THE COMPLEXITIES OF SELF-TRACKING – AN INQUIRY INTO USER REACTIONS AND GOAL ATTAINMENT

Complete Research

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Abstract

The activity of self-tracking is an emerging trend that often involves adopting wearable technology. Vendors promise new personal insights and opportunities to optimize health and lifestyle by adopting such devices. Spurred by these promises, users are also driven by curiosity and exploration to adopt and use the device with the aim of quantifying the self for the purpose of self-knowledge through numbers. We investigate the interplay of technology, data and the experience of self during the adoption and use of wearable technology as a pre-commitment device. The empirical focus lies on two self-tracking devices, which track moving and sleeping activities on a daily basis. 42 interviews were conducted with users of self-tracking devices. The findings suggest that self-tracking activity through wearable technology does not necessarily lead to behavioural change, but predominately works as a re-focusing device. In this light, the user experiences tensions between rational and emotional behaviours when reflecting on personal data. The results contribute to a more nuanced understanding of adoption of the emerging wearable technology in daily life and how users deal with the personal data by developing coping tactics, such as disregard, procrastination, selective attribution and neglect.

Keywords: Experiential computing, Quantified Self, Self-quantification, Self-tracking, Behavioural Economics

1 Introduction

The individual pursuit of self-knowledge and well-being are clearly marked in the emerging trend called self-tracking. Self-tracking involves adopting one or several methods and tools to collect data about the individual's performance in everyday life, such as mood, sleep, steps, daily activities, workouts, food consumption, finances or even blood sugar levels. Self-tracking is a way for individuals to collect personally relevant information that will inspire self-reflection, lead to self-knowledge and potentially motivate behavioural change (Li et al., 2010). Tracking the self is also encountered through life-logging and diary writing, yet the emergence of new technology and the accessibility of related tools and devices are enabling an entirely new scope of personal data gathering (Bell and Gemmell, 2010; Li et al., 2010; Sellen and Whittaker, 2010; Shilton, 2012).

Self-tracking wearables are often marketed by their ability to alter, or even improve, the adopter's behaviour by tracking and monitoring the individual's performance and thus motivating or enabling goal achievements. Vendors position wristbands as "a revolutionary system that guides you every step of the way to a better, healthier you" and "shows you how to make simple adjustments that, over time, add up to an all-new you" (Jawbone UP website, 2014), or, as "dedicated to helping people lead healthier, more active lives" (Fitbit website, 2014). Research corroborates this positioning by showing that pedometers can increase physical activity (Bravata et al., 2007; Tudor-Locke et al., 2004). In this context, self-tracking is an umbrella term that refers to the individual engagement and active pursuit of acquiring data on abstract and tacit aspects of daily life, such as mental and physical performance (i.e. mood, activity, sleep, blood sugar levels) as well as consumption (i.e. food, air quality).

While a plethora of research considers questions of information systems (IS) acceptance and use, there are not enough academic investigations on how users adopt such experiential devices (Yoo, 2010). In particular, we argue that self-tracking wearables represent an emerging technology that cannot be understood with existing theoretical perspectives on computing experiences that draw on a Cartesian split into body and mind (Yoo, 2010) and a primarily rational approach of actors to some alterity relationship (Ihde, 1990) with a system, which is essentially external to a user. Instead, wearable devices suggest a complex interplay of rational and emotional reactions of individuals to a device that is becoming a part of the self. As Yoo (2010) claims "Technology is not being interpreted, nor is it being experienced as an end in itself. Instead, it directly shapes and occasionally transforms our lived experience (p.218)".

Understanding adoption of such devices hence calls for augmenting research with a micro-level lens that enables exploration of the complex interplay of the technology, the personal data and the self. In this article we aim to address this need by drawing from conceptualizations of experiential computing (Yoo, 2010) and behavioural economics (Goes, 2013) to explain how such a seemingly rational adoption of a self-tracker to collect data for the purposes of gaining personal understanding and improving individual performance is actually increasing reflection, changing behaviour and driving personal insights. Motivated by this research objective, this study investigates:

- How are individuals experiencing and coping with the personal data offered by self-tracking devices in their everyday life?

To answer this question, we first position the concept of self-tracking in the chosen literature and provide a theoretical background of the study. We then present an empirical inquiry in which self-tracking is observed for people who adopted and use devices that collect and present data on daily activities. In particular, we investigate the adoption and use of two wristbands that automatically track moving and sleeping activities through the day. Our data identifies how self-tracking influences the individual's behaviour. The findings contribute to a better understanding of how users adopt and use experiential technology in their daily life and how they cope with the information provided in terms of altering or not their personal behaviour. We conclude by highlighting the implications for adoption research of experiential information technology.

