original one, Strauss and Corbin's new version, and Glaser's new version.

In the original version by Strauss and Glaser, the idea was to withdraw from theories as much as possible, leaving them in the background (still present but at a distance) (1967). Even though the book contains traces of naïve empiricism, the authors did not claim that researchers could access an uncontaminated reality via empirical data. But they were caught between the importance of remaining open to emerging ideas and the imperative no to draw from theoretical concepts *a priori* (Kell, 2015). In their original work, they remained quite silent on how to combine these two seemingly paradoxical injunctions.

Glaser's updated version of grounded theory integrates theoretical frameworks in the coding process, under the guise of theoretical codes (Glaser, 1978). He offers to build substantive codes (similar to classical open coding) and theoretical codes, the latter allowing the researcher to 'conceptualize how the substantive codes may relate to each other as hypotheses to be integrated into a theory' (Glaser, 1978: 72). In that sense, 'Glaser emphasizes that coding is a process of combining "the analyst's scholarly knowledge and his research knowledge of the substantive field"' (Kelle 2005:16). Returning to Peirce framework, this means a switch from pure induction to a mixture of induction/abduction.

In the case of Strauss and Corbin, they rely on a theoretical pragmatist model of human action to build their codes. The coding process emphasizes phenomena, causal conditions, context, additional conditions, actions or interactions and consequences of actions or interactions (Strauss and Corbin, 1990/1998). A theoretical model is thus interwoven with the coding process. Both offer a solution to the aforementioned paradox but have their disadvantages. Glaser's perspective acknowledges and integrates the analyst's implicit understanding of sociological theoretical schemes in the coding process. However, the procedure remains only partially systematized. On the other hand, Glaser and Strauss frankly impose a theoretical framework which, even though it offers a lot of possibilities, tends to obscure certain interpretations, notably macro sociological ones (Kelle, 2015).

In my case, I started my research—doing my first round of interviews—with the belief that I was implementing Strauss and Glaser's original form of pure induction. Of course, I was not too naïve and knew that I was going to draw from past experiences and the knowledge available to me, but I did not systematically theorize my relation to it. While coding my interviews, I rapidly created codes that led to one of my late hypotheses: that users' pasts, notably their social conditions, led to different self-tracking practices. At the time, I thought I was performing pure induction. Retrospectively, I think that I was performing Glaser's updated

form of abduction. I was semi-consciously creating theoretically informed codes (such as 'role of social determinants', 'role of sport socialization') that were based on my—limited and selective—scholarly knowledge. In a Bourdieusian vocabulary, I performed a form of abduction that was partly constrained by my past experiences and my position in the field of academic research. My knowledge of Bourdieusian theories (which likely originate from my supervisor) and my position as a sport scientist—slightly external to more mainstream self-tracking scholarship—led me to formulate hypotheses and ideas from a partly determined perspective while drawing from empirical evidence.

4.2. Empirical sources and methods

I gathered five different types of empirical sources: participant observations, scientific publications, description of technologies, semi-directive interviews and questionnaires. However, the dissertation predominantly relies on semi-directive interviews (Chapter 6, 7, and 8). It also—although to a lesser extent—relies on analyses of scientific publications and analyses of technologies (de-scription/technical walkthrough) (Chapter 5), and questionnaires (Chapter 7). Participant observations provided contextual evidence but are less central to the dissertation than other sources. The following sections describe the processes by which I gathered these different types of empirical data. The questionnaires and the quantitative analyses are described as part of chapter 7.

4.2.1. Integrating a digital health laboratory

I started my overall inquiry by interviewing people responsible for the development of eHealth and mHealth in Switzerland. This followed from the presentation of the results of my master's thesis (Presset et al., 2018) to public health operatives and officials and from the realization that they were caught between a lack of knowledge and know-how on technologies, and strong injunctions to digitalize. I interviewed the president of eHealth Switzerland—a coordination

organ of the federal office of public health (FOPH) responsible for the implementation of the electronic patient file—, its chief of mHealth operations, a specialist of public health and physical activities at the FOPH and a specialist of digitalization at the FOPH. Later, I kept doing interviews with actors of the implementation of the electronic patient files, but it became part of a project parallel to my thesis (Trein and Presset, in press). The first interviews had suggested another direction: that of the center for digital health interventions (CDHI).

'The Centre for Digital Health Interventions (CDHI) is a joint initiative of the Department of Management, Technology and Economics at ETH Zurich, the Future Health Technologies Program at the Singapore-ETH Centre, and the Institute of Technology Management at the University of St. Gallen' (CDHI, 2019). After a videoconference with one of its directors, prof. Tobias Kowatsch, I was included in one of their studies on an Assistant to Lifting your Level of physical activitY (ALLY). ALLY was developed by a section of the CDHI which is co-funded by the CSS insurance, one of Switzerland's major insurance companies. In this research lab, engineers and psychologists collaborate to study and develop digital health interventions.

For a year, I took part in the lab meetings and on several occasions discussed and presented my results there. The ALLY study was already on its way when I joined. It was a micro randomized trial aimed at testing different components of a smartphone-based intervention on physical activity (Kramer et al., 2019, more on ALLY in chapter 5). By the end of the study, all participants (n=274) received an email asking—among other things—whether they wanted to participate in an interview. I describe the process of interviewing these users in section 4.2.3 but turn to my analysis of the technologies before.

4.2.2. De-scribing the technologies

Interestingly, Akrich' *de-scription* is both a theoretical framework and a method which allows the analyst to explore—among other things—the configuration of users and its translation in a

technical apparatus (1992). It is described as 'the opposite movement of the in-scription by the engineer, inventor, manufacturer, or designer' (Akrich and Latour, 1992: 259). I used that

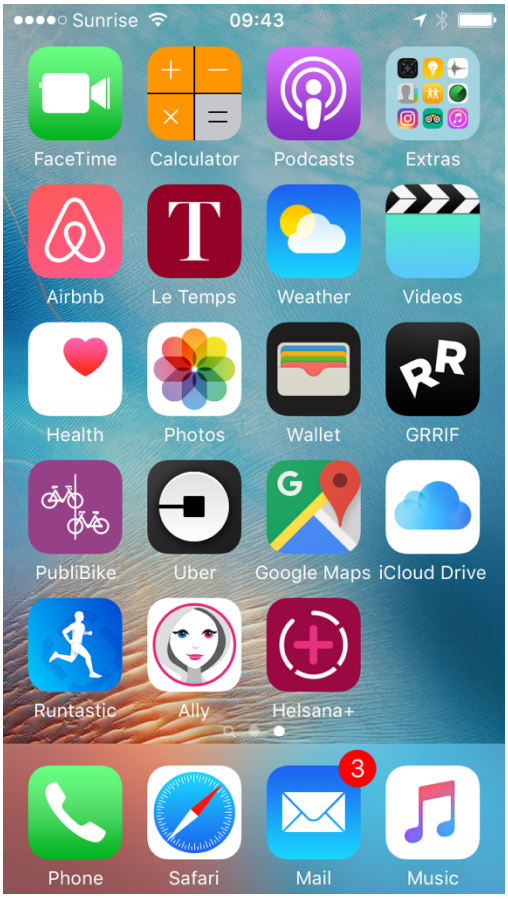

Figure 7 The ALLY app installed on my smartphone

method (described previously in chapter 3) to explore the technology at hand, its prescriptions, and their related *programs of action*. My role was to derive the prescriptions that were inscribed in the technology from observations and analysis of the technology.

In my case, I based my de-scription on two different empirical sources. First, a thorough analysis of the technology's functions. I experimented with the application itself, to which I was granted a user-like access by the designers. In that sense, I performed the innovative method of 'technical walkthrough', which 'involves the researcher engaging with the app interface, working through screens, tapping buttons, and exploring menus' (Light et al., 2018: 891) to mimic actual use while systematically reporting the prescriptions and cultural scripts encountered. Designers also provided me with images of all the screens the application displays.

The technical walkthrough and these images were used in combination to de-scribe the organization of the various screens (position of buttons, relation between indications, app architecture; see chapter 5), the functions of the application (what it measures) and derive the associated prescriptions (see chapter 5).

A specificity of my research is that the designers of the application are scientists themselves. After having initially contacted the lab's director, I was offered to integrate the team as external researcher. I was thus able to interact with the designers, participate in research meetings, even co-author papers with them. This form of participatory observation was key to understanding the logic of the designers and identifying their key partners. However, another important source of data to understand the process of design are the designers' scientific publications. In the publications, they left precise and systematic traces of the rationales they mobilized during the design process (Latour, 1987/1988; Latour, 1995). I read all the publications of the authors to assist my de-scription and gather evidence related to the design process (see chapter 5). Eventually, two interviews were done with the main designer of the application. The first was done before I wrote the dissertation as a way to gather missing information, the second was done after to check the validity of my results.

4.2.3. Interviewing users

I interviewed users in the four months following the end of the eight-week digital health intervention (ALLY). To systematize data collection while remaining open to new ideas and users' insights, I opted for semi-directive interviews. My main tool was an interview grid that allowed me to structure the interviews around a set of themes or questions, while leaving enough space for emerging ideas. Here, emerging ideas refer to parts of the discussions that did not relate to an item or theme of the grid or to ideas that came up to me while reflecting on the interviews, transcribing the interviews, or writing down preliminary analyses and memos. In

the cases of emergence of new ideas during an interview, I did not bring the participant back to the grid immediately but allowed the interviewee (and I) to explore the new theme.

To build the grid, I relied on my self-knowledge, my knowledge of the literature at the time, and exploratory interviews with users of tracking technologies. I did 5 interviews with users (mostly of jogging applications) in my social circle prior to the first ALLY interview. I did not use a grid. I simply took notes while trying to get them to speak about their self-tracking practices. I built from these three sources to produce a first interview grid (Table 6, in annexes). I then discussed it with my supervisor and headed in the first ALLY interview. I kept updating the grid after each interview and ended up the collection process with a grid that covered six main themes (Table 7, in annexes): practical software use; use of the generated data; reasons and conditions of the engagement in the application; motivations to track; body; and sociality.

This process is aligned with grounded theory for it encompasses both a distance with one's *a priori* knowledge and the constant updating of one's perspective. I met with 23 users before I reached data saturation (Table 2 summarizes information about the participants). In grounded theory, saturation refers to the fact that, along the research process, the addition of new observations will provide less and less novelties. Saturation occurs when 'no additional data are being found whereby the sociologist can develop properties of the category' (Glaser and Strauss 1967: 61).

Grounded theory is aimed at controlling bias and procedures during data collection and analysis but does not provide any tools regarding interviews as a specific data collection process. I approached interviews from the comprehensive perspective developed by Kaufmann (2006). According to him, novice interviewers face two pitfalls. On the one hand, the danger of following disguised quantitative injunctions (Cardon, 1996). According to Kaufmann, the researcher seeks the legitimacy of quantitative research within a paradigm that cannot offer it, and thereby loses its potential strengths. On the other hand, the danger of getting bogged down

in an endless auto-analysis derived from critical sociology's worry around the type of social relation that materializes between interviewee and interviewer (Kaufmann, 2006).

Following the principles of grounded theory, which emphasize the progressive construction of data by the researcher, and having been sensitized (as part of my studies) to qualitative research, the first pitfall was not too complicated to elude. I refrained from expecting my interviews to provide results associated with quantitative datasets (representativity, overarching perspective, etc.) and focused on the strengths of qualitative methods (idiosyncrasies, actual experiences, and anecdotes, etc.). The second pitfall required more active work on my part. The relationship between interviewer and interviewee is asymmetrical, with both actors playing a specific role and articulating corresponding narratives. Kaufmann recommends that the interviewer mitigates and accepts these flaws more than tries to negate them. He considers the relation inescapably artificial. One does not gather data in an interview, one co-constructs amidst a situated social relation. It is up to the interviewer to deal with these difficulties, to play around them and to try to build a confidence relationship with the interviewee, while always keeping the constraints of the situation in mind (Cardon, 1996).

In my case, I identified three risks. First, interviewees might have thought that I was close to the insurance company. This might have led them to hide information from me, to feel that I might transmit information further. Second, they might have thought that I was an engineer who develops the technologies. I started every interview by making it very clear that I was a sport scientist from the University of Lausanne interested in how people use these technologies, that I was not an engineer or involved in app development and that I had no vested interests with the insurance company. I made sure that this was properly understood and reaffirmed it during the interviews when it felt necessary. The third difficulty was trickier to deal with. I remained a representative of academic research. With certain users, this led to tensions for they wanted to challenge me on my imagined 'legitimate knowledge'. For others,

they did tend to ask my opinion about their practices and considered it particularly 'legitimate'. In every case, I did my best to present myself as someone that simply wanted to discuss and understand how they used self-tracking technologies and adapted my discourse, my body language, and my tone accordingly. Trying to tame—and not to negate—that asymmetrical component of the relation, I wore particularly common clothes, did my best not to 'sound' too academic and decided to do the interviews in public spaces chosen by the interviewees. Finally, let me note that ALLY interviews were done in German, whereas myStep interviews (see below) were done in French. Because they were not done in English, and for the sake of not overloading the document, decision was made not to include the interviews in annexes. I can provide them on demand.

4.2.4. Analyzing qualitative data

In grounded theory, the coding of interviews goes through three successive phases, Open coding, axial coding and selective (or theoretical) coding (Glaser and Strauss, 1967). The first phase is called 'open' to emphasize explorative possibilities of the process to produce new interpretations. During this phase, the interviews are coded sentence-by-sentence. The data is 'broken down into discrete parts, closely examined, compared for similarities and differences' (Strauss and Corbin 1998: 102). Of course, and as discussed, the analyst is not fully devoid of concepts and ideas at this point. But in choosing the codes assigned to each sentence, one can consciously attempt to steer away from concepts and word that are laden with too much conceptual flavor. In the case of the first 23 interviews, I performed an open coding which led to the identification of 59 codes.

In the second phase, axial coding, the analyst assembles the open coding categories together, thereby producing macro-categories, and links them together (Bruscaglioni, 2016). In the case of the first 23 interviews, this led to the identification of 6 categories: internal states, external conditions, motivations, limits of the technology, morals and politics, and continuation

after the protocol. In the last phase, a central category is selected among different possibilities (hence the term 'selective coding'). According to Strauss (1987), it should be a) 'central, linked with the largest possible number of other categories', b) 'frequent in the data', and c) 'easily linked with other categories' (Bruscaglioni, 2016:7). In my case, I did not seek to find one core category. I had found three main categories: *the reduction of physical activity to steps, the bracketing of everyday life, and the morality of steps*. These are the themes explored in chapters 6 and 8.

But something else had emerged from my work. Not all users seemed to appropriate these themes in the same way. There were differences as to how people reacted, notably regarding morality. This was not exactly a code, more of a patterned heterogeneity between subjects within codes. At that point, that is after the analyses of the first round of interviews and the writing of the first article, I used the results of the analysis to produce hypotheses. In many ways, I engaged in 'hypothetical inference', or 'abductive reasoning' (Peirce, 1974). Faced with a 'new and interesting empirical observation' (Kelle, 2015: 14), I relied on my theoretical knowledge to formulate a rule: characteristics of the individuals prior to the use of ALLY may impact actual use.

In both Peirce's framework and grounded theory, inquiry can be described as a back and forth between induction and deduction where inductive observations lead to the inference of hypotheses that then lead to further testing and inductive observations, etc. (Morgan, 2014). In the case of scientific research, this translates to a dual process of collecting data as a way to formulate hypothesis and collecting more data to test that hypothesis (Morgan, 2020). In many ways, this is what I did. A first entry into the field led to the articulation of hypotheses that I then took on to tackle. I formulated three hypotheses after the ALLY interviews: a) people's social positions and trajectories impact their adoption and use of digital tracking technologies,

b) this may lead to the reproduction or transformation of social inequalities, c) morals and politics seem to play an important role in appropriation.

4.2.5. Tackling new hypotheses

To tackle my new hypotheses, I decided to negotiate a data collection process with users of *myStep*, the actual application of the CSS insurance. With the support of the CDHI, I found an agreement with the insurance. They agreed to send an email to 20'000 customers. I gathered 1262 questionnaires (see chapter 7 for more details). In the last item of the questionnaire, people could give their email address if they were interested to participate in an interview. 22 users were interviewed. Overall, the data collection process thus followed a qualitative-quantitative/qualitative process, which Figure 8 summarizes.

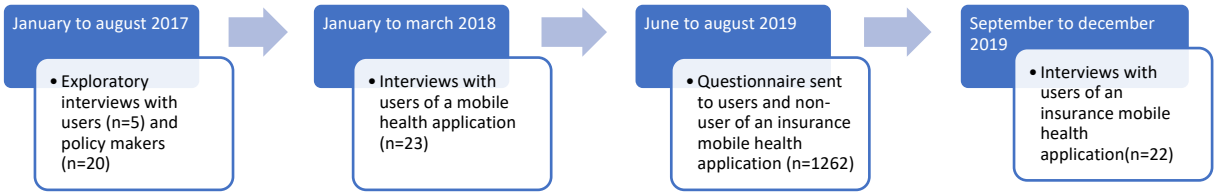

Figure 8 Data collection process

Now that I had hypotheses, I approached data collection and analysis slightly differently. I remained open to various theoretical approaches, emergent ideas, and counter examples, but I made an updated interview grid that allowed me to concentrate on the new hypotheses (Table 8, in annexes). I kept updating it. Its mains themes as I led the last interview were: information about the person, use of the application and the data, relation to performance, relation to sport, relation to health, relation to institutions, relation to technologies and relation to self. I reached saturation after 22 interviews (Table 2 summarizes the sociodemographic information of the 22 participants). When it came to analyzing the data, I re-used the categories developed during the coding of ALLY interviews (although I sometimes updated or changed

them in the process) while adding new ones. I did not start again with open coding, but directly with axial coding, while adding new categories when necessary. In the end, I had 16 categories: analyzing oneself, cheating, behavior change, competition, confirmation, control, engagement, finances, health, improvement, sociodemographic information, objectives, 'others should do more', politics, responsibility, sports, technology, and trajectories. This allowed me to build the ideal types described in article 7 and 8.

To summarize, I gathered data on two digital self-tracking applications: ALLY and myStep. I used participant observations, analyses of scientific publications and analyses of the technologies—via de-scription and the technical walkthrough method—to study their design. On the other hand, I used semi-structured interviews and questionnaires to study their use. The whole process was underpinned by grounded theory, which led to the emergence of my first results and a set of hypotheses that I went on to test. As was argued before, my results are the result of the interplay between—among other things—my position as I started my thesis, the state of the scientific field when I started my thesis, and the influence of my supervisor. These three parameters were channelled by and channelled my inductive approach to empirical data. This led to the articulation of specific research questions and hypotheses, and to a specific conceptual architecture. In the following chapters, I present my results. In other terms, the knowledge produced by the previously mentioned epistemological entanglement.

4.2.6. Induction and ideal types

In the previous sections, I described the processes that I used to systematically transform raw interview data into codes and categories. In the case of the second round of interviews for example, this led to the establishment of the 16 aforementioned codes. One last step (a series of steps would be more accurate) remained: that of transforming these categories into a meaningful text, into sections of a scientific article or a dissertation.

There are many ways these codes (and more generally the interview data as a whole, because the analyst has both the systematic view of codes and categories and the broader experience of having actually discussed with interviewees, transcribed the interviews and coded them) can be transformed into scientific propositions. In my case, I used a mixture of selective (theoretical) coding and a method that originates from Weber: that of creating ideal types (Glaser and Strauss, 1967; Weber, 1904/1949). In the following sections, I describe this method (selective coding was presented before) and explain how I created the four categories of users that are presented in chapter 7.

In a recent article, Neves and Mead suggested that the Weberian 'ideal type strategy is useful to conceptualize digital divide(s) because it helps explain what motivates, shapes, and characterizes uses and non-uses (whether voluntary, involuntary, or mixed) without rigid classifications' (2018: 53). In many ways, my analysis of second order divides is based on the application of such an approach in the context of the inductive analysis of the interview data.

In previous discussions (see 3.6) I described how scholars—in the context of analyzing digital divides—seek to steer away from analyses of social stratification that they deem too rigid. They both acknowledge the fact the appropriation of technologies is patterned, while pointing to the fact that these patterns must not be reified. In that context, building ideal types allows the analyst to provide a heuristic approach to regularities while recognizing that variations and idiosyncrasies are part of the social world (Weber, 1904/1949).

It is—unsurprisingly—in the context of criticizing nomological social sciences that Weber developed his ideal types (Weber, 1904/1949). He argued that social scientists can construct 'concepts and judgments that are neither empirical reality, nor reproductions of empirical reality, but that allow empirical reality to be ordered intellectually in a valid manner' (1913/2012: 127). These are called ideal types and are 'obtained by means of a one-sided accentuation of one or a number of viewpoints and through the synthesis of a great many diffuse

and discrete individual phenomena (…) into an internally consistent mental image' (1913/2012: 125). An ideal type can be a type of society (Cahnman,1965), an ideological model (Weber, 1905/2001), or a type of use (or non-use) of a technology (Neves and Mead, 2018). The aim of the method is to synthesize pattern variations into constructs that have heuristic and explanatory value. Ideal types are 'no hypothesis' but offer 'guidance to the construction of hypothesis' and are 'not a description of reality' but aim 'to give unambiguous means of expression to such a description' (Weber, 1904/1949: 90). In that sense, they allow the analyst to emphasize regularities and variations while keeping at a distance from rigid and one-sided classifications.

A question remains: how do we build such constructs? Ideal types have indeed 'attracted criticism grounded on assumptions that they were (…) formulated arbitrarily' (Bruun & Whimster, 2012; Rosenberg, 2016, Neves and Mead, 2018: 52). In my case, they were built systematically according to the grounded theory principles evoked before. They followed from my sentence-to-sentence coding of the interview data, which progressively led, in interaction with my own sensibility and my research focus, to the emergence of four ideal typical categories of use of self-tracking technologies.

While analyzing (reading, coding, and writing ideas about the interviews) I saw patterns emerge from the data. With regards to certain codes, the use of the technology showed similarity among interviewees whereas, for other codes, the use of the technology showed patterned variations among interviewees. In both cases, this pointed to the fact that there were different—but patterned and limited—ways to use the technology. For example, the sentences that were coded under the 'competition' category showed surprising similarity. A subset of users thus seemed to share a similar appropriation of myStep that emphasized competition. Unsurprisingly—at least from a Bourdieusian standpoint—the users who expressed these similar viewpoints also shared common characteristics, such as working in similar environments (see chapter 7). In other instances, for example in the case of the 'politics'

category, users expressed diverging viewpoints. To roughly summarize, some of them were afraid that myStep would disrupt solidarity, while others thought it was a good thing (see chapter 8). Once again, common denominators existed between the members of each group. However, in this latter case, I could have separated the category in two *a posteriori* (I did not because at that time ideal types took precedence over the categories and codes).

Little by little, I drew from the codes (convergent or divergent) to build my four ideal types. This was simplified by the fact that Nvivo, the qualitative software that I used to code and analyze my material, offers the possibility to cross compare codes (codes are the 'names' attributed to sentences) and cases (cases refer to the interviewees, who can be classified according to factors such as gender, socialization, profession, etc.). For example, I could request Nvivo to list all the sentences coded as 'politics' for cases (interviewees) that are men and/or earn high incomes. I was thus able to progressively highlight, in my data, the patterned recurrences and variations that made up the appropriation of myStep and their homology with people's pasts: the four ideal types presented in chapter 7. It is in that sense that, as explained in the previous sections, the inductive methods of grounded theory allowed me to produce a series of propositions (among which the ideal types) by systematically drawing from a mixture of empirical data and theoretical knowledge, and relatively to my position in the research field.

Profession	Age	Education	Income	Gender	Months of use	Idealtype
ALLY interviews						
Retired (insurance manager)	64	-	-	Man	-	Good-intentioned
Retired (home care director)	73	-	-	Woman	-	Good-intentioned
Crisis manager	31	-	-	Man	-	Good-intentioned
Manager	66	-	-	Woman	-	Good-intentioned
Banker	47	-	-	Man	-	Meritocrat
Informatician	54	-	-	Man	-	Good-intentioned
Engineer	38	-	-	Man	-	Scrutinizer
Engineer	47	-	-	Man	-	Scrutinizer
Senior manager	56	-	-	Man	-	Unclassifiable
Banker	70	-	-	Man	-	Meritocrat
Retired (consulting)	68	-	-	Man	-	Unclassifiable
Nurse	41	-	-	Woman	-	Litigant
Informatician	55	-	-	Man	-	Scrutinizer
Salesman (ex-engineer)	62	-	-	Man	-	Scrutinizer
Office worker	27	-	-	Woman	-	Good-intentioned
Graphist	48	-	-	Woman	-	Good-intentioned

Banker	53	-	-	Man	-	Meritocrat
Communication	42	-	-	Woman	-	Litigant
Cook	46	-	-	Man	-	Good-intentioned
Manager	58	-	-	Woman	-	Meritocrat
Business consultant	29	-	-	Woman	-	Meritocrat/litigant
Medical secretary	57	-	-	Woman	-	Good-intentioned
Office work	28	-	-	Woman	-	Good-intentioned
myStep interviews						
Sales manager	51	tertiary level professional education and higher education/university (very high)	>10'000CHF	Man	5	Meritocrat
Banker	46	tertiary level professional education and higher education/university (very high)	>10'000CHF	Man	18	Meritocrat
Finance Specialist	45	tertiary level professional education and higher education/university (very high)	>10'000CHF	Woman	20	Meritocrat
Consulting	54	tertiary level professional education and higher education/university (very high)	>10'000CHF	Woman	4	Good-Intentioned
Laboratory technician	70	upper secondary professional education (middle)	8'000-10'000CHF	Man	2	Scrutinizer
Expert in information security	64	tertiary level professional education and higher education/university (very high)	8'000-10'000CHF	Man	32	Scrutinizer
Project manager in engineering	33	tertiary level professional education and higher education/university (very high)	>10'000CHF	Man	12	Scrutinizer/litigant
Informatician	46	upper secondary professional education (middle)	6'000-8'000CHF	Man	18	Good-intentioned

School teacher	37	tertiary level professional education and higher education/university (very high)	8’000-10’000CHF	Man	24	Good-intentioned
Nurse	45	upper secondary professional education (middle)	4’000-6’000 CHF	Woman	5	Good-intentioned
Office worker	58	upper secondary professional education (middle)	8’000-10’000 CHF	Man	2	Good-intentioned
Office worker	50	primary and secondary compulsory education (low)	-	Woman	3	Good-intentioned
Team manager	-	-	-	Man	-	Good-intentioned
Team manager	49	upper secondary professional education (middle)	10’000CHF	Man	16	Good-intentioned
Taxi driver	68	upper secondary professional education (middle)	4’000-6’000 CHF	Man	24	Litigant/Good-intentioned
Police officer	33	upper secondary professional education (middle)	>10’000	Man	6	Litigant
Retired (office worker)	75	primary and secondary compulsory education (low)	4’000-6’000CHF	Woman	1	Litigant
School teacher with direction responsibilities	31	upper secondary professional education (middle)	8’000-10’000CHF	Man	12	Litigant
Law school student	25	tertiary level professional education and higher education/university (very high)	0-4’000CHF	Man	16	Litigant
Office worker	37	upper secondary professional education (middle)	4000-6’000CHF	Woman	8	Good-intentioned
Sports trainer	51	upper secondary professional education (middle)	-	Man	24	Litigant/Good-intentioned

Table 2 Sociodemographic characteristics of the interview sample

5. Scripting 'rational' subjects: the design of mHealth interventions

> « Par la définition des caractéristiques de son objet, le concepteur avance un certain nombre d'hypothèses sur les éléments qui composent le monde dans lequel l'objet est destiné à s'insérer. Il propose un « script », un « scénario » qui se veut prédétermination des mises en scène que les utilisateurs sont appelés à imaginer à partir du dispositif technique et des prescriptions (notices, contrats, conseils.) qui l'accompagnent ». (Akrich, 1987: 57)

This chapter is based on the following article:

Presset, B (Submitted). Configuring the 'rational self-tracker': The pitfalls of mobile health technology design.

5.1. Chapter overview

Drawing from observations within a mobile health research facility, this chapter analyzes the design of ALLY, a self-tracking intervention on physical activity. It investigates the promises and goals that surrounded its development and their role in structuring designers' relations with public and private actors. Akrich's method of de-scription (1992) is mobilized to follow them as they seek to 'materialize' the promise to change users' lifestyles. That is, as they attempt to translate expectations into the architecture of an actual artifact. The chapter highlights the role of expert knowledge, namely cognitive theories, in the process, and opens a window on the configuration of 'rational' users. Based on this empirical exploration, I conclude the chapter by questioning self-tracking design's role in the neoliberal landscape (Woolgar, 1990; Lupton, 2016).

This thorough de-scription of the technologies (the chapter focuses on ALLY, but also touches on myStep) is key to the chapters that follow. Indeed, in chapters 6, 7, and 8, the focus will be on users' reception of these scripts. Understanding how a script is conceived and what it entails is a crucial preamble to exploring how it interacts with users and how they co-constitute emerging practices, meanings, and values. Moreover, the script is key, all along the

dissertation, to explore designers' successes and failures, to determine whether they reach their goals and deliver their promises.

5.2. Joining a digital health laboratory as a ‘sociologist’

Figure 9 My arrival at the CDHI in September 2017

I visited the CDHI for the first time on the 27th of September 2017 after having exchanged emails and phone calls with one of its leaders, the Professor Tobias Kowatsch. The lab’s headquarters are in Zürich, in a large building of the department of management, technology and economics of the Swiss Federal Institute of Technology Zürich (ETHZ). On my first day, I met Jan-Niklas Kramer, with whom I have collaborated and regularly exchanged since. Jan-Niklas was a PhD at the time, and the lead researcher of the ALLY project. After he finished his PhD in 2020, he was hired by the CSS insurance company to officiate as innovation manager. I also met Florian Künzler, the other researcher involved with ALLY (in addition to Jan-Niklas and Tobias). From now on, I will refer to these three persons as the ‘ALLY team’.

The CDHI’s website presents its team as ‘multidisciplinary’ and notes that the ‘core team consists of researchers from various fields including technology management, computer

science, and psychology'[6]. When I checked the scientific orientations of its members in 2017, the most represented disciplines where computer science and behavioral economy, but there were also experts in medicine (endocrinology), psychology, and marketing. The lab is undeniably multidisciplinary, although composed of a bundle of selected disciplines. Before my arrival, anthropology or sociology were not represented. To this day, and to my knowledge, I remain the sole 'sociology-oriented-scholar' to have joined the team. However, I must note that my offer to join the lab was welcomed with enthusiasm. My disciplinary orientation was never questioned, and nobody made me feel like I was not part of the team. Sure, my position was that of both a collaborator and a critical observer and I did not take part in the actual development of technologies. But this was how I felt, not how other scientists made me feel.

Between September 2017 and April 2018, I went to Zürich twice a month to meet with the team and participate in lab meetings. During those meetings, each team presented its current problems and achievements. Most of the discussions revolved around solving the current difficulties faced by each team (or single researcher). As in any lab I ever visited or been part of most discussions centered on publishing, attending conferences, launching new projects, and winning grants. Aside from that, I had more 'relaxed' discussions, notably with PhDs. On some occasions, the person responsible for the joint projects with the insurance was present during the meetings. He often stayed afterwards for a second meeting, to which most PhDs (including me) did not attend. Retrospectively, I think I could have been included in those meetings. I just think that most PhD's were simply not concerned and thus left. At the time, I did not dare impose myself.

In addition to the general lab meetings, I also took part in specific ALLY meetings. Indeed, being interested in myStep, the step-counting application of the insurance, I was integrated in the research on step-counting prototypes. ALLY had already been developed and

[6] https://www.CDHI.org/team/ (accessed in April 2022)

the trial with subjects started just weeks after my arrival at the lab. I had the opportunity to witness its implementation and the data collection process. Moreover, I was included in discussions around the interpretation of data and the writing of articles. I was even included in one of the first publications on ALLY (Kramer et al., 2019a). To summarize, I interacted with ALLY designers as they gathered evidence and published results.

There is one specific moment of my first visit that I remember particularly vividly. I had just arrived in the laboratory and met with some of its members. At that time, I was a young PhD student with little experience in science and technology research. I had mostly been exposed to highly critical accounts of self-tracking, notably the early texts of Deborah Lupton on self-tracking or more classical—and highly critical—accounts such as Heidegger's or Deleuze's. Being in a huge building of one of the world's highest ranked universities filled with people actually designing the—highly criticized in social science literature—mobile health technologies felt impressive. I guess I was somewhat destabilized by this first physical encounter with the solidity and size of a mobile health sociotechnical network.

My memory of that day is entangled with one particular image, that of a poster lying in one of the offices I visited. Its title evoked the typical hybris of technological promises: 'Bridging digital and physical world'. Under it was a list of domains in which projects had been implemented, such as housing, health, trading, etc. On my first day at the lab, watching groups of passionate researchers planning mobile interventions, meeting professors who develop projects with insurances, hospitals, or public health partners in foreign countries, and strolling

in long corridors stacked with posters describing elaborate digital health studies, I physically witnessed the power of what critical scholars refer to as ‘technological promises’.

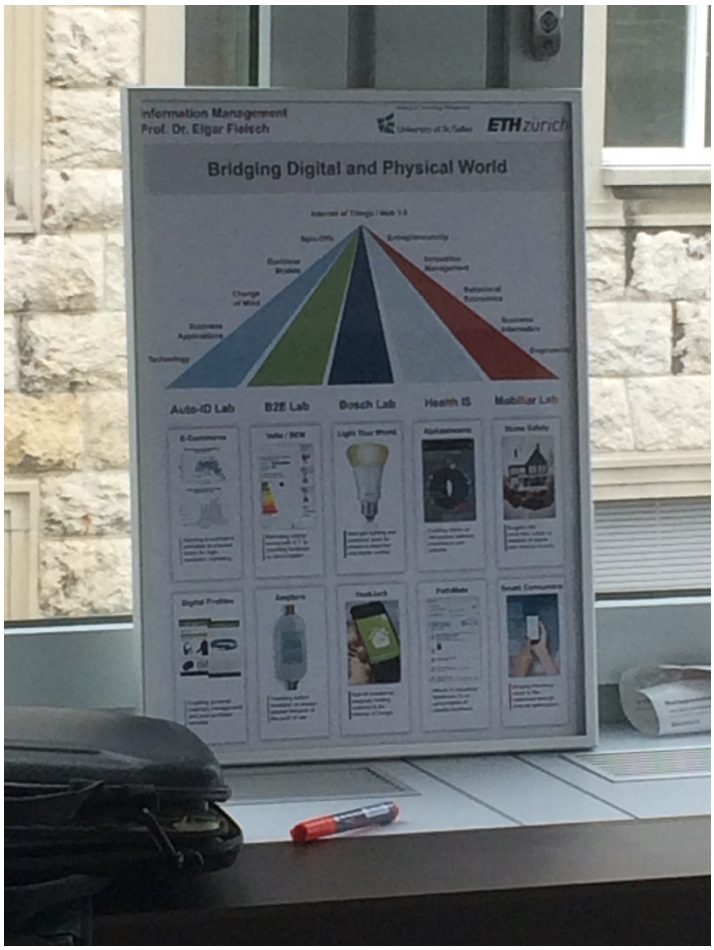

Figure 10 Poster seen in an office at the CDHI

5.3. The promises of self-tracking technologies

That I was struck by the power of technological promises during my first visit to the lab is not a surprise. Social science has a long history of exploring their role in science and engineering ecologies (Callon, Law and Rip, 1986). The sociology of expectations demonstrated how key they are in legitimizing and coordinating efforts between researchers, firms, and policymakers (Van Lente, 2012). Promises allow actors to structure markets, seek resources and forge networks (Van Lente and Rip, 1998). On the other hand, their credibility is continuously put to the test (Latour, 1984/1993) as they create ‘promise-requirements cycles’ (Van Lente, 1993).

Any laboratory, institute, or research relies on—and is constrained by—promises. My dissertation is no exception. I formulate many expectations, the most basic being to deliver new knowledge on self-tracking practices with the hope of improving public health delivery. The main promise of the Zürich lab is highlighted on the main page of its website:

> We are keen to see a world in which tailored digital healthcare solutions are effective and available to those in need. We would like to contribute to a clearer understanding of how non-communicable diseases can be prevented and better managed with the help of digital health applications and wearable devices. We believe that our applied research and prototype interventions offer the potential of bridging an application gap between theoretical research and care solutions. We value learning from industry and healthcare and enjoy working together towards shared goals.

My aim in this chapter will be to describe how the ALLY team attempted to secure that promise and in-scribe it in an actual technology. The expectations that surround self-tracking for health and wellbeing are many. Often understood as aspects of 'digital health' or 'mobile health', wearable tracking technologies are expected to play a central role in the development of new forms of personalized treatment and lifestyle management (Petersen, 2019). This is evidenced by the CDHI's vision, which pictures a world where 'non-communicable diseases can be prevented and better managed with the help of digital health applications and wearable devices'.

Exploring the discourse on self-tracking in technophile medias, scholars demonstrated that promissory discourses were central to the politicization and promotion of wearables (Ruckenstein and Pantzar, 2015). Self-tracking proponents picture a connected individual that seamlessly measures and shares her behavior, thereby unlocking a more objective relation to herself which is supposed to improve health, and eventually reduce health costs at a societal level (Sharon, 2017). If these promises are often identified in venture capitalists' discourses, they are also central to certain scientific fields, such as 'human computer interaction (HCI)'

(del Rio Carral et al., 2016), to which the ALLY team contributes. This highlights the role of promises in structuring self-tracking innovation across sectors.

