Stefan Selke *Editor*

Lifelogging

Digital self-tracking and Lifelogging – between disruptive technology and cultural transformation

Springer VS

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Digital self-tracking and Lifelogging – between disruptive technology and cultural transformation

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Contents

EXPERIENCES—CASE STUDIES

QUANTIFICATION—KNOWLEDGE

Introduction

Lifelogging—Disruptive Technology and Cultural Transformation—The Impact of a Societal Phenomenon

Stefan Selke

This anthology classifies and analyses a current societal phenomenon that can be placed between innovative technologies and cultural transformation. Here, *lifelogging* is understood as different types of digital self-tracking and recording of everyday life. The types of self-tracking and recording range from their use in research projects and experiments in scenes to everyday life experiences. The general term for this practise, *lifelogging*, may still need to be explained. Terms such as self-tracking, personal data or Quantified Self (*QS*) are often used synonymously in articles or scientific debates. The authors found in this publication have been given the freedom of choosing a preferred term, for the diversity of terms used here shows just how cutting-edge the topic is. Nevertheless, as the editor of this publication, I would like to introduce two arguments in favour of the use of the term *lifelogging*.

First of all, bordering terms refer more to sections, sub-cultures, specific uses or technical aspects of digital self-tracking and recording of everyday life. It is here that the term *lifelogging* is preferable as it is open and indifferent enough to encompass as many types, phenomena, actors and markets as possible. Furthermore, it can be noted that the term *lifelogging* has established itself as a categorical term even in the German language, for example in the media coverage on information and communication trends (e.g. Leipold 2015), in technical debates (e.g. the Ger-

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man Ethics Council[1]) or in public discussions such as the ZEIT[2] health conference in late 2015.[3]

Second of all, the term *lifelogging* has an additional advantage: The term most clearly shows the origins of the idea of digital self-tracking and recording of everyday life. Of all institutions, it was the Pentagon that launched a project that advanced to become the eponym of digital self-tracking (a detailed account can be found in Selke 2014, p. 33f.). DARPA project (*Defense Advanced Research Projects Agency*) defence experts were interested in new forms of digital logging and looked for ideas for their project *LifeLog* that dealt with equipping the soldier of the future with comprehensive sensors. The researchers' goal was to collect data on all of the soldiers' activities from various perspectives in order to give the task force a better overview of what was going on. Military officers were convinced of the advantages of this form of data collection. "Every soldier a sensor" meant that the soldiers were equipped with a high-resolution miniature camera on their helmet, two microphones (one to capture the soldier's voice, one to capture the sounds of their environment), a GPS device as well as acceleration sensors on different parts of the body and on their weapon (Magnuson 2007). This scenario of *a total overview and alertness* comprises the seed of a guiding principle that can easily be transferred from a military to a civilian context: There is no such thing as unnecessary information, each detail is potentially important. Only if everything has been recorded can one make a detailed assessment on an "operation". According to this *lifelogging* philosophy, the flexible individual constantly finds themselves on a "warpath" on which ever-retrievable information about one's own life and lifestyle appear highly useful.

The more data one has to work with, the better. Jim Gemmell, one of the main protagonists of the *lifelogging* movement and the software programmer of *MyLife-Bits*, uses the natural analogy of the black box in order to explain the principle of *lifelogging* (as quoted in Selke 2014, p. 13ff.).[4] As a matter of fact, the first *lifelogging* camera was invented by a *Microsoft Research* employee after suffering a bicycle accident that she could not remember at all. She wished she had had a device that automatically recorded and saved everything that happened around

1 http://www.ethikrat.org/veranstaltungen/jahrestagungen/die-vermessung-des-menschen. Accessed 07 Nov 2015.

2 Die ZEIT is a German national weekly newspaper.

3 http://www.zeit-konferenzen.de/gesundheit. Accessed 07 Nov 2015.

4 cf. the article *The Emergence of Lifelogging and Thinklogging* by Jim Gemmell in this anthology.

her, which is how a person could "rewind" their own life at any given moment and "look up" a certain event.

In the black box, mathematical calculations and rational thinking join to make effective behavioural changes. Hence, *lifelogging* promises the possibility of breaking bad habits and turning one's life for the better. An expedition in the last untapped areas of the "I" begins with the quantification of one's own life. *Lifelogging*'s promise is to use the management of this black box to turn our lives into a permanent project of optimization in which we observe, recognise and change ourselves. But to which end? And are we doing it voluntarily or under external pressure? These are some of the questions that will be asked from different perspectives in the articles presented in this anthology. Thereby, the types of existential calculation being presented are based on the idea that the body should work without failure and that one's own existence can be planned according to utility maximisation. In short, it is about the technical rationalisation and control over our lives. The black box is an ideal projection surface for the deep wish for order, structure, security and the self-improvement of the individual who is perceived as structurally flawed. Against this backdrop it is clear why the term *lifelogging* has been chosen for the anthology at hand.

As a heuristic collective term, *lifelogging* refers to diverse types of self-tracking that range from health monitoring and the detection of one's location and presence to the measurement of productivity at work. *Lifelogging* means capturing a human life in realtime by recording bodily, behavioural and data trails and saving them for later use. (Selke 2010, p. 107f.) With that, *lifelogging* is ultimately personalised informatics in the context of big data. The technologies used range from miniature camera and sensory technology, wearable computing and smart-watches connected to apps, to realtime data transfer and increasingly cheap storage technologies (e.g. cloud computing). However, the real *lifelogging* innovation is the automatic data collection that usually goes unnoticed in daily life. Discreet digital technologies make it possible to continually collect passive, non-discriminating data without having to pay too much attention to the process. The logger no longer has to make any decisions because the system and its sensors constantly collect different data (e.g. biometric data on the body, location, activity or images). This is how a person's "digital aura" slowly emerges (Hehl 2008) which can contain data on health, locations, productivity, finances, hormone levels or moods, depending on the person's data preference. *Lifelogging* can be understood as a technical form of self-observation and a passive form of digital self-archiving, with which a lot of potential, but also pathologies are associated. *Both* perspectives find their voice here in this anthology. I would like to illustrate these perspectives with quotes from two prominent women. On the occasion of the opening of the *Bosch GmbH*

Center for Research and Advance Engineering ("Bosch-Campus") on 14 October, 2015, German chancellor Dr. Angela Merkel revealed the following perspective on the collection and utilisation of digital data:

> "In many cases, our relationship to data is too strongly dominated by thoughts of protection (..) and perhaps too little by the idea that interesting products can be developed with the help of data. There is also too strong an emphasis on the concern that jobs will be lost to digitalisation and that not enough jobs will be created. It is for this reason that "data mining" (..), the collection and treatment of large amounts of data, will be something that will give people a ray of hope, so to say."[5]

The new definition of "data protection" receives a whole new meaning here, and this coming from the woman whose mobile telephone was tapped by the NSA for some time. The Bosch company needs data that we as consumers, patients, employees and health insurance clients create and these collections of data are growing exponentially in the context of big data. Regardless of euphoric assessments and diverse application guarantees, there are still many risks for citizens that are implied by the digital self-tracking boom. When Olympic gold medallist and former GDR figure skater Katarina Witt (Witt 2015) was asked in an interview if there were parallels between the Stasi and the NSA, she replied that there were. But then she followed up her answer with an observation that is highly interesting in the context of this anthology:

> "But what worries me more than the NSA (…) is the large amount of information that billions of people make accessible everyday over their mobile, WhatsApp and through pictures they put online. I find it dangerous that there are people out there who know what you eat, your daily step count, your pulse, when you go to bed—and they make money off of this information."

Witt is speaking explicitly about *lifelogging*, which amounts to a more or less comprehensive digital self-tracking and logging of everyday life. She is by no means alone with her concerns. The trend of *lifelogging* appears to mirror the spirit of the time perfectly: According to a study put forward by the market research company *yougov*, 32 % of German citizens could imagine sending pertinent medical information to health insurances in order to receive benefits. Every fifth of those surveyed would even consider having their children digitally monitored. Most of the

5 http://www.bundesregierung.de/Content/DE/Rede/2015/10/2015-10-14-merkel-bosch.html. Accessed 07 Nov 2015. Author's own translation.

surveyed though do have an inkling of the downside of self-tracking: 73 % suspect that any decline in the state of their health would lead to an increase in the monthly payments made to the health insurance, if this self-tracking data is to be integrated into the calculation basis for contribution amounts. 81 % actually believe that their data will be used for other purposes.[6] This concern is well founded, as the trend of buying and selling personal data by service providers, who provide private information regarding consumer behaviour, recreational activities and other personal topics, shows. The IT security company *Symatec* examined in their study *How safe is your quantified self?* several offers for self-tracking and discovered that data protection and user safety is of minor concern to most of the providers, as well as that this data is sold to marketing companies on a large scale.[7]

Nonetheless a euphoria currently prevails in the health service sector. The Technical Health Insurance's *(Techniker Krankenkasse)* assessment from internal "monitoring" reports indicate that the time for technical experiments is past and digital self-tracking can now be reliably implemented to contribute towards handling your health.[8] Health apps, as *Lifelogging* technology is commonly described, will take up a fundamental place in the prevention and care of chronic illnesses. *Lifelogging* obviously bring opportunities with it. Chronically ill patients can share data on Social Health Networks and platforms like *PatientsLikeMe* or *CureTogether* and, as a result, emancipate themselves from the specialist knowledge of doctors. There are still risks, paradoxes and the pathologies of self-tracking. Even the Technical Health Insurance *(Techniker Krankenkasse)* admits that most health apps lack "quality" and "sustainability".