2 Theoretical background

Research on self-tracking through wearable technologies falls into the stream of IS research on user behaviour. Numerous theoretical perspectives have been used in IS research to understand the adoption and use of technologies. For example, models have been introduced to explain adoption intentions, focusing on users' perceptions of a technology's performance and ease of use (Davis, 1989; Venkatesh et al., 2003), as well as focusing on the social and cognitive determinants of the user (Fishbein and Ajzen, 1975; Ajzen, 1991). Other researchers consider adoption as one step of a larger process that continues with sustained use and corresponding routinisation (Cooper and Zmud, 1990). Agarwal and Prasad (1997) examined the determinants of sustained use and identified result demonstrability as a relevant factor. More recently, researchers increasingly acknowledge affective

influences such as enjoyment as complementing existing rational determinants of use intentions (Dickinger et al., 2008).

While we acknowledge the importance of existing research in explaining the individual determinants of adoption and use, it is our contention that the use of wearable technology is a more complex process that involves the interplay of the device, the personal data and the self that experiences the technology directly (Yoo, 2010). In such a context, artefacts are not experienced as an end in itself but become "the alter ego, being attributed user's intention, hopes, and fears" (p.218) so that they directly mediate user experiences in everyday life. This calls for more comprehensive explanations of emergent digitally mediated user behaviour that go beyond coarse-grained and sequential rationalizations of outcome beliefs and consider the limits of the rational self. Yoo (2010, p.220) stresses the need to study the "nature and consequences of the digital mediation of everyday experiences"(p.220) in order to understand the transformative power of digital technology. As prominent candidates for recent conceptualizations that enter the IS field, we discuss the prospects of behavioural economics.

A promising perspective to explain self-tracking is *behavioural economics* (Kahneman and Tversky, 1984; Kahneman, 2003, Goes, 2013). With its focus on individual's choice process, it explains how everyday choices are made without considering all the information available as a rational approach would require, but based on selective choice of information, guided by heuristics. However, it underlines the threat of cognitive biases especially when heuristics are used for assessing quantitative information under uncertainty. For the purpose of this study where uncertainty is a minor element, behavioural economics offer an important approach that provides new and valuable insights on how individuals cope with numbers in the choice process.

We now introduce the main aspects of the process of self-tracking in more detail and position it in relation to behavioural economics to unfold a theoretical background on how people cope with the personal data. We will later use relevant concepts of behavioural economics as abstract 'sensitizing' theoretical concepts (Bowen, 2006). They offer "a general sense of reference and guidance in approaching empirical instances" (Blumer, 1954, p.7) and help to focus our theory development on the micro-level of the intimate interplay of the device, the personal data and the self, as well as the resulting changing behaviour and personal insights.

2.1 Theoretical process of self-tracking

Before the process of self-tracking starts, the choice or adoption of the tool is motivated by the claim that self-tracking devices can change individual performance. The devices act as pre-commitment tools for individuals who wish to follow a healthier lifestyle. Investments in pre-commitment devices work as "preventative measures taken to restrain the want self" which means that it involves an active choice made by the individual to commit to doing what is the "correct thing" to do, rather than succumbing to emotionally driven choices (Milkman et al., 2008, p. 332). In the context of this study, the self-tracking device is also a pre-commitment device shaped by technology.

After the adoption of a tool, such as a wearable device, self-tracking commonly starts with a preliminary goal (Bentley et al., 2013; Choe et al., 2014). The goal may be self-selected or suggested by the device and typically based on averages of the age group and the gender of the user. Alternatively goals are inspired by institutional suggestions, e.g., health authorities. Later in this section, we describe how the set goal influences the users' interpretation of the tracked data.

The activity of self-tracking is often dedicated to collecting quantitative personal data (Wolf, 2010; Sjöklint et al., 2013). We use self-tracking as defined in the context of the Quantified Self (QS), that puts numbers at the centre by measuring aspects of life that are not commonly measured (Wolf, 2010). Therefore, self-tracking is understood as an individual activity that pursues the collection of quantitative personal data on various aspects of life, such as physical performance and mood, with the aspiration to gain self-knowledge and motivate behavioural change (Li et al., 2010). In recent years,

QS practices have come to include more qualitative measures, such as diaries and life-logging, but remains focused on the quantitative measures as a primary form of insight into the self (REF).

After collecting information through the self-tracking devices, the users reflect on the data gathered, although time and scope of this reflection may vary. Individuals may use different cognitive systems to assess the self-tracking information during the decision-making process, as suggested by dual process theories from social psychology (Evans, 2010). They rely on a distinction between emotions or intuitive reactions and rational considerations, underlying the differences in mental effort required by the individual. Stanovich and West (2000) depicted two systems of thinking: the intuitive System 1, which is fast, automatic, effortless and emotionally charged, and the reason-based System 2, which is slower, effortful and deliberately controlled. A number of researchers have investigated how the two systems interact, drawing contradictory conclusions either that System 2 monitors System 1's activities (Kahneman, 2003) or that System 1 dominates System 2 (Evans, 2010). Most empirical studies in the field have concluded that everyday activities are mainly intuitive (Kahneman, 2003; Kahneman, 2011).