As suggested by Ruckenstein and Pantzar, promises are vehicles of strategic positioning (political and economic) but also reflections of sociocultural tropes. In one of the rare studies on self-tracking design, Viseu and Suchman explored the values that tracking technologies 'materialize and make visible' (2010: 5). Based on the example of a piece of clothing that provides bodily information to its users, they analyzed its promise to deliver objective physiological information, thereby allowing for better and more responsible lifestyle choices. According to the authors, the artifact—and by extension its designers—answer to the demands of an informational society where bodies are conceptualized as 'at risk' and in need of 'rediscovery and restoration' (2010: 23). Their ethnography revealed how the design of wearable computers is both shaped by and shapes contemporary discourses on augmented 'at risk' bodies (Lupton, 2016; Ajna, 2018; Kreminska, 2021).

However, the dominance of the aforementioned representations of self-tracking should not blind us to the existence of less common variations. Based on an ethnography of technological fairs and medical experts' congresses, della Bianca explored the various ontologies of the body that are imagined by self-tracking promoters. Focusing on biopedagogies and menstruation tracking, she highlighted the diversity of epistemologies that actors draw from to materialize their technologies and imagine their users. She identified four central values: productivity, autonomy, convenience, and control, which produce different learning regimes, bodies, and forms of authority, drawing our attention to less prevalent models of self-tracking design (2022).

Critical scholars have started to shed light on the expectations and cultural narratives that surround the production of tracking technologies, notably the types of subjects that its promoters imagine. However, little has been said about the mediations that bridge the gap

between the formulation of expectations and imaginaries and the production of actual technologies. In other terms, little work has followed designers from one end of the design process to the other, closely tracing the web of mediations that underpins attempts to configure self-tracking users (Woolgar, 1990; Latour, 1994). This might be due to the combined methodological difficulty to approach designers' teams and access the models they use to develop the technology, which are often implicit, and sometimes unconscious. Bridging this gap is essential if we are to understand how designers attempt to harness the—supposed—power of self-tracking, why they often fail to do so, and pave the way towards alternatives. Only by mapping the meanders of self-tracking design can we locate its dead-ends, its current and criticized obligatory passage points (Callon, 1984), and suggest new routes. This is to such a cartography that the remainder of this chapter is devoted.

5.4. At the origin of the script: a promise to change behaviors

The main expectation that surrounded the development of ALLY is to change users' walking behavior—also referred to as lifestyle—, thereby enhancing their physiological and mental wellbeing, and consequently lessening the global costs of health (Kramer, 2020). The following extracts of peer-reviewed publications illustrate the formulation of these expectations by the ALLY team in scientific papers and highlight the network of actors that it contributes to shape.

> Strong empirical evidence indicates that physical inactivity increases the risk of mortality[1] as well as of noncommunicable diseases, such as coronary heart disease, diabetes, or cancer. [2,3] More than 20% of the world's population is inactive (i.e., accumulating less than 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity per week), [4] illustrating the need for effective promotion of physical activity at a large scale. Technology may provide a viable means to address this problem (Kramer et al., 2019a: e45-e46)

Physical inactivity is established as a (public health) problem. The authors rely on scientific and grey literatures to argue that inactive people could benefit from more physical activity, which would lead to a reduction of the prevalence of noncommunicable diseases (NCDs). Based

on that and extending the reach of the issue to health economy, scientists tie inactivity (and the now associated NCDs) to the rise of costs in health.

> With health care costs being on the rise in Switzerland and other countries [16], health insurance companies are increasingly interested in the potential of pedometer-based physical activity interventions. (Kramer et al., 2019a: 2)

The insurers are introduced as a potential beneficiary of solutions to the rise of health costs due to physical inactivity. Focus is also set on pedometer-based interventions. Finally, digital self-tracking interventions are presented as an improved and more efficient way to change inactive people behavior. The technology developed by the researchers is introduced as a solution to issues faced by society at large, particularly by insurers and public health operatives.

> The emerging trend of self-tracking [8] and the public interest in self-tracking tools [9-11], offer great potential for providers of disease prevention programs to overcome the barriers to adopting active lifestyles. (Kramer et al., 2019a: 2)

To summarize, based on scientific literature, the scientists sketch a societal issue and present their research as a solution. In the process, they identify key stakeholders who could benefit from their innovations. A last step will be to argue that their solution is both innovative and more efficient (than other solutions).

Two arguments are generally advanced to present mobile health interventions as an efficient innovation. First, the fact that Smartphones and activity trackers are already diffused in the population. Second, the fact that these interventions are less costly than other types of public health interventions, notably because they require fewer human resources.

> Today, the widespread adoption of smartphones and activity trackers enables objective monitoring of walking and provides new opportunities for interventions on a large scale. Smartphone apps, for example, facilitate the delivery of health interventions to thousands of individuals at low cost and require minimal human support (5). If effective, these stand-alone interventions could have a substantial impact on public health. (Kramer et al.,2020: 2)

Of course, one could contest these arguments. However, our aim here is not to question the rationale of the designers but to follow it. We can note a third argument, advanced in the case of ALLY, but on which this dissertation will not focus: the fact that these technologies allow individualized interventions. By that, designers refer to forms of machine learning and algorithmic tailoring which could allow them to individualize the intervention. For example, a goal of the ALLY study was to determine at which time in the day it is more efficient to deliver feedbacks. These kinds of intervention are referred to as 'just in time adaptative interventions (JITAI)', a topic on which the CDHI is very active. However, the ALLY protocol was a way to gather data about that topic, not a fully developed tailoring prototype.

Consequently, users did not experience personalized prompts. To put it more precisely, users received feedbacks and prompts at different times in the day, so that researchers could inquire how timing impacts the engagement with the app and the realization of objectives, and, in further studies, develop an algorithm that would automatically select the appropriate timing, location, etc. to send a prompt. In the case of the ALLY study, researchers were gathering data to build this algorithm, users were exposed to different stimuli but did not actually experience individualized feedback. Being interested in users' point of view and experience of self-tracking, I decided to slightly neglect that part of the intervention (which has more to do with further developments), although I will sometimes refer to it. Also, I questioned people about timing of the feedback in the first round of interviews and none of them even remembered that they sometimes arrived at different times in the day, which reinforced my decision to leave this factor out of my analyses.

I have unfolded the common promissory matrix followed by the laboratory (see Figure 11). Lack of physical activity is identified as a problem that leads to an increase in NCDs and, consequently, in health costs. Mobile health interventions are then introduced as an efficient and adequate solution on the basis that they are low-cost and that most people possess a

Smartphone or a physical activity tracker. They are presented as a solution to lack of physical activity (they will get people more active), to NCDs (active people have a lower risk of NCDs) and to the rise of health costs (NCDs are costly). Let us note that a similar matrix is found in the introduction of most studies of mHealth in the HCI field, suggesting that the formulation of expectations by the laboratory on which this paper focuses is representative of the broader field of mHealth research. Whether or not these expectations are realistic, the evidence is sufficient, or the overall argumentation holds are not our focus here. Once again, my goal is to follow designers as they formulate expectations that provide meaning and goals to them and their associated network of actors (Van Lente and Rip, 1998), to which we now turn.

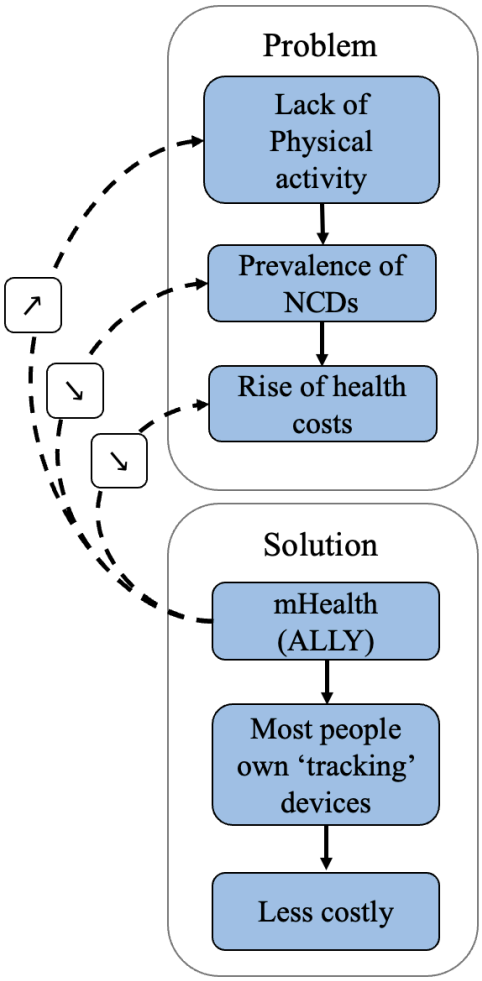

Figure 11 The promissory matrix of mHealth

5.5. Networks of actors, bundles of injunctions

Scholars have suggested that the implementation of tracking technologies by institutional actors is driven by pressures to remain innovative and up to date in fast-evolving markets (Petersen, 2019; Jeanningros and McFall, 2019). They also described the central role of shared expectations, such as raising the level of personalization and granularity of products and services, gaining a better understanding of societal issues via Big Data analytics, or helping people adopt healthier lifestyles in pushing these innovations forward (Meyers, 2018; Tanninen et al., 2021).

In other terms, the lab's expectations are not formulated in a vacuum. They rely on a broad array of injunctions and expectations regarding the digitalization of the health sector which have been on the rise in industrialized countries' political agendas since the nineties (Miège, 2002). In Switzerland, one can follow the progressive stabilization of the injunction 'to digitalize' from the early establishment of an 'interdepartmental working group' in 1995 (in reaction to G7's society of information projects), to the publication and ratification by the Federal council of two 'Cyberhealth Strategies' in 2007 and 2018, and the publication of

Illustration 5: Cas d'application «Quantified Self» (images tirées de la feuille de route mHIMSS 2012)

Figure 12: Extract from the eHealth Suisse mHealth recommendations document. It pictures an individual who, after having his genome screened and identified as at risk for diabetes, engages in self-tracking of his weight, physical activity and nutrition in an attempt to prevent the apparition of the disease.

‘mHealth recommendations’ by the confederation-canton coordination organ eHealth Switzerland in 2016. The latter envisions a ‘connected’ medical landscape in which wearables play a key role in prevention and redefine relations between medical practitioners and patients (see Figure 12).

During my fieldwork I have personally witnessed the effect of the laboratory promissory narratives on public health officials. Doing interviews for a project on digital medical records, two interviewees, the person responsible for the mHealth recommendations document and an official responsible for innovation at the Federal office of public health (FOPH), mentioned the CDHI laboratory, its ‘interesting work’ and suggested that I contact them. The second interviewee told me that representatives of the lab had come the week before our interview to present their work to FOPH officials. This demonstrates the existence of interactions between the lab and public health actors, and the role of promissory narratives in their structuration.

On the other hand, and maybe more obviously, the lab aligns itself with the rationales of insurance companies. A special issue of *Big Data and Society* on ‘Insurance Personalization’ recently set the stage for scholarly exploration of the growing interest of insurance companies for behavior-based schemes (McFall et al., 2020). Contributions suggest that these new schemes tamper with classical processes of risk pricing in a particularly opaque manner (Cevolini and Esposito, 2020; Jeanningros and McFall, 2020; Meyers and Van Hoyweghen, 2020).

Based on 16 interviews with insurance executives, Tanninen et al. have explored the pressures and hopes associated with tracking schemes (2020). Central to their account is the insurers’ ‘vision of becoming permanent participants in their customers’ lives and providing positive and relevant feedback at all times’ (Tanninen et al., 2020: 458). They revealed how the industry laboriously navigates amidst quickly changing regulatory constraints and technical challenges, pressured by fears of the GAFA entering their markets. Tracking people’s behavior is both perceived as an opportunity to build innovative markets and new relationships with

clients (Fourcade and Healy, 2017: 23). However, scholars insist on the current difficulties faced by insurers in materializing the promise of personalization and suggest that the development of such schemes has currently more to do with 'reaching—or selecting—the type of customers the company wants to insure and nudging them to behave in ways that lower their costs to the company' (Jeanningros and McFall, 2020: 13).

As was explained in methods, I had but little access to the insurance rationale in my study. Hence the fact that I cannot do more than hypothesize why it engaged in self-tracking technologies. Based on the previously mentioned scholarship, my hypothesis is that the insurance is a) pressured to innovate and develop digital solutions, notably by its competitors (see Tanninen et al., 2020), b) seek, for marketing purposes, to be present in customers lives, c) position itself as innovative, and in partnerships with public universities, d) attempt to attract 'good-risks' by picturing itself as oriented towards self-care and innovation, and e) attempt to change people behavior to contribute to a reduction of costs and common good. These are simply hypotheses based on the few aforementioned empirical studies (see chapter 8 for a broader review of insuretech research). More data would be required to provide an informed perspective. It is likely that all these factors contribute, to varying degrees, to the motivation of the insurance to develop a digital self-tracking program.

As was already noted, the lab is partially funded by an insurance company, which speaks to its intertwinement with the insurance market. The collaboration allows the insurance to brand itself as innovative, secure external expertise to develop new technologies, and communicate on its 'legitimate' association with a recognized public institution (as is evidenced by a page on its website[7]). On the other hand, the collaboration draws important resources to the lab for the pursuit of its own internal goals. Notably, it provides access to policyholders in the context of

[7] https://www.css.ch/en/about-css/driving-force/innovation/health-lab.html

scientific research. Both the subjects of ALLY's trial and the interviewees of my dissertation were recruited among policyholders with the help of the insurance.

The CDHI's work is both shaped by and contributes to shape a shared field of expectations which involves—at least—policymakers, insurers, and the scientific community, and in which the researchers situate themselves as the producers of technological solutions. By formulating expectations that align their work with the goals of public health actors and insurance companies, CDHI scientists draw resources and interests which are then channeled in the specific goals of the lab. Some of these goals are quite different from other actors', such as securing career paths, contributing to specific scientific fields or forging scientific networks. However, all goals coalesce around the production mHealth devices and new knowledge on how to design these.

Let us note that, at this stage, values have already infused the promissory narrative. First, a healthist rationale seems to drive the process (Petersen and Lupton, 1997). Indeed, the formulation of the expectation (by both the lab, the FOPH and the insurance) pictures health as an important pursuit that must be dealt with at the level of the individual and tends to downplay the role of structural forces. This is not surprising for this approach has been identified as particularly efficient in the field of policymaking (Baum, 2007; Baum and Fischer, 2014). Second, technology is imposed as the ideal solution, something referred to as technological solutionism, and which tends to obscure other solutions, such as investing in non-technological health promotion programs and initiatives (Morozov, 2013; Maturo, 2014).

Aligned with the objectives of public institutions, this promise of self-tracking, beyond its prevalence in policy making and market building, has become the keystone of a whole area of scientific research aimed at developing and testing health tracking interventions, to which the lab contributes. The ambition to develop self-tracking behavior-change solutions is indeed central to a dazing number of studies published primarily in the—broadly defined—field of

HCI. It has led to the establishment of dedicated scientific journals (e.g. JMIR mHealth and uHealth) and a surge of systematic literature reviews which have attempted to summarize self-tracking's role in promoting well-being and health (Feng et al., 2021), fostering a healthier lifestyle (Lentferink et al., 2017), raising the level of physical activity in overweight or obese adults (de Vries et al., 2016), cardio-metabolic patients (Kirk et al., 2019) or 'at-risk' individuals (Brickwood et al., 2019; Romeo et al., 2019). A similar review was also performed –although not published—by the ALLY team (Kramer, 2020). These reviews aim at securing the promise of self-tracking to move people towards healthier lifestyles.

This vast area of research does not only point to promises and expectations, but also to the difficult task of translating these into actual results. Most of these studies seek to identify which assemblages of technical features affect users' behavior the most. In other terms, they contribute to a common—although competitive—endeavor to tailor the most efficient self-tracking technologies (the ones that would most significantly change users' behavior). Such attempts to translate a vision, or an expectation, into an actual technology involve positioning oneself in a market, formulating promises, taking bets on who the users will be and how they will use the technology, translating models into technical features of hardware or software, and testing prototypes (Latour, 1987/1988; Callon, Law and Rip, 1986; Akrich, 1992). STS scholars have done a great job at exploring these intricate processes, but their exploration with regards to self-tracking technologies remain scarce. The next section dives into the details of ALLY's design.

5.5.1. Precisions on the Swiss context: insurances

As was explained in chapter 4, the empirical data on which this dissertation is built was gathered exclusively in Switzerland, in the context of insurances. Participation to both the ALLY scientific protocol and the myStep program required people to be under contract with the CSS

insurance (one of Switzerland's largest insurance companies). In the next paragraphs, I will provide readers with a basic picture of the system of Swiss health insurance.

In Switzerland, basic health insurance coverage is mandatory. However, contrary to countries that have adopted a form of 'centralized public insurance', the provision of insurance is mediated by a variety of non-profit private health insurance companies that compete amongst each other while offering the same—legally regulated—services (Bolgiani and al., 2006, my translation). In addition, the same companies provide non-mandatory and less regulated supplementary insurance plans. As a result of this intertwinement, authors tend to consider the Swiss health insurance model as 'in between a social insurance and a private insurance' (Crivelli, 2004; Bolgiani and al., 2006).

Let me first discuss details regarding the basic insurance, which was initially regulated by a 1911 law on health insurance, and remained practically unchanged up until 1996, date of LAMal's—the current legal framework—inception (Bolgiani and al., 2006). In Swiss basic insurance 'the equality of insurance fees is underscored, irrespective of any statistical calculation concerning the participants' risk categories' (Lehtonen and Liukko, 2015: 160). In other terms, people do not pay according to the risk they bring to the pool of insurees. Swiss basic insurance thus steers away from risk classifications and actuarial fairness. All citizens pay similar premiums and have access to the same services (Bolgiani and al., 2006).

There are a few exceptions to this rule. On the one hand, some limited forms of risk classification are performed, notably in relation to the canton in which the policyholder lives and to certain age group (notably children and young adults). On the other hand, the state offers subsidies to people with low incomes, that are financed by taxation. The premium rate is, indeed, set without considering income variations. Authors thus generally agree to say that 'the obligation to pay an income-independent premium, although partially corrected by targeted

subsidies, corresponds in fact to degressive taxation for the vast majority of the population' (Bolgiani et al., 2006: 253).

It must be said that the law forbids any form of risk selection with regards to the basic insurance. However, scholars have pointed to the fact that the possibility for policyholders to choose a deductible, that is, to choose the amount of the economic risk that will not be transferred to the insurance does allow a form of risk transfer. Choosing a high deductible (2'500CHF) will translate into a lower monthly premium than choosing a low deductible (300CHF) (Bolgiani et al., 2006).

Let me turn to the other form of health insurance: supplementary insurance. Supplementary insurance coverage is non-mandatory and provided by the same companies as basic health insurance (although the policyholder may be insured by two different companies for the basic and supplementary plans). In the case of supplementary insurance, policyholders must generally fill a series of questionnaires (sometimes undergo medical examinations) that insurers use to calculate the premium, impose limitations on the coverage, or simply refuse the customer. In that sense, and contrary to basic insurance, Swiss supplementary insurance relies on the idea that each policyholder should pay 'according to the risk they constitute for the pool', a principle commonly known as actuarial fairness or *chance solidarity* (Lehtonen and Liukko, 2015: 160). There is a variety of supplementary insurance plans that provide additional benefits (to the basic insurance) such as dental expenses, access to alternative medicines, a broader choice of health providers, etc.

As will be discussed in chapter 8, the implementation of self-tracking programs in basic insurance plans is forbidden. To the contrary, they can be implemented in supplementary insurance plans. The self-tracking programs discussed in this dissertation have been diffused in the context of supplementary insurance. As will be discussed in chapter 9, there have been debates in the Swiss parliament as to whether forms of behavior-based insurance should be

integrated in basic insurance. At the time of this writing, the Federal Council rejected these propositions. Insurance is the product of political and social decision-making, and different insurance policies embed divergent moral stances on deservingness and responsibility (Baker 2001; Beveridge 1942; Ericson et al., 2003; Ewald 1991). In other terms, insurance is open to change, and reflects socio-political decisions. However, it has been noted that, in Switzerland, the health sector is 'characterized by complexity, which is further accentuated by an exacerbated federalism and direct democracy that make any significant reform of the system problematic' (Bolgiani and al., 2006). Whether self-tracking will penetrate basic insurance remains to be seen.

5.6. Picturing ST users as rational subjects

I will now turn to how the ALLY team attempted to translate the promise to change users' lifestyle into an actual mHealth intervention. However, I would like to provide an important precision before I do so. My aim in this chapter is to sketch the contours of the artifact that users encountered. ALLY was both a research project, targeting specific research questions, and an attempt to develop new features for myStep, the application of the insurance (Kramer, 2020). Being focused on users, and also interested in myStep, my de-scription tends to emphasize the features of the artifact that users experienced with. As a result, I slightly neglected certain elements that did not play a role in user-interactions. This bears an important consequence, that of slightly neglecting some of the research done by the ALLY team, and thereby to flatten the complex research protocol that they put together. I refer readers to Jan-Niklas's thesis for all the detailed information on the ALLY research protocol (Kramer, 2020).

Now let us dive into the de-scription. I am interested in how the designers in-scribed their vision into the technical device. In the case of ALLY, the designers relied on theoretical representations of users (subjects) available within the scholarship they sought to contribute to (to configure users). In one of my discussions with Jan-Niklas, he told me that the selection of

theories that underpin the intervention was motivated by the following things. First, the team had identified the fact that people were motivated to use technologies, but often failed to translate motivation into actual behavior. Hence the selection of a framework that could account for this transition. Second, they used models that are prominent in health psychology research in Germany and Switzerland and had been used by some of their close colleagues. Selection of the theoretical models was thus based on specific research questions and a shared scientific culture.

ALLY's configuration of users is based on theories of human action, specifically the health action process approach (HAPA) model (Schwarzer et al., 2011), which is the product of intertwinements between Bandura's social cognitive theory (1986) and Heckhausen's volition theory (1991) (Kramer, 2020). In these frameworks, which are harnessed to configure users, health behavior (change) is conceptualized as the result of the interactions between—a minima—self-efficacy, outcome expectancies and perceived risks and advantages. I will stick with self-efficacy and outcome expectancy, the two main components of social cognitive theory (SCT), to demonstrate how they were translated into technical prescriptions.

While self-efficacy 'refers to personal action control or agency, outcome expectancies pertain to the perception of possible consequences of one's action' (Luszczynska and Schwarzer, 2015). Once they had chosen this specific model (of users) designers logically he attempted to translate self-efficacy and outcome expectancies in components of the application. Let me first turn to self-efficacy, which designers in-scribed as 'self-monitoring prompts':

> Self-monitoring prompts remind the participants of their daily step goal, compare the participants' current step count to their daily goal, and provide an estimate of walking minutes necessary to reach the goal together with an actionable tip on how to increase physical activity. These dialogues were designed to support the 3 subprocesses of the self-regulatory construct action control, namely self-monitoring, awareness of goals or standards, and self-regulatory effort (Kramer et al., 2019a:4).

Next section will demonstrate how these theoretical views on human behavior were translated in technological prescriptions. For now, let us note that self-efficacy—here subdivided in 3 subprocesses—is identified as one of the key components of behavior change, and that designers plan to translate it in 'self-monitoring prompts'. These physical activity prompts are:

> 'short conversations with the digital coach that remind users of their daily step goal (BCT 1.1: goal setting), compare the user's current step count to their daily goal (BCT 1.6: discrepancy between current behavior and goal, BCT 2.2: feedback on behavior), and provide an estimate of walking minutes necessary to reach the goal together with an actionable tip on how to increase physical activity (BCT 4.1: instruction on how to perform the behavior)' (Kramer, 2020: 108).

We may also note, anticipating the following steps of the de-scription, that the dashboard of the application (to be described later) was key to the attempt at enhancing self-efficacy. The other main component of SCT is outcome expectancy, which was translated in incentives.

> Conditional financial incentives (i.e., incentives directly tied to the achievement of behavioral goals) may boost motivation (and subsequent behavior change) by altering the associated outcome expectancies, that is, beliefs about positive and negative consequences of behaviors. (Kramer et al., 2020: 519)

The quote needs little commentary. (Financial) incentives are thought to improve outcome expectancy, supposedly leading to an increased likelihood to adopt and maintain the behavior. Here are two examples of designers attempt to actualize the promise to change behavior via conceptual configurations of users. SCT, and more specifically the interaction between the HAPA model and volition theory, are used to systematically and 'scientifically' frame users' configuration.

Before we turn to the next step, which is in-scribing these conceptual schemes in technical elements, let us briefly explore the model of the subject that lie behind SCT. There are many social cognition models (SCM), but all share a similar conceptual basis, which Conner and Norman (2015: 9) summarize in the following way:

> Each of these models emphasizes the rationality of human behavior. Thus, the health behaviors to be predicted are considered to be the end result of a rational decision-making process based upon deliberative, systematic processing of the available information. Most assume that behavior and decisions are based upon an elaborate, but subjective, cost–benefit analysis of the likely outcomes of differing courses of action. (...) It is assumed that individuals generally aim to maximize utility and so prefer behaviors that are associated with the highest expected utility.

This summary leaves little room for doubt as to the model of human subject embedded in the technologies: SCM's emphasis is on a 'rational' human that makes 'rational decisions' based on an elaborate 'cost-benefit analysis' and 'maximize utility'. This is a type of subject that has been well-documented by social scientists, and which will be discussed further in section 5.8.

So far, I have described the environment within which ALLY was developed. I highlighted the network of actors, technologies, and discourses that both constrained and enabled development, and led to the selection of a specific model of users based on SCT. Of course, I cannot argue that all self-tracking designers rely on SCT. However, critics within the human-computer interaction scholarly field do point to the dominant influence of cognitive models (Harrison et al. 2011) and—as will be discussed later—analyses of self-tracking devices and practices by critical scholars point to similar underpinnings. A recent paper by HCI scholars stated the following.

> Ubiquitous computing and HCI researchers and practitioners have long understood the importance of theoretically founded design, designing, and implementing technological interventions inspired by numerous psychology, behavioral science, sports science, and behavioral economics theories. Behavior change theories can positively affect ST by informing design, guiding evaluation, and inspiring alternative experimental designs [23]. Some of the most widely-used theories in the domain [53] include the Social Cognitive Theory [46], the Behaviour Change Technique Taxonomy [36], the Transtheoretical Model [44] and the Self-Determination Theory [15]. (Yfantidou et al., 2022:1)

I could not engage in a thorough analysis of each of these theories. However, a brief review of papers that present the Behavior change technique taxonomy (Gerjo et al., 2016), the transtheoretical model (Prochaska and Velicer, 1997) and the self-determination theory (Deci

and Ryan, 2012) suggest that self-determination or self-regulation or self-efficacy are central elements of each of them and that social determinants, although mentioned (referred to as social norms, social context, social ambience), remain backgrounds elements. Sure, the configuration of self-trackers can take many forms (see Della Bianca, 2022), but models that emphasize rationality seem dominant, at least in science-oriented design. I now turn to the last step of design, the translation of a model into a technical architecture.

5.6.1. The 10'000 steps norm

Before I proceed with the de-scription of ALLY and myStep, I would like to briefly contextualize their reliance on the 10'000 steps norm. In the case of ALLY, the app recorded users' walking behavior prior to the intervention in order to create a baseline. An individual objective was then chosen on that basis, which increased incrementally until users reached 10'000 steps a day. In the case of myStep, users earn a premium reduction at 7'500 steps, but it is lower than when they reach 10'000 steps. In both cases, the final daily objective for users is thus 10'000 steps, a norm that is largely diffused, to this day, by both public health organisms and companies.

There has been much discussion on this normative objective. Authors agree to situate its origins in 1960's Japan (Tudor-Locke and Basset, 2004; Carter et al., 2018; Abbasi, 2019, Pharabod, 2019). In 1965, in the aftermath of Tokyo's summer Olympics, a mechanical pedometer, the manpo-kei, was released by the Yamasa Tokei brand. The device displayed an analogical watch-like frame which automatically reset to 0 after reaching 10'000. Its name, the Manpokei, translates to 10'000 steps, and was used as a marketing slogan. Research suggests that—at that time—no scientific evidence supported the establishment of the norm (Gouthière, 2018). Surprisingly, the 10'000 steps norm was developed as a marketing slogan without proper scientific support.

It did not, however, remain unsupported. To the contrary, it eventually triggered scientists' curiosity and led to a wave of scientific publications. Researchers attempted to assess whether 10'000 is an appropriate number (Tudor-Locke and Basset 2004), whether number of steps is more appropriate than duration of walking (Baker, Mutrie et Lowry 2008), whether intensity of walking is more important than sheer volume (Tudor-Locke et al., 2018), or whether the norm should vary depending on age and health condition (Tudor-Locke et al., 2011; Tudor-Locke et al., 2011b; Tudor-Locke et al., 2011c). The norm remains disputed among experts to this day, while, on the other hand, designers, public health organism, and the industry tend to rely on it without much questioning (Pharabod, 2019). In the case of ALLY, researchers pragmatically chose to use the 10'000 steps norms based on the following argument: it 'approximates the World Health Organization's physical activity recommendations' (Kramer et al., 2020: 520).

5.7. Describing ALLY and Mystep

So far, my analysis has relied on discussion with the designers, and analysis of their scientific publications. In the current section, I will switch empirical ground and draw from observation of the technologies themselves. This will allow me to trace connections between designers' conceptual representations and the material architecture of ALLY. In addition, I will include my analysis of the myStep application. As was discussed, I did not have access to myStep designers. However, as will quickly become apparent, the two apps share a common architecture, and thus common prescriptions. I cannot argue that the same conceptual frameworks were used by myStep designers, but as will become apparent, a common understanding of self-tracking practices and self-trackers between the two is undeniable.

Table 3 summarizes my de-scription of ALLY and myStep's general prescriptions, detailed prescriptions, and incorporated programs of action. It complements my textual de-scription, which is segmented into four steps.

First step: measures and objectives

The first step is related to prescriptions that measure and display daily numbers: steps/objective, energy in kcal, distance in km and reward in CHF. For ALLY, they can be observed on top of Figure 13 left screen. Most of the screen is destined to the display of a single measure, the number of steps made throughout the day and its relation to the daily objective. Surrounding the numbers is a circle that fills itself as the user progresses towards the objective. For myStep, I direct the attention to the middle screen on Figure 15, which lists the numbers of steps done and associate it with an 'Erfüllungsgrad', a degree of fulfillment (in here, all days are characterized as 'Hervoragend' which means 'superb' or 'excellent'). These graphical (the circle), numerical, and textual inscriptions point to a clear two-stepped program of action: MEASURE YOUR STEPS and REACH THE OBJECTIVE. In other terms, what the app seeks to prescribe here is the fulfillment of the daily objective.

Displaying various representation of the current number of steps and its association with an objective mediates designers attempt 'to support the 3 subprocesses of the self-regulatory construct action control, namely self-monitoring, awareness of goals or standards, and self-regulatory effort' (Kramer et al., 2019c: 4). If users behave as predicted by cognitive models, if they are indeed rational beings constantly calculating cost-benefits associations, then these 'self-monitoring prompts' should lead them to comply with the prescriptions. That is, adapt their behavior, and reach the step objective. The dazing amount of numbers displayed by the applications (this will become even more apparent once I tackle step 4 of the general program of action) trace back to an expectation that subjects rationally compute these numbers on a daily basis and adapt their actions accordingly. SCT's model of a rational user is here mediated by a centration on live quantification and is at the core of the technical architecture.

Second step: rewards

The next type of prescription mediates the following program of action: EARN THE REWARD. On Figure 13 (ALLY), the financial rewards associated with the fulfillment of the objective are displayed in the middle of the first and second screen. For myStep, the middle screen on Figure 13 displays the financial reward next to each day. These remind users that fulfillment of the objective is (financially) rewarded. The emphasis on the reward, and its constant association with the step-objective mediates designers' reliance on 'conditional incentives' which are supposed to 'boost motivation by altering the associated outcome expectancies, that is, beliefs about positive and negative consequences of behaviors' (Kramer et al., 2020: 519).

Third step: consistency

In addition to daily counts, the applications variously display the three core measurements (steps, objectives, and rewards) in other forms: either aggregated numbers (weekly average, current total reward, total number of steps since the beginning, etc.) or graphic representations of the relations among numbers. For example, the middle screen on Figure 13 (ALLY) displays the average number of steps for the week and a graph of the past seven days. Figure 14 and Figure 15 (myStep) are replete with a myriad of graphical and numerical displays of the relation between steps, objectives, and rewards. All these prescriptions refer to a common thing: time (days, weeks, years, 'since the beginning of use'). What they prescribe is that the initial program of action is meant to be performed consistently over time. I argue that all these different displays of the relations among measures coalesce in a single program of action: BE CONSISTENT (with the initial three prescriptions). The general program of action can thus be summarized in four steps: 1) MEASURE YOURSELF, 2) REACH THE OBJECTIVE, and 3) EARN THE REWARD 4) CONSISTENTLY.

Regarding ALLY, the last screen of Figure 13 is an extract of a conversation between the user and the app's chatbot. The chatbot delivers prompts on a regular basis. Sometimes, the user can answer. For example, on Figure 13, the chatbot asks when the user plans to have a stroll during the week, to which the user can answer by selecting the day in a list. Designers gave me access to the full dialogue embedded in the application. It delivers a mixture of health promotion discourse, planning prompts and positive feedback (in addition to self-monitoring prompts). My analysis is that it is not aimed at another program of action from the ones already described, but at reinforcing them. The chatbot itself is a prescription designed to 'enable' (or 'constrain') the user to follow the initial program of action.

Fourth step (myStep): 'be good'

Regarding myStep, we can note one last prescription which is not present in ALLY. It is the opposition between a moving pictogram and a static pictogram, the lowest number of daily steps and the highest number of daily steps, and the user's best (bester) day/month and weakest (schwächster) day/month, which is displayed (for the rest of the month) on the bottom right of Figure 14 and Figure 15. I argue that these displays entail the following prescription: failure to reach the objective shows weakness, and success shows resolve. The related program of action is thus BE GOOD AND DO NOT BE WEAK (the terms are directly inspired by those used in the application: best/weakest). This refers to the previous steps. The user is a good user if he or she follows the previous steps and a weak/bad user if he or she does not. We can now summarize the whole program of action of myStep in the four following steps: 1) MEASURE YOURSELF, 2) REACH THE OBJECTIVE, and 3) EARN THE REWARD 4) CONSISTENTLY in order 5) TO BE A GOOD PERSON.

General pre-scription	Detailed technical pre-scription	Programs of action
Measure and display daily numbers	• Display daily steps • Display daily objective • Display daily reward	• Measure steps • Reach daily objective • Earn rewards
Measure and display daily numbers in time (week, month, overall, etc.)	• Display weekly overview • Display overall overview • Display averages • Additional similar functions	• Be consistent with the three previous prescriptions

Display and run a chatbot discussion (only ALLY)	• Display a chat window
	• Activate chatbot prompts
	  ○ Health promotion prompts
	  ○ Planning prompts
	  ○ Positive feedback
	• Allow users to select answers
		• Stick to the four previous prescriptions

Display activity as valuable and inactivity as nonvaluable (specific to myStep)	• Display best day and month • Display weakest day and month	• Be 'good'/do not be 'weak'

Table 3 Summary of ALLY and myStep prescriptions and programs of action

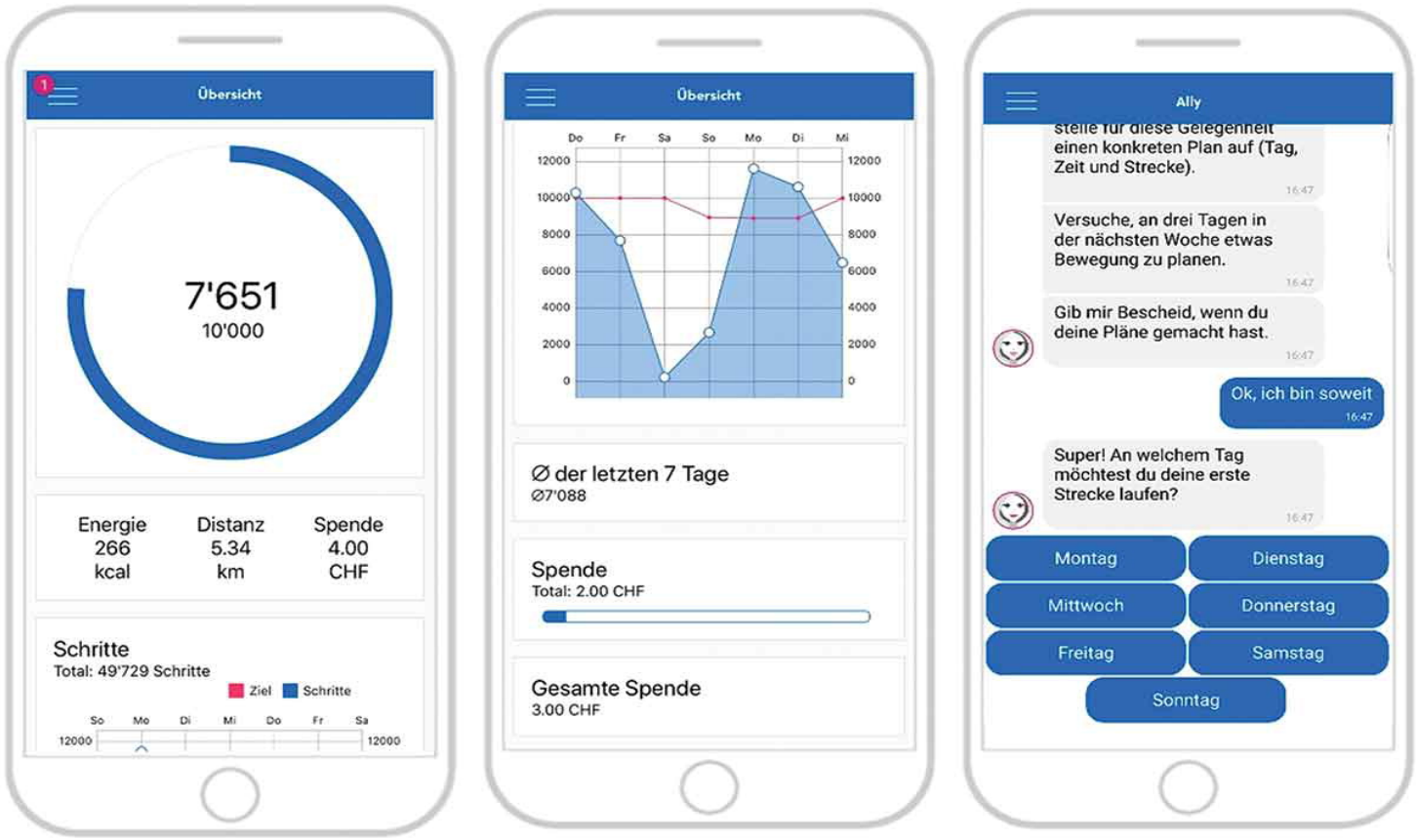

Figure 13: The Ally app.
Daily overview (left), weekly overview (center) and chat interactions with the chatbot (right).