Popular everyday life experiences—a *lifelogging* typology

There is a vast choice of self-tracking hardware and the corresponding software for almost every aspect of daily life. The spectrum of *lifelogging* applications these days is virtually limitless (cf. comprehensive Selke 2014) but can be divided into four basic categories.

The first type deals with *monitoring health*. Self-tracking (type 1a) is tasked with monitoring the body's own biometric data in realtime, and in so doing to

6 https://d25d2506sfb94s.cloudfront.net/r/19/Studienflyer_Quantified_Health.pdf. Accessed 04 April 2015.

7 http://www.symantec.com/content/en/us/enterprise/media/security_response/whitepapers/how-safe-is-your-quantified-self.pdf. Accessed 04 April 2015.

8 http://www.tk.de/tk/pressemitteilungen/politik/724460. Accessed 17 Aug 2015.

enable a *preventative* lifestyle. Examples of this are step counters (to measure activity), vibration belts (to measure correct posture) or calorie measurement (to keep a diet). In this category there are also several techniques to measure emotions and moods ("mood tracking").[9] The approach of collaborative healing (type 1b) following *curatorial* motives, complements the previous method, as the self-tracker often already has a chronic condition or rare illness. These self-trackers then compare the effects of medication or therapies on social media platforms and in doing so appraise statements made by the pharmaceutical industry or their doctors.

Whereas health monitoring focuses on physical data (steps, pulse, calorie expenditure, quality of sleep, etc.), the second type, *Human Tracking*, concentrates on logging the location of people via GPS or radio cell tracking and basically measures data about a person's whereabouts. This enables the location of a wanted or missing person at any given time, or to monitor whether aforementioned persons remains in a predetermined "corridor" (so called "geofencing"). All forms of performance measurement belong to this type. However, Human Tracking also signifies the unnoticed monitoring of the location of people (husbands, wives, children, employees), animals (e.g. hunting dogs) and objects (e.g. driving school or parcel delivery vehicles) as well as the visual display of that location on a digital map (e.g. on a smart phone or a tablet).

The basic idea of the third type, *Human Digital Memory* (type 3a) is outsourced memory. Visual data is central to this type. The understandable desire for a comprehensive archive that documents a lifetime can also be extended after death (post mortem) and led to the idea of *Digital Immortality* (type 3b). This can be achieved through the creation of digital life histories (so called "Rememories"), digital avatars or in extreme cases through the transfer of one's own consciousness to data storage, which is the vision of some developers.

The idea of a comprehensive record of all life moments stem from Vennevar Bush and was published in 1945 under the title *As we may think*. Back then the American pioneer in analogue computing suggested a kind of black box he dubbed MEMEX, which is short for "Memory Extender". This machine would function as an "enlarged personal addition to the own consciousness". Bush envisioned MEMEX as a mechanical all-rounder where books, notes, conversations and images could be saved so they would always be on hand for immediate retrieval. "All sorts of things", as he wrote (Bush 1945). Although this device was never built, it inspires the fantasy of developers to this day. The pioneers Gordon Bell and Jim Gemmell called their concept *Total Recall*. They have intentionally connected

9 cf. the article *Making Emotions Count: The Self-tracking of Feelings (Extended Abstract)* by Sarah Miriam Pritz in this anthology.

their guiding concept "E-Memory" (digital memory) to the MEMEX myth, in that they have claimed they can create a "real MEMEX" (Bell and Gemmell 2010, p. 56). Courtesy of connections between images and other data, an enormous digital archive develops, making it possible to "google" your own memories.

The fourth type broaches the relationship between *Surveillance* and Counter-Surveillance (*Sousveillance*). People are increasingly being monitored in the work place. According to a study commissioned by the Chamber of Commerce of Upper Austria, 26 % of employees in Austria already feel monitored and controlled.[10] Whereas employees in future will fight for privacy in some areas, the avant-garde are promoting complete transparency as a goal in life, which must seems a lot like digital exhibitionism to outside parties. Pioneers and artists like Rob Spence, Steve Mann and Hasan Elahi are trying to 'protect' themselves with their respective projects. By recording and broadcasting the data of their whereabouts and activities in realtime, they provide themselves with preventative alibis. This approach enables the creation of a personal, digital "protective shield" for people such as persecuted regime critics, critical artists or activists, who are exposed to threats. Or they wish to draw attention to, and increase vigilance from "below", of the omnipresent repression and surveillance from "above", and use empowerment as a tool against this control. Nonetheless the use of these applications can be positive, as shown by their use in the form of Crime Maps, which detail the location and residence of convicted criminals (in the USA).

Categorising this phenomenon

To categorise the phenomenon of *lifelogging* between technology and culture the concept of "multiplex media" (Rusch 2002, p. 181) is suitable. The dimensions contained therein enable the compatibility of technical and cultural points of view. Here, media is understood as the intersection for a complex constellation of artefacts, functions, expectations and societal effect.[11] In the first place mediality

10 cf. http://derstandard.at/1262209082132/Ein-Viertel-fuehlt-sich-am-Arbeitsplatz-ueberwacht. Accessed 13 Aug 2015. See also the article "Work-Logging" by Welf Schröter in this anthology.

11 Rusch postulates that media isn't a thing, which is often assumed in daily language use, but a complex constellation: "What we regard as media, is a highly complicated interaction of subjects, which is always characterised by the respective historical, socio-cultural backdrops. Added to this is the communicative and receptive usage of objects and devices, and last but not least appropriate knowledge structures and convention strategies for perceiving and processing the results" (Rusch 2002, p. 181).

stems from the overlapping dimensions of technicality, functionality and the cognisance of the executing subject as well as the social usage.

Lifelogging was identified early (Hehl 2008) as "emerging technology" on the level of *technicity*. Questions of the materiality of devices and their relationship to the own physique are central here. Apart from the widespread presence of recording devices in physical proximity, an increase in the performance of digital storage devices, coupled with falling prices and increased development of the processing power of the software, has magnified the capacity to process and visualise lifelogs. Future intrusion of technology, so called "Endocolonising" of the body (Virilio 1994), can be observed and should be evaluated.

The level of *functionality* deals with the different ways the available technology can be implemented. *Lifelogging* can best be understood as part of a process chain or a dimension within an 'architecture': beginning with "capturing" (data collection), followed by "upload" (storage), "content processing" (data processing) and lastly a "retrieval" (data recall) of the data for visualisation. *Lifelogging* applications are categorised according to the effort invested in data collection (low cost vs. high-cost) and the amount of data (high-sample vs. low-sample). Then there's the mode of relevance (active vs. passive), the degree of exchange of the data (individual vs. networked) as well as the addressees of the data (synchronic for oneself, comparative in peer groups or post mortem). Here, several questions on the behavioural level and regarding the man-machine relationship arise.

On the *cognitive* level the subjectivity of the user, meaning that their style of thinking, wishes, fears and intentions associated with self-tracking, are central. *Lifelogging* is based on the assumption of an objective measurement of self-assigned parameters and traces. Technical advances mean the degree of human measurement is potentially being increased infinitely, while simultaneously coupled with ever decreasing levels of effort. *Lifelogging* can also be understood as a technical answer to latent fears. The fear of losing control is clearly illustrated in the *lifelogging* manifest by Gordon Bell and Jim Gemmell. The ex-Microsoft employees are widely regarded as THE pioneers in the field of outsourced memory. Bell has been conducting a continually expanding self-experiment for years. Origin for this is certainly a fear of loss: "I hate to lose my memory. I want Total Recall" (Bell and Gemmell 2010, p. 24). Bell is not only searching for an antidote to forgetfulness but is indeed, revolting against a loss of control that comes with advancing age. Or against the unruliness of an empirical world, as Herbert Blumer (Blumer 1969) put it. The developers themselves predict a grand future for their own idea and outdo each other with visions of the future, usage scenarios and promises of worthy practical applications: "Soon you will be able to record your entire life digitally. It's possible, affordable, and beneficial" (Bell and Gemmell

2010, p. 3). Other, lesser known, but nonetheless excellent research projects, where self-tracking scenarios and practices are examined, are asking similar questions regarding opportunities, access and options for usage. Still, no definitive answers (empirical too) have been found yet.

On the level of *sociality*, practical usage methods and common conventions for data collection are made subject of discussion. Central here are questions to the rules and repercussions of self-tracking for possible lawsuits pertaining to socialisation. Is the diffusion of *lifelogging* creating a new social taxonomy or possibly even new categories of social reality? How do people perceive or connect to others in relation to their self-tracking practices? How will the social interaction change when more and more people begin to view others comparatively?