The user's reflection may hence range between sub-conscious, intuitive or emotional to conscious, rational reflections of the personal data. For example, Thaler and Shefrin (1981) proposed the use of a dual-self model in understanding the influences of emotions and rational arguments on an individual's decision process. They posit that an individual's decision is influenced by two selves: a *planner* and a *doer*. The planner focuses on long-term utility, using a rational mode of thinking, which underlines the decision's consequences. The doer has a myopic, short-term view, using an impulsive way of thinking, affected by emotions such as the desire or the need for instant gratification. The nature of the want-should conflict in the dual-self approach has been discussed for centuries, even in Homer's *Odyssey* (Milkman et al., 2008 provide an extensive literature review). The dual-self conflict implies that people are not passively guided from their changing mood and inconsistent preferences. They have the possibility to exert self-control and deal with the conflict between the desires expressed by the doer and the willpower expressed by the planner. Hoch and Loewenstein (1991) proposed the use of self-control mechanisms for desire reduction, or use of willpower to overcome desire. Willpower has been investigated by numerous researchers (e.g., Baumeister et al., 2003; Metcalfe and Mischel, 1999; Baumeister and Tierney, 2011). For the purpose of this study we focus on the conceptualisation of Hoch and Lowenstein (1991) viewing willpower as an opposing force to desire which refers to "the diverse tactics that people use to overcome, rather than to reduce, their own impatience" (ibid, p.500).

2.2 Self- tracking devices as a mechanism to enhance willpower

In the context of self-tracking data, the devices can be regarded as instruments supporting the user's willpower to reach a specific daily goal and overcome the desire to slack. Typically, two activities are monitored automatically by the self-tracking devices, i.e., sleeping and walking. According to Hoch and Loewenstein (1991), willpower strategies are the planner's rational attempts to quantify and highlight the costs that will incur to the individual because of time inconsistent preferences. The authors proposed pre-commitment devices, which "involve any device through which consumers impose constraints on, or alter incentives for, future behaviour" (p.501), economic costs assessment, time binding, cost bundling, using a higher authority or even regret and guilt as mechanisms to enhance willpower (Hoch and Loewenstein, 1991).

In our inquiry, motivated by the way self-tracking devices are marketed, we consider them as means of pre-commitment (Hoch and Loewenstein, 1991) for the walking activity. A pre-commitment device may alter the individual's incentives to choose among daily activities, e.g., resting in the sofa or going for a short walk, through the information updates. Pre-commitment is not operating in "brute force" as assumed by the theory (Hoch and Loewenstein, 1991), through penalties, but through the recurring updates of the user performance.

In particular, the dual-self conflict assumes time inconsistency of preferences which occurs because of the negative relationship between discount rates and time delay of the benefits of reaching a specific goal (Loewenstein and Thaler, 1989). This leads the individual to behave through myopic preferences overvaluing the benefit of an action providing a short term goal achievement. Self-tracking devices provide updates on the individual's progress of reaching a daily goal, such as walking a specific number of steps. In turn, this reduces the perceived time delay of benefits from reaching the goal by increasing the time proximity of the goal for the user. Moreover, it reduces the problem of time-inconsistent preferences, by re-focusing the individual's references points to the specific daily goal. Self-tracking devices should then reduce the problem of time inconsistent preferences since people will get systematic updates of their performance during the day.

For the sleeping activity we consider self-tracking device as an enabler to conduct cost assessments (Hoch and Loewenstein, 1991) by providing quantitative data of the individual's progress in the daily goal of sleeping, thus allowing the individual to make a rational cost-benefit analysis of the choices made with respect to different activities before or after the sleeping time, e.g., reading a book or browsing the Internet, which may influence sleeping duration and quality of sleep.

The individual only acquires information after the completion of the sleeping activity which can be then compared with the goal set. In this case the self-tracking device allows the user to reflect on the subjective costs and benefits of other activities chosen before or after sleeping which might have influence the specific performance. These costs and benefits may be measured in time consumed for these activities or quantified in relation to sleeping quality reduction, as measured by the self-tracking devices. People interpretations and actions based on the information provided may differ depending on whether this is based on emotional reactions or rational considerations. In either case the information provision through the self-tracking device should help the user's willpower to improve the quality of sleep and increase the time towards the daily objective.