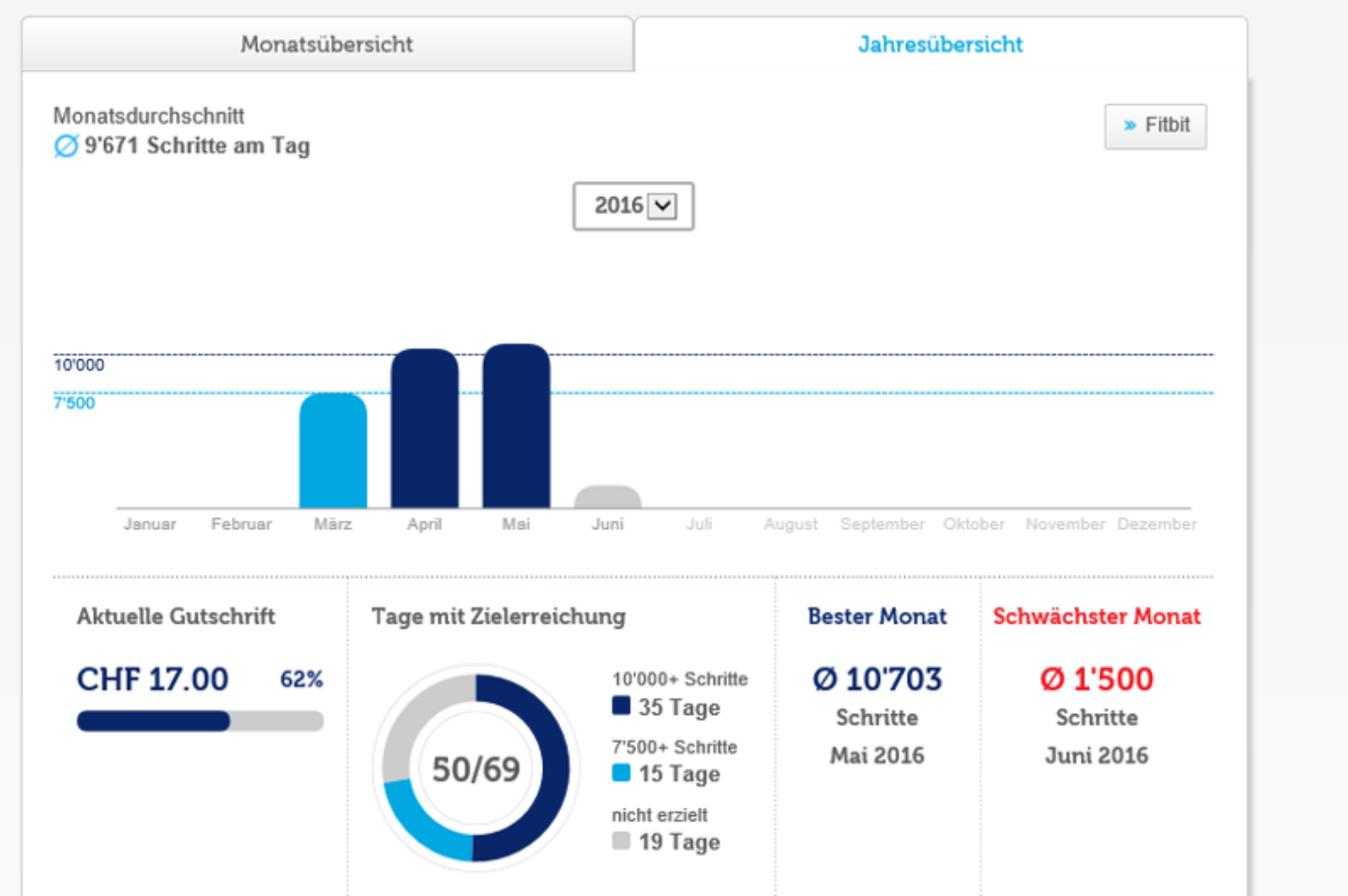

Figure 14 The myStep dashboard (browser version), yearly overview.
On top, the days of the week and the objectives. On the bottom: (left) the current reward, (middle) the numbers of days associated with objectives, (right) the 'best' and 'weakest' months.

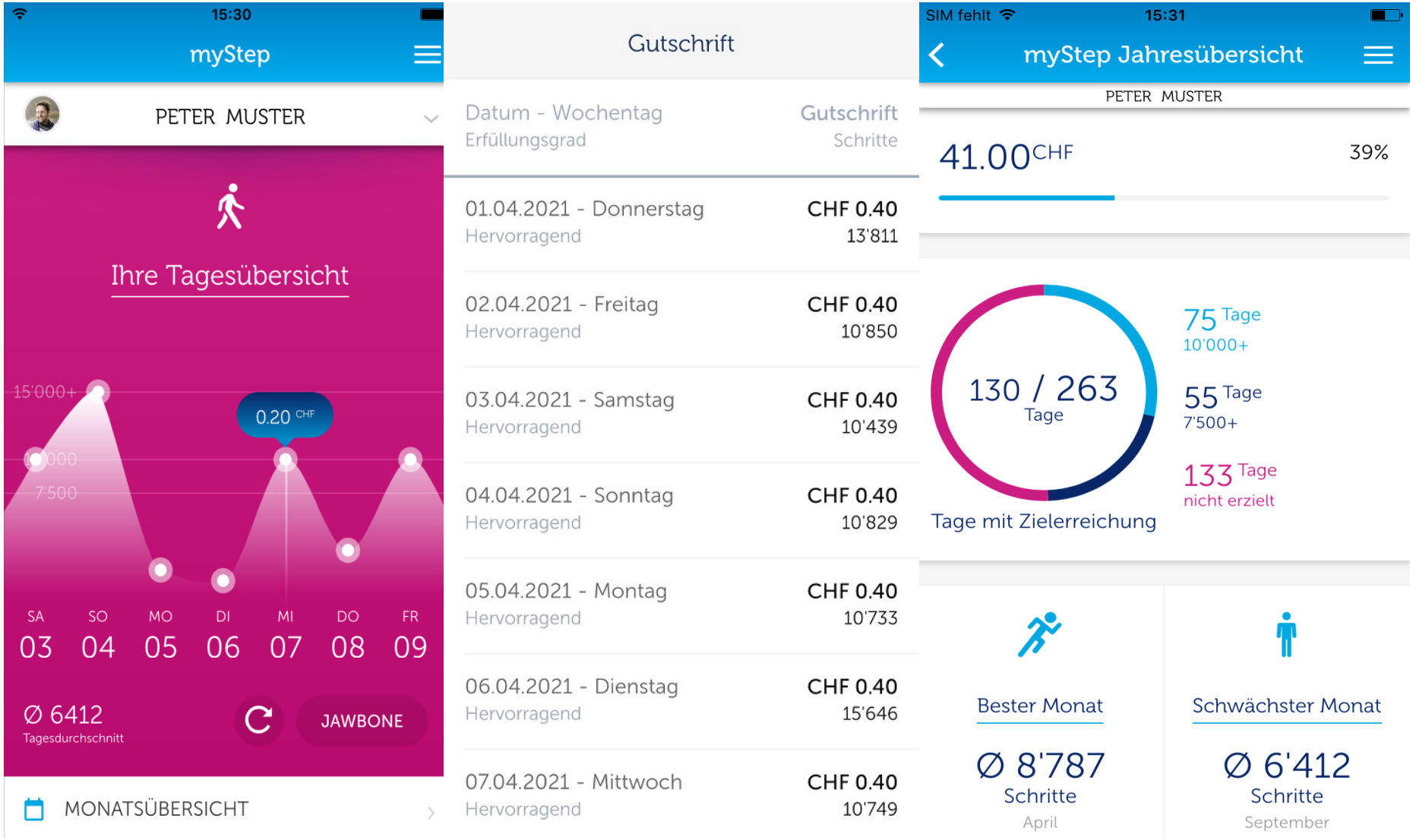

Figure 15 The myStep app (Smartphone version).
On the left, a graph displaying rewards, steps and objectives for the week, in the middle, the list of recent rewards, on the right the yearly overview with current reward, days associated with objectives and the best and weakest months.

5.8. On ALLY and myStep overlap with neoliberal rationales

So far, I have traced the contours of the expectation to modify lifestyles via mobile health solutions. I highlighted its role in setting a shared agenda and structuring interactions between a nascent scientific field and public and private actors forced to adapt to the quick evolution of regulatory frameworks, demands of a competitive market, and injunctions to 'digitalize' (Tanninen et al., 2020). I described how the designers strategically positioned themselves in this landscape as key skilled intermediaries susceptible to translate the expectations into actual artifacts. I then analyzed their attempt at configuring 'rational' users via SCT and translating it into technical features of digital applications.

This whole process of inscription is summarized by Figure 16. The diagram heuristically represents my de-scription of ALLY. It starts with the promise to change lifestyles at the top. Then, it displays the theory that was used to attempt to mediate this vision and separates it in its two main components. It then follows their translation into a technical architecture and ends with the underlying model that underpins the whole scheme. As suggested by Akrich, a device remains a chimera if we limit it to designers' script. The current diagram is such a chimera, an imagined script. However, next chapters will provide us with information on users' reception of this script, and new elements for the heuristic table. I will update the diagram by the end of each chapter, thereby tracing the contours the script.

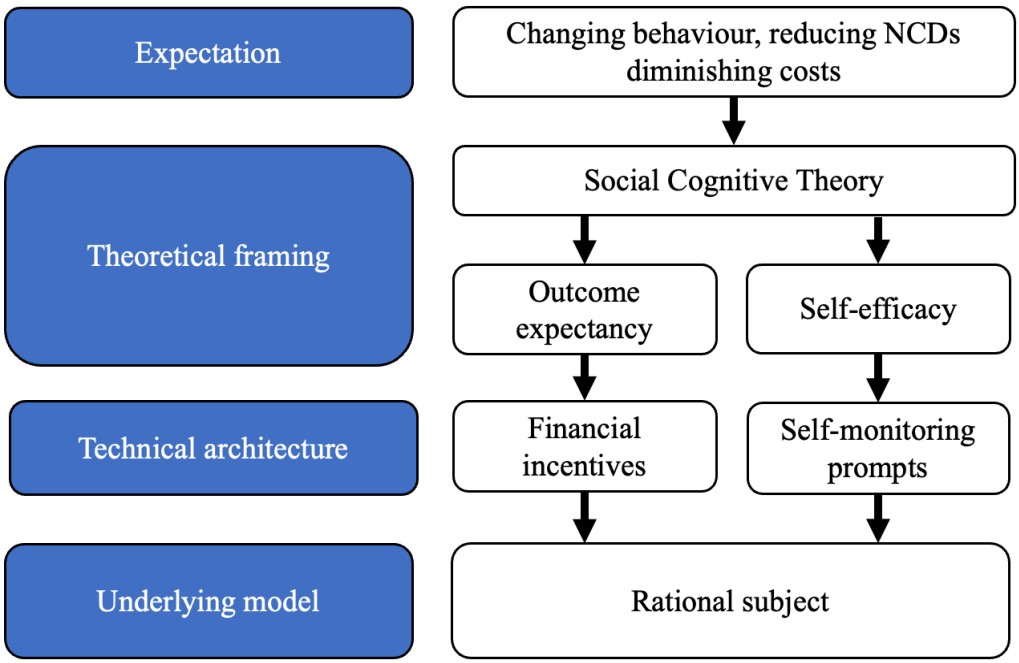

Figure 16 Heuristic summary of the de-scription (1)

Before we pursue our endeavor and turn to users' interaction with this script, I would like to contrast the identified form of ALLY's script with critical scholarship. As was evidenced, the script is based on the model of a 'rational' human that makes 'rational decisions' based on an elaborate 'cost-benefit analysis' to 'maximize utility'. Interestingly, the prevalence of similar representations of users in the self-tracking landscape led critical scholars to conclude that the practice is closely tied with the neoliberal model of the 'entrepreneur of the self' (Ajana, 2018; Lupton, 2016; Lupton, 2012; Ruckenstein and Pantzar, 2017; Schüll, 2016; Sharon, 2017). 'Emphasis on freedom and self-determination', the latter being an umbrella term that includes self-regulation and self-efficacy, has indeed been identified as central in neoliberal cultural patterns (Adams et al., 2019). This begs the following questions: are ALLY and myStep 'neoliberal' technologies? If so, what does our de-scription teach us about ST's intertwinement with neoliberalism?

Foucault's lectures on the birth of biopolitics paved the way for the self-tracking scholarship's exploration of neoliberalism. 'In neo-liberalism—and it does not hide this; it

proclaims it (…) Homo economicus is an entrepreneur, an entrepreneur of himself' (Foucault, 2008: 225). According to Foucault, neoliberalism's central tenet is the economization of all domains of human life, and notably of human life itself. The internalization of that perspective leads to a situation where 'the entirety of one's subjectivity is seen as constituting an enterprise tasked with increasing such capital' (Marinov, 2020: 7, Ehrenberg, 2005; Boltanski and Chiapello, 2005; Read, 2009). As a result, and according to post-Foucauldians, the neoliberal subject is socialized to become a 'active' patient, consumer, manager, etc. A subject that 'exercises agency, rationality, and liberty in order to become ever-increasingly self-managed, flexible, and efficient so as to remain competitive and survive' within the neoliberalized spheres of life (Dardot and Laval, 2009; Marinov, 2020: 7).

It is in that perspective—although with variations—that many scholars apprehend the practice of self-tracking (Ajana, 2018; Lupton, 2016; Lupton, 2012; Ruckenstein and Pantzar, 2017; Schüll, 2016; Sharon, 2017). Particularly noteworthy is neoliberalism's emphasis on 'a sense of freedom from constraints that affords an experience of radical abstraction from context', the necessity to seek continuous self-fulfillment and experience oneself as a project (entrepreneur of the self), and an imperative of growth that often translate to an injunction to optimize one's daily life (Adams et al., 2019: 191).

In the case of ALLY, I have highlighted the role of SCT in producing an imagined subject that shares many similarities with the neoliberal tracker described by scholars. The historical relations between SCT and neoliberalism are beyond the reach of my essay. However, authors have recently pointed to mainstream psychological research's entanglement with neoliberal perspectives (Pickren 2018, Teo, 2018). To a point where Adams et al have suggested that 'by studying psychological processes independent of cultural-ecological or historical context and by championing individual growth and affective regulation as the key to optimal well-being, psychological scientists reproduce and reinforce the influence and authority of

neoliberal systems' (2019: 189). We may note here, alongside these authors, that I do not aim to say the designers of ALLY (more generally researchers in psychology) deliberately intend to contribute to neoliberal systems and 'acknowledge that they often may desire their work to serve opposite aims' (Adams et al., 2019: 198). However, beyond intentions or awareness, their work is undeniably infused with a neoliberal perspective.

Indeed, beyond these discussions, and from a strict empirical standpoint, it is hard not to recognize that the script of ALLY shares similarities with scholarship's definitions of the neoliberal self-entrepreneur. Both are based on—but also tend to produce—a rational, active, and responsible subject that seeks to maximize gains. Gains that are both individual in the sense that the user is supposed to rationally seek to be in better health and make financial gains, and societal in the sense that the engagement in self-tracking practices should be perceived by both users and designers as contributing to lowering the costs of health.

ALLY (and myStep)'s focus on rational calculus and emphasis on individual responsibility comfortably fit within the current neoliberal health landscape. It is in that sense that I suggest that ALLY and myStep carry both healthist and neoliberal elements and tend to contribute to the neoliberal politics of health (Lupton and Petersen, 1996). The whole script—and its parts—are geared towards individual practices that align with a neoliberal rationale. However, we could limit ourselves to saying—if we wanted to elude using the controverted term of neoliberalism—that ALLY and mystep are technologies that highlight individual responsibility and (this will become more apparent later in the dissertation) undermine structural and social factors. Instead of characterizing them as neoliberal, they would thus be characterized as individualizing, responsibilizing, and de-contextualizing technologies.

5.9. On difficulties with the concept of 'neoliberalism'

Now, let me pose here to address common criticism towards analyses that rely on the concept of 'neoliberalism'. I agree that appeals to neoliberalism sometimes conflate very different

practices or ideologies, and often fail to systematically describe what they entail. However, I would like to offer two objections. First, I have been very clear as to what the neoliberal components of myStep and ALLY are. I identified a specific model of the subject, showed how it was inscribed in technical architectures, and suggested that this contributes to representations and enactments of a responsible and active individual, aimed at maximizing his/her gains. Only after this had been closely described empirically did I allow myself to suggest ties with a broader paradigm, diagram (Foucault, 2008) or abstract machine (Deleuze, 1980): neoliberalism. In other terms—and contrary to most of ST's literature—I alluded to neoliberalism only after having closely analyzed the technology at hand. Moreover, I sought to remain nuanced and limited my analysis to the fact that the technologies 'shares many similarities' with what is described by scholars as neoliberalism.

I agree that there may be a risk in reducing different localized practices or discourses to the single concept of neoliberalism, but also think that there may be a risk in not addressing a potential subterranean Zeitgeist and its effects. Some authors argue that neoliberal rationality is diffused through 'a patchwork of assemblies of agents, ideas and remedies shaped by national heritage and contexts, by constellations of interests, and a certain contingency in their arrangement' (Jeanpierre, 2007: 26), but still perceive and conceptualize it around central tenets (Hibou, 2012; Reigner, 2016). My take is that ALLY's design is a localized entanglement that, infused by healthism, technological solutionism, and SCT, led to the configuration of a user that shares similarities with the neoliberal subject discussed by scholars, and that—as we will see later, and more importantly—has similar consequences on society. In that sense, I abide by the conceptualization of neoliberalism as a 'global assemblage' (Ong et Collier, 2008), global forms that 'have a distinctive capacity for decontextualization and recontextualization, abstractability and movement, across diverse social and cultural situations' (Collier, 2006: 400)

while remaining ‘heterogeneous, contingent, unstable, partial, and situated’ (Ong and Collier, 2008: 12).

My argument is that ALLY’s script is a local and contextual instantiation of a broader web of elements heuristically named neoliberalism (Brenner and Theodore, 2002). And to be more precise, my analyses do not point to neoliberalism being a cause of ALLY and myStep development. Neoliberal discourse and practices may have played a role for sure, but my data does not allow me to fully trace that side of the equation. What I argue is that the script embedded within ALLY and myStep contributes to defining public health, subjects, and self-tracking practices according to a point of view to which scholars heuristically refer to as ‘neoliberal’. In other terms, I advocate that—a minima—what we call neoliberalism is a consequence of—among a myriad of other things—the design of ALLY and myStep, and more generally self-tracking.

5.10. Configuring rational subjects, a form of paternalism?

Before I close this chapter, I would also like to address a puzzling thing: the fact that ALLY is particularly guiding. Indeed, it sets a common goal, normalizes behaviors, sends notifications, constrains users, etc. How can this somewhat paternalistic tone go along with the focus on individual responsibility and freedom advocated by both SCT and neoliberalism? Once again, Foucault’s lecture on neoliberalism offers an answer. If (classical) liberalism was mostly about imposing a free market based on exchanges as a societal model, neoliberalism replaced exchange by competition as its main operative principle. ‘While exchange was considered to be natural, competition is understood by the neo-liberals of the twentieth century to be an artificial relation that must be protected against the tendency for markets to form monopolies and interventions by the state’ (Read, 2009: 28). Hence the fact that neoliberals, although they often present themselves as libertarians, are in fact highly interventionist.

The same paradoxical move is reproduced regarding individual investments and interests (notably in bodily capital). In neoliberal regimes, freedom is a core element, but it must be prepared, channeled, and adjusted to the needs of the market (Rose, 1996; Foucault, 2008). This is not done by frontal intervention on bodies or legal frameworks, but by directing the 'flows of interest and desire by making desirable activities inexpensive and undesirable activities costly, counting on the fact that subjects calculate their interests' (Read, 2009:29).

If we turn to ALLY's script, we find very similar processes. On the one hand, the model of subject mobilized is that of a rational individual making rational and supposedly free choices. However, the whole intervention is aimed at channeling users' agency (self-efficacy), notably based on expert knowledge (the objective, for example, comes from the scientific literature). In other terms, ALLY's script is based on the idea that individuals will rationally accept to follow experts' guidance. Hence the fact that they—the experts—choose the objectives (the general necessity to walk and be healthy, or the numbers of steps one must take), do not discuss them with users, and seek to impose them by relying on black-boxed self-monitoring prompts and incentives.

The technical architecture of ALLY is that of a rail that slowly pushes users towards an 'objectively better way of life' based on the idea that users will freely choose to follow it. The apparent paradox of neoliberal freedom is central to the script. Some authors have tied this paradox to a specific liberal branch called libertarian paternalism (Gane, 2021). Libertarian paternalism aims to solve the contradiction of both hard paternalism and libertarianism (hear: aims to solve the neoliberal freedom paradox). On the one hand, hard paternalism is seen as too coercive. On the other hand, libertarianism's model of a purely rational being is seen as flawed for humans make 'irrational decisions'. Therefore, libertarian paternalism aims to guide people towards better choices in a 'not too coercive way' (Gane, 2021). Gane identifies this rationale as the core element of technological nudging:

> Thaler and Sunstein argue that experts with an understanding of behavioural science can gently 'nudge' people to make choices that will improve their lives in ways that do not restrict the freedoms of those involved. They write: 'Because people are humans, not econs. . . they make predictable errors. If we can anticipate those errors, we can devise policies that will reduce the error rate' (Thaler, 2015: 325, in Gane, 2021:121-122)

I think it is fair to say that ALLY's team did not consciously try to restrict users' freedom, although I cannot produce any other proof of this than my general feeling of collaborating with them. ALLY's goal was to help people who already wanted to exercise more. However, in the process of translating that into a technology, designers relied on an understanding of users that bypassed reflexivity (among other things) and relied on blackboxed expert tools (such as SCT). If monitoring prompts and incentives as I described them do mediate an obvious form of libertarian paternalism, the focus on 'states of receptivity'—which I somewhat neglected in my analysis—is an even more telling example. The designers attempted to tailor an algorithm that would trigger self-monitoring prompts' timing based on a myriad of information silently gathered by the Smartphone.

> Beyond passive monitoring of health behavior, smartphones and wearables collect a wealth of contextual information (such as time, location, communication logs, or physical activities) that can be used to tailor the delivery of interventions to participant states that increase the intervention's likelihood of success. For example, an intervention could only be delivered at points in time when the participant is likely to change her or his behavior (state of opportunity) or is likely to engage with the intervention content (state of receptivity) [3]. mHealth apps that utilize this kind of dynamic tailoring are referred to as just-in-time adaptive interventions (JITAIs) [3]. (Kramer et al., 2019c:2)

This is an example of libertarian paternalism where people's awareness is bypassed. I do not aim to focus on this particular topic, but this is exactly the type of technological innovations that, according to critical scholars, currently threatens people's autonomy and privacy (Zubhoff, 2019; Couldry and Meijas, 2019). The researchers who theorized 'nudging' were awarded a Nobel Prize in economics (Thaler, 2015; Thaler and Sunstein, 2003), and their ideas are currently central to many countries public policies (Gane, 2021). Once again, even if

its theoretical underpinnings are different, we cannot ignore the fact that ALLY reproduces the exact same mechanisms that have been identified in libertarian paternalism. And once again, we cannot ignore the fact that ALLY leads to similar consequences (which will be discussed further in the dissertation).

5.11. Chapter recap:

In this chapter, I have described the promises surrounding myStep, their inscription in technical elements and the meanings and views that they originate from. I have notably identified a model of human action that tends to highlight responsibility, rationality, and gains, down to the technical features of the device. After that, I have highlighted ALLY and myStep similarities with the neoliberal politics of everyday life (Rose, 1996). Although neoliberal forms of responsibility as roots of self-tracking have already been theoretically discussed by scholars, no one had taken the time to trace them within the technology and its design, thereby bringing empirical proof of these intertwinements, and highlighting their local embeddedness (here with SCT) (Brenner and Theodore, 2002).

In this chapter, the focus has voluntarily been put on designers, an approach that comes with limitations. First, it may give the false impression that users seamlessly fit the roles inscribed within the technology, which, as we will see in the coming chapters, is not the case. By focusing closely on how designers conceive the intervention, I have slightly obscured the fact that they are themselves configured both by users and by their own organization (Mackay et al., 2000), and our focus on publications and science led to a neglection of the lived experience of design (Fischer et al., 2020). Finally, my study deals with design in the context of scientific innovation and may not be fully transferable to industrial design. These limits point to the current need to study the design of ST technologies further.

Deploying the web of translations involved in the production of a self-tracking technology provides important lessons for scholars, policymakers, and designers. First, being

the outcome of a collaboration between me, a critical scholar, and scientists who design self-tracking tools, and providing an analysis of self-tracking design in HCI from a social science perspective, this chapter bridges the gap that separates the two fields of research, paving the way for more interdisciplinary studies (this will be discussed further in chapter 9). Second, it provides empirical insights into how models of users are inscribed in self-tracking technologies, a topic that is still lacking in self-tracking research and has far-reaching societal consequences, notably on inequalities (as we will see in later chapters). Third, it suggests that some of the shortcomings of self-tracking that are usually identified by critical scholars and developers have their origins in the design process and the types of knowledges it draws from. Finally, the chapter offers a telling example of a localized neoliberal entanglement, or, in terms borrowed from Foucault, of neoliberalism as a 'practice' (Foucault, 1979/2008: 324)

6. Self-tracking in daily life, users' reception of a de-contextualizing script

> « Si ce sont les objets techniques qui nous intéressent et non les chimères, nous ne pouvons méthodologiquement nous contenter du seul point de vue du concepteur ou de celui de l'utilisateur : il nous faut sans arrêt effectuer l'aller-retour entre le concepteur et l'utilisateur, entre l'utilisateur-projet du concepteur et l'utilisateur réel, entre le monde inscrit dans l'objet et le monde décrit par son déplacement ». (Akrich, 1987 :58)

This chapter is based on the following article:

Presset, B., Kramer, J.-N., Kowatsch, T., and Ohl, F. (2020). The social meaning of steps : User reception of a mobile health intervention on physical activity. Critical Public Health, 1-12. https://doi.org/10.1080/09581596.2020.1725445

I was the lead author of the article, responsible for conceptualization, investigation, data collection, methodology, formal analysis, writing—original draft preparation, and writing—review & editing. Fabien Ohl had a supporting role in conceptualization, methodology, and writing—review & editing. Jan-Niklas Kramer and Tobias Kowatsch had a supporting role in data collection and writing – review & editing. To fit the thesis format, I switched to a first-person narrative even though the article was a collective endeavor.

6.1. Chapter overview

In this chapter, I analyze the integration of mHealth tools in everyday life. Insights into the actual use of such tools have empirical importance and contribute to our theoretical understanding of self-tracking technologies. Moreover, analyzing users' reception reveals what the script actually enables or constrains outside of the laboratory. In this context, prescriptions that could not be deduced from designers' plans reveal themselves to the analyst. The chapter is based on 23 interviews with people who participated in the ALLY trials. Results reveal that the script can result in the participants feeling ill-represented by the reductive nature of the data they generate. They also reveal the inadequacy between biomedical standards and the social

contexts of use. On the other hand, this chapter reveals some of the script's successes in altering users' behavior.

I conclude the chapter by discussing how the various negotiations, resistances, and misalignments experienced by users point to prescriptions of the script, notably its de-contextualizing and standardizing perspectives. These prescriptions, which I offer to qualify as 'negative', point to neglections or exclusions from the script. Hence the fact that, contrary to 'positive' prescriptions analyzed in the previous chapter—which are related to things that are highlighted by the script—negative prescriptions tend to be more difficult to pinpoint. To summarize, this chapter pursues the de-scription of ALLY's script, moving from production (design) to consumption (use), while remaining attentive to the obduracy of the technology itself.

6.2. Switching to users' perspective

So far, we have de-scribed the script from the point of view of design. As mentioned, the ALLY team did not encounter users prior to the deployment of the technology. And even once the technology was deployed, interactions remained rare (some users emailed the team to express complaints or ask specific questions). In other terms, users were globally excluded from the inscription process. In an interview done as I was writing the thesis, the lead researcher explained to me that the ALLY team did not have time to include users in the design phase, the temporal constraints of the research project being too strong. Now of course, even if temporal constraints are surely a reality, I hypothesize that other mechanisms are at hand.

Numerous scholars have highlighted the fact that designers tend to keep actual users at a distance (Woolgar, 1990; Suchman, 1993; Akrich, 1992, 1995; Oudshoorn and Rommes, 2004). Observing designers, they noticed a tendency to rely on what Akrich described as the 'I-methodology', that is to rely on personal experience to design (1995). Oudshoorn and Rommes suggested that it is 'often an unconscious process: the designer is not aware of the fact that the user representation he or she is using resembles himself or herself' (2004: 41). More generally, these authors point to the fact that designers tend to '*design from nowhere'*, that is to design as 'anonymous and unlocatable designers (…) to deliver technological solutions to equally decontextualized and consequently inlocatable "users"' (Suchmann, 1993: 27).

However, these critiques have mostly been formulated based on observations in the design of hardware, whereas, in my case, designers produced software. I would hypothesize that the production of software tends to strengthen these tendencies to design 'from nowhere' or 'at a distance'. Indeed, with regards to software, the delivery of the product—via mobile networks and internet—may (wrongly) feel more dematerialized than in the case of hardware. Moreover, we may hypothesize that the era of big data and personalization—because of the promises it entails—reinforces this tendency, or to be more accurate, transforms it. Indeed, the

beliefs that data will provide the necessary information on individuals to personalize interventions and that it will provide continuous feedback to adapt it may push designers to delegate the configuration of users to algorithms.

These, however, remain hypotheses. My own field work does not allow me to provide clear empirical evidence of these mechanisms. The designers I worked with did not include users in their protocols prior to releasing the software and argued that it was so because of time restrictions. Whether other sociocultural patterns and/or unconscious reasons also played a role remains to be proven by more solid evidence.

In many ways, my interviews were the first actual interactions between researchers and users in the project. Consequently, the ALLY team showed interest in what they were going to reveal. I traveled across Switzerland to do the interviews. The hours I spent in trains and the interviews I did in heterogenous contexts—from Zürich's fancy bars to small appartements in alpine villages—spoke to the power of mHealth interventions. ALLY's lead researcher wrote that mobile technologies 'allow for the provision of interventions and support largely independent of time and location' (Kramer, 2020: 5). Having to travel across a whole—although small—country to actually meet the people who interacted (on a daily basis for months) with a technology developed by a few people was a destabilizing experience. It certainly gave some weight to the aforementioned argument.

However, my interviews did also point to the limits of partitioned design processes (Suchman, 1993), to which I now turn. I will first discuss three prescriptions that complicated the appropriation of ALLY. These were derived from users' accounts and concern the necessity to carry the Smartphone close to one's body, the reduction of physical activity to steps and the 'bracketing' of everyday life. I will then turn to the two main uses identified among users. 'Surveillance', where users want to make sure that they comply with norms, and 'routinization' where users attempt to change their habits (Pharabod et al., 2013).

6.3. On the ‘stickiness’ of Smartphones

Ally and the 10’000 steps recommendation both rely on the possibility for participants to record their daily steps. This obviously necessitates a measuring device. Most interviewees used a Smartphone. Smartphones are often pictured as ‘always-on-the-person’, a rationale that is the source of many promises. Associated with seamlessness and automation, tracking technologies are supposed to allow unproblematic and stable monitoring (Mayer-Schönberger and Cukier, 2014; Van Dijck, 2014). The same promises were articulated by the ALLY team: ‘First and foremost, [smartphones and wearables] enable effortless and continuous monitoring of and automatized feedback on physical activity’ (Kramer and al. 2020: 5). If this promise is appealing for industries, public health operatives, and scientists, its practical realization may transform into a burden for end-users.

It may indeed be true that people carry their Smartphones around them most of the time, whether in a pocket, in a bag, or on a nearby piece of furniture. This proximity may be enough to learn a lot about the person’s activity (actual geographical position, time spent on the device, internet searches, etc.). However, once the focus switches to the body and its movement that kind of proximity is no longer adequate (Presset et al., 2018). Steps are measured by inferences from the vertical accelerations of the body and Smartphones contain tri-dimensional accelerometers to measure those forces. But the Smartphone must move in close imitation of the body for it to produce reliable measurements. Users must switch from having the Smartphone ‘around’ to having the Smartphone literally ‘on them’, on their bodies. Most of our interviewees found this an unpleasant experience.

> When you work at home all day, when you climb the stairs, when you do the laundry, where do you put the Smartphone ? In your shoes? In your socks? After a while, it becomes really painful… Smartphone application, I will not do that again… If CSS develops things on the Smartphone, I do not participate anymore! Not with the Smartphone! (29 year-old-woman, business consultant)

Let us note that health concerns were central to this participant's annoyance (she was concerned about the Smartphone radiations). For others it was unpracticality, lack of pockets, the fact that they did tend to forget the Smartphone somewhere, or a simple discomfort in always having to carry it around. Having to carry the Smartphone closely proved challenging and annoying for the interviewees. However, discomfort was not the sole issue. Users pointed to the fact that failing to have the Smartphone on them all the time resulted in a 'loss' of steps:

> I do not always carry my Smartphone with me. When I work for example, the Smartphone is… I do not know where… and I am doing steps, steps, steps, and… It is naturally not counting. At home too, I do not wear it when I clean, when I go up and down the stairs fifteen times. It is not counting all that and so I do not have any estimation (57 years old woman, medical secretary)

If having the Smartphone around was a burden in itself for some interviewees, for most of them the main problem was that failing to have it on them resulted in measurement inaccuracies. This, as we will see later, was an important issue for them. Most users expressed annoyance with the Smartphone, but not with ALLY's overall system. Hence the fact that most interviewees evoked bracelets or smartwatches as desirable solutions:

> But I do not have my Smartphone in my pants all the time. That is also something, it would be more convenient to have a bracelet. Because we sometimes let the Smartphone on the desk when we get up (48-year-old woman, graphist)

The materiality of the Smartphone and the burdensome necessity to have it 'stuck' to the body was not considered by designers. This resulted in participants having to take action for the intervention to function, finding ways to carry the Smartphone as much as possible and dealing with the fact that steps (and money) were sometimes 'lost'. In Akrich's terms, designers unconsciously ascribed users with a pre-inscription (a competence expected from an actant before it arrives in the setting). That of always carrying the Smartphone close to their bodies. But designers' expectation that this was taken for granted was contradicted by users' accounts. This crisis—a misalignment between imagined and actual use—led to forms of subscription,

that is negotiations and adaptations, to fill the gap and come up with solutions. However, it is likely that some users de-inscribed from the intervention because they could not—or did not want—to make this effort.

6.4. The reduction of physical activity to steps.

As was discussed before, ALLY is a profoundly normative mHealth intervention. Its goal is to compel individuals to persist in a standardized behavior: taking a specific number of steps a day as a proxy to the recommendations for physical activity made by various leading health organizations. It is somewhat unsurprising that one of users' most common criticisms was towards ALLY's reductive approach to physical activity.

Even though they completed questionnaires during the protocol, were invited to give written feedback and had access to a FAQ section that described the rationale of the study, users felt that they could not dispute their daily objectives. They felt unable to negotiate with ALLY. This issue was a consistently appearing topic in the participants' interviews.