Life is not lived in a bubble. *Lifelogging* is taking place in a social world and as such naturally also influences the rules of our coexistence. The question remains: how exactly? Like every new innovation, *lifelogging* must first pass the much quoted "proof of practical worth" before being accepted. Here the perspective of temporalisation must be observed. It's not only about the phenomena that can currently be observed, but a creeping change ("shifting baselines") of the underlying perception threshold that takes place over a prolonged period of time. Contemporary practices can be used as a seismograph for analysing the future of sociality, where self-tracking and *lifelogging* are seen as more and more commonplace. *Lifelogging* is therefore not only the convergence of technical developments, but can be interpreted as the *signature of contemporary society*. This is the reason for the subtitle of this anthology. *Lifelogging* is a set of disruptive technologies on the one hand and the sum of social practices on the other, which will have an effect on our cultural matrix, our rules of coexistence.

We're only just beginning to see the effects tied to these developments. *Lifelogging* only represents a small cross-section of the complete digital transformation of commerce, society and life in general taking place. From the viewpoint of driving forces, this development is "irreversible, (...) extremely fast and characterised by uncertainty." (Krcmar 2014, p. 10) *Lifelogging* is the precursor to further disruptive technology in varied fields—from medical care to the organisation of work places, the care of senior citizens to the organisation of our private lives—and features the characteristic of breaking with traditional values (Coupette 2014). Representatives of the consulting industry are already celebrating new "Business-Cases" as funding is being generated for "Joint-Value-Creation". These celebrations stem from the information self-trackers are providing, which enables accurate conclusions regarding behavioural changes. Namely, those which manifest themselves in consumer logs (Scheuch 2014, p. 23).

The booming lust for digitalisation conversion raises questions. Several different *modern social theories* discuss the starting point of the practice of self-tracking: Social acceleration and alienation (Rosa 2014), the "watering down" of formerly reliable social reference points in the liquid modernity (Baumann 2012) or the privatisation of reduction contingency (Krause 2005). Self-tracking can also be perceived as a reaction to social fatigue diagnoses on individual (Ehrenberg 2004) and social levels (e.g. Neckel and Wagner 2013; Grünewald 2013). Embedded in these meta aspects is analysis, that considers the human body as an object in an "*upgrade culture*" that needs to be optimised (Spreen 2015) at all costs (enhancement), whereby besides other measures, technical prosthetics are more and more common used (Harrasser 2013). The consequence is that this "Body 2.0" is "corporeal capital" (Schröter 2009) the preventative Self (Lengwiler and Madarász 2010) and the digital patient (Mathar 2010). Different articles regarding the neoliberal governance of the Self (Stark 2014; Lorey 2012; Foucault 1993) show clearly that an intentional reconfiguration under competitive conditions in the form of *lifelogging* fits in perfectly with the ideology of an achievement-orientated society.

Another context is the (rather complicated) debate concerning *Big Data* (e.g. Bunz 2012; Mainzer 2014; Stampfl 2013) as well as digital networking (Schmidt and Cohen 2013) and the multitude of interests involved in data as a commodity of the future. Central here is the question of tracing new borders between private and public space in this era of transparency and post privacy (e.g. Han 2013; Heller 2011).

Thirdly *lifelogging* can be understood as a prime example for the post medial, with which completely new individual and social challenges are connected. In the *era of the post medial* (Selke and Dittler 2009, 2010) new, radical technology sets are emerging which are easier to comprehend than endocolonised 'quasi-subjects' (Virilio 1994) or 'fluid knowledge objects' (Knorr-Cetina 1998). Post mediums are media that are near to, or even implanted in, the body and can replace socialising with other people. Not only is the media in conflict with media in the post medial era. More than that, media is conflicting with people themselves (Selke 2009, p. 32f.). According to the theory put forward here, people are less and less capable of drawing back from the collective liability process involved. The *phenotype human* is being judged more and more strictly according to criteria of usefulness by the *genotype human*. The result is a shift of the idea of man towards *the faulty social figure* or humans susceptible to faults. Extensive questions are connected with these contexts, classifications and possible analytical frameworks, which are only touched upon here: How does one live in a society of data and an objectivised reality? Is 'measured' man automatically 'better' man? And if so, what is the cost? These questions are important because the regime of control in our society is currently doubling and the *vertical surveillance* (for example by intelligence agen-

cies), which often creeps in under the perception threshold, is joined by *horizontal surveillance*. And these new forms of control do not only produce winners, even if this is often suggested.

Social relevance

The social relevance of these questions is undoubted if we observe the countless symposiums, podium discussions and last but not least, the extensive media coverage dedicated to the topic. Although an overview cannot be given at this point, I would like to mention some examples from personal experiences. The *German Ethics Board* (Deutscher Ethikrat) occupied itself intensively with the topic *The measurement of man—Big Data and health* (Die Vermessung des Menschen b-Big Data und Gesundheit)—explicitly referring to *lifelogging* at their annual convention in May 2015. The following could be found in the convention foreword: "In private life so called *lifelogging* is enabling an evermore extensive self-tracking, whereby the user is increasingly restricting their own freedom and self-determination without even noticing it."[12] As such, central *pathologies of digital* self-tracking are already known—it remains important to keep the *potential ones* in sight. This question and the logged ambivalences that have surfaced in the meantime have been recorded and led to several topical discussions, expert workshops and public events: An example of this was the political users congress that met in Wuppertal NRW, Germany in September 2015. Common thread throughout lectures and workshops was *Rip-app-off—how smart is the new consumer world really?* (Ziemlich App-gezockt – Wie smart ist die neue Verbraucherwelt wirklich?). Here subsequent questions to big data (in the financial sector) and self-tracking in leisure time and the fitness sector were highlighted. When a topic becomes the focus of consumer protection agencies, you know it has landed front and centre in societal consciousness.

Unsurprisingly, *lifelogging* is also attracting attention in art, and cultural circles. Here an example: The *Grillo* theatre in Essen, Germany, even typecast *lifelogging* in an original production *I have nothing to hide. My life with big data*. Here documentary material, scientific publications, sci-fi literature and contemporary articles are moulded into a "sequential, scenic firework", says the foreword to the piece. Big data and digital self-tracking are not only topics of this piece, but the phenomenon of the quantification of man is a common thread through

12 http://www.ethikrat.org/veranstaltungen/jahrestagungen/die-vermessung-des-menschen. Accessed 04 April 2015.

the entire theatre season—as one can see in the title of the season 2015-16: *Data counts* (Werte zählen). Nobel price laureate Elfriede Jelinek is quoted in the piece: "These days we can say that anyone who has a flawed physique is themselves at fault." This is a good starting point for questions that have been posed, but not comprehensively answered, by artists. Christian Tombeil, artistic director at *Schauspiel Essen* asks: "We are screening our lifestyles and regulating ourselves, our health and performance—in essence our usefulness—even our potential for happiness, with sophisticated measurements. And hoping in the process that our resources are infinite, as some guidebooks would lead us to believe. We would so like to be better. Not for us. But for our children. For the world in which we live. But can we really achieve this? And if so, at what price? (...) But are we not excluding something fundamental in doing so: togetherness vs against one another; speaking, listening and understanding as opposed to combat and victory; common ground vs isolation? Are we not pushing ourselves further away from each other? What do you think?"[13]

As a public sociologist, I hope one can forgive me for having a soft spot for such questions that arise in society and find their way into scientific debates. Questions which have been formulated by the general population and not in academic language or conversation. At the same time an amazing cross-section is affected by this topic—interest exists not only in ethic commissions and specialist conventions but also in theatres and at presentations in adult education centres. Hence with Max Scheler one could recently recognise in *lifelogging* a topic that permits *value tangency* ("Wertberührung"): more so it's completely revealed. The social relevance of the topic has revealed a diverse value tangency, which several authors in this anthology have touched upon in their respective disciplines. And they give competent, well-founded and multi-faceted answers to the questions that society is asking of the scientific community; precise answers to pressing questions.

Structure of this anthology—overview of the articles

The first part of the anthology, *Fundamentals,* contains articles, pertaining to the central question of the creation and definition of social reality through the collected data. In the second part, *Experiences—Case Studies,* different types of *lifelogging* are presented and categorised in their respective phases of development. The third part, *Quantification—Knowledge,* contains a range of articles, which discuss alternative, in-depth and critical aspects of *lifelogging* under the premise of gen-

13 Quoted from the program of "Schaupiel Essen 2015-16".

erating knowledge through proffering data. In the final part, *Risks—Visions*, an impact assessment in the form of a SWOT analysis follows, as well as a look at the possible future of *lifelogging*. Hereafter I will attempt to outline the articles that follow and make connections, where possible, to each other.