Another relevant theoretical concept is anchoring, a form of focalism with the tendency to rely too heavily on the first piece of information observed, which becomes the "anchor", during the decision process (Kahneman and Tversky, 1974). Once an anchor is set, there is a bias toward interpreting other information in relation to this anchor. Anchoring on a specific number is a cognitive bias (Bazerman and Moore, 2008). For example, a user may overemphasize the default goals set by the self-tracking device without paying attention to his physical condition. Moreover, using a specific anchor as a reference point raises a number of challenges interpreting the information provided by the self-tracking device and assigning subjective value to it. For example, depending on the level the anchor, or the reference point is set, the individual may make choices because of loss aversion (Kahneman and Tversky, 1984).

Another aspect of the individual's interactions with the information provided by the self-tracking device relates to the level of satisfaction it raises. The concept of aspiration level has been adapted in the field of behavioural economics to address the satisfaction treadmill, a measure of subjective happiness someone feels when reaching a specific performance in relation to a pre-set goal and how much is willing to increase the performance towards this goal (Kahneman, 2000). According to Kahneman, (1999) people may use different standards to declare their happiness depending on a number of parameters. Thus, it is interesting to see how people react to persistent inability of reaching the sleeping goal or the default quality.

In sum, empirical findings suggest a complex process of using wearable devices, setting goals and reacting to information about goal attainment. We now present an empirical inquiry to explore these facets and their applicability in more detail.

3 Research method

We conducted 42 semi-structured interviews to collect data for in-depth investigation (Lacity and Janson, 1994) of self-tracking by using Jawbone UP and Fitbit. These devices are wearable technologies (Li et al., 2010). Wearable technology feature sensors that are embedded in wristbands, watches, or clothes, such as shirts and trousers. The sensors track various aspects such as movement, steps, speed, and even muscle strength. The majority of such devices connect with a mobile application or a desktop dashboard that visualizes the information. In this case, the Jawbone UP and Fitbit are wristbands that measure activity and sleep.

There are 31 Jawbone UP respectively 11 Fitbit interviews. The interviews were conducted in Danish, Swedish and English over a period of 6 months and lasted between 25 and 60 minutes. Each interview was audio-recorded, transcribed and translated into English.

The sample was purposive so participants were chosen "because they have particular features or characteristics which will enable detailed exploration and understanding of the central themes and puzzles which the researcher wishes to study" (Ritchie and Lewis, 2003, p.78). A purposive sample ensures that relevance of the topic is discussed, although it is thus increasingly important to allow the sample itself to be multi-faceted so that the sample is not to homogenous (ibid, p.79). Therefore, all interviewees are currently using or have recently been a user of either a Jawbone Up or Fitbit. Interviewees were recruited through various forums: Quantified Self Forums, Facebook groups and physical Meetups. The interviewees are between 20 and 60 years of age with an even gender distribution.

Since the self-tracking movement is a new research area, it is appropriate to explore the motivations, experiences, expectations and utility of the users' behaviour. The interview concerned the interaction between the user and the self-trackers Jawbone UP and Fitbit. These devices automatically collect data on activity, such as the number of steps and sleep (e.g. light versus deep sleep) while calibrating with an app where it is also possible to manually log other aspects such as mood, food, water intake and workouts. The interviewees described Jawbone UP or Fitbit use in their everyday life, as well as what they thought about the use, through open-ended questions. During the interview, the subjects were first asked about general use. Then the interview addressed positive and negative experiences as well as motivation to reach the pre-set goals. Towards the end of the interview, questions were posed on reacting and interacting with the interface presenting the personal data as well as potential social aspects. Jawbone UP and Fitbit are different brands, but are similarly devices that measure the same type of activity, namely steps and sleep, which makes the personal data collection similar while there are some differences in the data visualisation dashboard.

The interviews were coded in the software MaxQDA. A total of 1160 snippets of text were coded in 10 categories. All contributing authors individually analysed the empirical data by carefully reading and reflecting on the transcribed interviewees, before comparing notes, discussing and resolving differences. In order to investigate our research question we employed constant, comparative techniques (Suddaby, 2006; Strauss and Corbin, 2008) whereby we analysed qualitative data in a systematic and iterative manner. The analysis evolved into an iterative process where data were compared with emerging themes in a cyclical process inspired by Miles and Huberman (1994).

As a first step in the data analysis we read all the interview transcripts to identify components of raw data, paying special attention to passages which captured ideas and themes such as "reaching goal", "updating frequency", "comparing data", and "changing goal". We organized these first-order codes into tables that supported a single theme across the various data sources, inspired by the in-vivo coding technique (Strauss and Corbin, 2008). In the next step, we developed second-order categories by using four key questions to sort through the raw data. Those questions were: 1) How do people react when not reaching the daily goal 2) How do people react when reaching the daily goal? 3) How

do people interpret the self-tracking data? 4) How often do people update data to monitor their daily performance? In the final step, through an iterative analysis, "disregard", "procrastination", "selective attention" and "neglect" in relation to "information presented by the self-tracking device" emerged as "transparently observable" (Eisenhardt, 1989, p.537) phenomena in the data, which we use to present and discuss our findings, inspired by Pratt (2009) as well as Vendelo and Rerup (2011).