> ALLY promised me that I would get a Swiss franc every time I reach 10,000 steps. On some days, ALLY counted wrong! And I always had to confirm. For example, ALLY said, 'you did 8,000 steps today, ok?' The only response available was: 'ok!' I could not say: 'no, it is wrong'! So, I made records [the interviewee displays a piece of paper with two columns of numbers]. Look at the numbers. You can keep it; it is only to help. You can see the data of the digital tracker, and you can see that ALLY sometimes counted wrong. And when ALLY makes mistakes, I have to go out and walk for an hour again; the day is not over for me then. (70-year-old man, retired banker)

According to this participant, the application did not count properly. Of course, we can argue that the participant's reference (another application) was mistaken. However, the primary problem is that the individual could not negotiate with ALLY: 'I could not say, "It is wrong"'. This problem was a substantial source of frustration for the participants. This frustration also occurred when the participants wanted the application to consider forms of activity other than steps:

> I was skiing all day. In the end, ALLY counts 2,000 steps. So, I say to myself, 'I did sporty behavior; I did a lot, and in the end, I have 2,000 steps'. So, it did not count and . . . or when I go swimming. It does not count. Or when I bike, it counts of course, but not steps, another kind of movement. Yes, another kind of movement, and you do not count that the same way. That was really the limitation, I think. Because it only counts steps. Yes, I find it bad. Movement is not always the same; sport is not always the same. Well, some have a bracelet or an armband that measures the pulse or other things. Myself, if I go jogging, I do not take my Smartphone with me; there is a limit between what I measure and what I do. (47-year-old man, engineer)

In this statement, the participant switches from step-counting to physical activity in general, which is a switch that the application was not designed to accommodate (it only counts steps). This problem probably arises from the ALLY chatbot dialogues, which tend to use physical activity as a synonym for steps:

> ALLY: 'Physical activity can reduce stress and positively influences well-being!' ALLY: 'When you move, you feel better' (Extracts from ALLY's statements)

Reduction of physical activity to steps is obviously a core element of the script. For the application to be low-cost, deployable on as many Smartphones as possible, and for its objective-oriented logic to work, it must reduce physical activity to steps. The objectives are set according to WHO's physical activity guidelines (2010) and their translation in steps recommendations (Tudor-Locke, 2008) which are also reductive (similarly to ALLY, they are designed for broad implementation). However, once appropriated in daily life by individuals who are not limited to walking (they can obviously ski, bike, swim, dance, etc.), the reduction is experienced as limiting. The frustration it generates is amplified by a feeling of injustice towards the incentivizing logic. If ALLY pictures physical activity as a proxy for health, and if incentives are in relation to being more active and healthier, participants feel betrayed when other physical activities, that are often perceived as more intense than walking, are not considered.

Interestingly, except for a few participants, the imprecision or limitation of the measures were not perceived as an argument against the logic of the intervention. One could think that this discrepancy between the measure and actual behavior would be used to undermine the rationale of the ALLY system. However, most participants pointed out the limitations to call for better measurements, a tendency that has been identified by others (Fritz et al. 2014). Participants suggested that ALLY should be adapted so that it would record more activities and provide a more accurate image of their activities. Basically, they agree to be measured as long as they feel accurately represented by the data, which shows a strong acceptance of the overall rationale:

> It should at least be representative . . . I do not care if the insurance sees it. But if someone really wants to see what is happening, then they should know how many beers I drink, for example. If we want to adapt insurance premiums in relation to movement, then all other activities should be integrated, shouldn't they? (47-year-old man, banker)

These accounts exemplify both the negotiations involved in the acquisition of technologies, and their mobilization as part of the construction of identities and the presentation of the self (Haddon, 2011). In the process of appropriating the script, participants resisted the reductive representation of their physical activity. The main reason for this resistance was that this representation did not—according to them—fit their actual behavior. The appropriation of ALLY was arduous because what some scholars call conversion, the technologically mediated presentation of oneself to other people (and reflexively to oneself), did not fit users' expectations (Silverstone et al., 1992). Nevertheless, this did not lead to de-inscription for my interviewees. Appropriation was more difficult, but we cannot say that it was unsuccessful. The users I interviewed either stuck to the standard use even though they were frustrated or used another device to measure other physical activities. However—once again—some users certainly de-inscribed from ALLY because they could, or would, not cope with that issue.

6.5. The ‘bracketing’ of everyday life

The participants experienced the intervention—notably the necessity to reach objectives—as an element of everyday life. However, as was mentioned before, the metric was developed in relation to physiological and medical standards (Kramer, 2020; Tudor-Locke et al. 2008). These standards are applied independently of what is typically termed the ‘social’ part of life. Whether it rains or whether it is the weekend or mid-week does not alter the physiological standards that underly step-counting. However, once the recommendation enters daily life, once the script encounters its users, the focus switches from physiology to individuals as social beings.

The participants understood movement (e.g., steps) as a quantity that can be dealt with in terms of a balance sheet, as if more movement here could compensate for a lack of movement there. Their idea being that at the end of the week, the sheet should be balanced:

> I wish I had a global objective for the week. Because sometimes I could not reach 10,000 on a particular day, but then on Saturday, I would go for a long walk, and so, I did a lot of steps. So... I thought it was a bit boring to have a daily objective. (64-year-old man, retired insurance manager)

For this interviewee, a weekly objective would solve the problem that it is occasionally difficult to reach a daily step goal. The reasons evoked in the interviews for not reaching daily step goals were taking care of children, work-related meetings, having another physical activity scheduled such as swimming or skiing and cold weather or rain. During appropriation, scholars highlight the necessity for the technology to find a place in the temporal routines of everyday life (Hynes and Rommes, 2005). Here, the temporal standard embedded in ALLY’ script was confronted with users’ social rhythms. This complicated the appropriation process. Some users offered a potential solution based on their idea that weekdays and weekends are different temporal spaces. They considered the weekend as a period of freedom to move more or move less and the weekdays as a period for controlled activity and discipline:

> Yeah, well there was this weekend day when I made only 8,000 steps, but I did not do more to reach the objective because I thought during the week I already did enough, yes. (41-year-old woman, nurse)

It is as if the responsibility for physical activity was applicable only on working days and as if weekends were days off from the step-counting discipline:

> I think that here the problem is everyday life; do we move enough? On weekends, either it is laziness and we do nothing, or we go for a walk and so we naturally have an enormous step count. But that is not everyday life; everyday life is Monday to Friday! (56-year-old man, senior manager)

This tendency to reinterpret the objective as a weekly objective prevailed for our interviewees. It is not unproblematic because physiological processes (at least when mediated by biomedical sciences) do not rely on the same temporality as the users' daily lives (Pantzar et al. 2017). This reinterpretation interestingly results in the subject expressing a need that differs from the 'needs'—mediated by science and technological design—expressed by their physiological constituents.

> And I made efforts to reach the goal. I'm often on my bike, and this does not contribute to my step-count much. Even if I'm on my bike for an hour, that's only 5'000 steps. That, I don't understand...when I...I ride my bike it's almost considered worse because I take fewer steps [than if I was walking]. Then I don't reach my goal. I can't do more than 5'000 steps because I have two children and I can't say to my partner 'oh I have to walk half an hour to reach my ten thousand steps'. (42-year-old-woman, communication manager).

Users point to the fact that the second prescription REACH THE OBJECTIVE was based on standards that are misaligned with the constraints of their daily lives. A myriad of antiprograms—'programs of action of actants that are in conflict with the program chosen as a point of departure' (Akrich and Latour, 1992: 261)—emerged that could be summarized as THE MESSINESS OF DAILY LIFE KEEPS ME FROM FOLLOWING THE PROGRAM. This is due to a misalignment between the knowledge forms designers drew from and the practical constraints of users' daily lives. I will come back to this by the end of the chapter.

If the materiality of the hardware, the reductive nature of ALLY and its neglection daily life constraints led to de-inscriptions and negotiations, the users I interviewed found ways to integrate the app in their lives. The two prototypical everyday uses observed were ‘surveillance’, in which people check if they comply with norms, and ‘routinization’, in which people try to use ALLY as a trigger to change what they identify as an inactive lifestyle (Pharabod et al., 2013).

6.6. Using ALLY to stick to norms

Among users who subscribed to the script of the application are people who needed reassurance that they comply with physical activity guidelines. These users need either a confirmation that they are doing enough movement (comparison to the norm) or a control that they do it on a daily basis (need to stick to the norm). Most of these users were already active before they engaged with ALLY. However, they wanted to see that confirmed by the step-count:

> Yes indeed I shouldn't really need it, but it's a nice feeling to see Monday, Tuesday, Wednesday, Thursday, Saturday, etc. with the goal achieved. And I also wear it when I work out. Because I go once a week to fitness at university, and occasionally to yoga. This allows me to have an overview of what I am doing (41-years-old woman, Nurse)

Here, ALLY is not used as a way to change one’s behavior, but as a confirmation that one is doing enough. This departs from designer’s attempts to change behavior, but not from ALLY’s script, which is perfectly adapted to the maintenance of a consistent behavior.

> I didn't really change despite Ally's efforts (laughs) or because there are step counters. It's more of a check (Prüfung) (42-year-old woman, communication manager)

Chapter 7 will provide more information on the types of individuals that were already active before they engage in the application. Notably, it will analyze their socioeconomic conditions and tackle their rationales for adopting the technology. Hence the fact that I refrain from providing a further analysis in here.

6.7. Using ALLY to change habits

For the rest of interviewees, the engagement with ALLY was driven by a desire to become more active. These users—who wanted to change their habits—identified an alteration of their awareness (often referred to as 'Bewusstsein') as ALLY's main contribution. Measuring the number of steps does indeed 'reveal' a 'hidden' part of one's life. That is, things that were difficult to perceive before suddenly become visible. Of course, people could guess how many steps they took, or rely on a subjective impression of whether or not they add an active day. But unless they manually count their steps, there is no way to know how many they take.

For my interviewees, the first step towards changing habits was to learn the equivalences between daily tasks and the volume of steps they represent. For example, learning that one's daily stroll to the train station represented around '2300' steps or that going down to the office cafeteria amounted to an average of '700' steps. Users progressively developed an ability to evaluate the numbers of steps taken:

> Interviewee: I would regularly look at, how many steps I have to take in order to reach that level. And over time I knew, okay, I have to walk another half hour or twenty-five minutes. It was... Yeah you kind of learn how much you have to do to reach this goal.
> Interviewer: You say you learned to measure steps by yourself?
> Interviewee: Yes, indeed, based on time, or... on speed, how long do I need to get there, how long do I need to walk to reach the goal in number of steps. That I've learned over time yes. So, time equals a number of steps, and so... here I have to walk 20 minutes to get to that number. That was a new form of knowledge for me. (53-year-old man, banker)

With this 'incorporation' process also comes a consciousness that this number can be altered. In other terms, the progressive realization that one's daily decisions impact the volume of physical activity leads to 'new knowledge with regard to the consequences of our actions' and, further down the line, new moral duties (Swierstra, 2013: 208). Hence the fact that the second part of ALLY's role in modifying behavior (after having brought steps to the fore) is to push users to develop an underlying state of doubt towards usually mundane decisions:

> Intervieweer: And what have you tried to do to achieve this goal? Did you change things?
> Interviewee: Uh... It was like a Bewusstmachung [education or more literally awareness]. So... yeah when I'm upstairs and I forgot something, I was like, okay, I'm doing the stairs again...I'm taking this chance to take more steps. Yeah...or...when a colleague tells me they have a question, I wouldn't say 'go down so...' but 'okay I'm going up'. These possibilities opened up... (56-year-old-man, team manager)

By revealing a usually hidden part of reality: the number of steps that we take, and by associating this number with health concerns and with a reward, ALLY creates a new distribution of responsibility. I mean it both in the STS sense of a specific delegation of moral responsibility (ALLY tends to raise one's awareness of one's responsibility while simultaneously hiding the role of external factors such as weather or availability of safe and practical walking routes) and a re-configuration of one's actual environment (stairs are imbued with a new meaning, distance to the nearest bakery becomes an opportunity, etc.). With these reconfigurations, doubts emerge about one's actions:

> I was never that attentive. I was just afraid sometimes to... instead of the elevator to take the stairs, maybe was here aware of having to take the stairs to increase my steps. Maybe that played a role in the back of my head. I take the stairs because maybe it makes me reach the goal... (46-year-old-man, Cook)

> No, at the beginning maybe we change a little bit, but then we maintain the same... more or less. Yeah, sometimes you think, well, we'll walk fast. Or sometimes, in terms of parking, at the beginning we said to ourselves, we always try to park as close as possible, and sometimes it's a bit the opposite now, we say to ourselves ah well that way I'll have a little walk and it'll do me some good, it'll air me out... And we park a little further away as soon as we find the first place... And then we finish... sometimes we think a little differently about the 'car-park' level maybe I think... (56-year-old-man, team manager)

This second type of use successfully prompted small changes such as not taking the elevator, doing 'active breaks' at work or avoiding public transports on small distances, at least for the duration of the protocol and up to the interviews (maximum four months after the end of the protocol). These processes are the sole evidence of behavior change found in the

interview data. Behavior change was the main promise articulated by the ALLY team, and in these cases, it was fulfilled. We may note here that the designers evoke the role of raising awareness in their publications:

> Physical activity prompts were designed to engage the user with the Ally app and increase the user's awareness of the daily step goal and their current physical activity level (Kramer, 2020: 126)

However, the designers noted that physical activity prompts did not have a statistically significant effect on raising users' step count. This is in line with my analysis. Users did tend to elude the chatbot or, when questioned about it, referred to it as useless or childish. In fact, ALLY team's results point to financial incentives, 'dashboard', and objectives as the main mediators for change:

> Daily incentives, physical activity prompts and planning exercises were evaluated. Of these, only daily cash incentives significantly increased physical activity. Physical activity prompts and planning may require sufficient participant engagement to be effective. Although not explicitly tested, the remaining components of the app, i.e. the dashboard and personalized step goals, also appear to contribute to the app's overall effect. (Kramer, 2020: 132)

By dashboard, the designers refer to the screen of the application that display the various numbers related to steps and rewards (see Figure 13, left screen). I will discuss the role of incentives in the next chapter. But for now, my results and that of the designers are aligned in saying that daily encounters with quantitative data (the dashboard and step objectives) did raise users' awareness, which led to the implementation of small changes in routine. According to me, this process is central to the observed behavior changes. Our results are also aligned in suggesting that physical activity prompts (forms of push notifications) and planning exercises did not contribute to behavior change. In other terms, the chatbot dialogue did not have a significant effect.

In the previous paragraph, I demonstrated how, in certain contexts (parking a car, going to the bakery, breaks at work, etc.), the different features of the ALLY system, interacting with users, prompted changes in awareness and behaviors. Such transformations have been explored in different self-tracking contexts (Pantzar et al., 2017; Pink et al., 2017; Pharabod, 2019; Kristensen and al., 2020). In the literature review, I pointed to the fact that self-tracking practices are both productive and the product of interrelations between users' agency and social structures. If we bear in mind the de-scription of the technical systems performed in chapter 5, the aforementioned transformations are a telling example of their mediation of sociocultural patterns, in the context of users' appropriation.

These changes in awareness and behavior could not have happened (or would have happened differently) without ALLY's mediation. The various elements (for example the development of the internet of things, the injunctions to digitalize, the pressures that lead insurances to develop mHealth interventions, the goals of the research lab, social cognitive theory) are mediated by a specific technical system (ALLY) that 'incites', 'induces' (Foucault, 1982: 789), 'allows, or forbids' (Akrich and Latour, 1992: 261) the development of certain forms of awareness and the performance of certain behaviors. It is in that sense that ALLY prompts agential modifications. In the next chapters, I will also turn to the meanings and values that emerge through similar mechanisms.

However, as was pointed in section 2.2.1, users do not passively receive these mediated prescriptions. As is evident in the previous examples, users resist, struggle, create, think and act. In Akrich and Latour's terms, users perform forms of subscriptions (1992). Scholarship has done a great job of exploring the various ways users' agencies become intertwined with self-tracking technologies to produce 'different kinds of complex and not very centered subjectivities' (Moser and Law, 1998: 210). Concepts discussed in the literature review, such

as ‘laboratories of the self’ or ‘human data assemblages’ are particularly fruitful to that end (Kristensen and Ruckenstein, 2020).

In the previous sections, I have provided examples of such processes. However, one of the main aims of this dissertation, as was discussed at length in the literature review chapter, is to demonstrate that these mechanisms do not happen in a vacuum. Agency (I generally prefer to simply refer to practices, meanings, and values to focus on the agential elements that I empirically revealed) must be situated with regards to (among other things, such as technological prescriptions) users’ pasts. Once again, this is not to say that people are not active, or that agencies are not always relational (Suchman, 2009). To the contrary, previous sections and the literature provide telling examples that they are. What the next chapters will demonstrate is that the practices, meanings and values (and down the line the agencies) that are produced by iterative interactions between technical systems, data, and users are also enabled and constrained by users’ prescriptions (see chapter 3 for my conceptualization of users’ prescriptions, and Figure 7 for my model of human-technology interactions). In that perspective—which is, once again, limited and related to my specific research questions—agencies are a byproduct of iterative and contextual interactions between (malleable) technical prescriptions inscribed by designers within a technology and a set of plural and contextual user prescriptions (see Figure 7).

6.8. The absence of ‘sociality’

I have thus highlighted two particularly salient ways to appropriate ALLY, and, in the next chapter, will describe four prototypical styles of use. However, it may strike the reader that no reference is made to forms of ‘sociality’. Many self-tracking studies have, indeed, revealed the communicative role of self-tracking, and its intertwinement with sociality (using it to encourage others as part of a group, to show the data to a health practitioner or a trainer, etc.) (Pharabod et al., 2013; Lomborg and Frandsen, 2016; Lombord et al., 2018; Kristensen et al., 2021). In

these studies, self-tracking and/or the data it produced are reframed by and harnessed in live social relations.

Surprisingly, this was not the case in my research. The interview grids for the first and second round of interview entailed a question about such sociality. However, interviewees remained particularly silent on the topic. Users of myStep and ALLY did not express any need or refer to any habit to share their data with others (except for the automatic transmission to the insurance), and more generally to discuss their practice with others. Some people did discuss the program itself and its importance with their families, notably to try and convince them to engage with it (see descriptions of meritocrats and litigants in the next chapter), but there are very few traces in my data of people sharing the data with others compared to other studies

My interpretation of this absence is that the context of use conditioned users to experience this form of self-tracking as an intimate and personal practice. By context, I mean the fact that myStep and ALLY are tied to health insurance, and that they provide financial incentives. My hypothesis is that health insurance is generally perceived as an intimate topic, even more if it relates to people's insurance premiums. In other terms, the data generated by myStep and ALLY is contextualized (by the applications themselves, see chapter 5 and 8) as a proxy for health and health expenditures. I thereby hypothesize that it was experienced as personal and intimate data that people are reluctant to share. Of course, this is a hypothesis based on people's sensitivity and silence around the subject and would require further observations to formulate a solid proposition.

6.9. Users' contribution to the de-scription of ALLY

This chapter was devoted to users' accounts of their experience with ALLY in the context of daily life. Interviewing them, I allowed them to express things they were not able to express otherwise, because the application remained a silent interlocutor. Once again, this is partly due to the processes by which the app was designed and deployed, which tend to produce barriers

between design and use. As suggested by Akrich, observing the mismatches between design and use, scripted and actual users, between the inside and the outside of the technology, allows the analyst to further the understanding of the script (1992). Notably, it highlights prescriptions that remain invisible as long as the technology is not used.

If we briefly go back to the technology of mediation—notably its hermeneutical branch—we notice that a script may highlight certain point of views, but that it may also (sometimes in the same movement) downplay or obscure others (Ihde, 1990; Swierstra, 2013). In the case of ALLY, the first part of the description, which centered on design, demonstrated that it emphasized users' rationality and responsibility, fostering a program of action centered around standardized measures, objectives, and rewards. This is what the technology tends to highlight or bring forward. Users, on the other hand, directed our attention to things that the application tends to neglect. The mismatches between the script and users' experience of it arose out of the neglections of the efforts needed to always keep the Smartphone on, the variety of physical activities, and the messiness of 'social life'. The physiological and rational standards of the script are ill-equipped to cope with the difficulty to carry a Smartphone in daily life, the existence of many non-walking physical activities, or the unpredictability of social life. There is a mismatch between designers' vision and users' practices, between the types of expert knowledges used to develop the application (SCT and physiological standard) and the constraints of daily life.

Based on users' accounts, I argue that, on the one hand, there are 'positive' prescriptions, which tend to be consciously implemented in the technology (for example incentives or self-monitoring prompts) and emphasize certain aspects of reality; and that on the other hand, there are 'negative' prescriptions, which tend to be unconsciously embedded in the script and relate to neglections or exclusions of certain aspects or reality. Logically, the first are easier to derive from the design or the technology itself, whereas the later tend to remain hidden if there is no

crisis (breakages, mismatches in use, etc.). The analyst may have educated guesses about negative prescriptions. For instance, I had hypothesized that some users may be troubled by ALLY's incapacity to factor in biking bouts. However, this remained a hypothesis. Only by analyzing users' perspectives was I able to bring this to the fore and provide evidence that it is indeed an issue.

This entails important consequences for critical scholars practicing de-scription and designers. Critical scholars do often focus on either design or use. Even Akrich, who brought our attention to the importance to articulate both views, does tend, in her articles, to emphasize one side or the other. Of course, this is often motivated by specific research questions, which do not always require the analyst to be symmetrical. However, I argue that sociological analyses that aim to contribute to the development of technologies should consider both sides of the (same) coin. Finally, I argue that adding the heuristic vocabulary of positive and negative prescriptions to the de-scription framework may facilitate the analyst's job. For technology designers, this analysis emphasizes—once again (Schuler and Namioka, 1993)—the necessity to integrate users in the development phase to identify potential negative prescriptions that may impact the success of the technology.

Users helped us identify negative prescriptions. First, they emphasized the materiality of the hardware on which the intervention relies, noting how burdensome it can be. Second, they drew our attention to the fact that physiological standards are at the root of the technology. These standards entail a form of reduction that resulted in users feeling ill-represented by the data they generate. Finally, they highlighted the fact these standards are uneasy to apply within everyday social rhythms (Pantzar and al., 2017). We can now trace back to the type of subjects that are embedded in the application's script and refine our table. Based on this chapter's results, I argue that the script pictures a rational subject that evolves in a de-contextualized environment. Figure 17 updates the heuristic de-scription table presented in the previous

chapter by adding the new negative prescriptions (hardware materiality and daily life messiness are coalesced in ‘neglection of social context’).

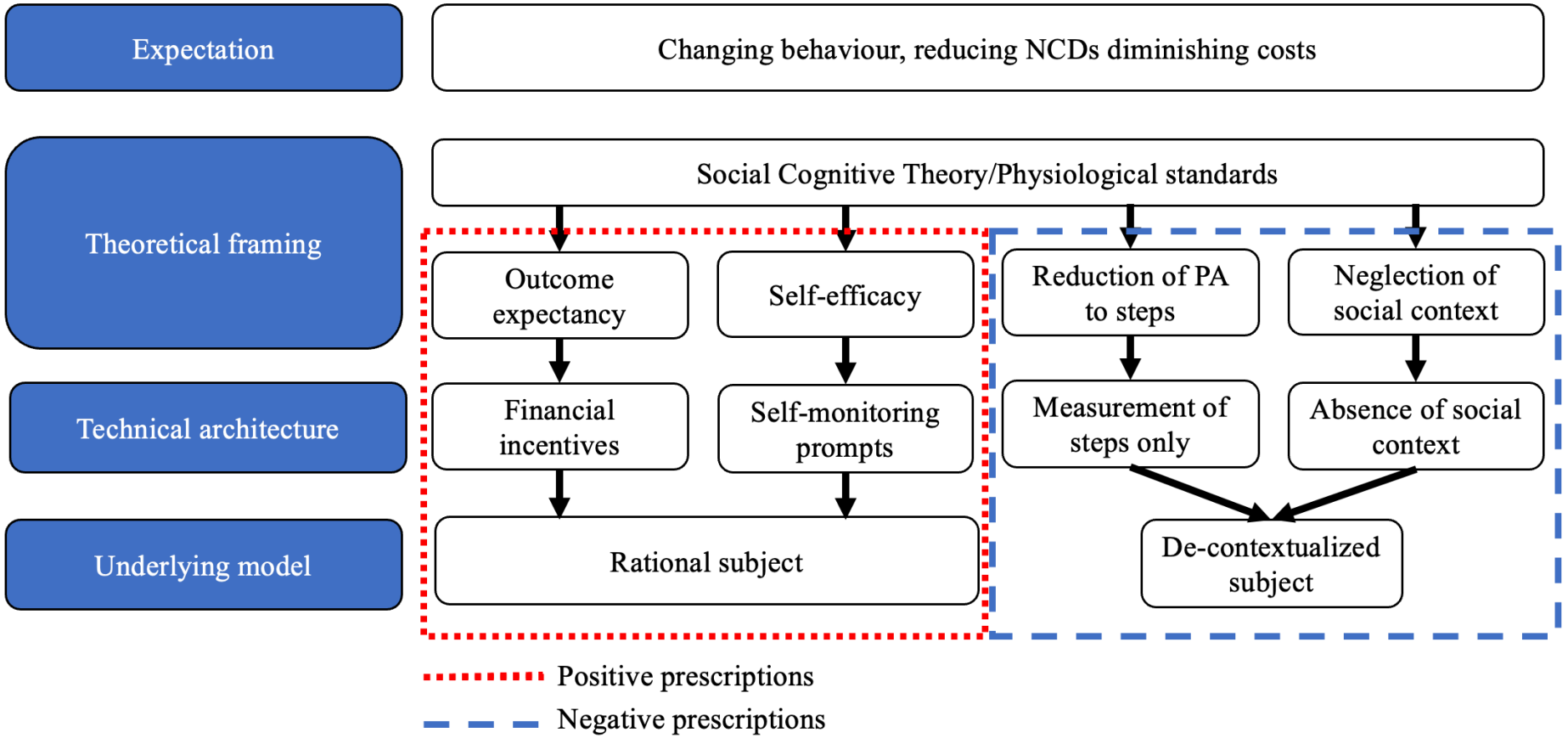

Figure 17 Updated version of the heuristic summary of the de-scription (2)

6.10. Chapter recap

Digital health interventions are sometimes described as invisible or silent manipulators in the sense that they preselect or choose for the individual (Cheney-Lippold, 2011). This chapter leads to a nuanced view of this assertion, for it demonstrated the resistance of users towards such prescriptions. Based on users' feedback, I identified three prescriptions embedded in the application, namely, the assumption that people carry Smartphones all the time, a reductionist approach of physical activity, and a 'bracketing' of social context. In the three cases, participants tended to force ALLY out of its planned trajectory. ALLY's incapacity to adapt their antiprograms led them to conclude that the application exhibited a 'lack of nuance or contextual understanding' (Willson, 2017). Once applied to people's lives, the code behind ALLY was limited by its own functioning, which 'reduces people to the properties that are relevant to a given step of the algorithm' (Totaro and Ninno, 2016).

It is likely that some users de-inscribed themselves because of these limitations. However, many users decided to carry on using the app and found ways to adapt to it. In those cases, I described two prototypical forms of use, surveillance and attempts at behavior change. These will be discussed further in the next chapter. The negotiations and resistance observed in this chapter offer a counterpoint to the idea that users trust technologies more than themselves and highlights the work and circumstances needed for data to 'become unquestioned, normalized and invisible' (Willson, 2017: 12). These are important results, yet they fail to address another form of–less visible—resistance to which I will turn in the next chapter.

7. Scripts and digital divides: the role of dispositions in adoption and use

> « C'est en ce sens que les objets techniques peuvent être considérés comme des instruments politiquement forts : dans le même temps qu'ils produisent des modes d'organisation sociale, ils les naturalisent, les dépolitisent, leur confèrent un contenu autre ». (Akrich, 1987 :67)

This chapter is based on the following article:

Presset, B. and Ohl, F. (submitted). Self-tracking's entanglement with social dispositions: a study of digital divides in health insurance.

I was the lead author of the article, responsible for conceptualization, investigation, data collection, methodology, formal analysis, writing—original draft preparation, and writing—review & editing. Fabien Ohl had a supporting role in conceptualization, methodology, and writing—review & editing. Fabienne Crettaz von Rotten had a supporting role in quantitative design and analysis. To fit the thesis format, I switched to a first-person narrative even though the article was a collective endeavor.

7.1. Chapter overview

Scholars have explored the role of self-tracking in mediating people's values, perceptions, and practices. However, the role of structural elements such as social conditions and positions has been neglected and, consequently, self-tracking's impact on inequalities remains a blind spot. Using both quantitative (n=818) and qualitative (n=45) data gathered from users and non-users of ALLY and myStep, I highlight the impact of users' dispositions on the adoption and use of the technology. I describe four prototypical categories of users, *the meritocrats*, *the litigants*, *the scrutinizers* and the *good-intentioned*. My results indicate that—although it may lead to the changes evoked in the previous chapter under certain conditions—the self-tracking intervention tends to reproduce inequalities and cast doubt on its promise to revolutionize health prevention. They suggest that too much emphasis has been put on the transformative powers of self-

tracking, and not enough on the effects of users' dispositions (Bourdieu, 1988). As a result, scholars, designers, and public health stakeholders may have contributed to the illusion that technological devices can override structural elements, with the consequence of side-lining the issue of health inequalities.

7.2. Following a hypothesis: the role of dispositions

The previous chapter is based on an article that I wrote early in my research. It led to the elaboration of two hypotheses that I will tackle in this chapter and the next. Namely, (1) that the adoption of self-tracking is conditioned by users' lifestyles and (2) that the use of self-tracking in insurance programs reconfigures users' understanding of solidarity. The current chapter focuses on the first hypothesis. Based on the concept of digital divide, it enquires whether acquisition and use of the technology reduce, reinforce, or transform existing health inequalities (Selwyn, 2004). To this end, I first question whether there are social conditions for acquisition by analysing sociodemographic differences between users and non-users of the application. I then explore differences as to how patterned groups of users appropriate the technology in daily life. Thereby, I tackle the two identified loci of digital inequalities: acquisition and use (Hargittai, 2008).

This is of importance, for unlike personal, idiosyncratic forms of tracking, institutionalized and financially rewarded self-tracking—for example, as part of an insurance program—involves its valorisation by a major health institution and its integration in a health-economy and the institutional governance of health behaviours. Behaviour-based programs and tracking technologies that deliver financial bonuses and premium reductions are increasingly being offered to large populations of policyholders, thereby transforming their relationship with insurance companies (Tanninen et al., 2021). This raises critical—and so far understudied—issues, notably regarding the impact of those digital programs on health inequalities (Halford and Savage, 2010).

As was discussed in the literature review, acquisition and use of self-tracking are often analysed without giving much attention to how they are embedded in existing lifestyles. Its uses are mostly apprehended as the outcomes of individual values and personal wills. However, the results presented in this chapter demonstrate that this is too restrictive an approach and that the

focus must be broadened. I offer to consider the acquisition and use of self-tracking as components of lifestyles whose understanding requires attention to the effects of dispositions, which are products of social positions and conditions (Bourdieu, 1998; Cockerham, 2013).

This chapter relies on both qualitative and quantitative data. The qualitative analyses are based on ALLY and myStep interviews. The quantitative methodology is presented hereunder. As explained earlier, I decided to present it close to the sole portion of the thesis that relies on it. In the following sections I present the quantitative methodology, describe patterns of adoption, patterns of use, and discuss their relevance for both scholars and policymakers.

7.3. The quantitative methodology

7.3.1. *Study sample*

Questionnaires were sent to 20,000 Swiss insurance customers who were eligible to use myStep. The email was sent by the insurance company (see annexes). We ensured that customers from all age and gender were reached. A total of 231 users of the myStep application and 840 non-users completed the questionnaire. 41 users and 212 non-users were excluded because they did not fully complete it. Table 4 summarizes the sociodemographic information of the 818 participants included in the study.

Table 4 Summary of the questionnaire sample's sociodemographics						
	Full sample (n=818)		myStep users (n=190)		non-users (n=628)	
Women (*n*, %)	*443*	*54.16*	*108*	*56.84*	*335*	*53.34*
Age (*M*, SD)	*44.91*	*15.48*	*41.01*	*12.97*	*46.09*	*15.90*
Income (n, %)						
Very low	*84*	*10.27*	*9*	*4.74*	*75*	*11.94*
Low	*166*	*20.29*	*43*	*22.63*	*123*	*19.59*
Middle	*163*	*19.93*	*35*	*18.42*	*128*	*20.38*
High	*168*	*20.54*	*45*	*23.68*	*123*	*19.59*
Very high	*237*	*28.97*	*58*	*30.53*	*179*	*28.50*
Education (n, %)						
Low	*18*	*2.20*	*4*	*2.11*	*14*	*2.23*
Middle	*259*	*31.66*	*66*	*34.74*	*193*	*30.73*
High	*72*	*8.80*	*18*	*9.47*	*54*	*8.60*
Very high	*469*	*57.33*	*102*	*53.68*	*367*	*58.44*
Time of use since adoption in months (M, SD)			*14.96*	*12.22*		

7.3.2. Measures

Age, gender, income, and education were measured in the questionnaire. Income categories were based on the 2018 Swiss Earnings Structure Survey by the Federal Office of Statistics (OFS): <4,000 CHF (very low); between 4,000 and 6,000 CHF (low); between 6,000 and 8,000 CHF (middle), between 8,000 and 10,000 CHF (high) and >10,000 CHF (very high). Education measures reflected the structure of the Swiss education system: primary and secondary compulsory education (low), upper secondary professional education (middle), upper secondary pre-university education (high), tertiary level professional education and higher education/university (very high).

7.3.3. Analysis

Statistics were calculated using SPSS software. Binary logistic regression assesses the relationship between a binary dependent variable and a set of (binary or nonbinary) independent variables (Pampel, 2000). Thus, we distinguished users from non-users, using the non-user group as the reference category. Gender was entered as a categorical factor, education and income were entered as ordinal variables, and age was entered as a continuous variable. Odds ratios refer to the likelihood of using the application. Hence, numbers greater than 1 point to a greater likelihood of using myStep, whereas numbers lower than 1 point to a lower likelihood of using myStep.

7.4. Acquiring ST technology, first order digital divide

Let us consider first order divide, or inequalities in acquisition. The logistic regression provides clues as to how social conditions and positions influence the likelihood of adopting myStep. Table 5 summarizes its results. myStep users are significantly more likely to be younger (OR=0.973), have a middle or high education (OR=0.816) and have a higher income

(OR=1.250). These three factors are typically identified as significant by research on mobile health technologies (Bhuyan et al., 2016; Carroll et al., 2017; Bol et al., 2018) and recent studies on ST (Régnier and Chauvel; 2018; Findeis et al., 2021). Gender has no significant impact.

Table 5 Results of the binary logistic regression			
	b (SE)	OR	95% CI
Gender (male=0)	-.072 (.178)	0.931	[0.657,1.319]
Age	-0,027 (.006)**	0.973	[0.962,0.985]
Income	0.223 (.070)**	1.250	[1.090,1.433]
Education Level	-0.203 (.093)*	0.816	[0.681,0.979]
Note: R^2 = .051 (Nagelerke). Model X2 (4) = 28.216, p<0.001, OR = Odds ratio, *p <.05 ** p<.001.			

Descriptive statistics suggest that the typical user is 42 ± 12 years old, with an upper secondary professional education (middle). Regarding income, the most impoverished people (<4,000 CHF) are by far the least likely to acquire myStep. Figure 18 compare users to non-users according to income, education, and age. Particularly evident on the graphs are the decreased likelihood to be user as one ages (top), the lower likelihood to be user for people with low income (bottom), and the greater likelihood to be user for people with a professional education. These results are perfectly in line with recent articles (Régnier and Chauvel; 2018; Findeis et al., 2021).

These results highlight the significant impact of age, income, and education on the acquisition of myStep. They thus confirm the presence of a first order digital divide which is not due to economic barriers, since the application is free. However, the interview data (described below) and the low values of the model coefficients (R^2 = .051 (Nagelerke). Model X^2 (4) = 28.216, $p<0.001$) suggest that acquiring myStep is tied to more complex processes.

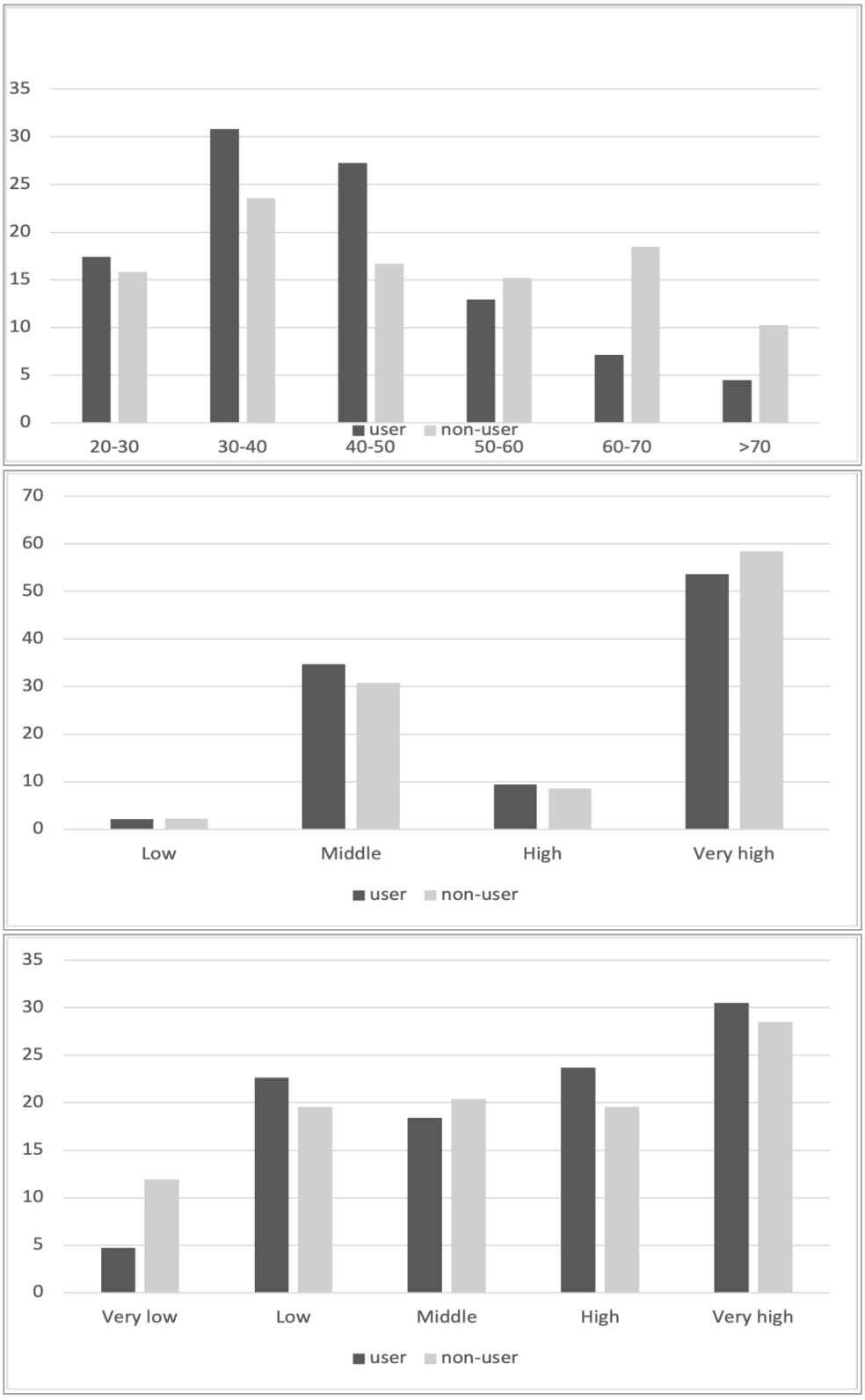

Figure 18: Graphs comparing users (n=190) and non-users (n=628) according to age (top), education (middle), and income (bottom) in percentages.