The article *Lifelogging and Vital Normalism. Sociological Reflections on the Cultural Impact of the Reconfiguration of Body and Soul by* Lars Gertenbach and Sarah Mönkeberg begins with exposing a widespread claim. The authors consider *lifelogging* as anything but the mere continuation or increase of already existing social and cultural technology. They see a whole *new* quality in the phenomenon of self-tracking. The authors categorise the recursive data conversion of life paradigmatically into a primary living (and not in a classic social sense) orientated, normalised control logic. They question, which cultural importance it has to create a digital copy of lived life. They make a connection between *lifelogging* and *livelogging* and claim that we are witnesses to the development of a new social technology that will lead to a reconfiguration of mind and body in the end. Via the statistical vision of Gabriel de Tarde they arrive at an expansion of the concept of normalism by Jürgen Link. To this end they propose the useful term *vital normalism*, that encompasses on the one hand a new form of socialisation and on the other a new "*life culture*". This normalisation that is oriented towards vitality leads to fundamental shifts: from "social logic" to "life logic", from the idea of self-awareness to self-optimisation, from the reference point of the psychological to a vital orientation. This analysis is found at the beginning of the anthology because the other articles, often implicitly, also reference to these shifts—or contradict them.

The article *Lifelogging—Project of release or source of objectification* by Peter Schulz, raises a similar claim that understands itself as a requalification of classical reification diagnoses. In doing so the author clears up the question of why and how reification can be transferred from the domain of wage labour to normal employment spheres. *Lifelogging* practices, according to the article, are a reaction to experiences of dissolution by reification and the loss of autonomy that comes with it. The chain of argument stretches from the idea of reification as central paradigm in the critical theory to the question of how man emerged as a fault source, and how a reconstruction of basic logic led to the evolution of "absolute separation of subject and object" in capitalist societies. The author contemplates the totalisation process of reification through to (current) diagnoses of times via Post-Fordism topics. Against this backdrop he unfolds his theory of *lifelogging* as an estranged reaction to reification. *Lifelogging* is often seen as a digital and technical variation of post modern subjectivication forms. Peter Schulz recognises two shortcomings with this view, as self-inflicted optimisation directs itself at everyone and not only self-trackers, and because self-reification (historically) already existed before the separation of work

and leisure time. This article sensitizes to the question of where exactly little known or recognised junctions are and where radical upheavals are happening.

The article *You are Your Data: Self-tracking Practices and Concepts of Data* by Deborah Lupton shows that personal data, shared though self-tracking inside a knowledge economy, can gain added value. As a result the phenomenon of self-tracking is set in a cultural context and reminds us that it is in essence, apart from all the individual and social implications derived from it, just an activity. Self-tracked data is characterised by the fact that it can be accumulated to complex data assemblages, whereby the question arises who the data belongs to. Bodies according to the author, are increasingly becoming known as data bodies, data masses replacing theories. It is slowly recognisable that new approaches towards our own lifestyles are resulting from this. The author outlines baselines that are already shifting, for example the equalisation of people with data, mistaking activity and passivity and interpretation without intuition. She also points out in closing that the idea of the "ideal self" will soon be facing a new alternative: The unquantified self is a social figure, which deliberately revokes quantification and optimisation.

The article *21st Century Men and the Digital Amalgamation of Life. A Science and Technology Perspective on Lifelogging* by von Peter Biniok und Ines Hülsmann considers the phenomena of *lifelogging* from the *perspective of science and technology studies* and thereby expands the view on the phenomena once again. On the basis of an *iPhone 5s* marketing campaign the authors examine the manifestation of a contemporary lifestyle and its consequences. The idea of a technology led smart life forms the backdrop for and analysis of the self-tracking hype. The spread of smart technology and accustomisation to its usage has found fertile ground for the self-tracking boom. The authors discuss *Lifelogging* taking the three connected perspectives of technology use, development and trajectories into account. The complex interaction between development and use of technology as well as the convergence of man and machine become clear not only on a general level, but also when broken down for the example of *lifelogging*. Several examples make clear which shifting boundaries are being associated with the acceptance (of the developers), that quasi autonomous technologies are replacing human advisors or partners, etc. Technology is becoming a life companion, while data is gaining evermore authority. The authors show that the practice of self-tracking is steadily developing from niche pastime to an everyday activity for the masses. Several other (more prognostic) articles concerning *lifelogging* are founded on these basic diagnoses.

With the article *Capturing the Ordinary. Imaging the User in Designing Automatic Photographic Lifelogging Technologies* by Vaike Fors, Martin Berg and

Sarah Pink, the second part of the anthology regarding experiences and case studies of *lifelogging* are introduced. The article itself broaches the subject of *lifelogging*, using mini-cams on the body, by using the example on development the *Narrative Clip* from Sweden. Goal of the article is to understand the more mundane practices as part of the development process. In other words, an article to answer the question how technology developers can conceptually anticipate usage variations. With this in mind, the article connects nicely with the general statements made by Peter Biniok and Ines Hülsmann. Inspired by the findings of *HCI research* (Human-Computer-Interaction), the authors postulate that there are multiple influences on the development process. The developers make implicit assumptions about users and usage, as well as the potential of *Lifelogging* cameras. Central point here is the premise that the camera opens a new view on everyday life. They represent extensive documentation of individual environments, enhance the experience of the moment as well as the opportunity of re-living it. While this has always been available for photography, other functions are now being added. This is particularly the idea of a cognitive out-of-body reminder on the basis of the idea of a completely out-of-body memory, which is outsourced and improved by the camera (in the sense of a complete photographic memory). The authors make clear in their article that a mechanical understanding of recognition, experience and remembering forms the basis of the worldview of developers, and how in the end it comes to a shift in the ability to act.

The article *Deathlogging: Social life Beyond the Grave. The Post-Mortem Uses of Social Networking Sites* by Hélène Bourdeloie and Martin Julier-Costes shows a further shift of borders and at the same time marks an expansion of the measurement zone beyond our own lives. Deathlogging (i.e. the digital persistence of deceased persons) is presented as a new form of measurement of death on the basis of findings from a research project. The *techno-spiritual dimension of data* is particularly clear here. The article shows clearly that *lifelogging* doesn't stop with the end of an individual biological existence. Deathlogging means that everyone, whether they want to or not, has a digital afterlife. As a result of this, a completely new form of mourning, which transcends or blurs the borders between traditional rituals and the technological proximity to media, appears. The authors present an empirically founded typology of remembrance websites and their usage characteristics. Usage forms range from attempts to erase all traces (total nonrecall), to leaving an explicit digital legacy. The article delivers an important contribution to understanding the new visibility of death in the digital age. *Lifelogging* enables completely new settings for death. Hardly any other topic showcases the ambivalence associated with digital self-tracking more clearly that deathlogging. The technology offers an arena for wishes and fears, for new forms of communitari-

sation and the virtual communication with the deceased. Here a continual spectrum of cultural change becomes apparent. It begins with new practices related to self-awareness and self-tracking on the one hand, and with new mourning rituals and transforming of the remembrance of the deceased on the other.

With the article *Lifestories as a Lifelogging-Project: Russion Émigré Bloggers and Their Life Stories* by Nina Kresova-Iordanishvili and George Tarkhan-Mouravi we take a step back, although it still deals with the field of remembering in general terms. The article is based on a broad and, at the same, deep underlying understanding of *lifelogging*. The authors search for "personality traits" in blog entries of Russian emigrants and analyse 30 of their narratives. Their cache of data is taken from the popular Russian blogging network *LiveJournal*. These e-narratives are analysed and categorised using *linguistic* methods. They assume that all narratives hold a certain number of messages, and imagine an intended audience. On the basis of narrative modality the authors differentiate between three ideal types of *lifelogging* projects.

In her article *Making Emotions Count: The Self-tracking of Feelings* (in the form of an "extended extract") Sarah Miriam Pritz addresses the topic of measuring something fleeting. The author makes clear that feelings are increasingly being handled as a phenomena with almost ontological status. This means nothing else than that they can be sorted, measured, regulated, and once again, normalised. Apart from the measurement of health and performance, the option to measure feelings makes clear how technological-numerical forms of self-awareness are approaching and new categories of social reality are being created. Between the theories of disciplining and the informalisation of feelings the author discovers paradox connections.

The article *Built Environment, Physical Activity and Social Participation of Older People. Is Lifelogging an Effective and Valuable Assessment Method?* by Daniela Kahlert brings *spatial research* questions in focus. As a result this article differs from many of the others, in that they place the measurement of physical data in focus. The living environment of elderly people, their physical activities as well as diets or emotions can just as easily be measured. Starting point here is demographic change, and the questions related to this, like if and how physical activity has a positive effect on elderly people. If one assumes there is a connection, the next question appearing is: "factors that affect older people's physical activity and social participation" and how to identify it. At the point of intersection between space and health research the author questions how living environment and the activities of elderly people can be depicted, and how *lifelogging* can be implemented as a research method for outpatient assessment in social area contexts. Several advantages of (visual) methods are contrasted with obstacles and disadvantages.

The article *Self-Monitoring—Embodying Data and Obliviating the lived body!?* (in the form of an "extended abstract") by Lisa Wiedemann begins a series of articles, which preoccupy themselves with the question of changes in forms of knowledge due to *lifelogging*. The author asks how self-tracking becomes a technology itself: in other words the targeted intervention of an individual in his own life in the sense of Foucault. These experiments at self-transformation are based on statistics, which lead to numerical forms of experiences and normalisation. The author creates a detailed view of the gouvernamental reference to a biological power and categorises the phenomena of *lifelogging* as an "I project in the data stream" within the semantic field presented. The resulting core theory is of the forgotten physique and digitised body, which allow the possibility of constituting the own persona along the lines of biometric guideline elements. Through *lifelogging*, the individual becomes a calculable object that can be "administered".