4 Findings

First, we present the interviewees' perceptions of the self-tracking device. Second, we present results on users reactions and non-reactions to the information presented by the self-tracking device. Finally, this opens up for four types of coping tactics: disregard, procrastination, selective attention and neglect.

4.1 Perceptions of the self-tracking device

This section presents the study findings on the users' perception of adoption and use of the self-tracking device. The device is a discrete wristband without a screen. Any interaction with the personal data must be done by launching the accompanying mobile application. We proceed in presenting perceptions of the self-tracking device and the data provided by the accompanied app, namely addressing how the users' experience the artifact rather than the artifact itself.

The interviewed users rarely gave a distinct pre-defined reason for the choice to wear and use the self-tracking device. The results suggest that the choice of wearing and using a self-tracking device is most commonly spurred by curiosity and exploration, rather than an articulated goal: "*Curiosity. I like to get some insights about daily life […] but also, bottom line, to know more about yourself*" (Male, 30, account manager).

The users also explained that the device is seen as a helpful tool to expose personal data that had always been present but never palpable, until it is made explicit by using the device. One user said that it is "*data that you never thought about before and now it's so obvious that you can see it all the time - that you can be reminded that you need to move more. So it's motivating*" (Female, 30, project assistant). It was described as an archive, journal or "*a diary of behaviour. Behaviour can be adjusted and [give] insights about behaviour*" (Female, 26, entrepreneur). The personal data comes to play a role and several users identified that "*Without those numbers, I wouldn't really be able to assess myself as well.*" (Female, 33, housewife). Therefore, the practice of self-tracking leads to a "*mirror of reality through numbers that I wouldn't have access to otherwise. It's hard to track yourself and be objective. We are very subjective animals so I think it gives you an objective view" (*Male, 31, account executive). The self-tracking device and its data expose users to new ways of seeing the self, which is motivating for the aspiration of behavioural change.

In this manner, the self-tracking device operates as a prompting tool for pursuing self-awareness. More specifically, the device often plays a role in bringing awareness about existing routines, which may lead to behavioural change. A user gave an example: "*I use the reminder function all the time so if I am inactive for thirty minutes it will start to buzz on my wrist so I know to get up and go get a glass of water or maybe go outside to get some fresh air*" (Male, 31, account executive). By gaining awareness of personal patterns, the device was described as a "*powerful motivator [that gives the] right information at the right time to make and change your path*" (Male, 35, student). Awareness also shows that it has the potential of influencing the development of a new routine: "*I have become much more aware not to sit too long at my desk. […] I raise the desk and stand up. Also, I tend to walk to a colleague delivering a message instead of sending an e-mail*" (Female, 47, secretary). Another user says "*now I don't mind taking the longer route or the unnecessarily long route, or park further away on the parking lot*" (Female, 44, store clerk).

The self-tracking device often becomes an integrated part of everyday life: "*It's just a part of me. I got used to that. If it breaks I will just buy another one. Just as a toothbrush. It's just a part of my daily life already*" (Female, 32, entrepreneur).

In sum, the self-tracking device is emerging as a tool for the individual to explore and track personal aspects that previously had not been explicit. It allows the user to create a personal data archive. The awareness of behaviour also brings motivation to change behaviour and improve health, especially with the help of the reminder functions.

4.2 The reactions to the self-selected goals

This section presents findings on the reactions (and non-reactions) to the self-tracking device results, such as personal step and sleep goals. Each user sets goals, either by accepting the device's recommended goals or by making adjustments according to personal preferences. A majority of users chose the recommended goals: "*I stuck with 10 000 [steps] and eight hours a night. Even if I don't ever make eight hours of sleep. I haven't changed them because I still think they are ideal numbers*" (Female, 30, designer). Users who decided to change the goals, made mostly upward yet rarely downward adjustments because "*I would feel like a wimp*" (Male, 35, student). The role of the goals and the users' reactions to goal are presented below.

Few users argued that the device and the related goals had little to no impact on them. "*It didn't really help me exercise more or become fitter, to be honest, so I didn't see the need in wearing it anymore*" (Female, 29, account manager) and "*It didn't change any behaviour. I had expectations about the data BUT it was just there*" (Male, 28, designer). The users who claimed not to react nor change behaviour by the wearing the device, simultaneously expressed that it was "fun" and "felt good" to reach a goal, whereas not reaching a goal was disappointing and would induce the aspiration to attain the goal, by walking more or sleeping more. As a result, the perception of the device's influence was at times inconsistent, yet showed that there were short-term reactions to the information provided by the device, albeit unclear of the long-term changes.