Findeis et al. 2021 faced similar issues, which point to the difficulty of identifying the key factors in the adoption of such mundane technologies. Further down, I use interview data to clarify the links between cultural dispositions and use of the technology. Before I engage with this, I would like to draw—upstream—from these descriptions to tackle the role of life life trajectories and specific forms of socialization in the acquisition of the technology.

For users in the first category, *the meritocrats*, acquisition of the technology is driven by an ethos that emphasises self-responsibility and improvement. In other terms, users download myStep because it aligns with an existing lifestyle oriented towards self-optimization. A similar process leads *the scrutinizers* to acquire the technology. In their case, acquiring the technology inscribes itself in a disposition to measure and analyse data. Let us note that for these two first categories, and contrary to the other two, acquisition is not tied to the financial rewards distributed by the application. These are regarded as unimportant, which is likely tied to the social position of these users, who all earn high incomes.

This is not the case of the next two categories, where users' economic profiles are much more heterogenous. *The litigants* acquire the technology because they believe in its political underpinnings, they regard myStep distribution of incentives as fairer (than traditional health insurance) for it financially acknowledges their efforts regarding physical activity (Van Hoyweghen et al., 2007; McFall, 2019). Let us note here that for these first three categories, changing behaviour is not an issue. Most of these users already reach the step objectives prior to the acquisition of myStep and consider their lifestyles healthy. To the contrary, changing one's behaviour is central to the acquisition of the technology by the last category, *the good-intentionned*. These come from heterogenous backgrounds but share a common denominator: they all suffer—or one of their close relatives suffers—from a health condition. Hence their acquisition of myStep as a tool to increase their physical activity. The centrality of health

prevention for this category supports previous research that identified health related concerns as a focus of middle-aged and older self-trackers (Dagiral et al., 2019b).

Empirical proofs and close descriptions of the categories will follow in the next sections, but this brief consideration of acquisition rationales provides an important information: acquisition is—at least partly—explained by the interaction between social condition and positions, secondary socializations, and life trajectories, in other terms: by dispositions (Bourdieu, 1984). That perspective explains the difficulty faced by current quantitative studies (including my logistic regression), which limit their models to raw sociodemographic determinants. Considering these statistically proves the presence of a first order divide but fails to account for the various logics of acquisition—notably those of poorer and older individuals—that underly it.

Such patterned heterogeneity in the diffusion of an insurance self-tracking intervention raises questions about its actual health promotion potential. In other words, the promises of self-tracking programs to change people behaviour and better their health are here undermined by classical socio-determinants of health (Robinson et al., 2015; Baum, 2007; Baum and Fisher, 2014). Quantitative data shows that certain categories of people are statistically excluded from the program, and qualitative data suggest that changes in health behaviour are an acquisition factor for only one out of four categories of users. As in many other cases, the people who are more likely to use the application are not the one typically identified as the main targets of health promotion (Western et al., 2021). This is a first sign that self-tracking interventions, once considered at the level of a population, may reproduce prior lifestyle patterns and the associated forms of inequalities more than disrupt them, although they may lead—in certain cases—to beneficial change in behaviour. Let us note that we should remain cautious regarding that interpretation for the category of non-user does not automatically equate inequality or disadvantage (Wyatt, 2003).

These results were confirmed by a recent discussion with Jan-Niklas Kramer. During the ALLY protocol, participants income and education were monitored. At the end of his thesis, in a short section devoted to the 'public health impacts' of ALLY, Jan-Niklas argues the following:

> Participants in the two field studies were systematically better educated, healthier, better paid and more active than the general population. These factors are directly or indirectly related to a lower NCD risk. Because increases in physical activity have greater effects on NCD risk for inactive and at-risk individuals (cf. section 1.1), voluntary selection into health interventions is accompanied by reduced public health impact (Kramer, 2020:142).

This is discussed in the general discussion and was not the focus of the core arguments in his thesis. Consequently, the thesis—or the articles—do not frontally engage that question, and do not explain how these results were attained. When I asked Jan-Niklas about it on the phone, he told me that they compared the sociodemographic information of the ALLY participants to data from the Swiss federal office of statistics. Results highlight the fact that they differ significantly, mirroring my results on myStep, and pointing to a first order digital divide.

In ALLY's case, the researchers compared participants to Swiss general population. In the myStep case, I compared users and non-users within the insurance company. In both cases, we found evidence of a digital divide. One thing should be noted. In both cases, only policyholders that had a supplementary insurance could participate. Supplementary insurance is not compulsory in Switzerland. It is thus likely that people who experience precarity are statistically excluded from such insurance plans. I called the Federal Office of Public Health, the Federal Office of Statistics and the Swiss Financial Market Supervisory Authority to find data that could support this, without success. I cannot prove it empirically, but I suggest that the first order digital divide present in the adoption of myStep is in fact even more pronounced if we factor in the fact that having a supplementary insurance is already subject to a divide.

7.5. Second order Digital Divide, tackling heterogeneity in the use of myStep

As we have seen, dispositions play an important role in the acquisition of technologies. However, acquisition corresponds to an intention of use, not to a use—or a practice—in itself. As a result, it is mandatory to turn to the effective appropriation of myStep in everyday life to better identify the effects of dispositions and to tackle second order divides. In the next sections, I describe four clustered (in the sense that there are similarities between users in a similar pattern) and characteristic (in the sense that what is found in a pattern is not found in others) types of myStep use that emerge from the analysis of interview data. Let us note that these descriptions include the empirical evidence regarding the acquisition patterns evoked in the previous section.

Before the description of each category of use, I included the description of one individual belonging to that category (the text is presented in a grey box). I did so to mitigate the fact that the presentation of ideal types tends to obscure the lived experience of individuals. Because ideal types rely on the observation of patterned recurrences, and because I choose to draw from a mixture of quotes derived from all members of a category, my presentation of the categories tends to invisibilize the lived experience of the interviewees and their idiosyncratic trajectories. Of course, what is lost on the side of contextualization and idiosyncratic trajectories is gained on the side of systematization and objectivation of the patterned organization of the social world. By presenting the trajectory and history of one member of the category alongside the description of the ideal type, I hope to have found a middle way to mitigate the abstraction necessarily caused by the systematization.

7.5.1. The meritocrats:

Mathieu (pseudonym) is a 46-year-old man who works full-time in wealth management for a private bank. He is married with two kids. He did a commercial apprenticeship (in Switzerland)

as an adolescent, which he later followed with a master in wealth management. He initally comes from a practice-based background, which led him to learn on the field before he went back to university to obtain skill-certifications.

He mentions coming from a sport-oriented family. According to him, he 'has always been in sports'. He approaches sport as both a way to remain healthy and a possibility 'to go beyond oneself'. His is mainly running, although he does some cross-country skiing in the winter and 'sometimes' plays tennis. He generally runs three or four times a week depending on whether he is 'training for a race', which translates into four or five hours of actual training. He generally participates in four of five races a year, one of which is a marathon.

He has been using a heart rate monitor since he started running (more than 20 years ago), and now uses a sports' smartwatch. He measures—a minima—his heart rate, speed, and distance, and follows a training program. He was already tracking himself when he discovered the myStep program. When asked about his reason for participating in the program, he gives two answers. First, he enjoys being rewarded financially for his efforts. Second, he believes that people should generally be incentivized to exercise more so that the health costs would be lowered.

He believes that sport and his professional environment are similar in the sense that they rely on objectives and measures to organize competition amongst individuals, and, down the line, better performances. In both cases—he gives the telling examples of not being selected in a sports team and having performed badly at work and being confronted about yearly objectives—he believes that objectives and measures are a means to responsibilize people. He thinks that myStep—although not very relevant for him because he is very active—can produce the same responsibilizing-motivating effect on less active people, hence his support for the program.

The first type of use is characterized by an injunction to improve. This necessity is at the core of *meritocrats*' appropriation of the technology. It applies to other aspects of their lives, suggesting that self-tracking is part of a bundle of practices related to a common lifestyle. When asked about the necessity to measure steps, an interviewee provides the following answer:

> So that I can see where I am at! How I feel after I have done my steps, if I feel good, bad… and to go even further and run—that is the point—even further than I ever had (…) Now I walk 25, 30 (minutes) without a problem, maybe not running. But it is… yes always surpass one's, yes always go further. (45-year-old woman, finance specialist)

These users, contrary to the three other categories, are not satisfied with reaching the objective. They strive for more steps in what seems like an endless quest for optimization. Measurements are used as a standardized baseline out of which increments, and decrements can be deduced. Hence, the necessity to measure regularly and the irritation toward walks that are not measured. The centrality of numbers and quantification is also highlighted by a disdain toward other forms of relations to physical activity, such as feelings that are described as 'guesswork' or 'silly'.

If the technology is appropriated as a proxy for continuous improvement, it is also valorised as fostering 'accountability'. From that perspective, using the application reveals the 'real' state of things and, thus, confronts users with their active or inactive lifestyle.

> Interviewer: you mean that your wife does not like the idea of measurement?
> Interviewee: Ah no! But also, because numbers… they show things as they are… and it makes you accountable. If you do not see the numbers, you can always say "that is ok, I am good" (…)/with numbers/you become responsible, huh? It is written on paper, huh? You cannot escape it! (51-year-old man, sales manager)

Accountability and responsibility are used interchangeably by *the meritocrats*. The possibility to measure is closely tied to a moral duty to face one's responsibilities to be physically active to diminish health costs. Indeed, these users consider myStep—and individual behaviour—as key to diminishing the global costs of health.

All users in this category are highly educated, earn a high income and work in private companies (mostly in finance). Moreover, they have been socialized in sports and/or professional environments that valorise competition, improvement, and quantification.

> Well, it also has to do with my work. Most of the time, my job is to make profit on money, on my acquisitions. It is always about profits, gains. And it is physical, tangible, I know exactly what I win. And here I know exactly what I win too; in steps, in cardio, in minutes, I think that… for me it is related. (45-year-old woman, finance specialist)

The meritocrats have incorporated—prior to their appropriation of myStep—an ethos that valorises improvement and quantification. They already reach their daily step objectives before using the app and thus only slightly change their behaviour with improvements that are not rewarded (steps over 10,000 are not rewarded). The centrality of improvement, which is absent from the script of the application and from the other three forms of appropriation, seems to stem from these users' lifestyles, refracting the dispositions they have acquired in specific environments, notably working in private finance companies and practicing competitive sports. This may be tied—and the same could be said, *mutatis mutandis,* for the next two types of use—to what Bourdieu calls *amor fati* or necessity made virtue; i.e., instances where 'external constraints have been transformed in interior models, in personal tastes (or passions)' (Lahire, 2001). Here, the script of the application dynamically interacts with the lifestyle of users and allows for the expression of incorporated dispositions.

Centration on improvement and optimization in self-tracking is often interpreted by scholars through the notion of entrepreneurial self which highlights individual's managerial attitude towards their bodies, health, and lives (Rose, 2007; Cabanas and Illouz, 2019; Kreminska, 2021). In this perspective, self-tracking is both the product and productive of neoliberal trends in which the burden of responsibility for health is transferred from institutions to individuals (Ayo, 2012; Petersen and Lupton, 1997). *The meritocrats* in our sample have internalized this entrepreneurial ethos in specific work and sport environments and find in

myStep both a way to express and reinforce it. Let us note that similar forms of appropriation have been documented by Kristensen among Danish trackers and by Dagiral among French and Californian trackers (Kristensen et al., 2015; Dagiral, 2019).

7.5.2. The litigants:

Ana (pseudonym) is a 75 year-old Portuguese woman who was born in Mozambic, where she was trained as a schoolteacher. She left Mozambic in the seventies after the independence to come to Switzerland, where her husband had done some of his studies. There, they found employment as waiters in hotels, where she worked for nearly ten years before she found an office job in a bank. During the interview, Ana explained that migrating to Switzerland was an arduous process, notably because she did not speak French or German. She explains that she had to accept 'any contract in hotellerie' to earn money. At the time of the interview, Ana was widowed and retired.

According to her, she has always enjoyed sports and physical activities. However, during her time as a waitress, she could not engage in extra-professional activities much. Notably because she was already very active in her job. She explains that her growing on a farm played an important role in being active physically and caring about nutrition. She avoids processed food and 'reads a lot about nutrition'.

Ana owns a Fitbit bracelet that she uses to record her step and upload her data to the myStep application. However, she had already been tracking he steps for years before she engaged with myStep, on her Smartphone. She mainly joined myStep to earn the premium reduction, after a discussion with friends who had heard about the program. She was already walking 10'000 steps a day before she downloaded the app and—according to her, downloading myStep 'did not change anything regarding her behavior'.

According to her, people are responsible to try and be in good health. Thereby, she believes that programs like myStep are important. According to her, she should not pay for

people who ‘stay all day in front of the television eating chips and doing no efforts’. She believes that the ‘less we ask of people, the less they do’. According to her, her difficult experience as a migrant taught her to be responsible and hard-working. She believes that—to the contrary—people become lazy when they can rely on social services, hence her support for myStep like incentives.

Litigants never mention improvement. Moreover, they do not seek change. None of the users in this category changed their walking behaviour as part of the program, and they all reached their objective since day one.

> Interviewee: …but all of that /walking/, I was doing it before. It has nothing to do with the app; I was doing it before.
> (41-year-old woman, nurse)

This leads to the following question: why do they use the app? The first answer is valid for all users in this category; they seek confirmation that their behaviour is aligned with the expected lifestyle or norm that the technology encompasses.

> Interviewer: You mentioned the pleasure to see the globality?
> Interviewee: Yes, it is pleasurable yes…
> Interviewer: Why is it important?
> Interviewee: It is a confirmation … When all the boxes are green, I know that I was not lazy! (41-year-old woman, nurse)

For *litigants*, aligning with the objective is reassuring or securing. They use myStep as an actionable (daily and for a financial reward) classificatory scheme, legitimized by institutions, which ‘implies a symbolic privilege: the privilege of being comme il faut, conforming to the norm’ (Bourdieu, 1998: 69). On the other hand, dispositions are ‘armed with a set of perceptual and evaluative schemes’ (Bourdieu, 1984: 54). Thus, the effect of social position and adherence to a neoliberal model of body management drive to condemn people who do not comply with the norm. The—morally laden—word ‘laziness’ is indeed used to refer to a potential failure to

reach the objective. Daily objectives are understood as moral compasses, and *litigants* harshly criticize people who are inactive and do not comply with prescribed norms. Like *meritocrats*, *litigants* consider that movement is a matter of individual responsibility. They perceive myStep as a fairer way to determine insurance premiums (Van Hoyweghen et al, 2007).

> For me it's something that's important and so... people who complain, who don't move, who don't do anything and then... who are very sedentary and who fall ill; on the one hand, I... it's perhaps a bit hard. I'm not going to say, 'that's what you get', but it's a bit your responsibility, it's a bit up to you... (31-year-old man, school teacher)

> I think it's important that... well, it always bothers me to... to pay for people who, I mean, who won't take care of themselves. It's something that's important to me, I keep myself in shape, I try to pay attention to what I eat, what I do. And it bothers me to pay more for health insurance because there are others who need it more because they are less careful than me. (33-year-old man, police officer)

The insistence on morality and justice, coupled with an emphasis on rewards and objectives, is characteristic of *litigants*' appropriation of myStep. It explains why they are the only category that mentions potential forms of cheating:

> People may give their phone to someone else. I never did it, but, well… It is always a danger when one gives people money; they will try to circumvent things. And there, I think we need to be strict: it is fraud. (70-year-old man, banker)

In contrast to the first category, it comprises many people with unstable or difficult financial conditions. Users here fall into two categories: people with favourable life conditions who adhere to neoliberal political values (but have not incorporated a need for improvement or optimization) and people who struggle with difficult life trajectories (migration, unsatisfactory financial conditions), share the individualizing logic of myStep and need the financial reward.

The appropriation of myStep is centred on the objective, which is understood as a norm or a moral compass. Users in this category adopt the application to reassure themselves that they comply with a norm and turn its logic against 'lazy' individuals who do not. myStep

becomes a means to contrast one's identity with others. Numbers and the application—which are legitimized by their integration into an insurance company program provide a quantitative, practical, and tangible tool to denounce abnormal behaviours, drawing boundaries between people and expressing one's morals on a daily basis.

7.5.3. The scrutinizers:

Benoit is a 64-year-old 'informatician specialized in information systems and information security'. At the time of the interview, he had mostly been doing consulting and expertise in the last eight years. In his youth, he studied physics, before he transitioned to programming. Around his fifties, he went back to university to do a bachelor in management and a master in information security. He jokingly designates this as a 'midlife crisis'.

According to him, he dedicated his life to work with the consequence of 'neglecting physical activities'. When he reached his sixties, he decided to 'get back on track'. He lost thirty kilos by walking around ten kilometers a day. He then 'developed a taste' for these daily exercises, but, at the time of the interview, he was struggling with those because of joint issues. He believes that time (he had more time once he became a consultant) was a key factor with regards to his physical (in)activity.

He own a Garmin watch which he uses to record his heart rate ('sometimes'), steps, speed and distance. He explains to me that he enjoys the numbers and the playfulness of measurements. He is passionate about how to set the proper objectives, how meteorological conditions impact the number of steps, or the inter-relations between intensity and volume.

> Interviewer: Let us talk about myStep. I see that you have brought… (designates papers that the interviewee has laid on the table).
> Interviewee: Numbers!
> Interviewer: Numbers… well let us start from that then!
> Interviewee: So, those are the statistics that I have produced since 2016. I pulled the results by month for each year. And we are there (points to the current month on the curve). And you remember when I talked about joint

> pain? We can see, here, that there is a trend towards decrease… (64-year-old man, expert in information security)

Scrutinizers have an analytical relationship with numbers, which are seen as partial evidence for their quest to describe and analyse their behaviours. These users aggregate numbers in curves (myStep already does it, but not on the same scale) or correlate them with other numbers (weather forecasts, speeds, heart frequencies, etc.). They are sceptics, but not of numbers; they are passionate about numbers and never criticize the application's overall quantification rationale. They are sceptical about each tool and each metric. It is as if they are looking for the best combination of metrics to account for their activities.

> Interviewer: Do you sometimes go for a walk without the watch?
> Interviewee: It happened, but it became a real impulse, to think 'ah where am I at? 8,000? 2,000?' Ah, it is growing, it is… and I am always thinking about a potential correlation, meaning, on another path. How much time does it represent? That is easy, I am used to it. And the number of steps…? From which I deduce distance, because when you know the average stride length… (64-year-old man, expert in information security)

This specific point of view is different from the first category in two main ways. First, numbers are, as we have seen, transformed, pooled, and distrusted at first sight. Second, the overall goal is not to improve but to understand or to monitor. *Scrutinizers* share a taste for number that can be seen in their intrinsic pleasure in measuring and trying to figure things out.

This analytical relationship with numbers and myStep stems from a specific professional socialization. All users in this category have been trained either in the fields of science or engineering. Once again, the appropriation seems to be framed by user's specific education. Let us note that users in this category share similarities with members of the Quantified-Self movement, an institutionalized group of passionate users who also tend to originate from the fields of engineering and science (Nafus and Sherman, 2014).

> Interviewee: So, mainly heart rate and speed… That's basically it, but it's true that it's also linked to my work, because we only do measurements, tests,

> statistics and… you see how. We know that if there's a breakdown, we have to analyse several things; we want to say yes, that's it… That's a bit of it; it's the side that's maybe scientific or yeah… (70-year-old man, retired laboratory technician)

For the *meritocrats*, *litigants*, and *scrutinizers*, use of the technology leads to the reproduction of already existing tastes more than to modifications of behaviour. The constant necessity to improve and optimize (Dagiral, 2019; Cabanas and Illouz, 2019; Kristensen et al., 2015; Boltanki and Chiapello, 1999), the tendency to perceive self-tracking through the lenses of healthism and neoliberalism (Petersen and Lupton, 1997) and the emphasis on the quantification of health and bodies (Adams, 2019; Carter et al., 2018) were acquired in prior socializations for the *meritocrats* and the *scrutinizers*, and are re-enacted and strengthened by the intervention. In the *litigants*' case, the intervention reinforces an already present normative view of health and facilitates an incorporated disposition to draw boundaries between responsible and irresponsible citizens. The researchers cited above have argued that these trends are mostly harmful for individuals and collectives. In that perspective, the appropriation of the self-tracking intervention may, as in acquisition, reproduce existing damaging structures.

7.5.4. The good-intentioned

Mélanie is 50-year-old. Married with two kids, she works part time in a children daycare. She used to work as a saleswoman and a postal worker. However, she explains that, when her husband became the owner of a small company, she decided to leave these 'painful' jobs and start working part-time.

She has always enjoyed light physical activities. However, taking care of her family and working pushed her away from those. Later, when she approached her fifties, she had 'some alerts with regards to health'. At that time—she explains—she had put on a lot of weight, notably after 'having carried her children'. The combination of 'feeling older', having gained weight and the concerns of her medical doctor pushed her to 'try by more active'.

In the process of becoming more active, she attempted to harness the help of self-tracking technologies. She bought different watches and used a variety of applications. However, she did not find one that 'really worked' for her and describes the process of using these tools as a mixture of hopes and disappointments. At the time of the interview, she used her smartphone to record steps and a watch for light running. She explains that the process was lengthy but that she eventually found a way to integrate physical activities in her daily life. Technologies and myStep were a support, but she is not found of either. She is very critical of the latter, which she sees as a threat for the most vulnerable populations.

The clearest characteristic of people in this category is that their interest in technology, measurement, sports—and, more generally, in myStep itself—is low. This is particularly striking; notably, in comparison to the other three other patterns, and points to a misalignment between the script of the application and these users' dispositions. It highlights the complexity of the links between acquisitions, uses and cultural dispositions.

> Well, there are excellent tools, but apart from that, I am not a big fan. I am not seeking the latest gadget. I benefit from them but also endure them for the most part, like everybody… I can really do without them for a week. (37-year-old man, school teacher)

Contrary to the three other categories, here, adherence to quantification and technology is low, with people often describing the process as tedious. The common thing among the *good-intentioned* is that they all have directly or indirectly encountered health-related problems. In the following quote, the interviewee simply refers to feeling less healthy. But other cases include living with someone who has a serious heart condition, having undergone surgery, being pressured by close—and worried—relatives, etc.

> The reason is that since I am retired, I do not go to work with my bike every day. It felt like that daily movement was lacking. I became less healthy and

> put on weight. So, I decided if I do not bike every day anymore, I have to find a way to move. (64-year-old man, retired insurance manager)

Good-intentioned focus on changing their behaviour. They see myStep as a support to bring some physical activity in their daily lives. This is unsurprising considering that their appropriation has to do with concrete health issues. They truly strive to walk more; something that cannot be said of users in the three preceding categories.

> Yes, ten thousand steps is a lot. But, as it is planned, you have to do it. You can do it under pressure (laughs) or… Sometimes it is good because you do a little more. Sometimes it is bad because you are always focused on it. (57-year-old woman, secretary)

The hesitation in this user's experience is notable. She describes a form of pressure that is sometimes good for it helps her reach her objective. However, sometimes it is bad; it draws her focus and attention from other things. Here, we find a struggle that is characteristic of attempts at self-discipline. Numbers and the technology serve as a support or a control/pressure to perform a desired behaviour.

> Yeah, well, sometimes you tell yourself: okay, let's walk there. Yeah maybe… You feel like you want to do a few steps today. Or, sometimes, when you start parking, you tell yourself, because you always try to park as close as possible… And, sometimes, now it is reversed. You tell yourself, okay I will go for a small walk; it feels good, and I get fresh air. So, you park a little farther away once you find a place… And then… sometimes, you think slightly differently about "car-parking" I think, maybe… (56-year-old man, team manager)

This category is characterized by mixed socioeconomic status and heterogeneous socializations. The common denominator is a life trajectory where health problems play a role. It seems that encounters with serious health issues flatten the differences that may be observed otherwise. Thus, dispositions here seem to be—at least partly—overwritten by a life trajectory that entails health difficulties. These users strive to adopt a practice that is not aligned with their

dispositions; hence, the sense of going against oneself, of struggling to force oneself (Bourdieu, 1984; Lahire, 2001).

For the good-intentioned, self-tracking supports forms of self-disciplining which can lead to the promised change in behaviour. The interaction between myStep and users whose life-trajectory entails health issues—or worry that health issues may emerge—leads to actualizations of the technology's behaviour change components. In those cases, my results are in line with self-tracking studies highlighting the tensions and efforts that users face, and the work they must perform, when striving to change themselves (Kristensen and Ruckenstein, 2018; Choe et al., 2014; Didžiokaitė et al., 2018). For good-intentioned users, the promise of self-tracking to change behaviour is implemented via an attempt at self-discipline that could be analysed—but this would go beyond the reach of this chapter—through a post Foucauldian perspective.

Nevertheless, some cautions are in order. First, according to the insurance, only 1 to 2 percent of the customers use the application, so the overall impact on population behaviour is likely to be weak compared to what is promised. Second, interviews suggest that good-intentioned users struggle with the attempt to change behaviour and may not succeed in implementing it. Data is currently lacking regarding the long-term consequences of self-tracking on behaviour modification (Spotswood et al., 2020). Finally, we can hypothesize that the arguably positive modifications in walking behaviour will eventually be accompanied by the previously cited harmful injunctions (Adams, 2019; Carter et al., 2018).

7.5.5. In-between categories

In the four previous sections, I have presented four ideal typical ways to use self-tracking technologies in insurance. To do so, I drew from qualitative data, inductive mechanisms and the concept of ideal type. As explained in the methods section, these categories should not be misinterpreted, 'they are not hypotheses, but help with their development; they are not

descriptions of reality but give clear expression to those descriptions (Weber, 1949 [1904]). Finally, they are a "utopia" because we cannot find them perfectly in any empirical reality (Neves and Mead, 2018: 50). They are built from empirical data through a systematic approach (here grounded theory) with the aim to heuristically help researchers interpret and describe social processes, notably recurrences and variations (here with regards to the appropriation of a mobile health technology by various populations). Consequently, social reality is bound to be more fluid than the ideal types built on its observation. To acknowledge that fluidity, and to discourage too rigid readings of the previous sections, I will provide the example of a user that stand 'in-between' categories.

Brian (pseudonym) is a 33-year-old man who works in informatics. As I will argue, his appropriation stands in between the categories of scrutinizers and litigants. That position is not a surprise for he followed a trajectory that led him from technical engineering studies to working as a manager in a large telecommunication company.

> Yes, so I studied in /anonymized/. I did mechanical engineering, and then I did my master in /anonymized/, in aerospace. Then I came back to Switzerland where I finally found a job in consulting. I worked in consulting; and then left for project management. I worked in different companies and now I've been working at /anonymized/ for a year as a project manager. (33-year-old man, project manager)

He explains, all along the interview, how he transitioned from a training in aerospatial engineering to becoming a manager in a large company, mostly responsible for selling infrastructure to companies.

> At the end of my master's degree, I did a sort of mini—how can I describe it—a three-month module in business engineering and business management. I found it interesting... It triggered this idea of doing this intensive course in—sort of a mini MBA but ultra-condensed—where you don't go too far in all the... We had finance, accounting, production, flow management, uh... marketing, project management, well, a little bit of everything. And in fact, that's what I liked the most, and that's how I went from doing a master's degree in engineering, to going in the direction of a little more business project management...

That transition was not an easy one, and Brian describes the struggles and sufferings that accompanied his integration in large business-oriented structures. He experienced high levels of stress and suffered from a burnout as he was heavily pressured in the first company he worked for.

Considering that bi-partitioned professional socialization, it should not come as a surprise that his appropriation of myStep fluctuates between the scrutinizers and meritocrats categories, between a fascination for numbers as intellectual tools to describe realtiy, and a general emphasis on performance and self-optimization. The following quote evidences the focus on numbers as analytics and a general ambition to 'get better':

> But again, I'm trying to get into a rhythm where I'm in my zone, where I'm pushing myself and everything. I need to do it (intense physical activities) three or four times a week... And so, I have this goal that I need to train 3 or 4 times a week, that's it. So, it's kind of a macro vision, I take a macro vision and then I cut it into little pieces, and I use the tools or the applications (numbers) to try to reach my goals.

As most meritocrats, he does a lot of physical activity. MyStep plays but a small role in his life that is already replete with numbers and intense physical activities. It is part of a broader quantification landscape. Hence the fact that he did tend to answer myStep-oriented questions using other examples. He often mentions sleep, which he sees as crucial to keep a high level of 'performance'.

> And so, typically it's something… I set myself some goals every year. One of those it is that I want to sleep 7 hours on average. Because 7 hours is what I need per night to feel fit in fact… My rule it that for every time I wake up at night (the app tells him how many times he woke up) I must add at least half an hour (of sleep).

As evidenced by the previous quotes, Brian mixes scrutinizers' emphasis on quantification to understand and organize activities with meritocrats' emphasis on performance, a theme that he often refers to in the interview, perceives as important, strives to implement in his life, and systematically links to quantification and objectives.

> So, it's clear that there is a performance objective in society, and then it's up to... I think for me it helps to have an objective and to, to push for performance

I argue that he is an example of someone that stands in-between categories. Following my hypothesis that professional socializations and the use of self-tracking are in a relation of homology (Bourdieu, 1979), I argue that this interviewee provides an example that mixed socializations (engineering/private company management) can lead to mixed appropriations (scrutinizer/meritocrat). The interviewee points in this direction when, asked about the reason why quantification is a suitable way for him to manage self-hygiene, he answers:

> I think I have a mindset kind of like that... I'm an engineer, I work as a project manager, so I'm used to cutting things up like that.

His answer is that both his training as an engineer, and his experience as a project and team manager were key to his appropriation of myStep, and more generally self-tracking tools.

The interviews are replete with examples of people who either truly stand in-between categories or fit firmly in a category but simply draw from another categories' logic here and there. In the case of Benoit (the portrait of the scrutinizer category), health conditions (overweight and joints issues) triggered his adoption of myStep which was then driven by scrutinizers emphasis on numbers and their articulation. Thereby, he mixes typical good-intentioned and scrutinizers' elements. In some cases, a specific idiosyncratic factor plays a role in adoption and use. This is the case of Ana (portrait of the litigants category) for whom migration trajectory obviously impacts the appropriation of myStep; or another interviewee, a taxi-driver, for whom religion is intertwined with self-hygiene and responsibility, and thus impacts his appropriation of myStep. Ideal types are meant—on the one hand—to provide a base from which variations and idiosyncrasies can be studied. On the other hand, they provide elements to explain social mechanisms. I believe that my four categories can help in both these endeavors, first by providing readers and other researchers with a typology that can help organize and study the social world (notably by helping structure scientific debate), second by

providing an avenue to question and highlight self-tracking practices' intertwinement with digital inequalities (this is mainly how I used them in my dissertation).

7.6. Inequalities in self-tracking

My results indicate that digital divides are observable at two levels, in the acquisition and use (first and second order digital divides) of myStep. They demonstrate how—within this institutional context—social conditions and positions, secondary socializations and life trajectories interact (and coalesce in dispositions) to condition the adoption and use of the technology. The fact that poorer, older, and less educated people are less likely to adopt the technology presumably contributes to strengthen existing inequalities and is a clear sign of first order divide (Selwyn, 2004; DiMaggio and Hargittai, 2001). Moreover, the results substantiate the fact that those among the poorer and less educated who still opt for the technology are partly driven by perceived health threats and financial rewards. This bears the risk of making opting out of such technologies a social privilege (Lupton, 2016).

Regarding second order divide, or patterned differences in appropriation, my results point to four prototypical types of use. An important finding is that behaviour change is only central to one category, thereby mitigating the promise of behaviour change that surround self-tracking technologies (Piwek et al., 2016). That category, the *good-intentioned*, brings together people with heterogenous socioeconomical backgrounds who all suffer from a health condition. In their case, both the adoption and the style of use are largely constrained by a common alteration of life trajectory that seem to moderate the effects of dispositions adverse to self-tracking. Good intention reveals a complex situation in which a particular condition (health issues) is combined with ambivalent dispositions. Bourdieu call this the goodwill of the petite bourgeoisie (Bourdieu, 1998). People who 'force' their tastes and impose themselves what is considered culturally legitimate. People of this category were not particularly disposed to use

self-tracking technology before they developed a health condition. But because of their social position and condition, they find a certain legitimacy to take over the practice, engage in a new socialisation, and seek to change their behaviour in spite of their reservations (Lahire, 2014). Let us note that some people—logically absent from the sample—face health conditions but still opt out of self-tracking technologies, the weight of adverse dispositions remaining too high.

In the case of the three other categories, dispositions acquired in specific socializations play a major role in appropriation, the tracking technology offering a possibility to express and enact an already incorporated ethos. The *litigants* are characterized by their adherence to the political implications of myStep and wish for a reorganization of insurance around the unpooling of risks and the financial valorisation of habits they deem healthier and more responsible (Van Hoyweghen et al., 2007; see next chapter). This seems to stem from either difficult life trajectories and conditions and/or from attachment to neoliberal politics. The two other categories bring together people with homogenous socioeconomical backgrounds. On the one hand, the *meritocrats* category is composed of people who work in finance and have been socialized to seek self-optimization through quantification. On the other hand, the *scrutinizers* category is composed of people who work in informatics and science and have been socialized to measure and analyse data.

Use of the self-tracking technology offers an opportunity for specific dispositions within these three categories to express themselves. Once entangled with self-tracking, these dispositions become actionable and quantifiable daily. For *scrutinizers* and *meritocrats*, these are the constant necessity to improve and optimize (Cabanas and Illouz, 2019; Kristensen et al., 2015; Boltanki and Chiapello, 1999), the emphasis on performance, competition and individualistic self-exploration (Adams, 2019; Carter et al., 2018), and/or the quantification of health and bodies (Lupton, 2016). Trends which the researchers cited above agree to qualify as harmful for individuals and collectives. In the case of *litigants* the classification of individuals

as (ir)responsible is facilitated and may reinforce forms of symbolic violence towards people who do not comply with physical activity guidelines. Moreover, the drive toward the unpooling of risks in insurance has been identified as a challenge to solidarity in health (McFall, 2018). In these perspectives, and for these three categories, the self-tracking intervention leads to the re-production of health damaging structures more than it contributes to health prevention, thereby producing second order digital divides.

7.7. Self-tracking and dispositions

My results suggest that self-tracking should be considered as a cultural practice that entangles itself with already existing practices and lifestyles. I argue that technological tools and practices should not be analysed as autonomous categories. A few studies have highlighted different styles of tracking but remained impervious to the social origins of these styles, notably because they mixed different technologies used in different contexts (Pols et al., 2019; Pharabod et al., 2013; Rooksby et al., 2014)). The specificity of this study is that it highlights the presence of various appropriations—and thus various consequences of use—among users of the exact same application in a similar context. This rare setting allowed me to focus on differences among users.

Changing people's behaviours is one of the main promises of digital tracking interventions, which eventually entails changing people's dispositions (here towards physical activity) and practices. My results, therefore, turn the promise of digital tracking on its axis; I have shown that self-tracking is often transformed by and appropriated according to people's dispositions, something that—in the case of self-tracking in health insurance—leads to the reproduction of inequalities. Consequently, users' dispositions should be systematically considered in the development, study, and evaluation of self-tracking programs. This is not to say that technology, peers, context, and environment do not also play a role in appropriation (Kristensen et al., 2021; Hockey, 2006) but that social backgrounds are most often neglected.

My research adds to two currents of the literature on self-tracking. First, it contributes to the nascent quantitative literature that aims to identify the profile of self-trackers. So far, this literature has mostly been descriptive (Régnier and Chauvel, 2018; Findeis et al., 2021). My research furthers the discussion by proposing a systematized theoretical framework. The use of Bourdieu's framework highlighted the role of dispositions in the adoption and use of self-tracking technologies, adding to the sole consideration of raw sociodemographic variables. Moreover, focusing on a single application deployed in an institutional context allowed me to go beyond the description of idiosyncratic uses and reflect on self-tracking's entanglement with inequalities. Second, my research adds to the more established literature on self-tracking. This literature is characterized by the dominance of Foucauldian studies, STS, and post-phenomenology. These frameworks led to elaborate accounts of self-tracking but tend to neglect the role of users' social backgrounds. My research brought the focus back on these, highlighting self-tracking's social embeddedness and paving the way for more symmetrical analyses.