The article with the programmatic title *Reflect Yourself! Opportunities and limits of Wearable Activity Recognition for Self-tracking* by Manuel Dietrich and Kristof van Laerhofen follows an interdisciplinary classification of the activity detection of the technology. *Philosophical* and *critical design theories* are referenced in this article by the respective authors. They pursue questions along the guideline of how the relationship of the user to their actions changes when activity detection technology is implemented. How exactly does an expansion of self-awareness possibilities come about in this context? Although this article would have fit in well in the first part of this anthology ("Fundamentals"), it forms a fitting tandem with the article by Stefan Meißner that follows. Although both authors stress the ubiquity of self-tracking technologies on the one hand in the article, they repeatedly raise the idea of self-improvement through self-tracking. Four process steps (sensor data recording, automatic interpretation of the activities, visualisation and how this can be used for reflection), that are core elements of self-tracking, are presented in two examples here. The first example revolves around a portable data recorder, which enables the logging of the activity *cigarette smoking*, to garner findings regarding individual smoking habits. The second case study focuses on manual *activities of scientists* in a biological laboratory. Through their analysis, the authors come to the conclusion that the relationship between data and self-awareness should be seen as differentiated.

With the article *Effects of Quantified Self Beyond Self-optimization* by Stefan Meißner an important inverted perspective of by now (too) well-liked arguments has been achieved. The author contradicts the one-dimensionally understood optimisation theory, that is often mentioned. Based on self-attribution, which tends to place awareness or emancipation in the foreground, the author understands optimisation not as an improvement on previous goals, but rather sees the poten-

tial in "discovery of new opportunities for man". Here he differentiates between self-improvement as modest improvement of present circumstances, and self-enhancement with a view of, in principle, an unlimited space for opportunities. With this, Meißner masterfully counters common arguments that see pressure in the direction of normalisation or conformity as a result of self-tracking. Self-tracking, so the core assessment, can better be implemented to achieve a distanced self-relationship, which allows us a window of opportunity to behave differently to others.

The article *Measuring the Entrepreneur of Himself. Gendered Quantification in the Self-tracking discourse* by Simon Schaupp follows once more the examination of Post-Fordism subjectivication forms, but differentiates the perspective, where *gender specific* differences become apparent. This point of view is also taken and followed up in the next article by Corinna Schmechel, who examines calorie tracking in the self-tracking field. Taking historical predecessors of *lifelogging* into account, Schaupp shows that by now every aspect of life, according to rational criteria, can be measured by the collection of quantitative data. In the centre of all this stands the self-tracker, as a person that is following the imperative of permanent self-optimisation. The author especially wants to highlight "business masculinity" as a special form of the "business self". He shows how economic rationalities and the logic of competition become visible and relevant in regimes with masculine subjectivication forms.

In the previously mentioned article *Calorie Counting or Calorie Tracking. How Quantified Self Transfers Feminized Bodily Practices Into New Ways of Performing Masculinity* by Corinna Schmechel, *gender-specific* differences in the practical aspects of self-trackers are examined, by way of the example of calorie tracking. Proceeding from the assumption that certain technologies create gender specific subjects and following historical precedents (e.g. in the civil hygiene discussion), the author shows how, by creation of physical gender-specific self-tracking, a process of gender connoted transformation can be observed. The "crux" here is that digital self-tracking practices offer the opportunity to integrate practices with feminine connotations into the repertoire of male subjectivication and gender performance.

The article *Self-tracking as Knowledge Production: Quantified Self Between Prosumption and Citizen Science* by Nils B. Heyen also stresses the aspects of potential, which rarely gets noted, and in this respect aligns his perspective with that of Stefan Meißner. Tying in to the Prosumer Theory of Alvin Toffler, Heyen develops the *concept of a hybrid social figure*, which at the moment can be granted a new and innovative status in-between the dichotomy of experts and laymen. The debate about *citizen science* is taken as a reference for this categorisation, to describe aspects of knowledge transfer through self-tracking as "personal science" in its potential, but also in the charged relationship between institutionalised norms and rules of the scientific system.

With the article *To Log or Not to Log? SWOT-Analysis of Self-tracking* by Na Li and Frank Hopfgartner the fourth and last part of the anthology begins. The systematic recording of strengths, weaknesses, opportunities and threats contribute to an objectification of the debate and delivers multiple reference points for further analyses. As a result, the article offers a good overview of the potential and risks of *lifelogging*, and differentiates the phenomena more clearly from self-tracking and Quantified Self (*QS*).

The article *The Emergence of Lifelogging and Thinglogging* by Jim Gemmell views the topic from the insider perspective of a pioneer in the self-tracking movement. The author delivers basic explanations to technological developments and conditions of *lifelogging*. In this article, the former *Microsoft-developer* once again reviews the most important stages of development he was involved in. His conclusions are of a more practical nature on the one hand (users want automated services) and visionary on the other. His contribution to thinglogging shows clearly in closing, that this is about an interaction between technological developments and cultural transformation. Basic values change as new technologies become available e.g. the way handing down of values from one generation (last of the analogues) to a new one (the digital natives) takes place.

Conclusion and outlook

My own article *Expansion of the Combat Zone. Rational Discrimination Through Lifelogging and the New Social Taxonomy* is placed—much as a representative outlook—at the end of this anthology. Here I underlay critic on the commercialisation of self-tracking with a model of a new form of discrimination between social and static discrimination. Rational discrimination develops in my opinion by the supposed objective and rational recourse of data, which can be understood as meta-social commentary of a person to their own social position. Nevertheless personal outlines of the constructed numerical objects or bodies of data tend to disappear then. It's easier to act more ruthlessly, simply put discriminately, against people "without definitive outlines". In closing, I ask about the next stage in self-tracking: What actually happens when decisions engines ("Entscheidungsmaschinen") relieve us of the smaller or larger questions in life? What can, will or may we decide at all in the future? Disruptive developments are already appearing, which show what a new taxonomy of sociality could look like in the future.

The long-term change of social relationships, in the direction of a new control regime, is supported with an anthropological argument at the end. Here we can assume that human evolution (Anthropogenesis) remains incomplete. The Italian

philosopher Giorgio Agamben reminds us of the fact that thinking involves the still unanswered question "if man will become human" (Agamben 2015). Therefore, in modern societies, in which a *policy of truth* by negotiation has been replaced by the *economy of truth* by quantification, and an apparent lack of alternatives due to ideologies of limitless advancements exists, we must develop a new idea of the humanity (or inhumanity) of man. The following anthology therefore pursues the intention of enlightenment.

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Fundamentals

Lifelogging and Vital Normalism

Sociological Reflections on the Cultural Impact of the Reconfiguration of Body and Self

Lars Gertenbach and Sarah Mönkeberg

In 1890, the French sociologist Gabriel Tarde speculated on the further development of society and social statistics. In case it were possible to maintain the progress of the last years, he assumed, "a time may come when upon the accomplishment of every social event a figure will at once issue forth automatically, so to speak, to take its place on the statistical registers that will be continuously communicated to the public and spread abroad pictorially […]. Then, at every step, at every glance cast upon poster or newspaper, we shall be assailed, as it were, with statistical facts, with precise and condensed knowledge of all the peculiarities of actual social conditions" (Tarde 1903, pp. 133f.). In the end, this scenario might lead to a development in which "every sensation—colour, sound, taste, etc.,—is only a *number*, a collection of innumerable like units of vibrations that are represented collectively by this single figure." (Tarde 1903, p. 135, emphasis in original) And by looking at the curves which ultimately illustrate the conjunction and intertwining of those numbers and collected data, it would be nearly impossible to withstand the impression that they "are at times as strange and picturesque as mountain profiles, more often as sinuous and graceful as living forms." (Ibid., p. 114)

It might be confusing to start an essay focusing on the relatively new phenomenon of *lifelogging*, with a reference to an opus written more than 120 years ago. But Tarde's utopian view emphasizes two aspects that seem to be crucial to this sort of digital self-documentation: On the one hand, Tarde fundamentally ascribes data

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the function of orientation and guidance in daily life. More than other sociologists at that time he notes the practical and mundane usage of data, hence directing the attention to the pragmatic dimensions of quantification. On the other hand, he was picturing a scenario in which data possess some kind of animated quality. They not only derive dynamically from daily life activities, they are instantly recorded and connected during production. Subsequently, these two aspects lead to another important characteristic of *lifelogging*: due to its dynamic and simultaneous quality, this kind of self-quantification is becoming increasingly recursive. Even if collecting data may be first and foremost an instrument of representation and documentation that accumulates and combines social "facts", ultimately it tends to be far more than just sheer registration. At last, as can be argued following Tarde, it amounts to a widespread *datafication of life*, in which the acquired data instantly function as a guideline and landmark for individuals and their further actions and performances—a fact that seems to be more and more important in the light of progressing digitalization.