However, most users recognised that the information about reaching versus not reaching the goal caused a reaction. Users had a positive yet brief reaction when a goal was reached. The user felt "*Good and satisfied. It makes me feel I'm a good person. An active person taking care of my health*" (Female, 26, student) while another elaborated that *"It's a little victory when you do well but it's completely ridiculous, because it's just your steps. […] nobody can alter it or fake it: you've done those 10 000 steps and that's a good feeling. So you kind of feel like "I've done good today"*(Female, 28, researcher).

It was clearly suggested that not reaching a goal was "*a stronger sensation than reaching your goal*" (Male, 28,). The reaction was longer and often caused subsequent activity, such as strategic thinking and the aspiration to alter behaviour. One user said that some days "*I just don't care. But generally speaking, it just gives me a disappointed feeling so the next day I'm determined to meet that goal*" (Female, 30, project manager). A similar reference was made by another user who said that "*if I don't reach my goals, yeah, I kind of think about it. But then I just think that I'll do something about it the next day instead to get the steps. I guess it's important to get a good average*" (Male, 42, teacher).

When reaching and not reaching a goal, the user is influenced by the results and plans future behaviour with the aspiration of meeting or overachieving on the self-selected goal. In the event of reaching a goal, the user was positive which sometimes spilled over to be continuously motivated to meet the goal, while some even aspired to over-achieve. "*I try to aspire to do more than the 10 000 steps a day but I think, I feel even better when it is blown out the park, as they say*" (Female, 30, project manager).

Another user described that he would say to himself: "*Let's reach it tomorrow too but do it even better tomorrow"* and elaborated that this aspiration lead to that "*you kept pushing yourself. It was a good feeling when you were reaching a goal*" (Male, 30, account manager). On the other hand, when the goal was not reached, the user would consider the underlying reason and often succumb to different interpretations to deal with the prospect of not attaining the goal because "*it was quite easy to reach the goals if you wanted to. And everybody has twenty minutes sometimes during the day or night if they want it*" (Male, 30 account manager). On the basis of the user's aspiration to meet the goals, we identified that underachieving commonly lead to a certain set of coping tactics, which are elaborated in the next section.

4.3 Coping tactics

The reaction to not reaching a goal generate different types of coping tactics among the users. It is difficult to establish the user's dedication and pursuit to fulfill a goal, because as soon as the user was exposed to data that showed insufficient or unsatisfactory activity to meet the goal, a string of justifications were brought forward to consider why the goal had not been met. The value of the goal was no longer explicit in itself but rather placed on a grey scale where the user seemingly internally debated the validity and importance of the goal. Suddenly, the initial daily goal of 10 000 steps was altered by the user's reasoning. Simply, the user would reflect on why the goal had not been reached and often find a way of coping with it. This is referred to as coping tactics in this paper. Four coping tactics have been identified: disregard, procrastination, selective attention and neglect.

The most recurring tactic is **disregard** where the user dismisses the personal data and starts reasoning and even formulating excuses. For example, the user might argue that he or she "*did not have the possibility to change it, because you do not have more time in the course of a day, just because you now know that you are not moving enough*" (Male, 23, student). Another user said that: "*I can't change the past anymore so I just see it as a way to get an overview of my behaviour and maybe change them in the future but not thinking about the past*" (Male, 30, entrepreneur). As a result, the user contends that the inability to complete the goal was due to the circumstances. The same rhetoric was often followed by attributing blame to the circumstances or tool: "*I know I can't reach the goal because I was in the office in a meeting all day* " (Male, 30, entrepreneur) or "*I could perform much better if the dietary functioning was better*"(Male, 23, student).

Procrastination occurs when the user reacts to unsatisfactory results by aspiring to correct the insufficient behaviour by adopting strategic thinking. The strategic thinking often results in making short-term or long-term plans to achieve the goal at a later stage. Thus, the user delays the possibility of reaching the goal by postponing the effort. A user said about her reaction: "*It makes me think. It does affect me. Makes me think of how I can improve. I would be upset if it would be continuous*" (Female, 36, analyst). Often this could lead to considerations such as: "*I need to move more tomorrow*" (Female, 28, project manager). A typical user that resorts to procrastination argues that: "*If I don't reach the weekly goal, then I'll go back and look at what I missed and why so I can try to change it in the future*" (Male, 40, consultant).

Selective attention is adopted when the user primarily focuses on goals that are more likely to be achieved in the present, rather than those that are more difficult to attain. The user directs attention to specific categories, rather than the results as a whole. "*I know that I will do well on [stairs]. Stairs are thus important to me. It gives me the boost*" (Female, 28, student). Another user said that *"as long as I ran instead of lifting, I could measure how much I ran. It ended up being that I would rather run than lift because I wanted the result to look as good as possible on the Jawbone"* (Male, 29, account manager).