As institutions promote the promises of self-tracking, it is crucial that critical scholars do not feed these promises by forgetting to reinscribe self-tracking in its social grounds, which are both diverse and unequal. Otherwise, the risk is to transform socially grounded forms of reproduction and exclusion into individual lack of will or technological failure. In that sense, both scholars and institutions may contribute to reinforcing forms of symbolic violence towards those who do not adopt those new technologies (Bourdieu, 1984; Bourdieu and Wacquant, 1992). Overemphasizing their transformative potential may lead to relegating social determinism to the background and transmuting differential dispositions (here for physical activity) into personal (lack of) responsibility for health. This is not to say that self-tracking cannot prove helpful or lead to changes, but that the likelihood for such changes to happen depends on how users' situations and their social backgrounds are articulated.

7.8. Back to the script (again)

Let me now go back to the script narrative. I started, in chapter 5, by describing the script's emphasis on a particular form of 'rational subject' derived from cognitive theories. I interpreted this as a potential manifestation of a neoliberal rationale. In chapter 6, I drew from users' appropriation of the script in everyday life to highlight some of the script's de-contextualizing and reductive features. Question is: does the analysis of the script's entanglement with structural forces such as dispositions and lifestyles provide new information on its prescriptive inscriptions? Once again, my results—which are mirrored by the ALLY team's results—point to 'negative' prescriptions that downplay or obscure certain actors or processes, namely 'social determinants' (Ihde, 1990; Swierstra, 2013).

What my dispositional analysis taught us is that the appropriation of the script is largely conditioned by users' dispositions, understood as a dynamic interplay between social conditions, social positions, and life trajectories. Unsurprisingly—at least from a sociological perspective—users do not arrive as blank slates in the interaction. To the contrary, they come laden with condensed and incorporated pasts that tend to impact adoption and use. Unsurprisingly again—this time from a Bourdieusian point of view—these pasts follow a patterned organization, for groups of people tend to share common experiences. The fact that people's pasts may impact adoption and use, and the fact that people's pasts tend to be—partly—socially structured are totally absent from both ALLY and myStep scripts.

Hence the following argument: ALLY and myStep entail negative prescriptions in the sense that their script completely neglects—and obscures—users' social embeddedness, thereby downplaying the role of social determinants. Now, I have identified social cognitive theory as the main theoretical influence on the script, and—drawing from critical literature within the field of psychology—have argued that it tends to downplay the role of social structures, and thereby to contribute to neoliberal practices (Pickren 2018, Teo, 2018; Adams

et al., 2019). It seems like the case at hand—the adoption and appropriation of myStep—is a telling example of such an effect. Bandura's theories do include 'sociostructural variables' (Bandura, 1991). However, 'primacy' seems to remain on 'self-agency' (as evidence by the title of Bandura's article: *The Primacy of Self-Regulation in Health Promotion*), and sociostructural variables are approached from a perspective that—compared to Bourdieu—remains highly limited (to broad variables) and undertheorized (Bandura, 2005: 245).

What we can say is that in its localized expression (notably with regards to ALLY), SCT led to the neglection of social determinants. The initial script completely obscures the role of such factors, which is evidenced by another update of the de-scription summary (Figure 19). One of the immediate consequences of this is that the technology failed to deliver its promise. The ALLY team is not blind to this, and their latest publication insightfully notes that 'field studies identified three major barriers that limit the public health impact of mobile physical activity interventions considerably' (Kramer, 2020: 141). These three barriers are limited reach, selection effects and attrition. According to my results, these three caveats are partly due to the neglection of users' social embeddedness, something that Kramer acknowledges (Kramer, 2020).

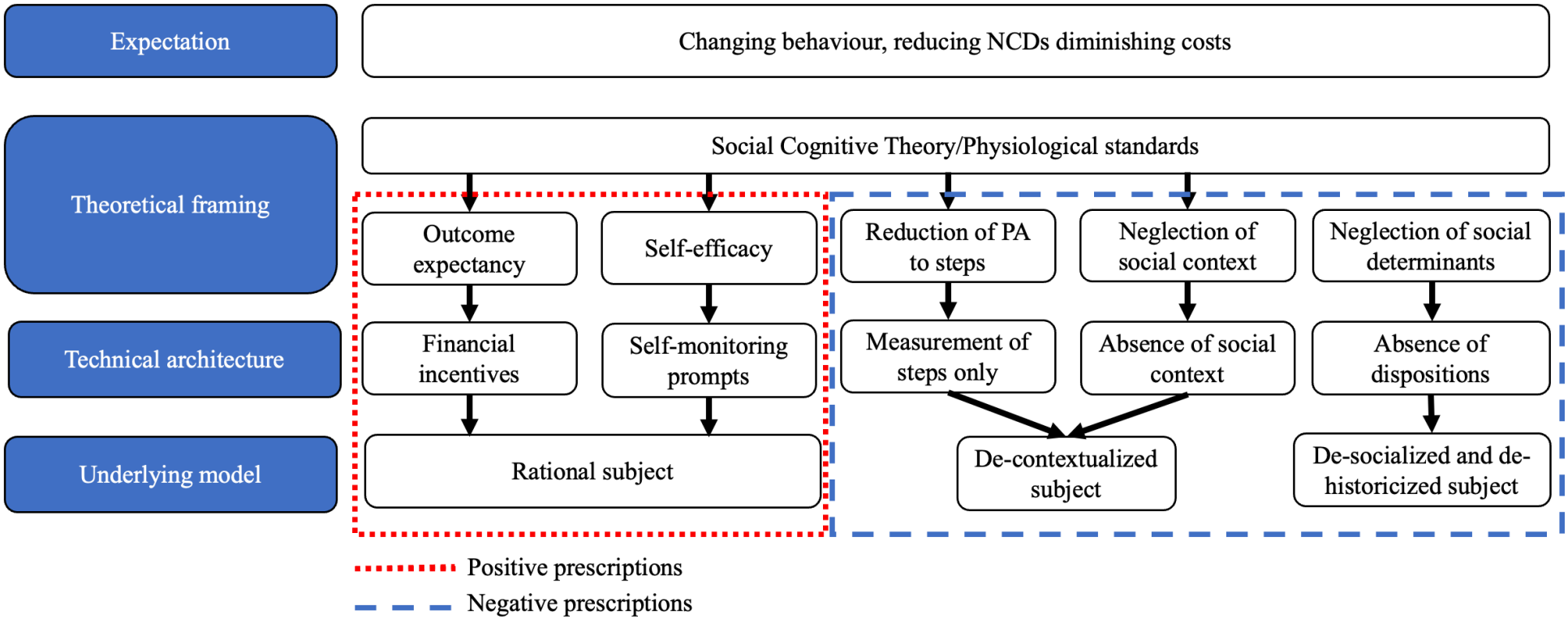

Figure 19 Updated version of the heuristic summary of the de-scription (3)

7.9. Chapter recap

In this chapter, I questioned the role of myStep and ALLY in reproducing health inequalities. Based on the concept of digital divide, I argued that patterned differences are found both in the acquisition and use of the program. In the first case, poorer, less educated, and older individuals are statistically less likely to engage with ST. This bears the risk of strengthening health inequalities. Regarding use, I described four prototypical categories of users. For three of them, I argued that their use of the program leads to the re-production of harmful practices, notably a focus on optimization, the transformation of walking in performance or societal duty, the quantification of life and a tendency to reductively classify others. However, for one category of users, I showed that self-tracking may lead to beneficial behaviour change. I identified dispositions as the main factor that leads to these patterned differences. Therefore, I suggested that self-tracking should be considered as a cultural practice that entangles itself with already existing practices and lifestyles, and that social conditions and positions—which have so far been neglected—should be systematically considered by scholars and designers.

Public health institutions should tread lightly around ST interventions. Current health policies, notably fuelled by neoliberal individualism and speculative promises regarding technologies (Petersen, 2019) tend to lean on digital behavioural interventions, despite strong evidence that their utility is limited when addressing the impact of social inequalities (Baum, 2007; Baum and Fisher, 2014). My results empirically confirm this in the context of self-tracking in insurance by showing the presence of first and second order digital divides. On the other hand, I recognize that, for the *good-intentionned*, attempts at behaviour change are provided with an elaborate disciplinary intervention that brings—quantified—movement and bodies to users' attention, thereby enabling what some call a 'laboratory of the self' (Kristensen and Ruckenstein, 2018).

8. Scripts, politics, and morals: a policyholder perspective on solidarities.

> « Nous venons de voir sur plusieurs exemples comment les objets techniques préforment les relations entre les différents acteurs qu'ils suscitent et leur donnent ce qu'on pourrait appeler un contenu 'moral'; attribuant rôles et responsabilités ». (Akrich, 1987: 65)

This chapter is based on the following article:

Presset, B. and Tanninen, M. (submitted). Moral destabilization of solidarity in insurance: An empirical study of self-tracking practices.

I was the lead author of this article for conceptualization, investigation, data collection, methodology, formal analysis, writing—original draft preparation, and writing—review & editing. Maiju Tanninen had a supporting role in conceptualization, formal analysis, writing – original draft preparation, and writing—review & editing. To fit the thesis format, I switched to a first-person narrative even though the article was a collective endeavor.

8.1. Chapter overview

In this chapter, the focus is set on the general context of ALLY and myStep: insurance. This specific institutional setting has been in the background of all previous analyses. In this chapter, it is brought to the fore, and both the script and users' accounts are analyzed under its light. The chapter focuses on how daily use of a tracking technology that distributes insurance premium reductions impacts (or not) users' understanding of insurance. I particularly focus on the notion of solidarity, which is central to this inquiry. The research question emerged from ALLY interviews, in which participants had intense reaction to issues related to solidarity even though ALLY's incentives were not premium reductions.

Scholars have started to explore self-tracking practices in insurance (McFall et al., 2020), with an emphasis on how regulations prevent the 'disruptive' effects that these new technologies could have on the solidarity models of insurance (McFall, 2019). However, little

has been said about how policyholders experience the ways in which self-tracking frames solidarity. Drawing from the interviews with myStep users, I demonstrate how the technology destabilizes commonly shared understandings of solidarity and lead to alternative enactments. Tensions arise between solidarity as it is currently implemented in health insurance regulation and practices and solidarity as it is embedded in myStep's script. Some users enthusiastically adopt the individualizing rationale of the technology, which allows them to express an incorporated ethos that valorizes self-responsibility. Others struggle between their convictions and the script of the technology, notably its decontextualizing components. These results suggest that, although self-tracking in insurance encounters regulative barriers, its current forms of implementation lead to moral destabilization at a microsocial level. This outcome might contribute to macrosocial changes, notably in regulation, bearing important consequences for insurers, policyholders, policymakers, and scholars.

8.2. Self-tracking in insurance

This chapter takes a slightly different angle by focusing on how myStep and its users co-constitute enactments of solidarity. So far, I have discussed the individualizing rationale of myStep with regards to pricing and touched upon users' understanding of these pricing innovations. Behind these issues lies the question of solidarity in health insurance. Indeed, by individualizing the premium, myStep reconfigures the current canonical from of insurance pricing in Switzerland, which is based on mutualized prices. This begs the following question: does the use of myStep destabilize this classical form for solidarity?

Scholars refer to programs like myStep as behaviour-based personalization, behavioural insurance, interactive insurance, or self-tracking in insurance (McFall, 2019; McFall et al., 2020; Meyers 2018; Tanninen et al., 2020) and note that they could have 'far-reaching consequences on social solidarity' (McFall et al. 2020: 8). Self-tracking in insurance has indeed been claimed to have the potential to individualize risk calculations, challenge established pricing models and, in extreme cases, affect the very principle of insurance operations: collectivity (Cevolini and Esposito 2020; Zuboff 2019). Although some of these scenarios might not be feasible in practice since they face conceptual, regulatory, and infrastructural barriers (Jeanningros and McFall 2020; McFall 2019; Meyers and Van Hoyweghen 2020; Tanninen et al. 2021), the new insurance schemes have raised concerns about intensified 'dataveillance' and discrimination against people deemed high risk. Data practices included in the policies could have troubling effects on people's everyday lives: users are not always sure what data are being collected from them, to whom they are transmitted and for what purposes they are used (Tanninen et al., 2022). Consequently, the introduction of self-tracking in insurance (STi) has generated uncertainty regarding solidarity and fairness on different scales: actors from regulators to individual policyholders are facing its destabilizing effects.

This chapter focuses on the perspective of policyholders who currently use myStep. Self-tracking in insurance technologies mediate a daily, actionable perspective on the practices that participate in the production of risk and responsibility. Exploring this mediation sheds light on the co-constitution of solidarity between policyholders and data-driven technologies as part of daily activities. These technologies bear normative ideas about how responsibility and solidarity should be delegated in insurance relations and how users of such schemes interact with these conceptions. Consequently, I address the two following questions. How do policyholders enact solidarity together with a self-tracking in insurance program? Does the use of the technology reinforce, destabilize and/or change users' perspectives on solidarity? I focus on the appropriation of myStep. This empirical ground allows me to anchor my reflections in observations and elude the hyperboles and mixture of various contexts that sometimes characterize theoretical arguments.

I begin the chapter by describing how the introduction of self-tracking in insurance has provoked a debate in the Swiss parliament over solidarity; through this contextualizing story, I show that self-tracking in insurance has opened the 'blackbox' of insurance solidarity and that, despite the parliamentary debate being temporarily settled, solidarity remains an unsettled issue from the policyholders' point of view. I do a brief detour to discuss the literature on solidarities and insurtech, after which I describe and analyze three different appropriations of the technology regarding solidarity: *convinced users* who are broadly aligned with the rationale of the technology and enact a form of 'STi solidarity', which highlights individual responsibility for decreasing medical costs for everyone; *doubtful users* who struggle with the rationale of the technology and formulate an ambivalent stance, caught between their adherence to 'institutionalized solidarity' and their desire to benefit from the insurance schemes; and *nonusers* and *ex-users,* who might reject, either intentionally or unintentionally, the rationale of the technology and its alternative form of solidarity. I conclude by discussing the role of the

technology in mediating interaction between the different forms of solidarity observed, the destabilizations that it provokes and the possible effects that it could have.

8.3. Context: Swiss parliamentary debates on self-tracking in insurance

In response to the uncertainty around novel insurance technologies, self-tracking has prompted regulatory debate and legislation aimed at safeguarding solidarity (McFall et al. 2020: 3). In March 2018 in Switzerland, left-wing parliamentarians addressed two motions (Streiff-Feller, 2018; Vogler, 2018) to the Swiss Federal Council. Their concern was that, if self-tracking programs became implementable in basic insurance, they would threaten the 'principle of solidarity' that rules the Swiss legal framework regarding compulsory health insurance[8]. In September of the same year, proponents of self-tracking in insurance reacted by making a parliamentary motion (Humbel, 2018), claiming that digital innovation, personalization, and financial incentives are essential for the prevention of lifestyle diseases. The Federal Council responded to both sides, reaffirming its support for the principle of solidarity (Federal Council, 2018a; 2018b). It rejected the offer to implement the interventions beyond supplementary insurance by arguing that self-tracking in insurance programs violate the principle of solidarity; cannot ensure data quality, privacy, and security; and cannot prove that they contribute to lasting health benefits.

The implementation of seemingly innocuous insurance bonus programs had, thus, sparked tensions at the highest level of the Swiss political field. Central to the motions were the ties among data tracking, pricing, and solidarity. Both sides agreed on the idea that using behavioral data to personalize risk affects the solidarity principle of health insurance but disagreed about its consequences: the opponents pictured self-tracking as a route to discrimination and exclusion, while the proponents perceived it as a tool to influence citizens'

[8] In Switzerland, basic health insurance is mandatory and covers a range of strictly regulated rights. Supplementary insurance—as its name suggests—refers to insurance contracts that cover additional and nonmandatory health insurance options. Both are offered by private companies.

health-related behaviours and generate cost savings. This brief political account exemplifies that self-tracking has energized and transformed the debates around solidarity, notably by challenging its current institutionalized forms. The new technologies entangled themselves with prior tensions, gave them new breadth and rearticulated them under a new light, emphasizing the contextual and localized negotiations that are at stake with commonly shared values and the practices of valuation (Helgesson and Munesia 2013; Prainsack and Buyx 2017).

However, this re-energizing of debates around solidarity was rapidly shut down by the Federal Council, confirming the view that current regulations preempt the broad implementation of self-tracking in insurance in certain countries (McFall 2019). Nevertheless, I would like to point out two reasons why it is vital to go beyond the regulatory and/or theoretical perspectives. First, the closure might be only temporary. Self-tracking in insurance allowed Swiss parliamentarians to reignite the debate and force the Federal Council to reassert its stance. The prefixes 're' here point to a constant state of reaffirmation. A conjuncture is only the current point of equilibrium between opposing forces (Latour 2007). Thus, we must remain open to changes happening, which will likely lead to further debates and negotiations in the future, something I discuss further in the conclusion.

Second, although they are banned from Swiss basic insurance, these technologies are still implemented in supplementary policies. In other words, policyholders that have opted in for such a scheme currently practice self-tracking in insurance. Moreover, other citizens are exposed—notably through media coverage and commercials (insurance do communicate about these programs a lot, see Figure 20)—to its existence. This fact is important if, like many sociologists, we consider regulations to be—at least in part—inferred from social norms that are reproduced and negotiated in the context of daily activities (see, e.g., Giddens 1986). I follow this perspective in this chapter, thus changing the focus from regulations and insurers to

Figure 20 Commercials for self-tracking in insurance by two of Switzerland's biggest insurance companies.
On the left: 'Modernity is when my healthy lifestyle is rewarded'. On the right 'Be active and profit with the new Helsana+ app.

policyholders. I inquire how the debate that was temporarily closed by politicians continues to play out—through the prism of self-tracking technologies—in daily life. In other words, I analyze policyholders' perspectives and everyday experiences with self-tracking programs to understand how they appropriate these technologies, how it impacts their views about solidarity and whether it could lead to further challenges for institutionalized forms of solidarity.

8.4. The solidarities of insurtech

Insurance is a collective technique for mitigating risk based on the principles of risk pooling and spreading: it brings together a large number of individuals who carry the burden of the economic damage that the pool as a whole encounters (Ewald 1991; Lehtonen and Liukko 2011). Because of this collectivizing mechanism, insurance always entails a form of (practical) solidarity; however, the way in which a particular insurance policy produces solidarity,

inequality and exclusion differs depending on the way in which it is organized (Lehtonen and Liukko, 2011). On the one hand, some policies rely on the idea that each policyholder should pay 'according to the risk they constitute for the pool', a principle commonly known as actuarial fairness or *chance solidarity* (Lehtonen and Liukko, 2015: 160). In this model, individualizing of risk classifications and underwriting are needed to form pools in which the ratio between risk and premium is the same for each member. Insurance policies entailing a mode of *risk* or *income solidarity*, on the other hand, subsidize those who face a higher level of risk or are less affluent. These forms of solidarity are often present in social insurance, in which little to no risk classification or underwriting is performed.

The different types of insurance solidarities demonstrate that insurance is not a morally neutral, unmalleable technology but a product of political and social decision-making: there is not a singular insurance logic, but different insurance policies embed divergent moral stances on deservingness and responsibility (Baker 2001; Beveridge 1942; Ericson et al., 2003; Ewald 1991). These normative decisions regarding which risks should be insured and consequently with whom we declare solidarity are often blackboxed and hidden from the view. Sometimes, however, they become visible, such as in the discussions surrounding the use of genetic data in insurance. Genetic risks were perceived as being completely out of individual control, hence constituting these 'at risk people' or 'risk carriers' as deserving of insurance coverage. However, people engaging in behaviours deemed 'unhealthy' and suffering from lifestyle-related diseases were cast as 'risky selves' or 'risk takers', whose risk derives from their ignorance or lack of self-control and who should take responsibility for their actions (Petersen and Lupton, 1996; Van Hoyweghen et al., 2007: 189). These moral understandings informed insurance regulation, banning the use of genetic data in insurance and pushing insurers to explore ways to encompass lifestyle factors in underwriting (Meyers and van Hoyweghen 2017; Thomas 2012; Wauters and van Hoyweghen 2016).

Self-tracking in insurance is often seen as a threat to the solidaristic basis of insurance. The vision is that access to more granular behavioral data could enhance the predictability of risk. Insurers would no longer rely on statistical information, but the 'individual risk' of the policyholder would be rated in 'real time' based on the continuous flow of their personal data. This process could dismantle the collective mechanisms for risk mitigation, making people more responsible for their individual choices (Cevolini and Esposito 2020; Gidaris 2019; Zuboff 2019). The most extreme scenarios of 'individual risks' have, however, been shown to be unfeasible since they contradict the basic principles of insurance. Risk is always a collective concept since it is based on the law of large numbers (Barry and Charpentier 2020). Furthermore, the practices of risk pooling and spreading are vital for the profitability of insurance operations (Lehtonen and Liukko, 2015). Pricing of insurance individually would likely involve guesswork (McFall 2019). However, that is not to say that STi would not have any effect on insurance practices. It might well contribute to the unpooling of risk: although risk 'groups' of one person are impossible, with behavioural data, the pools could become narrower (Barry and Charpentier 2020). Hence, the implementation of behavioural data could contribute to a development in which insurance becomes increasingly exclusive with highly selective risk pooling and actuarially fair pricing (Ericson et al. 2000, 534–537; Heimer 2002, 117).

I follow these perspectives in arguing that self-tracking encompasses a certain view of solidarity and that debates around it seem to have reopened the blackbox of insurance, rendering solidarities, inequalities, and exclusions visible (and negotiable) again, at least temporarily. My aim in this chapter is to determine the form of solidarity embedded in myStep and how it is appropriated by policyholders. I use the notions of chance, risk, and income solidarity as a guideline for the types of solidarities typically present in insurance but do not limit my examination to these categories. My focus is on how policyholders enact solidarity with

experimental technologies; hence, some alternative versions can appear. Generally, solidarity refers to an enacted commitment to carry 'costs' (financial, social, emotional or otherwise) to assist others with whom a person or persons recognize similarity in a relevant respect' (Prainsack and Buyx 2017: 52). Solidarity must be enacted and contextualized; it sometimes relies on values and meanings that cannot be 'fully articulated nor assessed according to parameters of rationality' (p. 47), and its practice might encompass the 'human, natural and artefactual environment' (Prainsack and Buyx 2017: 47-48). In other words, I would like to approach solidarity from a practice-based and networked perspective and bracket the abstract and/or normative perspectives of values (Helgesson and Munesia 2013).

In the following sections, I take a closer look at the types of solidarities enacted by myStep users. In this case, different senses of solidarity circulate in political discourses, as evidenced by the description of parliamentary debates. One is cemented by law, which I call institutionalized solidarity. The other is related to the script of myStep and its enactment, which I call STi solidarity. Their nature is described and explored empirically in the following sections. First, I do a slight detour to precise myStep's take on solidarity. Next, I consider users who are convinced by the script embedded in myStep and adopt STi solidarity. Then, I consider users who struggle between STi solidarity and institutionalized solidarity. Finally, I briefly touch upon individuals who reject STi solidarity altogether.

8.5. The in-scription of solidarity within myStep

As a reminder, the basic script of myStep is composed of the following prescriptions: 1) MEASURE YOURSELF, 2) REACH THE OBJECTIVE, and 3) EARN THE REWARD 4) CONSISTENTLY in order 5) TO BE A GOOD PERSON. This description is somewhat narrow, and the current research question requires further details, notably regarding step three of the script, which focuses on its financial components. Step three states that users who 1)

Figure 21: The myStep application installed on a Smartwatch Retrieved from https://apps.garmin.com/de-DE/apps/8d1c670a-e51c-4a68-b654-9e9a42a1ffe3 (February 4, 2022)

MEASURED THEMSELVES; and 2) REACHED THEIR OBJECTIVE; 3) ARE FINANCIALLY REWARDED. As Figure 21 shows, the technology displays a financial reward—a premium reduction: we see steps on the left (daily), associated with the reduction of the premium on the right (yearly). Over both is a gamified element, a logo of the insurance that fills itself as steps are added. When users reach the objective and get the reduction the logo becomes fully blue. Hence, a causal relation between steps and financial application is made visible and actionable, for users' bodily movements directly modify the numbers displayed and is contextualized as part of contractual insurance.

By displaying the amount of money that the user can deduct from premiums thanks to his or her walking behavior—and by displaying money and the steps next to one another—the script of myStep emphasizes that movement is essential to reductions in insurance premiums.

By extension, it suggests that active people (should) pay less money than inactive people. In this sense, the script mediates a point of view on the social system of insurance. By offering policyholders the possibility to decrease their premiums, the script follow a logic of partial (since the amount of the reduction is capped) individualization of risk and focus on individual behavior.

With self-tracking, the responsibility for one's health—and by extension the costs of disease—are partially transferred to the individual. In the case of supplementary insurance, the calculation of risk is based on myriad information that policyholders must give to the insurance company before signing a contract. In that sense, supplementary insurance is an example of 'chance solidarity' (Lehtonen and Liukko, 2015). The script of the program does not disrupt the logic of supplementary insurance, but it pushes the boundary of responsibilities further by amplifying the granularity of categorizations. Moreover, it adds in-time behavioral information to the equation. The policyholder is offered the chance—or laden with the burden—to take daily control over a part of the premium. Every day, he or she can claim money by walking. Part of the price of risk is renegotiated on a daily basis, and self-tracking partially displaces responsibility (by a maximum of 146 CHF/year) further to the side of the individual. This vision of insurance and solidarity is embedded within myStep's script. Let me now turn to how it is appropriated by policyholders.

8.6. Convinced users, adopting a script that emphasizes responsibility

The interviewees whose views are broadly aligned with myStep have a few patterned characteristics. The common denominator between them is a strong belief in an individualizing ethos of self-responsibility that has been incorporated prior to the use of self-tracking. For approximately half of them, this ethos stems from secondary fields of socialization, notably in the professional environment (they work for private companies, have a university degree and are high earners, and most of them are men) and in competitive sports (*the meritocrats*). For

the other half, it stems from difficult life trajectories (*the litigants*) that have led to moralizing views of health and physical activity and an insistence on one's own responsibility. The focus of this chapter is not on the cause of the appropriations, but I would like to remind here that past experiences and life trajectories play major roles in enabling a particular appropriation of myStep's rationale (as argued in chapter 7).

Central to convinced users' appropriation of the technology is the way in which they picture the current conjuncture of the insurantial landscape. They consider it unsatisfactory for two related reasons. First, they believe that there is a decay in people's health-related habits, notably (but not only) with regard to physical activity. According to them, this decay leads to more diseases and thus to a rise in health costs and, consequently, in insurance premiums.

> Our health system is sick… If we can create applications like that, (…), if it allows people to see how much they move, what they ingest (…) If it helps people - and I think the vast majority of people are unhealthy -, if it makes them healthier, I think it is good. That is why I participate. (29-year-old woman, business consultant)

For them, tracking devices represent a solution to this decay because they encourage people to be more active, notably via individualized feeds, nudges, and rewards. Interestingly, most of those convinced users were already active before they engaged with myStep. Consequently, they did not adopt myStep to change their behavior but to support the implementation of these technologies so that others would become more active. They believe that the responsibility to 'save' the 'sickened health' system belongs to inactive people. From this perspective, they adopt and support myStep because they believe it to be a disciplinary or motivational tool that will render inactive people more active and hence diminish the constraint of NCDs on the health economy and lower insurance premiums.

The second reason—which mirrors the first one—is that they find it unfair that the costs of health are supported by active people. In this sense, they agree with the idea that one of them articulates in the following way: 'I pay for all the people who smoke, drink, do not engage in

sports and have preventable chronic diseases…'. According to them, this fact is an injustice because 'If you refrain from smoking, if you exercise more, don't you deserve more substantial discounts on health insurance?'. In other words, myStep is seen as a technology that allows for the redistribution of the costs of inactivity:

> Therefore, uh... for me truly, it's the financial aspect. I think it's important that... well, it always bothers me to... to pay for people who, I mean, who won't take care of themselves. It's something that's important to me. I keep myself in shape; I try to pay attention to what I eat, what I do. In addition, it bothers me to pay more for health insurance because there are others who need it more because they are less careful than me. (33-year-old man, Police officer)

These users appeal to a sense of justice in the interviews. According to them, the current form of risk pricing in health insurance is unfair. They argue that people who are inactive should pay a higher premium; they are regarded as irresponsible risk takers who choose not to look after their health and should thus carry a larger portion of the costs (van Hoyweghen et al., 2007). This insistence on justice and/or a morality based on self-responsibility is highlighted by the fact that these users often complain about potential cheating.

> (If myStep was implemented in basic insurance), then people would cheat right away... Afterwards, there must be analyses done because the watches can't do everything... unless algorithms allow us to say OK, with the heart rate... according to the pulsations, we can say, yeah, there is this component; there is that component in the blood... However, then it would be truly advanced. However, we can do things that we didn't think of before. (46-year-old man, Informatician)

The two related reasons for adopting myStep are grounded in the belief that one is responsible for one's own behavior. Following this belief, these users argue that they—the responsible ones—should not pay for the irresponsible others. MyStep, which provides a reduction of premiums based on actual behavior, responds to this demand by delivering to these users both a financial reward for what they consider responsible behavior and—consequently—a sense of justice.

We should note that convinced users never refer to myStep or to their stance as forms of solidarity. If they use the term, it is to designate the institutionalized solidarity in basic insurance. They refer to their position as based on 'responsibility' or (interchangeably in the interviews) 'accountability', reflecting the shift of responsibility to the individual. Although they do not use the term solidarity itself, we must note that they refer to responsibility for one's own behavior as something that—according to their rationale—will translate into benefits for all.

> And that I think that, as I said at the beginning, we should better value the fact that people take care of their health. The system must be supportive, and that's fine, but if people are making efforts to be healthy, I think it's in their best interest as well to encourage it -- and to find a way to encourage people to do something because it will have an immediate impact on premiums and on people's health in general. (46-year-old man, banker)

This interviewee binds together institutionalized solidarity, when he says that the system must be 'supportive', and the rationale of myStep, when he says that encouraging people to be more active via myStep is in the general interest. He argues that valuing one's own efforts is fair and that efforts lead to gains for all citizens. In this sense, we could say that he subscribes to a form of solidarity that, in part, relies on personal responsibility. These users turn the institutionalized form of solidarity on its axis by arguing that efforts made by the individuals benefit all policyholders, thereby arguing for solidarity via an appeal to responsibility. Most of them—after all—believe that it is important to decrease the global cost of health via STi (which is a dubious but understandable claim). A cost that is currently a threat to many citizens, as explained by the next interviewee, who struggled with it.

> I think the cost of health care is a big shock, especially when you have a family with children and everything. You see the bills coming in, and you think, 'How can people who have children (…) do it with the money they have?' I say to myself, if everyone did their part and managed to lower these insurance premiums, maybe we would already be able to have something more. (33-year-old man, Police officer)

Here, also, the participation in myStep and the alignment with the responsibilizing script are seen from a perspective of solidarity that recognizes a common struggle with finances. To summarize, convinced users formulate a moral perspective around health and insurance that is anchored on the script of myStep. It is characterized by a conviction that unsubsidized forms of insurance premiums are fairer and by the delegation of moral responsibility for the costs of health to those who are considered 'risk takers' (van Hoyweghen et al., 2007). Interactions between users and the script thereby lead to the articulation of a form of solidarity that emphasizes responsibility and partial individualization of risk to manage the rising costs of health. It results in narrower risk pools and more precise risk calculations, and it refines 'existing segmentation thanks to new parameters' (Barry and Charpentier, 2020). The technology is not particularly destabilizing for those users; rather, it reinforces an existing ethos and becomes a new actionable tool for articulating it.

I have noted before that this appropriation cannot be isolated from the policyholders' past experiences. We should also note that—to articulate it—these users draw from discourses available on the social landscape. Notably, and although my empirical material does not allow me to bridge the gap between these discourses and policyholders' views, convinced users' perspectives are evocative of classical liberal and current neoliberal approaches to insurance. These approaches take many forms but agree on the following points. They emphasize individual responsibility with regard to health and, consequently, picture subsidized access to insurance as a threat that eventually renders people irresponsible (Baker, 2000; Ewald, 2020). This line of argumentation has been translated into the concept of 'moral hazard' in recent neoliberal attacks on welfare states (Ericson et al., 2000; Hacker, 2008) and has been shown to rely not on a supposedly 'neutral and economic' rationale—as its proponents argue—but on morality, for it is always grounded in the 'identities, norms, and affiliations that constitute the lived moralities of the people acting in that social field' (Baker, 2000: 567). These liberal

discourses, which highlight responsibility and advocate for a shift towards an unpooling of risks in insurance (Ericson et al., 2000), are central to current attempts to implement self-tracking in insurance.

8.7. Doubtful users struggling with a decontextualizing script

In this section, I turn to users who struggle with the responsibilizing components of myStep's script. Similar to convinced users, doubtful users' past experiences seem to partly shape their appropriation. However, in contrast to convinced users, doubtful users do not share a similar socialization matrix but a common life trajectory: they—or some of their close relatives—suffer from health conditions (*The good-intentionned*)[9]. This suffering has led them to adopt myStep as part of an attempt to raise their level of physical activity. However, for most of them, this adoption is not without struggles. Indeed, the form of STi solidarity embedded in myStep challenges these users' attachment to institutionalized solidarity.

In contrast to convinced users, doubtful users' first motivation has to do with changing their behaviour. They are aligned with the part of the myStep script that targets step increments. For many of them—and similar to some convinced users—a second motivation is to benefit from premium reductions. Thus, their initial motivation to adopt the application has little to do with the situation of the health system or with a political perspective. However, their appropriation is not without a moral component, as evidenced by recurring references to laziness.

> It is a satisfaction (to have reached objectives) yes, yes… At the end of the day, I am like: 'Yeah I did not spend the day lazing around'. It is satisfying, yes. (45-year-old woman, nurse)

[9] Let us note that the *scrutinizers* are more difficult to classify according to solidarity. Overall, they tend—in their discourse—to fluctuate between both types of solidarity.

These users articulate a moral perspective on walking, but it remains disconnected from the health system and financialization. It could be argued that these users experience myStep as an individual or intimate endeavor. In most interviews with these users—in contrast to convinced users—I had to initiate the discussion regarding the responsiblizing logic of myStep and its political underpinnings. When I did, doubts and hesitations emerged in interviewees' discourse:

> So I think you must be very, very careful about that because a person who is genetically -- we are not all the same. And a person who has more difficulties should not be (…) There is a part that we do not control, and we should not be, uh... yeah get into a thing where you are in bad health, and you must pay for uh... Yeah, it's complicated... to position yourself in relation to that is a bit complicated. (…) I think that I am a little bit social then... (embarrassed laughter). (45-year-old woman, nurse)

Confronted with the political implications of myStep, the interviewee resists the individualizing component of the script by suggesting that health might elude one's control. In other words, an attempt is made to classify inactive people not as 'risk takers' who consciously decide to be in poorer health but as 'risk carriers' who have limited capabilities to influence their health risks (van Hoyweghen et al., 2007).

This resistance spawns from an incorporated conviction that genetic or social determinants influence health conditions and are beyond individual control. This interviewee identifies her training and practice as a nurse as the origin of this belief. Whether it stems from professional socialization or from the ontological experience of suffering from a health condition is beyond the reach of this chapter. My data shows that the aforementioned perspective on control and determinism is shared by the whole category of doubtful users. However, the use of the application, the daily encounters with it, and its recollection as part of an interview question this perspective and lead to ambivalent discourses and practices:

> Well then... given the... yeah.... I think it's good to value people who make an effort -- I mean, who take responsibility. And I mean, it's not 50% of the bonus less... And I don't feel like I'm penalizing anyone else by doing this. In

> the sense that I mean... I'm paying the same premium as the person who's not doing anything, and I just get a little deduction because I'm taking extra steps. But it's not, it's not, I don't feel like I'm disassociating myself from others by doing this... I really don't... (45-year-old woman, nurse)

There is much ambiguity in this quote. The interviewee goes back and forth between arguing for institutionalized and STi solidarity. There is a struggle between being a beneficiary of the program and attempting to argue that this benefit does not lead to a desolidarization from others. The ambiguity is at its peak when the interviewee says that she pays the same premium but simply receives a deduction. If one receives a deduction, one does not pay the same premium. The two forms of solidarity are here clashing with one another within the same individual. Practicing the STi form (measuring oneself and benefiting from a premium reduction) is understood as potential desolidarization, a deviation from institutionalized solidarity, hence the necessity to try and justify oneself. Using self-tracking in insurance, policyholders find themselves practicing premium individualization and the unpooling of risk in a very concrete manner. This experience is destabilizing for those who stand for institutionalized solidarity but use self-tracking to change their behavior or because they struggle to make ends meet.

The ambivalence and the struggle between the two forms of solidarity are present for all these doubtful interviewees, but it ranges from intense—as was the case here—to mild. The following interviewee goes beyond genetic determinants and invokes cultural or social determinisms, drawing from the idea that some people are not disposed—in a Bourdieusian sense—to engage in physical activities.