Subsequent to these preliminary remarks on Tarde, our main thesis is that *lifelogging* must be understood as an expression and emblem of this recursive datafication of *life*. Furthermore, we will argue that *lifelogging*, as a prototypical technology of self-constitution, is linked to a specific model of social control we call *vital normalism*. With this concept we propose to expand and complement the notion of *normalism* as defined by Jürgen Link (2004a, b) in a way that it should be able to address the fusion of a so-called "flexible-normalistic" type of sociation with the rise of a "culture of life"[1]. Therefore we will first discuss *lifelogging* as a phenomenon of the recursive datafication of life (chapter 1), followed by a short outline of the characteristics of the specific modern and essentially vitalistic concept of life, unfolding itself at the threshold of the 20th century. Although it is already grounded in the drastic cultural changes at the turn of the century, this concept is still crucial for the modern biological sciences (chapter 2). Following these general but necessary considerations we will distinguish between three forms of normalism. Our aim is to provide a basis to assess different and chronologically alternating ways and practices of constituting the self (chapter 3). In the end, this typology should help to outline *lifelogging* as the twofold enterprise of being an expression and a proliferation of vital normalism at the same time (4).

1 This is basically a foucauldian approach which focuses on the centrality and regulatory power of normalization for modern societies.

1 Lifelogging: Setting the self in motion?

Lifelogging assembles various practices of life-protocolling such as self-monitoring, human or self-tracking, e-memory and forms of digitalized and digitalizing self-control (sousveillance) that are mainly grounded in the quantified self movement (cf. Selke 2014, pp. 13ff., 73ff.).[2] Although up until now, many different and specialized ways to log life coexist and the vast bulk of equipment is still not applicable in everyday life (even though it is progressing technically and becoming less expensive) (ibid., p. 78), these practices seem to be unifiable in the vision "that digital data help in making the biological body healthier and having a better life in general" (ibid., 33). Ultimately the core of the ideologies of the *lifelogging* movement is the idea of "creating a better human" (ibid.).[3]

Besides this ideological sediment surrounding and related to the technological progress, *lifelogging* is rendered possible through developments in the research fields of ubiquitous or pervasive and wearable computing and of augmented reality.[4] Another factor is the internet itself, since it is a major accessory for decentralization.[5] This change addresses the individual more and more in its everyday, and therefore "normal activities", thereby fostering communications to become increasingly independent of time and place. This development culminates in the expansion of mobile technologies of communication since the turn of the millennium and its merging with personalized internet structures, especially of the so-called web 2.0. On the one hand, we are facing a fundamental integration of digitalization media into everyday life, while on the other hand, *lifelogging* indicates how the quality of data has changed. After a first wave of digital self-publishing by disclosing any kind of intimate and private details of life and practical knowledge,[6] there is now a second wave whose focal point is mobile data and which indicates a turn to the *moving* body. Regarding this new quality and quantity of self-datafication, it

2 The term emanates from a Pentagon project, which was stopped in 2004 (cf. Selke 2014, p. 33f.).

3 All translations from German are by the authors.

4 For an overview of different visions and developments in quoted research fields, see Matern 2007; for pervasive- and wearable-computing: http://www.pc.inf.ethz.ch/. Accessed 10 July 2015. http://www.wearable.ethz.ch/. Accessed 10 July 2015. For augmented-reality, e.g., the venturi project: https://venturi.fbk.eu/. Accessed 10 July 2015.

5 By that we do not mean to insinuate some power-free or "noncoercive" zone, but to highlight the fundamental change in the forms of communications. Further considerations regarding the relation between decentralization and recent forms of power and governance can be found in Dorer 2008 and Reichert 2013.

6 cf. i.e. 2008; Mönkeberg 2013; 2014.

seems appropriate to assert that the amount of all lifelogs ideally produces "a sort of a digital double of the experienced life" (ibid., p. 73).

This thesis marks the vantage point for our following argumentation. Therefore, we do not focus on specifics of different practices of *lifelogging*, but try to generalize them under the following question: *Which cultural meaning lies beyond the desire to create a digital copy of experienced life?* This perspective is not restricted to those superficially athletic or fitness-oriented practices of *lifelogging*, which, for instance, use pedometers or pulse monitors while jogging or to measure someone's sleep. We are interested in the extensive use of mobile technologies of connection and digitalization which aim to dataficate everyday activities and daily movement. Certainly this can be something that is individually motivated by sports and fitness. But from our perspective, this would merely be an expression of a general tendency, in which mobile digitalization not only enables more freedom of movement and higher mobility, but also aligns itself to the concept of movement as such—and the mobile data you log. "Thermostats, for instance, controlled via smartphone to regulate the room temperature from distance. Wristbands registering body-functions and saving them in the cloud. […] Cams transferring their photos through the internet" (Graff 2014)—all these achievements of wearable internet not only allow mobility but they produce dynamic data, too. It becomes increasingly evident that these new forms of datafication are above all geared towards physical activity when you look at *Apple's* and *Google's* patent applications in the past years. In 2013, the United States Patent and Trademark Office approved a patent for *Apple* to control three-dimensional objects on a touchscreen by using special gestures (cf. Campell 2013); *Google* designs *Glass* explicitly "for those who move"[7] and will use the so-called "Heart-Shaped Gesture" to take photos—and simultaneously like and share them (cf. Desat 2013).

In summary, we consider it to be crucial to view *lifelogging* as much more than just a continuation of well-known forms of recording and protocolling life and self-performance that are merely changing their looks and foci or are expanding into contemporary cultural practices. Instead, in focusing on the *live* quality of lifelogs, we try to claim that this can be understood as the emerging point of a new cultural technique that leads to a novel configuration of body and self. Although *lifelogging* obviously depends on the development of specific technologies, from a perspective of cultural sociology it is important to emphasize that it still has to be embedded in social practices that are necessarily entangled with specific and historically changing logics of sociation and culture. Below we will try to trace this

7 http://chipsetforum.blogspot.de/2014/09/google-glass-designed-for-those-who-move.html. Accessed 10 July 2015.

transformation by distinguishing between three forms of *normalism*. Following Link, we interpret them as (different) forms of dynamic stabilization of the "productive chaos of modernity" (cf. Link 1997, p. 313). Because *lifelogging* consists primarily of documentation and (normalistic) datafication of *life*, we will initially turn our attention towards the development and transformation of the modern concept of life.

2 Idiosyncrasies of modern life: a short outline

The recent rise in discussions regarding the concept of life as well as related biologisms are not just a result of the newest developments in the natural sciences (cf. Breidbach 2012, p. 3). The "gradual naturalization of perception forms" (ibid., p. 14) can be traced back much further. It had already begun to replace the moral concepts in the 19th century which were lost due to the process of secularization—a development which can be seen as a breeding ground for the ascent of the life sciences to become the leading science of the 20th century (ibid., p. 11). The proliferation of the underlying bio-scientific *weltanschauung* is based on a specific concept of life, which became crucial at the threshold of the 20th century—as Georg Simmel (1997), Helmuth Plessner (1975) und François Dagognet (1988) have pointed out.[8] This concept articulates a particular understanding of life, which, despite all the differences and transformations since then, still seems constitutive for the present datafication of life activities. Ultimately, the boom of the concept of life around 1900 has to be understood as a twofold response: (1) to an alteration in the medical-scientific understanding of life and (2) the tremendous proliferation of artifacts in daily life.

(1) The 18th and 19th century can be seen as the starting point for a novel scientific engagement with the concept of life. Grounded in a vitalistic understanding of life, it generally "rejected two metaphysical interpretations of the causes of organic phenomena: animism and mechanism" (Canguilhem 2008, p. 122). On the one hand, this concerns the assumption of an extra-sensual and animated soul, inherent to human beings. On the other hand, it contains the refusal of the idea that the organization of life is determined by some goal or regulated through general

8 See Plessner (1975, p. 3): "Every time finds its salvific term. The nomenclature of the 18th century culminated in the idea of reason, the one of 19th century in the idea of development and the present [1928] in the idea of life."

principals, external to life as such.[9] Not only the above mentioned Tarde, even his successor on the chair at Collège de France, Henri Bergson, was inspired by this concept of life. Georg Simmel refers to these developments in vitalism, too, insofar as he interprets the dynamics of sociation and culture as forms that are created by life (cf. Simmel 1997, p. 76). Although each of these positions has to be understood as a response and alternative to the dominant contemporary evolutionary concepts, Simmel is especially interesting since his concept of life as well as his diagnosis of modern culture as such refer to a self-referential model of life. He describes how external and metaphysical explanatory models are gradually replaced by vitalistic views, founded on the idea that the essentially creational motion of life can only be understood in its own (vitalistic) terms. In this manner vitalism does not rely upon any sort of external substantiation or any explanatory model that refers to abstract functions or final goals—for life serves no purpose besides itself.