Neglect of the personal data is exercised until the user is certain that it is sufficient to meet or exceed the goal. A typical user would only check the data "*every two days. Especially, I check when I do sports. Then I want to see my data, but if I don't do sports I tend to not look at it, because I feel guilty*" (Male, 28, lawyer). Another user expresses that she feels "*Guilty. That is also one of the reasons I haven't been using it lately. I sometimes got upset about the fact that I couldn't always achieve my goal*" (Female, 26, student). This indicates that the user neglects interaction with the data until there is satisfactory information.

The coping tactics are often spurred by the presence of unsatisfactory results in relation to the self-selected goal. However, the option of lowering the goal despite repeated nonattainment of a goal was not common because "*maybe my goal is too high, maybe I should lower it to 9000, but I would feel like a wimp*" (Male, 35, student). On the other hand, some users would not increase the goal because "*I don't want to feel like I don't conquer the new goal. I think it's just my own mental sort of thing, that if I create new goals I am not going to achieve them and be disappointed in myself*" (Female, 30, project manager).

5 Discussion

This article aims to investigate how individuals use experiential technology in the form of self-tracking devices and how they cope with personal data provided in everyday life. We observed that usage is as a complex process and focused on the interplay of the experiential device, the personal data and the individual who experiences the technology.

Our main finding is that self-tracking devices, despite being marketed as pre-commitment devices or enablers, are not functioning as such but rather as re-focusing tools that summon coping tactics. The emergence of coping tactics illustrates the important role of the dual-self and the conflicts between a user's rational and emotional reactions when reflecting on personal data.

Our data further suggests that adoption of the self-tracking device is tied closely to *self-exploration*, often related to well-being and health. The users aim at doing the "correct thing" (Milkman et al., p. 332) and hence the adoption of the device expresses a certain aspiration to achieve a healthier life. However, in practice the device is not used as a pre-commitment device. This is reflected in the main reason for adoption: Most users did not always have a very explicit goal that they want to achieve when adopting the self-tracking device. The results indicate that most users expressed general curiosity that fuels the aspiration of exploring the self. For studying adoption of wearable self-tracking devices, the main assumptions of existing theories in the IS field about rational, goal oriented behaviour as well as the deterministic models postulating technology as an enabler for improving the individual performance are not directly applicable and need to be broadened.

The investigated behaviour suggests that a concrete standard goal (e.g., the average steps of the user's age group) conveyed by the software might create an external, critical anchor with profound long term implications for most users. While the user may not have a precise goal when adopting the self-tracking device, the device asks the user to accept or alter the recommended goals during the set up routine. As most users have not formed a preference they merely accept the prompted recommendation of 10 000 steps. Although after some usage, a few high achievers may adjust the goals upward. This action is quite carefully considered as the user is tactical enough to set attainable goals. On the other hand, there is rarely downward adjustment, as this is perceived as a personal failure requiring substantial justifications, referred to as coping tactics in this study. These results indicate that the user is likely to be anchored by the initial and externally set goal, and sometimes an explorative inclination to do better might bring about an attempt to change the anchor. However, underachievement yielded a pressure to justify with negative implications for use motivation if users

saw no purpose to change their behaviour in the long run. Often users would neither personalize nor adapt the standard goal to avoid failure by keeping the default.

Next to users' complex process of positioning towards own or provided goals, most users did not constrain the emotional self through rational pre-emptive counter measures, as the pre-commitment devices would do (Hoch and Loewenstein, 1991). As a pre-commitment device, the self-tracker should support the rational self (the planner) with personal data for evaluation and spur the user to attain the aspired goal. However, our findings clearly show that it instead appeals strongly to the emotional self (the doer), causing coping tactics to emerge rather than behaviour change based on rational thinking. The personal data stimulates the doer to justify the exposed results. In short, a pre-commitment device usually causes the user's rational self to alter behaviour (Hoch and Loewenstein, 1991), but instead we find that the user attempts to justify the results. Hence, the wearable technology was not controlling the users in a narrow sense of committing them to healthier behaviour. When users underachieved on the goals set on the device, the doer was provoked and reacted by developing coping tactics instead of attempting to alter behaviour to meet the goal. The users confessed little self-control was actually exhibited in the pursuit to reach the goal. Four coping tactics were identified: disregard, procrastination, selective attention and neglect.

The **disregard** tactic is the most commonly occurring. Disregard happens when the user is not satisfied with the personal results, such as not reaching a goal. Then the user shrugs off personal failure by reasoning and formulating excuses. The user might i.e. dismiss the validity of the results, emphasize the unimportance of the goal or argue circumstances counteracted success. In relation, some users also disregards information that is "too obvious" as it is considered as uninsightful. Such data just "made sense with their lives" and therefore, the user did not reflect on it and disregarded it (Bentley et al 2013, p. 30:23).