> Interviewee: Well... so I have mixed feelings about it. On the one hand, it can motivate some people. But I don't think that should be the only goal. But trying to get people to take care of themselves is a good start. Because there are people who are careful anyway because it's in their culture or in their way of being, and then there are people who just let themselves go (50-year-old woman, office worker)

This user has ‘mixed feelings’ because, despite his belief in forms of cultural determinism, he believes that self-tracking programs could ‘motivate people’, advancing the idea of a culturally constrained disposition to change. Once again, self-tracking destabilizes values and leads to the articulation of ambivalent discourses, like for the next user who feels ‘reluctant’ regarding the individualizing part of the script. However, he goes a step further and ties the argument to the risk of strengthening inequalities.

> Um... I'm more reluctant because I think there may be so many cases where people who are not active can't do anything about it... And then they would pay even more for it. So I would be afraid of abuse... Not necessarily abuse, but uh, I would be afraid that it would create more disparities. And I think there are people who can't move for good reasons. So I think it would be a shame; it would start to bother me if it was as... generalized as that. (54-year-old woman, consultant)

All these cases display struggle and ambivalence. In many ways, doubtful users blur the distinction between ‘risk takers’ and ‘risk carriers’ and articulate often paradoxical discourses at the juncture between different forms of solidarity. This outcome could be due to the context of the interview since interviewees might associate the interviewer with the insurance and fear being too assertive. This scenario seems unlikely for the external and nonjudgmental position of the interviewer was clearly explained at the beginning and reaffirmed during the interviews. Moreover, users were assertive or critical of other topics that regarded insurance. More likely, these struggles were due to the paradox of being a user of the technology (trying to change one’s own walking behavior) while feeling uneasy towards its individualizing script. This paradox eventually leads to being caught between a belief in institutionalized solidarity and a practical engagement with a technology that embeds STi solidarity. In these instances, there is a struggle to adopt a practice that is not aligned with one’s ethos, hence the sense of going against oneself—of struggling to force oneself (Lahire, 2001).

Let me now return to the script. Interestingly, these users point to the previously mentioned decontextualizing features of the script. Once again, users point to negative

prescriptions. When they argue that structural elements, such as culture, disability, socioeconomics, etc., are not considered by the script, they make a Bourdieusian claim like that made in chapter 7. These policyholders are at odds with this omission because, according to them, it is unfair. Their view of solidarity entails the adaptation of interventions—and costs—to people's socioeconomical situation. In that sense, they are closer to forms of risk solidarity (Lehtonen and Liukko, 2015). Like convinced users, doubtful users are likely to draw from available discourses to articulate their stances. In such cases, the neoliberal discourses evoked in the previous sections are resisted by mobilizing what McFall calls 'socialized actuarialism' (McFall, 2019: 56). That is, perspectives on social insurance are generally tied to welfare states that emphasize solidaristic pooling motivated by the recognition that risk is collective (Ewald, 2020).

8.8. Nonusers rejecting and/or ignoring the script?

I have now described the two main appropriations of myStep regarding insurance pricing. A last one must be evoked: that of people who reject the script altogether. Thus far, I have considered users of myStep. However, most policyholders simply do not use myStep; they are nonusers. This large and heterogenous group comprises a variety of stances (Wyatt, 2003). It likely ranges from people who do not care, do not have access, or do not want to have a smartphone to those who have not even read the insurance company's communications about myStep. What I want to point out is that among this large group of nonusers are likely people who decided not to engage with myStep because they did not agree with the individualizing rationale of its script. However, my data do not allow me to quantify these people, or to explore their understanding of myStep. Last, I would like to mention the category of ex-users, that is, people who stopped using the application. They might not actively refuse the script (and the underlying idea of solidarity) but passively opt out and go against it.

8.9. Mystep solidarities

Self-tracking in insurance programs, with their responsibilizing and individualizing tendencies, have been pictured as a threat to the collective mechanisms of insurance and, importantly, to the principle of solidarity. However, the limited scope of these technologies (McFall, 2019; Meyers and Van Hoyweghen 2020; Author 2 et al. 2021) and the different ways in which users relate to them suggest that more nuanced positions regarding the issue of solidarity are needed. My analysis shows three ways in which users appropriate the script of the self-tracking program and enact solidarity with it. First, users who subscribe to a minimal form of collective risk mitigation and align with the responsibilizing prescriptions of the self-tracking script enact *STi solidarity*, a stance that emphasizes the role of individual responsibility in achieving the collective benefit of decreased health care expenditures. These policyholders, who were—prior to the adoption of myStep—already active and in good health, argue that people are responsible for their physical activity and that one should change one's own behavior to mitigate costs for everyone.

Second, users who are engaged with self-tracking but, at the same time, oppose its decontextualizing prescriptions and value the subsidizing forms of insurance that adapt premiums to mitigate the exclusion of people deemed high risk struggle between STi solidarity and the more institutionalized notions of solidarity. Caught between these two senses of solidarity, these users see that engagement in physical activity is subject to various constraints, such as genetics, culture and socioeconomical factors, yet they still want to engage in the program to reap health benefits and to receive premium reductions. This dilemma creates internal conflict, an ambivalent stance towards solidarity and hesitation towards the idea of expanding self-tracking to mandatory health insurance. Finally, some people reject self-tracking altogether, either because they subscribe to *institutionalized solidarity* and actively

oppose the programs' potential to exacerbate social inequalities or because of more mundane reasons, such as a lack of interest in the services.

The analysis shows thus that, even in the case of the convinced users, what is at stake is not a pure case of 'each individual mending for themselves'. Instead, these users highlight the importance of furthering the *common good* through individual responsibility. From my perspective, STi solidarity is a form of solidarity because, as evidenced by the interviews, it is an 'enacted commitment to carry "costs" (financial, social, emotional or otherwise) to assist others with whom a person or persons recognize similarity in a relevant respect' (Prainsack and Buyx, 2017). STi solidarity concerns responsibility for one's own costs as a way to diminish the burden of premiums for all. Hence, it is arguably a form of solidarity. Furthermore, not all users of self-tracking buy into the logic without problems, which technologically deterministic accounts might suppose. Although they engage with the technologies, they experience ambivalent feelings towards it and express viewpoints that contradict each other. My research thus mitigates the binary oppositions often found in theoretical accounts.

Where the two solidarities differ is in their understandings of responsibility, deservingness, and fairness and their models of the subject and his or her volition. The hesitant users picture a determined subject whose control over his or her health can be limited, whereas the convinced users picture a rational actor who has the ability to take control over his or her health. In other words, where institutionalized solidarity emphasizes structure, STi solidarity emphasizes agency. Because they picture subjects in different lights, the two solidarities lead to different interpretations of the rising costs of health and lead to different reactions to it.

This difference highlights three important points. First, the script of the technology is sufficiently malleable (Wyatt, 1998) to allow for differing appropriations. Second, it points, beyond malleability, to some people using the technology while struggling with some of its prescriptions (Akrich and Latour, 1992). Last, it highlights how users' pasts—conceptualized

as dispositions—impact the appropriations of a similar technology (see chapter 7). As I have shown, socializations and trajectories are modulating elements in the interaction with self-tracking, and they tend to structure users' appropriation of the script. Of course, self-tracking did not develop in a neutral environment. It was implemented in the midst of political regulations and struggles and within a specific market environment in which the rising cost of insurance has been a highly relevant and prominent topic. Interactions between these different elements produce a partly constrained array of practices, values, and meanings, among which we find different enactments of solidarity.

So, does self-tracking in insurance challenge established forms of insurance solidarity (McFall et al. 2020; Cevolini and Esposito 2020; Zuboff 2019)? My research paves the way for empirical approaches to that question from the policyholder's perspective. For convinced users, it reinforces an existing ethos. It provides individuals with an actionable and quantifiable tool to enact and express their view of solidarity which is aligned with the program. Several of these interviewees mention the use of the technology as a political gesture and suggest that numbers and self-tracking are mobilized to attempt to convince—irresponsible—others to act. In the case of doubtful users, the technology plays a destabilizing role and prompts struggles and doubts regarding institutionalized solidarity. Eventually, it might lead to the slow adoption of STi solidarity. Finally, a large group of nonusers could be resisting the script. Whether self-tracking truly threatens institutionalized solidarity remains to be seen. What is certain is that it unsettles entrenched norms and values, forcing users and politicians to reassert their stances and, in the process, stimulating the enactment of emergent and sometimes ambivalent forms of solidarity (Prainsack and Buyx, 2017).

8.10. Chapter recap

Self-tracking has reopened the blackbox of insurance solidarity in Switzerland and framed it according to its responsibilizing perspective. It has ignited political debates and

inter/intraindividual struggles among users. More than disrupting or dismantling solidarity, I have shown how self-tracking fosters rearticulations, negotiations, and ambivalent positions and leads to the enactment of STi or combined solidarities. As I have argued, the moral reinforcements or destabilizations mediated by self-tracking could translate into moral changes, notably for people who find themselves caught between two forms of solidarity. Eventually, this dilemma could lead to changes in social acceptability and norms and, even further down the line, in regulations. However, this outcome remains to be proved; what I have shown in this chapter is that self-tracking destabilizes or reinforces existing moral perspectives and leads to alternative enactments of solidarity.

I would like to offer a few suggestions about what other elements could impact the relationship between self-tracking and solidarities. First and foremost, injunctions to digitalize health are currently highly prevalent (eHealth Suisse, 2018), and the COVID-19 pandemic might have energized them even further. These pressures, combined with the normalization of tracking tools, could encourage the implementation of tracking in basic insurance. The literature has shown that extreme individualization of premiums is very unlikely (Barry and Charpentier, 2020; McFall, 2019), and it seems that, in contrast to the more speculative scenarios of the policies' potential effects (Zuboff, 2019), individualization is not the aim of the current tracking programs. Instead, they have a limited range with partial individualization, that is, with using new parameters to refine existing risk calculations (Barry and Charpentier, 2020). It is under this format that they might gain currency in basic insurance. The second factor is the reduction of resources and the increase in costs. As we have seen, many users express doubts about the logic of individualization but still engage in the program to reduce health costs. If inequalities and costs continue to rise, it could lead to greater adoption of self-tracking, which might also be a factor in turning the moral and regulatory tables.

9. Summary of the results

> « … il nous faut nous éloigner de ces zones où les mouvements sont trop bien ajustés les uns aux autres ; il nous faut introduire une distance, une discordance là où tout et tous adhèrent ». (Akrich, 1987: 50)

In the previous chapters, I have gone from design in the laboratory to use in daily life, unfolding the practices, meanings, and values that emerge from ALLY and myStep scripts' interactions with their users. In this shorter chapter, I take a reflective stance on the dissertation and summarize its main results.

9.1. The design of self-tracking in insurance

In this dissertation, I have offered to picture ALLY and myStep as scripts (Akrich, 1992). This allowed me, in chapter 5, to explore the promises involved in their development, the theoretical frameworks used to deliver these promises and the translation of these promises in a technical architecture. Doing so, I provided an empirical window on the processes that underpin the inscription of self-tracking technologies, which were summarized, as the dissertation progressed, in Figure 16, Figure 17, and Figure 19. Closely following designers as they attempted to secure the promise to change users' behavior, I drew attention to the meticulous configuration of the latter as 'rational' subjects. I highlighted how designers rely on expert knowledge—notably cognitive theories—to design technologies while keeping users at a distance (Suchman, 1993). Changing users' behavior is arguably the main promise of the self-tracking technologies I studied. However, a large portion of the designers' job has been to inquire subsets of that promise as part of their scientific protocols. For example, the deployment of ALLY was key to understanding which type of incentives is most susceptible to change people's behavior (Kramer et al., 2020).

The de-scription of ALLY and myStep architectures is the main topic of chapter 5. There, I highlighted designers' reliance on social cognitive theory to configure users and

followed its implementation in the features of the application, such as incentives or self-monitoring prompts. I went on to suggest that the type of technologies it resulted in shared much similarity with scholars' critical accounts of neoliberal self-tracking (Ajana, 2018; Lupton, 2016; Lupton, 2012; Ruckenstein and Pantzar, 2017; Schüll, 2016; Sharon, 2017). However, most of this critical scholarship is theoretical or solely based on empirical evidence gathered among users. In other terms, it is key to comprehend overlaps between self-tracking and neoliberalism from a consumption standpoint. My analysis of design practices, on the other hand, provided clues as to how 'neoliberal' self-tracking technologies are produced.

As was argued in chapter 2 (see Figure 2), self-tracking practices are both the product and productive of 'socio-cultural paradigms' (Kreminzska, 2021:33), such as neoliberalism. Most scholars heuristically breakdown this dualistic phenomenon into—a minima—the three following phases: technologies are imbued with certain things (in-scribed), which they then mediate (script), to users who are active in the process (subscription/de-inscription). If most of the literature focuses on the third step—and to a lesser extent the second—I documented the first one. My analyses demonstrated how and why technologies are scripted in a way that is likely to constrain the emergence of the practices, meanings, values, and political and societal consequences generally referred to as 'neoliberal', while remaining attentive to the resistances and detours (both passive and active) imposed by users.

In that perspective, my research contributes to the critical literature by drawing the focus on the local constraining entanglements amidst which self-tracking technologies are developed. I have shown how organizational and professional constraints weigh on designers who do not only aim to develop technologies and change users' behaviors, but also attempt to contribute to specific disciplinary fields, secure career paths, and grow their laboratories. I also drew the attention to the necessity for them to develop partnerships with private and public actors (here

with an insurance), subscribe to technological solutionism and align themselves with promissory narratives and injunctions.

Doing so, I pictured ALLY and myStep as products of a local and contextual entanglement infused by a broader web of elements heuristically called neoliberalism (Brenner and Theodore, 2002; Ong et Collier, 2008). In other terms, I re-inscribed design practices in their localized and constraining organizational, ideological, and socioeconomical landscapes (Mackay and al., 200; Oudshoorn and al., 2004). Critiques of self-tracking's neoliberal entrenchment often lack such an empirical ground, and tend to picture neoliberalism as an indiscriminate, decontextualized, and ghostly threat with obscure origins. My research provides clues as to how we can unpack these localized neoliberal entanglements and contribute to their re-framing or de-construction, if only by pointing to them and allowing engineers and scientists—whose awareness of these processes may be lacking (Adams and al., 2019; Pickren 2018; Teo, 2018)—to reflect on them.

I will not come back on the de-scription itself further in this concluding section. However, I would like to argue that similar endeavors to closely analyze self-tracking technologies are lacking in the literature. Sure, de-scribing a technology is time consuming and requires specific skills that may elude some scholars (for the simple reason that they do not know about such methods). However, avoiding the de-scription of technologies has four—in my opinion detrimental—consequences.

First, it draws social scientists away from design, obscuring its role in the production of self-tracking, thereby reproducing already strong disciplinary boundaries, and preventing fruitful exchanges (Lupton, 2018e). Second, it reinforces a tendency to produce theoretical papers. I do not aim to say that these are not useful and recognize that my disciplinary training as a sport scientist may have led me to overvalue empirical research. However, theoretical papers tend to produce hyperbolic accounts and rarely encompass nuanced point of views.

Moreover, they are often ignored by designers and policymakers, who focus on evidence-based literatures. Nevertheless, I am neither blind to their importance in setting up critical perspectives, nor to their privileged position in the symbolic economy of the scientific field (Bourdieu 2001/2006). Third—and although it feels tautological to mention it—our understanding of self-tracking technologies should be grounded in the analysis of self-tracking technologies (which requires close and systematic de-scriptions). Fourth and finally, de-scription provides a basis from which re-inscriptions—updates of the design—can be derived. Indeed, thorough analyses of technologies via a common and flattened semiotic plane allow both constructive exchanges between critical scholars and designers and fosters possibilities to reverse engineer the technologies. In other terms, they are key to move beyond critique, something I will briefly address in 11.1.

9.2. Exploring users' perspectives

Influenced by Akrich's call to go beyond design (1992), I also tackled the use of self-tracking technologies by interviewing its users. One of the main results of chapter 6 was to show that the script of ALLY did not take situational context into account. By context, I meant other forms of activities, clothes in which the Smartphone did not fit, cold-rainy days that made it more difficult to reach the objective, having a hurt hip, having children, being scared to go out at night, etc. This neglection led participants to feel 'at odds' with parts of the script that I offered to call 'de-contextualizing', while also highlighting the fact that this was reinforced by a reductive approach to physical activity.

In chapters 7, I focused on another type of 'context'. I went from—to put it broadly—an interactionist understanding of context to a focus on social dynamics, structuralism, and critical sociology. I showed that sociocultural forces were also neglected by the script, although they played a major role in adoption and appropriation. I demonstrated that the uptake of the technologies was not homogenous in the population, thereby pointing to a first order digital

divide (Selwyn, 2004). In addition, I highlighted differences in how the technologies are used, pointing to four prototypical types of users: the *meritocrats*, the *litigants*, the *scrutinizers* and the *good-intentioned*. I argued that users' dispositions have a major influence on self-tracking practices but are neglected by the cognitive models on which designers relied.

Overall, I argued that the de-contextualizing components of the technologies came from SCT's reductive model of human action. SCT models emphasize a reduced form of agency whereas, on the other hand, structural elements are 'at best, relegated to the position of background variables, acknowledged only insofar as they affect beliefs that are theorized to be a dominant influence' (Burke et al., 2009: 56). MyStep and ALLY do not encompass any technical feature that would bring such variables into their perspectives. Absence and neglection (negative prescriptions) are difficult to pinpoint if we focus solely on design, and users were key to bringing these de-contextualizing components to the fore.

The de-contextualizing features of cognitive theories have been analyzed as a serious limit in the public health literature (Burke et al., 2009). Public health scholars advocated for a shift 'from explaining health related behavior simply in terms of 'health beliefs' (i.e., health belief models etc.) toward attempting to understand the layperson's actions in terms of their own logic, knowledge and beliefs which are grounded in the context of people's daily lives' (Williams 1995: 580). In other terms, public health scholars suggested that local context and lay knowledge had to be integrated into the SCT model. Situational elements were to be poured back into the equation, a shift that may broadly be described as 'interactionist'.

But public health scholars went further, arguing that broader 'sociocultural forces that shape people's day-to-day' should also be discussed' (Burke et al., 2009: 57). In other terms, they advocated for a second shift, rooted in structuralism and critical sociology. In retrospective, I realize that I re-enacted those two shifts—which had not been implemented by designers and remain globally neglected by people who use cognitive models (Pickren 2018, Teo, 2018;

Adams et al.,2019)—in the context of self-tracking in insurance while gathering evidence on technological design, scripts, and uses.

Based on Ihde's insight that mediations generally entail an inescapable binary trade-off: 'for every revealing transformation there is a simultaneously concealing transformation of the world, which is given through a technological mediation' (1990:50), I argued that there are 'positive' and 'negative' prescriptions. The first tend to push a perspective to the fore, while the second tend to obscure or neglect a—usually opposed—perspective. Akrich and Latour frontally point to this process but choose not to name it (1992). Being interested in cross-disciplinary exchanges I think it important to emphasize (and name) this point, notably to insist on the existence of the 'negative' side of prescriptions. This attempt to systematize de-scription is rooted in the necessity for me (as a critical scholar involved in a digital health lab) to exchange across disciplinary silos. Of course, this may have the disadvantage of oversimplifying a more complex reality. Let me note that this positive-negative vocabulary could be articulated with Swierstra and Waelber's 'matrix for the technological mediation of morality' (2010:162), in which authors list the various processes by which mediations perform this double movement with the aim 'to enable engineers to take a prospective responsibility for the future social roles of their technologies' (2010: 157)

My role with regards to the script has been to reveal the 'positive' and 'negative' prescriptions it had been imbued with. I did that by taking users' perspective into account, going back and forth between the script imagined by designers and users' appropriation of it (Akrich, 1992). This allowed me to produce a detailed de-scription of myStep that revealed—to put it shortly—both its emphasis on self-responsibility and its neglection of contexts. What remained to be done was to reflect on the potential consequences of the diffusion of such a script, something that was scattered throughout chapters, and which I address in the next section.

9.3. The societal consequences of self-tracking in insurance

I have argued that the diffusion of ALLY and myStep scripts is tied to social inequalities, social ordering and labelling, morals, and politics. Chapter 7 tackled self-tracking in insurance' intertwinement with inequalities. Considering the role of users' patterned pasts (belonging to a specific generation, having more or less income, having been socialized to sports or performance in a specific way), I argued that self-tracking in insurance represents a major risk to strengthen social inequalities, while allowing certain users to—potentially—change their lifestyles.

Using their own frameworks, the designers had suggested that self-tracking technologies represent a limited opportunity to change people's behavior (Kramer, 2020). Using a broader framework (that considers structural determinants), I have demonstrated that behavior change is indeed reduced to a limited category of people, notably those who experience dramatic health related changes in their life trajectories. Moreover, I pointed to the detrimental societal consequences of the 'selection effects' (to use designers' words) that tend to exclude poorer, older, and less educated people (Régnier and Chauvel; 2018; Findeis et al., 2021). If it sometimes leads to potentially beneficial behavior changes, the patterned adoption of myStep mostly ends up lowering the premium of more educated, richer, and middle-aged people, who are not the typical targets of health promotion programs.

Second, I demonstrated that a large proportion of myStep users do not benefit from its behavior change features. To the contrary, the application ends up strengthening the constant necessity to improve and optimize (Cabanas and Illouz, 2019; Kristensen et al., 2015; Boltanki and Chiapello, 1999), the tendency to perceive daily physical activities as performance, competition or societal duty (Adams, 2019; Carter et al., 2018), and/or the quantification of health and bodies (Lupton, 2016). This points to a second order digital divide (Selwyn, 2004; Hargittai, 2008). In other terms, people use the technologies in different ways, and if some uses

may be beneficial, other end up having detrimental consequences. More importantly, these forms of use do not emerge randomly, they are the products of patterned appropriations of the script. Patterns that notably depend on people's dispositions, and hence, bear the risk to strengthen already present damaging structures.

Self-tracking technologies tend to reinforce normative judgments. The scripts of ALLY and myStep classify people depending on whether they achieve objectives. This is translated by users in social labels like 'lazy-active'. Let us note that, in the case of myStep, the moral interpretation of the objective is embedded within the technical architecture (weak/best). In other terms, self-tracking tools mediate a particular ordering of the social world which may lead to forms of guilt-tripping and accusations (Foucault, 2008; Canguilhem, 1996). More dramatically, the emphasis of the script on self-responsibility (and the mirroring neglection of social determinants) are used to articulate a political discourse that transmutes social inequalities in individual (ir)responsibility (Petersen and Lupton, 1997; Read, 2009; Gane, 2021), something that has been identified in other types of policies, notably regarding transportation:

> The emphasis placed on individual responsibility in the framing of public issues is a strong trend that affects contemporary debates and contemporary public spaces (François and Neveu, 1999), in which citizens are considered as responsible for their own fate and, consequently, structural inequalities are depoliticized so that they can be interpreted as careless or irresponsible individual choices (Reignier, 2016: 5).

In that perspective—and although our results regarding inequalities are similar—my narrative and the ALLY team narrative part ways. By producing and diffusing self-tracking technologies that entail a responsibilizing perspective, the CDHI tends to contribute to and reproduce the neglection of structural inequalities and their depoliticization. On the other hand, by bringing negative prescriptions and social inequalities into focus, I tend to counter these narratives. However, it must be said that by recognizing the 'selection effects' related of their

technologies, and by integrating a critical scholar in their team—and remaining open to his critique—the CDHI does genuinely try to be self-critical and question its own perspective. Recent discussions with one of the centers lead researcher confirms that current projects attempt to take socioeconomic status into account. How and with what effects? This remains to be seen.

Related to this debate is the moral and political reception of myStep by users and politicians. As was evidenced in chapter 8, there are tensions within the parliament and within individuals between the script's interpretation of responsibility and the current institutional interpretation of responsibility in insurance. A tension that is crystallized around the financialization of risk (Lehtonen and Liukko, 2011, 2015). I have shown the role of self-tracking technologies in igniting and actualizing this tension. By encapsulating a neoliberal understanding of responsibility, and inviting it within the regulatory framework of insurance, self-tracking technologies destabilize the frontiers that are currently drawn in Switzerland between state and individuals, insurances and policyholders, volition and social forces, and individual responsibility and structural inequalities (McFall, 2018).

9.4. Agency vs structure all over again?

The struggle between self-responsibility and structural inequalities is central to contemporary political oppositions, and the self-tracking forms analyzed in this document draw from one rationale—neoliberalism—that right winged politicians have been using in recent history to address governmentality issues (Rose, 1996). Self-tracking has to do with governing selves and the ethics of personhood (Lupton, 2016), processes that are intimately tied to the interrelations between society and individuals (Foucault, 1979/2008). Whether in their neoliberal form, where they guide and constrain the production of active citizens fit for advanced liberal societies (Rose, 1996); or in alternative forms, where they allow users to question their identities and allow the emergence of new practices (Kristensen and Ruckenstein, 2018), they always trace

back to how subjects 'produce' themselves in interaction with social structures mediated by technologies, to the productive space mentioned in chapter 2.

In my work, I have tried to remain distant from strict determinism, and have offered to picture freedom and responsibility, in a neo-kantian perspective, as an agential capacity rooted in structural forces that may constrain or enable them. In other terms, I have drawn attention to the conditions of production of responsibility and solidarity (which are neither equal, nor stable). My research suggests that the production of and the discourses around self-tracking technologies contribute to neoliberal attempts to depoliticize social inequalities, notably by obscuring the role of social context, while emphasizing individual responsibility. On the other hand, it suggests that on the consumption side—which I prefer to call 'use'—self-tracking practices are partly determined by people's dispositions, and hence by social dynamics.

Tensions between agency-oriented and structure-oriented accounts and practices point back to my critique of the literature in chapter 2, and the fact that STS, post-phenomenology and post-Foucauldianism tend to neglect the social grounds of tracking practices. The field of sociology in France may have played a role in freezing certain theoretical oppositions instead of articulating them (Bigo, 2011; Nelson, 2014). On the one hand, the excessive attention given to social classes and structures may have eclipsed the specific effects of technology and materiality. On the other hand, the opposition to essentialism and determinism may have led to the neglect of the social grounding of uses. In this dissertation, I have argued that it is possible to give a nonessentialist account of human-technology interactions while considering people's pasts. This is crucial for scholars also play a role in the aforementioned debates. By neglecting the role of people's pasts, we risk reinforcing and reproducing beliefs that health practices are fully determined by peoples' (ir)responsible individual tendencies, or that failures to address this issue are purely technological.

This is why, based on empirical evidence, I attempted to integrate Bourdieu's dispositionalist framework and de-scription. In order to do this, I had to emphasize the fact that pasts (dispositions, being the product of dynamic interplays between social positions, conditions and trajectories are a form of incorporated past) are not stable, isolated things but are continuously reworked and reassociated collectives. Doing so, I steered away from purely deterministic understandings of Bourdieu's framework, while re-integrating the role of social structures and power relations into Akrich and Latour's semiotic plane. This allowed me to suggest that such networked pasts are similar to affordances, or prescriptions (which, because they reflect the mediation of design, are also incorporated and sedimented pasts). It eventually leads to picturing human-technology interactions as iterative and contextual interactions between (malleable) technical prescriptions inscribed by designers within a technology and a set of plural and contextual user prescriptions rooted in dispositions. In this perspective, the patterns of adoption and use emerge from a limited (but still broad) field of possibilities or, in other words, are partly—and I insist on partly—determined by both types of prescriptions. Figure 6 summarizes this position.

My role regarding myStep and ALLY's scripts has been to reveal their theoretical underpinnings, highlight their blindspots, give voice to their users, tackle their design and use from a critical point of view (notably reframing them under another light) and draw attention to their potential dangers while recognizing their situational usefulness. Notably, it has been to highlight the role of theoretical frameworks (both on the side of HCI and on the side of critical scholarship) in drawing the attention away from social structures. I have been vocal about this in peer-reviewed articles, newspapers articles, conferences, and my dissertation. Whether or not this will impact the design of future self-tracking technologies is beyond my reach. However, in section 11.1, I briefly tackle potential evolutions.

10. Limitations

> « La science consiste à faire ce qu'on fait en sachant et en disant que c'est tout ce qu'on peut faire » (Bourdieu, 1984 : 54).

As was argued all along this dissertation, every point of view, every method, and every theory come with both strengths and limitations (Ihde, 1990). In this section, I will discuss the limitations of my dissertation. I address methodological limits first, before I turn to theoretical ones.

10.1. Methodological limitations

As was discussed at length, my research was done in collaboration with a laboratory and a private insurance company that have vested interests in the diffusion and development of digital health solutions. It is then legitimate to wonder whether that network of partners did impact the integrity of my work. Surely, working and interacting with these actors has had an influence on me. If only because I got to know their goals and ambitions, to understand their hopes and fears, to share time and to collaborate with them. Nevertheless, I strongly believe that this did not impact my results and interpretations. I believe that my critical stance evidences the fact that I did not take the interest of these actors upon me. To put it broadly, I highlight the fact that they developed—in ALLY and myStep—digital self-tracking technologies that negatively impact society, notably by strengthening inequalities and supporting neoliberalism (towards which I have been overtly critical).

During our collaboration, the insurance and the laboratory raised only few concerns regarding my work. The ALLY team, who co-authored my first paper with me questioned certain of my hypotheses or interpretations but let me publish the paper as I wanted it. Overall, our interactions never went beyond sound academic debate. On the side of the insurance, the only concern they expressed targeted a question in the questionnaire about the legitimacy of self-tracking in insurance. I answered that it was an important question to understand users'

point of view, and the insurance eventually accepted to leave it in the questionnaire. To summarize, the censorship of these actors on my work has been inexistant. Something that was probably reinforced by the fact that my financial resources all came from the university of Lausanne, leaving me as much independent as possible.

Some of the difficulties that I faced were related to sampling. The first order divide that I revealed regarding the diffusion of the technology was mirrored in my own work. First, people who do not have access to private supplementary insurance were fully excluded from the studies (in both cases, people were reached by the insurance, selected within the pool of supplementary insurance policyholders). Consequently, my accounts invisibilized the most vulnerable populations. Second, non-users were probably less likely (less disposed) to participate in the questionnaire. Moreover, they were not interviewed, notably because of time restrictions. As a result, my work neglects the perspectives of non-users, although it is key to understanding the social impacts of a technology (Wyatt, 2003).

All these points regarding sampling are likely to have reinforced the voice of convinced users against less convinced, richer citizen who can afford a private insurance against poorer who cannot, users against non-users and policyholders against non-policyholders. All this should be considered while interpreting my results. However, let us note that in most cases, the inclusion of those neglected populations would likely reinforce my claims more than undermine them. For example, the inclusion of people who do not have access to private insurance in the statistical analysis would largely and undoubtedly reinforce the first order digital divide that I identified. Nevertheless, it has led to a lack of knowledge on the specifics of these populations.

Another methodological limit has to do with temporality. I have always collected data at a single point in time. Consequently, I was limited in my possibilities to provide evidence on how people changed. I made interindividual comparisons, but my intraindividual comparisons were based on the information I gathered on people's past as part of a single interview, not

through several interviews led at different moments in time. As a result, I had to rely on people subjective accounts to assess whether they were changed by the intervention, by the daily use of self-tracking or whether they already carried the propensity to change within themselves. I argue that in most cases, what I witnessed was the mediated actualization of an already present disposition. However, it would be important to pursue this enquiry further.

Sure, people could not have articulated certain of their views if they had not used the technology. Simply because it requires having used it (or intimately know it) to articulate them. But I remained—and still remain—under-equipped to account for the actual processes of change. This is a major limitation, which I hope to have acknowledged by remaining cautious around the subject. Research that uses questionnaires and/or interviews before, during, and after people use the technologies would allow us to gain a firmer understanding of the progressive entanglement between users and technologies.

10.2. Theoretical limitations

The limits regarding grounded theory have been discussed in the method section. Also, some of the limits of de-scription and Bourdieu's framework have been discussed in section 3.4. In the current section, I briefly re-address the limits of these frameworks, but mostly turn to the limits of my own articulation of those to analyze human-technology interactions. In my work, I have highlighted the shortcomings of STS, Foucauldianism, and new materialism. In concrete terms, I slightly invisibilized agentic forces while highlighting structures and pasts, and invisibilized idiosyncratic creativity to highlight patterned inequalities. The whole move was motivated by my aim (triggered by empirical induction) to re-affirm the role of users' pasts. This led to my attempt at integrating Bourdieu with de-scription.

Nevertheless, my attempt at pluralism is no panacea. And the following question must be addressed: what perspectives did my combination of Bourdieu and STS obscure? To answer that, I turn to recent work in cultural sociology and its critique of these two trends in the field

of human-artifacts interactions (Alexander, 2020). According to Alexander, most studies of subject-object (human-technology) relations are biased by what he calls the 'objectification of objects' (2020: 382). By that, he means a materialistic understanding of materiality, the consideration of objects as inert, non-symbolical things. He traces this stance back to Marx, Weber, and Benjamin (we could easily add Heidegger) whose positions emphasize how technologies alienate, de-humanize and lack 'aura, mystery, and the power of enchantment' (Alexander, 2020: 382). He posits that this stance was actualized in the post-structuralist neglection of materiality and in new materialist's reductionist and non-cultural/symbolical understanding of object as 'only' material.

Departing from these stances, Alexander argues for a more complex model of thing-human interactions where 'things are made by agents who create scripts and have access to the means of symbolic production' and the 'objects so produced are then put into the scene by gallery owners, advertisers, and PR' (389). Part of this 'mise-en-scène' is also provided by criticism, and all this coalesces in the audience feeling in 'fusion' or 'defusion' with the object (see Figure 22). There is an awful lot to unpack and to criticize in that stance. Notably, what exactly is fusion? What of agents who do not have (conscious) access to means of symbolic production but still produce objects? What is the role of users in production and mise-en-scène? But my aim here is not to criticize or unfold Alexander's perspective. It is to use it to criticize my perspective. And according to his perspective, I obscured affectual and symbolic forces, notably by steering away from how the technologies are 'mise-en-scène' (sold, communicated, packaged, etc.).

I admit having neglected—although I do not deny their importance—affects, which Alexander ties to the object 'aesthetic surface' (Alexander, 2020: 385) According to him, the role of the sensuous has been largely ignored, although it plays a major role in the adoption and appropriation of objects. And even though his conceptualization of it remains unsatisfactory to

me (he never systematizes his views), he has the merit of recognizing that affect is not transcendental, but rooted 'sociologically, in space, time, and social relationships, as a social performance' (Alexander, 2020: 387). Deborah Lupton's work on self-tracking reveals that 'feminist new materialism' is already prone to tackle most of what Alexander criticizes in materialism. She focuses on the affective forces that are source and product of tracking interactions and draws attention to certain mise-en-scènes, notably regarding advertising (Lupton, 2018a, 2018b, 2018c, 2018d).

Recognizing, conceptualizing, and mobilizing affects in my research may have led to a more complete understanding of adoption and appropriation, notably because it would have reinforced my understanding of the symbolic role of technologies. For example, it would have meant diving into the symbolical and affectual underpinnings of propositions like 'I feel good when all the week is displayed in green on the app' or 'I find the analysis of data playful'. What symbolical and affectual architectures lie behind these feelings? And how are they actioned (even construed) by the technology and its designers? This last question brings together affects, symbols, and *mise-en-scène*, which are three blindspots of my research, all three addressed by Alexander. Moreover, it would have drawn the attention to how designers and the insurance communicate about the technologies while attempting to recruit potential users, processes that culturalist understanding of technologies do put to the fore (Silverstone et al., 1992; Haddon, 2007).

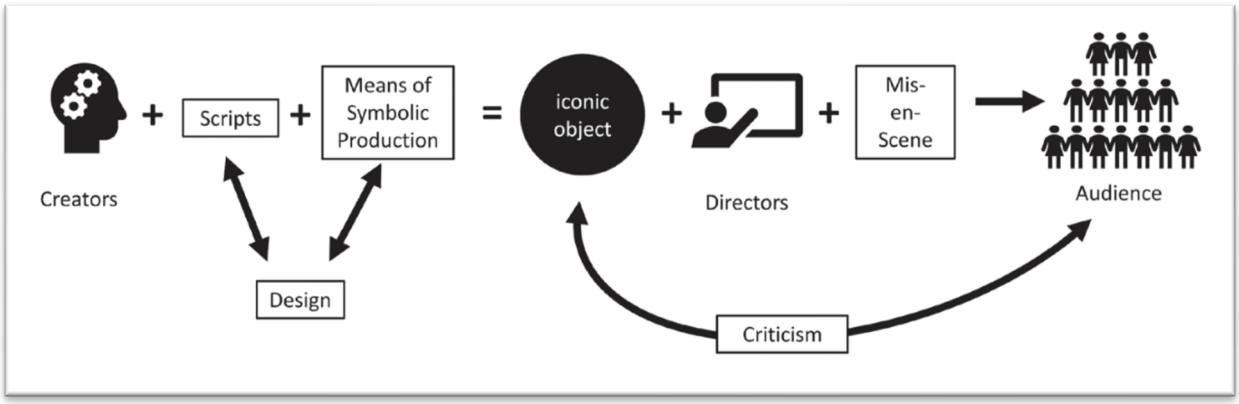

Figure 22 Model of human-objects interactions
Copied from Alexander (2020: 390)

A possibility to elude some of the aforementioned limitations would be to draw from practice-based theoretical frameworks. I mentioned Schatzki in the theoretical framework section, but the more recent work of Shove et al. (2012) could be mentioned. In both cases, reference is made to a 'practice-turn' that notably originated from Giddens and Bourdieu's attempts at going beyond classical oppositions between agents and structures (see section 2.1). They acknowledge, of course, that it would be a rough simplification to believe that these authors were the first to turn to practices (let us simply think of Wittgenstein and Heidegger), or that their endeavors are representative of the practice-turn as a whole.