The idea that life can no longer be understood as a static principle, but rather as something that generates its own forms (more or less stably) through its dynamics, can particularly be traced in the writings of Bergson. His notion of life similarly entails a fundamental "critique of mechanism and finalism" (Vrhunc 2002, p. 99), since he mutually and generally deems both incapable of measuring the reality in which we live (Bergson 2010, p. 1). Classical metaphysics fail these requirements, for they have replaced "a full and mobile experience" (ibid.) with a "system of abstract general ideas" (ibid., p. 7) with the result of a "more or less artificial arrangement of concepts, a hypothetical construction" (ibid.). From Bergson's point of view, life itself contains duration and creation and does not need to be fulfilled by an external explanation or complementary scientific interpretation.[10] Therefore, the analysis of life should not focus on the identical and immutable in advance. A perspective which merely focuses "on generalized structural principles will be at risk to ignore the historical moment of structural developments and their functions" (Vrhunc 2002, p. 123). Although life is not only familiar with forms and structures, but is constituted by them, they should not be viewed as if they were somehow preexisting, generating entities on an independent, emergent level.

Since these ideas of an autonomous molding of the fundamentally active life have to get by without a causative explanation of this movement and because they denominate this as characteristic of life, they facilitate the process of datafication.

9 For a discussion on vitalism with respect to Nietzsche, Tarde, Bergson, Simmel, Deleuze, Foucault and Negri, see Lash 2006.

10 The notion of life in the works of Bergson does not only go against metaphysical thinking in general, but also more precisely against the way Spencer (and Darwin) conceptualizes time and biological evolution (cf. Delitz 2014, p. 45).

In doing so, they leave a void that can be occupied by the practical life sciences. The fact that even Darwinism can only describe the evolution of species instead of explaining it (Breidbach 2012, pp. 10ff.) results in attempts to save the forms of life positively "as data, independent of any interpretation" (ibid., p. 16). In a striking accordance to the ideas of Tarde the sciences are trying to count and measure similarities of motions.[11] The clearest expression of this logic can be found in the idea that life itself is information and data so that "nowadays we have to approach the DNA if we want to know what life means" (Liebsch 2012, p. 470), since the genetic code has become the epitome of life (cf. Deleuze 1988, p. 131).

(2) But the dissemination of the vitalistic concept of life does not just pave the way for an increasing datafication of life. Up to a point where technology and artificiality enables nature and the living, it evokes a fundamental critique of the separation of naturalness and artificiality. Vitalism understands life as fundamentally artificial. When Bergson, for example, emphasizes that there cannot be "any life without form" (Vhrunc 2002, p. 123), this is by no means restricted to an epistemological or scientific way of thinking. Instead, it is the operating mind as such that forms "matter according to the requirements of our life" (ibid., p. 111). This argument is of crucial importance since this continuous action of appropriation, molding and production frees mankind of the mercy of the laws of nature (cf. ibid.). Thus, life forms itself in the artificial, through technologies and culture: "It is life itself […] with its impetus and dynamism, its transformation and differentiation, which provides the driving force behind the entire process, but which, being itself formless, can only manifest itself as a phenomenon by being given form." (Simmel 1997, p. 77) Plessner's perspective is similar to this. Here human life is artificial by nature because, first and foremost, "man has to turn himself into what he already is" (cf. Plessner 1975, p. 309).

With this in mind, it is appropriate to assume that the constitutive "rejection of essential or even antagonistic discontinuities" (Balke 2009, p. 153) can be understood as one of the "most prominent symptoms of the emergence of a complex concept of normality which starts its career in the 19th century, at first in medicine" (ibid.). While capturing philosophy it reinforces the increasing datafication of life. However, the desire for autonomous self-datafication that is manifested in *lifelogging* still has to be explained, since it cannot be understood solely based on this general change. In fact, even though (or because) the modern scientific exploration of life is only possible through technical instruments and the proliferation of artifacts, there is a fundamental discordance between the described philosophical concepts and the prevailing day-to-day semantics around 1900 concerning the

11 For this logic of scientific explanation, see Tarde 1903, p. 5f.

notion of life and its entanglement with the artificial. The latter is characterized by separating both and portraying them as two antagonistic principles; it tries to defend natural life against its absorption over the course of technological progress. Therefore, the importance of the concept of life here differs from the philosophical notion of vitalism: it is first and foremost a response to the proliferation of artifacts since the threshold of the 20th century (cf. Eßbach 2011).

Given the cultural prevalence of the idea of a fundamental separation of life and the artificial, the approach of a philosophical vitalism, associated with Bergson, Simmel, Tarde and Plessner, remained a marginal position in the first half of the 20th century. A noteworthy change occurred only several decades later as the increasing technical possibilities and the rise of the life sciences further promoted a concept of life that turned the (scientifically sterile) search for the specific form of life into a question of its formability. Thereby, the difference between the living and technology becomes less distinct, making life and nature more and more accessible. This development, to which Paul Rabinow refers to with his concept of biosociality (Rabinow 1996a), can also be understood as a cause of the revived interest in philosophical vitalism and the authors mentioned above. Essentially, it amounts to a situation in which nature has become technologically accessible, a state that can be described as an expansion of the "sense of possibility" (Musil) unto the biological condition of life. Although this entails a continuity with some vitalistic concepts at the dawn of the 20th century, it nevertheless implies a crucial break—as we will argue below.

3 Normalism as a form of life

The starting point for our argumentation is the assumption that the social centrality of the concept of life is deeply related to the implementation of a specific mode of social control, characterized as normalism by Jürgen Link (1997; 2004a, b). The concept of normalism does not only apply to the tendency of modern societies to gather data on society and life, but also emphasizes that these data are increasingly used as instruments for self-assurance, self-reflection and self-definition.[12] The normalistic mode of control is based on a (statistical) datafication of society and tends to establish a dynamic and flexible conception of the "normal". This does

12 Normalism is defined as "the totality of discourses, procedures and institutions, through which modern societies fabricate those 'normalities' that eventually have risen to the status of ultimate foundations and absolute certainties" (Gerhard et al. 2001, p. 7).

not only mean that the measurement and regulation of order rest upon a statistical notion of normality (in contrast to a normative, i.e., moral or religious one) but that the acquisition of this normality also happens more and more self-referentially. Normality is less and less based on extra-statistical fixation or absolute principles.

Despite (or even because of) this general tendency to self-reference, there are different models or strategies of normalistic sociation. At the beginning we mentioned a trisection of normalism as an analytical framework for the phenomenon of *lifelogging*. In this regard, Link pointed out that the "normalistic archipelago" (Link 1997, p. 13) can already be differentiated in two types, functioning as several strategies to process the normalistic datafication of society and life: a *protonormalism* and a *flexible normalism* (Link 2004a). Even though both forms intersect, they nevertheless are linked to a substantial historical transformation of modernity. While protonormalism dominates through early and classical modernity, flexible normalism overlaps with postmodernism (cf. ibid., p. 81; Link 2004b). To further clarify these different concepts, one can refer to Foucault's distinction between *normation* and *normalization* that has played an important role in the discussions on the non-disciplinary power of governmentality (cf. Foucault 2007, p. 57, Schrage 2008).[13]

Protonormalism (as defined by Link) and normation (as defined by Foucault) can be understood in analogy to Foucault's concept of discipline (cf. Foucault 1995, pp. 135ff.). Here, the distinction between the normal and the abnormal is made on the basis of prescriptive norms and normality is not only the endpoint of statistical aggregation: "Disciplinary normalization consists first of all in positing a model, an optimal model that is constructed in terms of a certain result, and the operation of disciplinary normalization consists in trying to get people, movements, and actions to conform to this model, the normal being precisely that which can conform to this norm, and the abnormal that which is incapable of conforming to the norm. In other words, it is not the normal and the abnormal that is fundamental and primary in disciplinary normalization, it is the norm." (Foucault

13 The distinction between normation and normalization must be seen as a stopgap referring to the German terms Normierung and Normalisierung (see footnote 16 for more clarification). It has the merit of formulating a conceptual opposition and it allows two further accentuations: on the one hand, it emphasizes the tendency of normalism (in general) towards the concept of normalization (in contrast to the less self-referential concept of normation) and, on the other hand, it clarifies that vital normalism must be seen as a specification of the concept of normalization (i.e. flexible normalism)—and not its replacement or overcoming.

2007, p. 57)[14] The centrality of prescriptive norms enforces a certain standardization and implies a rigid application of the a priori set norms. The result is that the zone of the normal tends to be compressed in a stable manner (cf. Link 1997, p. 78). Pertaining to effects on the self and the body, this model implies and demands adaptation, too, since the act of subjectivation orients itself towards a priori norms. One crucial consequence is that the self is at once disconnected from and enclosed in the body; as the conscience, the soul or the inner core.[15] "Due to the primacy of the norm in relation to the normal, to the fact that disciplinary normalization goes from the norm to the final division between the normal and the abnormal, I would rather say that what is involved in disciplinary techniques is a *normation* rather than normalization. Forgive the barbaric word, I use it to underline the primary and fundamental character of the norm." (Foucault 2007, p. 57)[16]

Subsequent to these different roles of the norm or the difference in priority between norm and normality, it is thus possible to further distinguish between the two modes of normalization. Whereas normation (German: Normierung) operates with the fixation of an (ideal) norm and, for that reason, implies a comparatively severe grasp on deviation, the primary focus of normalization lies on forms of self-control and self-positioning. In lieu of a relatively strict demarcation between the normal and the abnormal, normalization entails permeable and dynamic boundaries with more tolerance to ambiguity and biographical breaks. Accordingly, Link characterizes flexible normalism by a solely statistical measurement of normality that goes along with a fluid (cybernetic) model of feedback and adaption. Complementary to protonormalism (or normation), this strategy aims at the maximum expansion and dynamization of the zone of normality (cf. Link 1997, p. 78). It

14 Here, Foucault still uses the term normalization to describe what he will later call normation. At this point, the conceptual distinction has not yet been made; it follows immediately after this passage. Given the context it should be clear that it is the concept of normation he describes.