The **procrastination** tactic is used in an attempt to correct the unattained goal by creating short and long term plans. Often the user formulates a new strategy, such as arguing that the goal might be achieved by a weekly or monthly basis. The procrastination tactic is also present in the empirical findings of Li et al. (2011) who describe that users allow themselves to miss exercise and postpone activity measures, especially if the user had been tracking for a longer period of time (e.g. a year). Marakas and Hornik (1996) also found that users prolong cooperation to meet or complete tasks or goals, especially when faced with new technology. Their findings argue that the new technology stresses the user and the user's worldview.

Selective attention indicates that the user focuses on particularly satisfactory data and claiming that this is most interesting. This usually occurs to goals that are more likely to be achieved (or overachieved), rather than those that are harder to attain. In order words, the user pays more attention to a certain type of information, and especially in categories where performance is high, but without entirely ignoring all streams of information. The user's selective attention to some sources of information has been also investigated by Bazerman and Moore (2008) who referred to the concept of bounded awareness.

This is also related to the individual's limited processing capacity, which leads to applying selective attention as a way to extract the most important information for processing (Strayer and Drews, 2007). When it comes to processing personal data, the user is also likely to identify with the information and personalise the related viewing behaviour, such as only looking at information that he or she deems valuable (Karapanos, 2013). Some users are more likely to selectively attend to positive feedback because it seems more believable (Hixon and Swann, 1993).

Neglect occurs when the user purposely overlooks to check or interact with the personal data which often leads to irregular but conscious checks. Cosley et al. (2012) that found that users are likely to avoid negative data it and will only be more engaged when the data is positive. The negative data triggers a shift in the user's mood. Another study implemented the tool Fish'n'steps, which is a virtual fish bowl that responds to the user's daily step count by making the fish happy or sad. The study found that users would ignore the display when the fish was unhappy. In other words, the user would not review the data when it was likely to be unsatisfactory (Consolvo, McDonald, and Landay, 2009).

The outlined mechanisms have more general repercussions for IS research. As our data illustrates, experiential devices are calling for explanations that consider a more complex and intertwined interplay of the tool and the self where adoption is not considered as a dichotomous decision but an exploratory process (Yoo, 2010). We find that the assumption of clear outcome beliefs in the form of achieving explicit rational goals is not warranted as individuals may curiously explore their goal in an exploration phase in which they are susceptible to anchoring biases. The goal attainment process that affects subsequent beliefs and attitudes about the system is also more complex as our data emphasizes justification tactics that illustrate how the individual self and tool observations intertwine, and advances from task performance to lived experience (Yoo, 2010).

We find that the complex micro-level processes can be explored by enriching IS adoption research with behavioural economics (Constantiou et al., 2014; Constantiou et al., 2012) as means of investigating the user perceptions and reactions to the information provided as well as the subsequent behavioural changes in everyday life.

6 Conclusion

This study investigated the complexities that arise when the self-tracking user copes with personal data offered by the experiential device in everyday life. The goal was to gain insight on how users react to interacting with the device and their personal data. Our departure point was to investigate the promise of a pre-commitment device that drives rational insight and changes behaviour, but the effects were halted by the user's emotional reaction to the personal data. Through an interview-based empirical inquiry we find that the device evoked reactions that lead to coping tactics: disregard, procrastination, selective attribution and neglect.

On a more general level, our study of user behaviour suggests a complex interplay of users, their experiential device and the personal data, which is not sufficiently covered and explained in adoption studies of traditional IS. In an attempt to overcome these limitations we identified concepts of behavioural economics as providing a useful theoretical vocabulary to explore this domain. We further contribute by identifying new behavioural facets, such as the four coping tactics as a useful addition to the concepts of behavioural economics, pointing to complex behavioural patterns in the context of individuals' technology use.

The proposed coping strategies can be investigated in relation to the use of other self-tracking devices or applications that provide personal data to the individual. The proliferation of such technological solutions on everyday life is intensified. Examples include social media services that provide updates on individual activities and presence, devices that monitor health data or other data of the individual's performance. The recent introduction of smart watches and other wearable devices that allow self-tracking of different aspects of the individual's life are expected to increase individual information abundance. Further, the self-tracking concept would also be interesting to apply in an organizational context, where workers are measured individually on key performance indicators, such as sales targets.

Future research should focus on exploring further variables that might influence users to adopt coping tactics, such as duration of self-tracking, number of devices, and level of analysis. This could involve quantitative studies of native self-tracking users or experiments on non-native self-tracking users and see if they react similarly to native users when using the device.

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