Authors generally recognize the plurality of practice-oriented research but highlight a series of its key elements. First, practice-oriented critical research aims to steer away from structural explanations of social reproduction, notably because 'they leave many questions hanging. Of these the most important have to do with exactly how practices emerge, evolve and disappear' (Shove et al., 2012: 4). There are, of course, competing definitions of practices, but Schatzki defines them as 'temporally and spatially dispersed nexus of doings and sayings' (1996:89). Shove and al. conceptualize practices as a series of elements that are brought together as practices are performed (2012). The focus on the interrelations between the elements of practice and their performances in everyday life provides these authors with a particular lens

that tends, indeed, to draw the attention away from the sometimes-limiting notions of structure and agency. In that sense, they provide interesting avenues for the study of human-technology interactions.

Focusing on dispositions with a Bourdieusian lens has some limitations. Culture is characterized by a global compression (Robertson, 1990), in which many cultural intermediaries contribute to its complex circulation (Featherstone, 2007). Meanings and normative models of collective identity can be influenced by several forms of socialization (Lamont and Molnár, 2001). Furthermore, interactions between peers and market forces may challenge traditional forms of legitimacy and modify lifestyles (Warde, 2008). Meanings of self-tracking are thus reworked by public policies, social media, insurance programs, or corporations that manipulate social codes to change behaviours, legitimate practices, generate profits or develop their businesses.

Giving attention to dispositions and lifestyles should not lead to depicting users as passive (Hyysalo et al., 2016). The emphasis that Bourdieu put on reproduction and structures may—falsely—lead to essentialist and overly deterministic accounts, which I hope to have avoided. However, my results prove that some determinisms are at play in the acquisition and use of self-tracking, which are often neglected. As we have seen, their logics are complex. If some users gravitate towards self-tracking because it fits their lifestyles; others, although not disposed to it, use self-tracking to face financial and/or health issues. Dispositions may evolve in specific contexts, for example, under the influence of peers or public policies (Coulangeon; 2008).

My theoretical articulation (see Figure 6) relies on rather clear distinctions between designers and users, and users and technologies. I recognize—alongside critical scholars (e.g. Mol, 2002; Latour, 2007; Barad, 2007; Bennett, 2010)—the limits of such boundaries. I tried to remain cautious around those and attempted to articulate a perspective that both recognizes

that users and technologies carry autonomous prescriptions (at least prior to their entanglement) and that they eventually become utterly intertwined. As was discussed in the theoretical framework chapter, I attempted to go back and forth between acknowledging the entanglement of users and technologies and disentangling them to try and answer my research questions.

I will now discuss the limits of my approach to the digital divide and digital inequalities. First, the digital divide may be criticized for its reductive treatment of digital inequalities. Indeed, by tri-partitioning digital inequalities in first, second, and third order, the concept of digital divide does both enlighten and obscure our understanding of inequalities. On the one hand, it provides a systematic lens that structures analysts' endeavors and the scientific debate as a whole (Lythreatis et al., 2021). On the other hand, that systematization standardizes analysts' approaches, thereby marginalizing, or obscuring alternative perspectives (Ragnedda and Munschert, 2018). It also bears the risk of becoming an empty—or flat—concept that blurs the complexity of digital inequalities (Gunkel, 2003; Selwyn, 2004). Used in this perspective, the concept may lead to reductive statements, and poorly informed policies. However, I hope to have avoided these pitfalls by infusing the concept with my own conceptualization of human technology interactions (see chapter 3).

As was described in section 3.6, the concept of digital divide has been refined by critical scholars who efficiently alleviated its binary grounds. However, some scholars still argue that, even re-conceptualized, the concept leans towards binary opposition. Based on Chandler, Gunkel suggested that the digital divide was originally built as a 'great divide theory'—theories that 'tend to suggest radical, deep, and basic differences' (Chandler, 1994: 1)—and would be more accurate if reframed as a 'continuity theory'—theories that 'stress a "continuum" rather than a radical discontinuity' (Gunkel, 2003: 507). He argues that the term itself should be modified because it is too suggestive of a binary opposition. He notably mentions Warschauer, who, early on, suggested to replace it by 'digital stratification' (Warschauer, 2001).

In my dissertation, I believe that I have harnessed both reductive and more complex approaches of the digital divides. On the one hand, I have sometimes—in the process of arguing that digital divides are present in the adoption and use of self-tracking technologies—relied on a binary opposition between adoption and non-adoption, and between four different types of use. I believe it was important to adopt this somewhat straightforward and slightly reductive stance because a) it helped me highlight the existence of inequalities, b) I helped me underline the shortcomings of the literature (that tends to obscure the presence of inequalities), and c) the constraints of publication do favor clear and direct arguments. On the other hand, I tried to accompany my arguments with precautions, notably by a) noting that the categories of use and non-use are not as straightforward as is sometimes suggested, b) highlighting the fact that practices are co-constituted by designers, technology, and users, c) bringing the role of various dispositions to the fore, and d) acknowledging the porosity of the categories of use I created. I strongly believe that all perspectives come with both strengths and weaknesses, and that such a conundrum is only resolved—in a somewhat neo-kantian manner—by acknowledging one's position and the effects it produces. I have tried to do as honestly and reflexively as I could in the context of this dissertation.

In my dissertation, I used a combination of Bourdieu and Akrich to tackle digital divides. It allowed me to emphasize the co-constitution of inequalities between designers, users and technologies and to highlight the role of users' pasts. In that sense, I think I have avoided the pitfall of oversimplifying digital inequalities. However, this approach has its weaknesses. First, as explained in chapter 3, I relied on a neo-Bourdieusian framework, health lifestyle theory, developed by Cockerham (2013). This approach puts the emphasis on the interplay between social determinants, socializations, and trajectories. I have argued that it is more dynamic than Bourdieu's original framework, and that its emphasis on dispositions provided a suitable lens to tackle my research questions. However, in the context of my dissertation, it drew the attention

away from important elements of a more 'classical Bourdieusian approach'. First, it draws the attention away from the social origin of the parents, which we know play an important role (Bourdieu, 1979/1987). Sure, this mostly derived from methodological and temporal limitations, but it weakened my understanding of people's pasts and of the structural forces under which they operate. Moreover, I did not properly distinguish between primary and secondary socializations, which once again, might have weakened the same point.

Another limitation related to the Bourdieusian framework is that I did not systematically gather evidence on people's dispositions with regards to insurance and insurance companies. This resulted from my early focus on self-tracking practices and their integration in everyday life. As evidenced by table 7 (annexes), my first interview grid did not entail questions on the insurance. Sure, I did question people about the role of insurances, and how they felt about these new programs, and this even more in the second round of interview (see the integration of questions on insurance in table 8). However, even though this allowed me to gather people's opinions and understand the values they attached to insurance practices, a more structured focus on how people used their insurance (selection of insurance, type of franchise, attempts to limit one's use of the system, etc.) and what they thought of the insurance market more generally would have allowed for a more in depth study of dispositions towards insurance's role in self-tracking (and self-tracking transformative effects).

Finally, I acknowledge the fact that my focus on myStep and ALLY may have undermined the influence of the broader technological landscape. My goal was to explore the specific role of myStep and ALLY because I considered that close descriptions of specific self-tracking devices were lacking in the literature (see chapter 2). My desire to provide such a systematic and close analysis may have led to the invisibilization of the broader technological landscape. By that, I mean other devices that people use (many of my interviewees—and this is apparent in chapter 6 and 7—used other apps or devices to records cycling, swimming, etc.),

platforms on which they may prepare their training sessions, self-tracking tools' commercials, or the imaginaries of self-tracking tools (notably in science fiction or tv-shows). In many ways, my research has a narrow focus. This focus comes with its strengths, but it may also undermine the role of broader sociotechnical landscape in influencing self-tracking practices.

11. Avenues for further research

> « Dans un groupe de recherche de cette sorte, la censure collective est très puissante, mais c'est une censure libératrice, qui fait rêver à celle d'un champ idéalement constitué, qui libérerait chacun des participants des 'biais' liés à sa position et à ses dispositions » (Bourdieu, 2001: 220)

In the coming paragraphs, I propose six avenues for further research based on my results and the limitations evoked in the previous section.

A first important avenue for self-tracking research is to enquire the temporal effects of self-tracking. By that, I do not mean whether people drop it or not after a while, although it is an important topic which people have already started to tackle (Lomborg et al., 2018). No, what I mean is that we need studies that follow people as they engage with a particular tool and document the formation of new subjectivities and practices in iterative interactions between scripts and users. Otherwise, we will always be left with wondering how and if self-tracking transforms individuals. Until this is closely studied, for example drawing from methods based on Husserlian phenomenology (Vermersch, 2011; 2015), a crucial part of self-tracking is left in the darkness. In fact, these progressive changes—that have not been closely studied—are central to most scholarly arguments about self-tracking.

Second, more quantitative studies are needed to document differences in adoption and use, notably in institutional contexts. First, they would provide data on new settings so that we start to get a grasp of self-tracking's worldwide diffusion and penetration. Beyond adoption, they could allow us to cement the fact that second order digital divide are present in the use of self-tracking. However, this will be a difficult task for variations in self-tracking practices seem to be related to more minute factors than broad sociodemographic ones (Findeis et al. 2021).

My research paves the way for the study of self-tracking's role with regards to digital inequalities/digital divides. As was explained in the previous section, there are many limitations to my study, and this calls for further endeavors. My analysis of first and second order divides

shed light on how previous non-digital and digital dispositions impacted digital tracking practices, but much work remains to be done in that area. As was evidenced in chapter 3, the study of digital inequalities and digital divides can take many forms, which all lead to different research questions and ways to problematize the adoption and use of self-tracking tools. One interesting possibility would be to explore something I generally eluded in my research, which is how digital self-tracking may be 'converted into externally observable social resources (better job, better salary, bigger social network, better knowledge etc.)' (Regnadda, 2018: 2367). I believe that my research provides first clues as to these processes, and—provided some new analyses—could lead to an exploratory article on third order divides in insurance self-tracking. However, I hypothesize that a focus on third order mechanisms would lead to particularly interesting results with regards to three specific contexts: self-tracking for professional athletes, self-tracking for patients in medical settings, and the presentation of the self through self-tracking on social networks.

Third, little has been said of the communication surrounding self-tracking tools. Ruckenstein and Pantzar (2017) inquired their representation in specialist medias, and Lupton has done preliminary research on markets (2014a). But we need to understand how they are sold to people through commercials, how employers and insurers present them to their employees and policyholders, how self-tracking brands represent themselves on social medias, etc. What is the symbolic economy of self-tracking beyond keen users' circles? This is important because, as was argued in the previous sections, communication is an understudied part of the scripts, Moreover, it is likely to be a crucial factor to alleviate first order divides (Kramer, 2020).

Fourth, little has been said of non-users of self-tracking technologies. As was argued previously, non-users are central to the development and the use of a technology (Wyatt, 2005). Such research would allow us to know more about the resistances and obstacles to self-tracking,

and about the alternative views formulated by non-users. Moreover, neglecting non-users bears the risk of 'accepting a worldview in which adoption of new technology is the norm', something I might have contributed to with my work (Wyatt, 2005: 78).

11.1. Alternative self-tracking technologies

In addition to the avenues mentioned in the previous section, I think that there is a crucial need for collaboration between critical scholars and designers to operationalize alternative tracking tools. This calls for the difficult task of working beyond the limits of social science, in interaction with engineers and designers.

Anthropology has been key in questioning social sciences relations with design (Kimbell, 2011; 2012; Gunn et al., 2013; Pink et al., 2016; Smith et al., 2016), but the operationalization of critical theories in design practices has mostly been led by STS scholars. Drawing from STS insistence on symmetry (Bloor 1991), they have highlighted the importance to avoid the binary pitfalls of technology-centered or human-centered design (Berg 1998) and shown a refusal to contribute to 'weak' and unidirectional interdisciplinary connections (Blomberg and Karasti 2013). They notably offered to pragmatically approach the design of technologies as interdisciplinary 'trading zones' in which disciplines iteratively engage with practical and conceptual problems-solving situations (Dewey 1938; Galison 1997; Vertesi et al. 2016). This led to the development of various methods, most notably critical technical practice (Agre 1997), participatory and reflexive design (Schuler and Manioka 1993; Sengers et al., 2005), and critical approaches to design (Suchman 2012; Vertesi and al. 2016). How to use this literature to transform self-tracking design and practices is a matter of future research, but I would like to sketch some initial ideas.

Critical scholars have paved the way towards alternative models, notably by picturing self-tracking as a reflexive practice, co-constituted by human and technological affordances, that lead to the emergence of affective and agential capacities (Pantzar and Ruckenstein, 2017;

Kristensen and Ruckenstein, 2018; Lupton 2019a; Lupton 2019b). What I suggest is that we need interdisciplinary applied research based on these models. Such research would steer away from the limited models—e.g. those analyzed in my dissertation—and pave the way towards the implementation of alternative self-tracking technologies. How do we in-scribe (re-inscribe in Akrich and Latour's vocabulary) self-tracking technologies with a focus on reflexivity, agency, affects and social structure in mind? How would such a technical architecture support idiosyncratic self-exploration? How do we avoid the neglection of people's awareness or the technocratic imposition of expert knowledge? What new pitfalls and neglections would emerge with these alternative technologies? These are questions that such research could inform, reverse-engineering self-tracking technologies from a critical perspective, and paving the way towards a more humanistic understanding of technological design (Drucker, 2014).

12. Closing remarks

> "To study is always to do politics in the sense that it collects or composes what the common world is made of" (Latour, 2007: 256)

As was already suggested, I consider my PhD as a 5-year process of iteratively entangling myself with—among other things—methods, concepts and theories, empirical data, users, designers, the academic market, and other researchers. It led to the production of a certain perspective on digital public health and self-tracking practices that is mediated by this document, and by me (in the sense that I am a biosocial vessel carrying this perspective within me). I have tried, in this text, to describe and disentangle this lengthy process as best as I could. However, a last question remains hanging: 'what should I do (with this perspective)?'.

This is an ethical question—at least in the Kantian perspective (Kant, 1781/1998)—and may seem to lie slightly beyond the empirical aim of this document. However, any scientific proposition about the world necessarily involves a political and moral perspective (Latour, 1984/1993). Moreover, it is hard to argue that a scientific proposition can remain 'neutral' or 'passive', for we know that all propositions are performative (Austin, 1962; Deleuze, 1980). This is particularly true for researchers (like me) who—although they may often argue against it— consciously or unconsciously follow their own 'interests' (Bourdieu, 1992).

Therefore, writing down this document necessarily entailed a moral and political stance, and it would be somewhat dishonest not to position myself towards it, to hide behind a pretended scientific 'neutrality'. I argue that there are two ways to tackle this ethical question, which are not exclusive of one another. The first follows the general suggestion of certain critical scholars—although rarely frontally articulated—that self-tracking represents too many risks and disadvantages and should be abandoned or fought against. As an empirically grounded critique, my perspective could reinforce—for example—the Federal Council's position regarding tracking in insurance programs evoked in chapter 8. It can thus be used—and

promoted by myself—as an argument against the development of tracking programs, a caution against technological solutionism and a small empirical piece of broader critiques of neoliberalism and healthism. This is a classical critical stance, which would lead to me using and promoting my work to restrict and hamper the development of self-tracking technologies.

The second follows Rose's insight that 'while many changes are shaped by processes that are open to criticism' these changes also see the emergence of new practices, meanings, or even lifeforms that are 'open to experimentation and to contestation' (2007: 39-40). He suggests that, beyond criticism, scholars should explore the innovations and what they bring about under a more optimistic light. Such an optimistic stance is also suggested by the self-tracking scholars who shift the focus from normative constraints to idiosyncratic, situational, and distributed form of self-reflexivity that allow people to explore and test new identities (Pantzar and Ruckenstein, 2017; Kristensen and Ruckenstein, 2018; Lupton 2019a; Lupton 2019 b; Ajna, 2021).

Following that stance probably means using the critique to try and change self-tracking practices, as was suggested in 11.1. It means using obstacles and failures as opportunities to question values, redefine practices and produce alternative visions and artifacts (Sengers et al., 2005). Of course, re-inscribing self-tracking technologies with alternative models and values may implicate a partial entanglement with both technological solutionism and healthism. But this does not necessarily mean retreating from reflexivity or social sciences (Pink et al., 2016).

Diving in the design of alternative self-tracking practices may be a fitting role for a trained sport-scientist who took on the role of a critical scholar in an interdisciplinary applied laboratory. If I were to follow that path, I would complete a whole research cycle that goes from critiquing a technology, to designing, implementing, and testing (critiquing) an alternative. Such applied research cycles may be required if we are—in the future—to seize the opportunities of self-tracking in a responsible, reflective, and inclusive manner.

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14. Annexes

14.1. Invitation to the myStep part of the research

- Lire en ligne ici

Participez à une étude sur l'activité physique et la technologie!

Bonjour Madame Bucher

A l'avenir, quelle importance les technologies de mesure auront-elles avoir dans les domaines de l'activité physique, du sport et de la santé? Faut-il les utiliser ou les éviter?

Ce sont ces questions très intéressantes que se posent actuellement des scientifiques de l'Université de Lausanne. En tant que partenaire officiel, la CSS invite des clients qu'elle a sélectionnés (et dont vous faites partie) à prendre part à cette étude!

Que devez-vous faire?
En remplissant un petit questionnaire en ligne (5 à 10 minutes), vous apporterez un précieux soutien à la recherche menée par l'Université de Lausanne.

Participer maintenant »

Dans le questionnaire, vous serez amené/e à saisir des données sur vous-même ainsi que sur votre comportement et vos motivations. Les données sont enregistrées sur des serveurs sécurisés de l'Université de Lausanne, anonymisées et exploitées uniquement à des fins de recherche. La CSS n'a aucunement accès aux données collectées et ne peut pas remonter aux personnes ayant participé.

Comment aller plus loin?
Si vous le souhaitez, vous pouvez participer à un entretien approfondi concernant l'activité physique et les technologies. Dans ce cas, il vous suffit de remplir le champ concerné à la fin du questionnaire afin de saisir des données de contact pour les chercheurs et d'obtenir de plus amples informations. Les entretiens durent une heure au maximum et peuvent être réalisés dans un lieu de votre choix ou par téléphone. L'équipe de chercheurs de l'Université de Lausanne tirera au sort cinq bons d'achat d'une valeur de 100 francs utilisables dans les magasins Manor parmi les 40 participants maximum.

Qui peut participer?
Tous les clients CSS âgés de plus de 18 ans. Peu importe si vous aimez ou non le sport ou si vous vous intéressez ou non aux technologies. Ce qui est important pour les travaux de recherche, c'est qu'un maximum d'opinions différentes soient récoltées.

Pourquoi devrais-je participer?
Pour soutenir une étude passionnante qui se penche à la fois sur la technologie et sur la santé. De nos jours, les questions portant sur l'activité physique, la santé et les nouvelles technologies sont devenues centrales. En remplissant le questionnaire et en participant éventuellement à un entretien, vous contribuez à ce que les chercheurs comprennent mieux le lien entre activité physique, sport et technologies dans notre société et puissent récolter l'avis de la population.

Participer maintenant »

La date limite de participation est le 20.07.2019.

L'équipe de chercheurs vous remercie pour votre collaboration!

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14.2. Interview grids

Table 6 Interview grid before the first ALLY interview

Thème	Question générale	Sous-thème	Questions d'entretien, relances
Usage de l'application	Comment se passe concrètement l'utilisation des outils par la personne ?	*Exemple*	Journée type ? Sortie sportive type ?
		Outils	Quel(s) outils ? Quelle plateformes ?
		Rythme et contexte	Ponctuel ? Continu ? A quelle occasion ? Seulement sport ? Quotidien ?
		Type de données	Quels types de données utilisez-vous ? n'utilisez-vous pas ?
Usage des données	Quel usage est fait des données ? Comment s'intègrent-elles dans les pratiques ?	*Usage des données*	Comment les données aident-elles l'entrainement/le suivi de santé ?
Historique	Quel historique de l'(dés)engagement dans le self-tracking ?	*Déclencheur*	Quand avez-vous commencé/arrêté ? Pourquoi à ce moment-là ?
		Modifications	Votre usage a-t-il changé au cours du temps ? Comment ? Pourquoi ? Changement d'outils ?
		Arrêt	Avez-vous arrêté ? Pourquoi ?
Motivations	Qu'est-ce qui motive l'utilisation des outils ?	*Motivations, croyances*	Pour quelles raisons utilisez-vous les outils ?
Corporalité	Quels liens entre le corps et les données ?	*Corps*	Ressenti ? Pertes ?
	Quels savoirs sur soi développés avec les données ?	*Connaissances*	Physiologie profane ? Quelles croyances ? Limites ?
Social	Existe-t-il une socialité des données ?	*Social*	Avez-vous des amis qui utilisent le même type d'outils ?
		Plateformes	Partagez-vous vos données ? Avec qui ? Comment ?

Table 7 Interview grid after the last ALLY interview

Thème	Question générale	Sous-thème	Questions d'entretien, relances
Usage de l'application	Comment se passe concrètement l'utilisation des outils par la personne ?	*Exemple*	Journée type ? Sortie sportive type ?
		Outils	Quel(s) outils ? Quelles plateformes ?
		Rythme et contexte	Ponctuel ? Continu ? A quelle occasion ? Seulement sport ? Quotidien ? Difficultés pour utiliser l'application dans la vie de tous les jours ?
		Type de données	Quels types de données utilisez-vous ? n'utilisez-vous pas ?
		Difficultés, limites	Quels aspects de l'application ne vous conviennent pas ? Manque-t-il des choses ?
Usage des données	Quel usage est fait des données ? Comment s'intègrent-elles dans les pratiques ?	*Usage des données*	Comment les données aident-elles l'entrainement/le suivi de santé ?
Historique	Quel historique de l'(dés)engagement dans le self-tracking ?	*Déclencheur*	Quand avez-vous commencé/arrêté ? Pourquoi à ce moment-là ?
		Passé	Avez-vous utilisé d'autres outils avant ?
		Modifications	Votre usage a-t-il changé au cours du temps ? Comment ? Pourquoi ? Changement d'outils ?
		Arrêt	Avez-vous arrêté ? Pourquoi ?
Motivations	Qu'est-ce qui motive l'utilisation des outils ?	*Motivations*	Pour quelles raisons utilisez-vous les outils ? Santé, performance, curiosité ?
Corporalité	Quels liens entre le corps et les données ?	*Corps*	Ressenti ? Pertes ?
	Quels savoirs sur soi développés avec les données ?	*Connaissances*	Physiologie profane ? Quelles croyances ? Limites ?
Social	Existe-t-il une socialité des données ?	*Social*	Avez-vous des amis qui utilisent le même type d'outils ?
		Plateformes	Partagez-vous vos données ? Avec qui ? Comment ?

Table 8 Interview grid for the myStep interviews

Thème	**Sous-thème**	**Question**	**ok**
Individu, introduction		Qui êtes-vous ? Travail, sport, famille, éducation ?	
Usage de l'application	Usage	Pouvez-vous me montrer vos données et m'expliquer ce qui s'y passe ?	
	Engagement	Quand avez-vous commencé à mesurer ? Pourquoi ?	
	Usage quotidien	Comment utilisez-vous l'application au quotidien ?	
	Usage et temporalité	Est-ce que la manière d'utiliser a changé au cours du temps ?	
	S'autoévaluer	Avez-vous appris à évaluer vos pas ?	
Rapport à la performance	Journée active ?	Qu'est-ce qu'une journée « active » ? Était-ce déjà ça avant l'application ?	
	Journée paresseuse	Que pensez-vous de quelqu'un qui n'atteint pas cela ?	
	Performance plus	Que pensez-vous de quelqu'un qui fait beaucoup plus ?	
	Identité et chiffres	Que pensez-vous de vos chiffres ?	
	Partage et-identité	Vous en parlez à d'autres ? Comparez ?	
	Avis externes	Que pensent les gens de votre participation à *Mystep*	
	Habitudes	Avez-vous changé des habitudes ? Lesquelles ? Selon quelle temporalité ?	
Rapport au sport	Sport	Pratiquez-vous du sport ou des activités physiques ? Lesquelles ?	
	Temporalité sportive	Quelle temporalité entre ces pratiques ou modes de relation à la pratique ?	
	Socialisation au sport	Faisiez-vous du sport jeune ? Avec vos parents ?	
	Sport et valeurs	Qu'est-ce que les activités physiques vous procurent ? Que recherchez-vous ? Creuser…	
	Sport et performance	Avez-vous fait du sport de compétition ? des courses ? quels sont vos résultats (insister) ?	
	Sport et technologie	Utilisez-vous des technologies pour mesurer vos activités sportives ? lesquelles et que mesurez-vous ?	

Rapport à la santé	Care et alimentation	Vous préoccupez-vous beaucoup de votre santé ? Alimentation ? AP ?	
	Santé temporalité	Si vous vous en préoccupez : était-ce toujours le cas ? Est-ce que ça a changé ?	
	Santé	Avez-vous eu des problèmes de santé ? connaissez-vous des risques ? Famille ?	
	Santé et société	Pourquoi pensez-vous que certains font attention à leur santé et d'autres pas ?	
Rapport aux institutions	Santé et société	Que pensez-vous du système de santé et d'assurance ?	
	Santé et société	Mesurer l'AP dans l'assurance, pourquoi ? quels risques ? bénéfices ?	
	Santé et société	La santé et le système de santé sont-ils responsabilité des individus ?	
		Utiliser mystep a-t-il changé votre perception de cela ? A quoi attribuez-vous cette perception ?	
Rapport aux technologies	Technologies	Appréciez-vous les technologies ? Lesquelles ? Utilisez-vous des mesures de l'AP ?	
	Technologies et société	Pensez-vous qu'on utilise trop ou pas assez le potentiel des technologies ? Pourquoi ?	
	Technologies et société	On propose un dossier électronique du patient des avril prochain, on mesure l'AP dans les assurances, que pensez-vous de l'entrée des technologies dans la santé ?	
	Sécurité des données	Quels risques au niveau des données ? Partageriez-vous les vôtre avec l'état ? des entreprises ?	
		L'expérience de mystep a-t-elle changé votre perception des risques en matière de données ?	
	Technologie et institutions	Que penser des interactions entre entreprises privées ou assurances et l'état dans la santé et les technologies ?	
Rapport à soi	Général	Vous considérez-vous plutôt stressé ou détendu ? Comment gérez-vous globalement vie et travail ?	
		Avez-vous toujours été comme cela ? Est-ce que ça a changé ? pourquoi ?	
	Organisation personnelle	Vous considérez-vous comme quelqu'un d'organisé ? Planifiez-vous beaucoup à l'avance, par quels biais ?	
	Travail et performance	Comment gérez-vous la masse de travail, objectifs, meetings, technologies ?	
	Performance	Que pensez-vous de la performance dans notre société ? De la quête de résultats ?	
		Pa rapport à la performance, vous dîtes que… Quand pensez-vous avoir débuté à voir les choses de cette manière ?	
Sortie		Souhaitez-vous ajouter quelque-chose ? Avez-vous des questions ?	

14.3. Questionnaire items

Question	Type of response
Année de naissance ?	date
Gender	gender
Au cours des trois derniers mois, j'ai utilisé la marche et le vélo comme moyen de transport en moyenne...(Sont exclus: la marche et le vélo lorsqu'ils sont pratiqués comme sports et non comme moyens de transport) [Vélo]	• Jamais • Moins d'une demi-heure par jour • Entre une demi-heure et une heure par jour • Plus d'une heure par jour
Au cours des trois derniers mois, j'ai utilisé la marche et le vélo comme moyen de transport en moyenne...(Sont exclus: la marche et le vélo lorsqu'ils sont pratiqués comme sports et non comme moyens de transport) [Marche]	• Jamais • Moins d'une demi-heure par jour • Entre une demi-heure et une heure par jour • Plus d'une heure par jour
Au cours des trois derniers mois, j'ai fait de l'activité physique ou du sport en moyenne... (Sont exclus: la marche et le vélo comme moyens de transport)	• Jamais • Moins d'une demi-heure par jour • Entre une demi-heure et une heure par jour • Plus d'une heure par jour
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [être en contact avec la nature]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [penser à autre chose]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [être en forme physique et bien entrainé]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [se détendre]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [partager des moments de convivialité]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [faire des rencontres]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [prendre soin de son apparence]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [poursuivre des objectifs de performance personnels]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [dépasser ses limites]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [se préparer à une compétition]	Five points likert scale
Lorsque vous faites de l'activité physique ou du sport, il est important pour vous de... [prendre soin de sa santé]	Five points likert scale
Durant l'école obligatoire, je pratiquais de l'activité physique ou du sport en club, environ... (Est exclu: le sport à l'école)	• Jamais • Moins d'une demi-heure par jour • Entre une demi-heure et une heure par jour • Plus d'une heure par jour
J'ai du plaisir à pratiquer des activités physiques ou du sport...	Five points likert scale

Je suis bien renseigné-e sur les recommandations de santé en matière d'activité physique...	Five points likert scale
Je suis bien renseigné-e sur les recommandations de santé publique relatives à la nutrition...	Five points likert scale
De manière générale, j'apprécie les nouvelles technologies telles que les Smartphones et les applications...	Five points likert scale
J'utilise les technologies de mesure de l'activité physique suivantes : [Mesure des pas]	Five points likert scale
J'utilise les technologies de mesure de l'activité physique suivantes : [Montre connectée (Applewatch, Samsung, etc.)]	• Jamais • Rarement • Plusieurs jours par semaine • (Presque) tous les jours
J'utilise les technologies de mesure de l'activité physique suivantes : [Montre sportive (Garmin, Polar, etc.)]	• Jamais • Rarement • Plusieurs jours par semaine • (Presque) tous les jours
J'utilise les technologies de mesure de l'activité physique suivantes : [Application Smartphone pour le sport (jogging, cyclisme, fitness, remise en forme, yoga...)]	• Jamais • Rarement • Plusieurs jours par semaine • (Presque) tous les jours
J'utilise les technologies de mesure de l'activité physique suivantes : [Cardiofréquencemètre (mesure de la fréquence cardiaque)]	• Jamais • Rarement • Plusieurs jours par semaine • (Presque) tous les jours
Les technologies de mesure de l'activité physique (mesure des pas, du jogging, de la fréquence cardiaque, etc.) sont utiles car: [Elles permettent d'être plus performant]	Five points likert scale
Les technologies de mesure de l'activité physique (mesure des pas, du jogging, de la fréquence cardiaque, etc.) sont utiles car: [Elles permettent d'améliorer la santé]	Five points likert scale
Les technologies de mesure de l'activité physique (mesure des pas, du jogging, de la fréquence cardiaque, etc.) sont utiles car: [Elles sont motivantes]	Five points likert scale
Les technologies de mesure de l'activité physique (mesure des pas, du jogging, de la fréquence cardiaque, etc.) sont utiles car: [Elles permettent de mieux contrôler l'activité physique]	Five points likert scale
Les technologies de mesure de l'activité physique représentent les risques suivants: [Elles rendent les individus dépendants (à la technologie)]	Five points likert scale
Les technologies de mesure de l'activité physique représentent les risques suivants: [Elles présentent un risque au niveau de la sécurité des données]	Five points likert scale
Les technologies de mesure de l'activité physique représentent les risques suivants: [Elles poussent les individus à toujours chercher la performance]	Five points likert scale
Les technologies de mesure de l'activité physique représentent les risques suivants: [Elles stressent les individus]	Five points likert scale
La CSS assurance propose une application, "mystep", qui permet de mesurer son nombre de pas journalier et d'obtenir des réductions sur l'assurance complémentaire…	This question divides the participants between ex-users, users, non users who know myStep and non users who do not know mySetp
Questions for users	
Depuis combien de mois environ utilisez-vous l'application mystep?	months
J'ai commencé à utiliser mystep car... [Je voulais améliorer ma santé]	Five points likert scale
J'ai commencé à utiliser mystep car... [Je voulais la tester par curiosité]	Five points likert scale
J'ai commencé à utiliser mystep car... [J'étais motivé-e par la récompense financière]	Five points likert scale
J'ai commencé à utiliser mystep car... [Je voulais augmenter mon activité physique]	Five points likert scale

J'ai commencé à utiliser mystep car... [Je cherchais un déclencheur pour reprendre l'activité physique]	Five points likert scale
Utiliser mystep m'a conduit à changer certaines habitudes et marcher plus qu'auparavant	Five points likert scale
En utilisant mystep, j'ai progressivement appris à évaluer le nombre de pas que je fais sans avoir besoin de l'application...	Five points likert scale
Le fait d'atteindre mon objectif régulièrement me procure de la satisfaction...	Five points likert scale
Questions for ex-users	
J'ai commencé à utiliser mystep car… [Je voulais améliorer ma santé]	Five points likert scale
J'ai commencé à utiliser mystep car… [Je voulais tester par curiosité]	Five points likert scale
J'ai commencé à utiliser mystep car… [J'étais motivé-e par la récompense financière]	Five points likert scale
J'ai commencé à utiliser mystep car… [Je voulais augmenter mon activité physique]	Five points likert scale
J'ai commencé à utiliser mystep car… [Je cherchais un déclencheur pour reprendre l'activité physique]	Five points likert scale
J'ai arrêté d'utiliser mystep car... [C'était trop compliqué à utiliser]	Five points likert scale
J'ai arrêté d'utiliser mystep car... [Cela me stressait]	Five points likert scale
J'ai arrêté d'utiliser mystep car... [Je n'arrivais pas à atteindre mon objectif]	Five points likert scale
J'ai arrêté d'utiliser mystep car... [Je me suis lassé-e]	Five points likert scale
Questions for non-users who know myStep	
Ce qui me motiverait à utiliser mystep (ou une application similaire)... [Pour améliorer ma santé]	Five points likert scale
Ce qui me motiverait à utiliser mystep (ou une application similaire)... [Par curiosité]	Five points likert scale
Ce qui me motiverait à utiliser mystep (ou une application similaire)... [Pour la récompense financière]	Five points likert scale
Ce qui me motiverait à utiliser mystep (ou une application similaire)... [Pour augmenter mon activité physique]	Five points likert scale
Ce qui me motiverait à utiliser mystep (ou une application similaire)... [Comme déclencheur pour reprendre l'activité physique]	Five points likert scale
Ce qui me retiendrait d'utiliser mystep (ou une application similaire)... [Je n'en ai pas besoin, je pense être assez actif-ve]	Five points likert scale
Ce qui me retiendrait d'utiliser mystep (ou une application similaire)... [Je ne souhaite pas partager ces données]	Five points likert scale
Ce qui me retiendrait d'utiliser mystep (ou une application similaire)... [Je préfère limiter mon utilisation des technologies]	Five points likert scale
Questions for non-users who know myStep	
Rappel: mystep est une application de la CSS assurance qui permet de mesurer son nombre de pas au quotidien et de recevoir une récompense financière lorsque l'objectif de 10'000 pas est atteint. Question: Je serais intéressé à utiliser une application comme mystep...	
Ce qui me motiverait à utiliser mystep (ou une application similaire)… [Améliorer ma santé]	Five points likert scale
Ce qui me motiverait à utiliser mystep (ou une application similaire)… [Tester par curiosité]	Five points likert scale
Ce qui me motiverait à utiliser mystep (ou une application similaire)… [Pour la récompense financière]	Five points likert scale
Ce qui me motiverait à utiliser mystep (ou une application similaire)… [Pour être plus actif-ve physiquement]	Five points likert scale
Ce qui me retiendrait d'utiliser mystep (ou une application similaire) car… [Je n'en ai pas besoin, je pense être assez actif-ve]	Five points likert scale
Ce qui me retiendrait d'utiliser mystep (ou une application similaire) car… [Je préfère limiter mon utilisation des technologies]	Five points likert scale
Ce qui me retiendrait d'utiliser mystep (ou une application similaire) car… [Je ne souhaite pas partager mes données]	Five points likert scale
Une personne qui est active physiquement devrait payer une prime d'assurance maladie plus basse…	Five points likert scale

Je serais d'accord de partager des mesures de mon activité physique (pas, course à pied, etc.) à des fins de santé avec : [La Confédération ou mon canton]	Five points likert scale
Je serais d'accord de partager des mesures de mon activité physique (pas, course à pied, etc.) à des fins de santé avec : [Mon assurance]	Five points likert scale
Je serais d'accord de partager des mesures de mon activité physique (pas, course à pied, etc.) à des fins de santé avec : [Mon médecin]	Five points likert scale
Je serais d'accord de partager des mesures de mon activité physique (pas, course à pied, etc.) à des fins de santé avec : [Une entreprise privée]	Five points likert scale
Je serais d'accord de partager des mesures de mon activité physique (pas, course à pied, etc.) à des fins de santé avec : [Une université]	Five points likert scale
Je serais d'accord de partager des mesures de mon activité physique (pas, course à pied, etc.) à des fins de santé avec : [Mon employeur]	Five points likert scale
Il devrait être interdit aux institutions (Etat, assurance, employeur) de mesurer l'activité physique des individus...	Five points likert scale
Quel métier exercez-vous actuellement? (dernier métier exercé pour les personnes à la retraite ou au chômage)	text
Vous êtes de nationalité...	text
Quel est votre niveau de formation?	• Scolarité obligatoire • Maturité gymnasiale • Fromation professionnelle initiale CFC, apprentissage • Formation professionnelle supérieure HES • Formation universitaire
Quel est (environ) le salaire mensuel (net) de votre ménage?	• Ne souhaite pas répondre • 0 à 4'000 CHF • 4'001 à 6'000 CHF • 6'001 à 8'000 CHF • 8'001 à 10'000 CHF • Plus de 10'000 CHF