15 This is a central topic in Norbert Elias' writings on the civilizing process. According to him, a great consequence of modernity is the perception of individuals "that their own 'self', their 'true identity', is something locked away 'inside' them, severed from all other people and things 'outside'" (Elias 1994, p. 475). As Charles Taylor has pointed out at great length, this "modern inwardness" must be understood as "the sense of ourselves as beings with inner depths, and the connected notion that we are 'selves'" (Taylor 1989, pp. 389f.).

16 In the German version of this text we replaced the cumbersome term normation with the term Normierung. Unfortunately, neither the English nor the French language offers a similar distinction. Instead of using the German term we follow the English translation of Foucault's lecture: we will speak of normation instead of the often used term of standardization.

is generally motivated by the assumption of a "fundamental continuity (not: identity) between 'normal' and 'abnormal' or pathological phenomena" (Balke 2009, p. 154). Ultimately, it represents a mode of (re-)production of normality and societal order, which is dynamic and malleable and in which fixed qualitative demarcations tend to disappear—being replaced by a concentration on solely quantitative calculations. Inasmuch as boundaries are still set, they are "on principal just a shiftable marker on a continuum" (Link 1997, p. 339).

Here, a conceptual analogy can also be found in Foucault's writings. While the model of discipline correlates to protonormalism, a more flexible concept of normality is discussed alongside the model of governmentality and in addition also in the corresponding model of control by Deleuze.[17] This becomes most obvious in the matter of subjectivation. In this regard, Foucault and Deleuze emphasize the enforcement of a culture of self-adjustment, self-governing and self-normalization that can easily be related to the idea of a flexible-normalistic subjectivity. Here, "an adaption-generating norm is replaced by a sort of norm-generating normality" (Castel et al. 1982a, p. 305; see also 1982b), with the result that the work on the self and the body increasingly becomes one's own responsibility instead of being primarily guided through disciplinary institutions (ibid.).

According to this discussion, there are far-reaching consequences regarding the form of sociation. First of all, the model of normalization (in contrast to normation) attributes the subjects with greater participation and increases the area of their responsibilities to a point where cooperation evolves into an institutional expectation. Under the conditions of flexible normalism, the subject has to take care for its (own) normality. The comparison with the curves of normality has been passed over to the subjects themselves, so that it is up to each individual to position within the spectrum of the normal. This aspect can be illustrated by the semantical change from *health to fitness*. To live along the model of health is by and large coherent and steady, since its primary goal is to conserve the (normal) status quo. In an attempt to confront each individual with accurately defined parameters of health, it defines a threshold above which any additional change becomes undesirable and unnecessary (Bauman 2005a, p. 198; 2005b, p. 93). In this regard, the idea of health is characterized by a quasi-external reference, building up an external guide to consult, evaluate and define conditions of the self and the body. Fitness, however, is characterized by the absence of this sort of orientation. "As such, 'fitness' knows no upper limit; it is, in fact, defined by the absence of limit; more to the point, by its inadmissibility. However fit your body is—*you could make it fitter*. […]. In the search for fitness, unlike in the case of health, there is no

17 See Deleuze 1992 and with regards to this reading of Foucault, see Gertenbach 2012.

point at which you can say: now that I've reached it I may as well stop and hold on to and enjoy what I have. There is no 'norm' of fitness you can aim at and eventually attain. […] Each dose is to be followed by a larger dose. Each target is but a successive step, one in a long string of steps already taken and yet to be taken." (Bauman 2005b, pp. 93f.)

This passage points to a crucial argument that cannot be given too much importance. For Bauman, fitness is not an extension or prolongation of health, but an antipode for it consists of a fundamentally different mode of operation. This is why it corresponds to flexible normalization: it does not only manipulate the conditions of illness but the conditions of health, too. In the case of fitness, the former concept of health as a reachable and stable status disappears until it even becomes impossible to refer to a norm as such (Castel et al. 1982a, p. 317). Living under the imperative of fitness implies permanent change, it requires "developing all individual and social abilities, overcoming fixations and obstacles, eliminating archaisms, leaving illusions behind, and getting freed from alienation" (ibid., p. 318).

Up to this point, we have basically argued in accordance to the general concept of normalism and the tendency towards the more flexible and less rigid form of normalization, as described by Link and Foucault. With the notion of a *vital normalism*, however, we try to go beyond these concepts in asserting another crucial cultural transformation. For us, this term seems to be able to outline the combination, or, to be more precise, the deformation of flexible normalism with a *culture of life*. Thus, we try to capture a type of normalization primarily geared towards vitality which occurred alongside an alteration in the form of sociation, namely from a "logic of the social" to a "logic of life" (cf. Rabinow 1996a, p. 99; Knorr-Cetina 2005). Its main implications concern different technologies of the self: whereas modern and, at least to some extent, postmodern forms are mainly focused on the mind/psyche and, in this spirit, aimed towards a mainly mental concept of self-knowledge, recent technologies of the self revolve to a much greater extent around the somatic dimension of the self, and therefore a more vitalistic notion of self-creation. However, this does not imply a dismissal of the main characteristics of normalism, i.e., the importance of subject profiles, data comparisons and the (self-)localizations within normality and its various curves and charts. Instead it alters the ways data are extracted, presented and compared without abandoning basic premises, impositions and modes of subjectivation of a normalistic form of sociation. Still, it is not about the conditioning of subjects to preassigned and fixed responses, but the installation of a flexible and adaptable dispositif within themselves, which enables them to compare themselves to aggregations of data, curves, mean values, i.e., various calculations of normality in general (cf. Link 1997, p. 338). This transformation, which is already implied in the transition from health

to fitness, marks a direction *lifelogging* can dock onto. This shift from healing the sick to optimizing the healthy, from reactive medicine to preventive care, requires not only more personal initiative and responsibility: It enforces a more body-related self-perception and the rise of such forms of sociality that are solely based on biological data and/or gathered around biological phenomena.[18]

As a result, *lifelogging* is far from being just a renewal or intensification of established social and cultural techniques. It might rather be the most enigmatic point at which a novel *culture of life* connects with established technologies of normalization, focusing on fitness, optimization and prevention. In combination with the characteristics of mobile digitalization to enable the collection of data that focusses on the self and body in motion, it seems fair to assume that *lifelogging* is a paradigmatic practice for a mode of societal control that is primarily concerned with life. Although protonormalistic strategies were also aimed at the collection of biological data, this was neither a process of recursive datafication, nor did it occupy the self-perception and practice of the subjects as it is the case nowadays. Bound to the idea of health, it immobilized the self and the body, keeping life in an orderly fashion. Here, an intervention only became necessary in the case of a specific incident, so that medical and therapeutic practice was fundamentally reactive. Fitness, on the other hand, emphasizes self-construction and focuses less on past events or diseases already in existence. Instead of being reactive, it is proactive and prophylactic. Combined with the notion of improvement, it follows the logic of prevention and demands constant work on the self and the body. This is exactly what can be found in various technologies and practices of *lifelogging*. However, it is crucial for vital normalism to address life in motion, for it is accompanied by a *model of movement*, constantly enforcing new forms of self documentation which function as a mode of comparing and locating oneself within a dynamic normalistic field.

Overall the constitution of subjects still occurs through normalistic distribution curves as such, but in this process it increasingly rests upon dynamic biosocial data

18 This is exactly what Paul Rabinow has in mind with his concept of biosociality: "I am not discussing some hypothetical gene for aggression or altruism. Rather, it is not hard to imagine groups formed around the chromosome 1 7, locus 16,256, site 654,376 allele variant with a guanine substitution. Such groups will have medical specialists, laboratories, narratives, traditions, and a heavy panoply of pastoral keepers to help them experience, share, intervene, and 'understand' their fate. Fate it will be. It will carry with it no depth. It makes absolutely no sense to seek the meaning of the lack of a guanine base because it has no meaning." (Rabinow 1996a, p. 102) Hence, it becomes clear that this shift is to a far lesser extent a biologization of the social than an indication that biology itself "has become a cultural technique" (Böhme 2004, p. 76). For a discussion about the distinction between biosociality and the biologization of the social, see Wehling 2007.

instead of stable values and rigid norms. Furthermore, a crucial criterion of vital normalism, already indicated in the shift from health to fitness, is that the comparison with the manifold reference points of normality tends to lie upon the subjects themselves. This particularly concerns the ways in which data are attained, assembled and fed back. Instead of being solely collected in a centralized manner via aggregated population statistics, it is to a much greater extent embedded in various micro-politics of the self and emphatically focused on vital data. Henceforth every connection to the internet can be a contribution and for that matter helpful in evaluating what it means, "to live in the right direction, with the right tempo etc." (Link 1997, p. 339) Thus, in the end, the lifelogger becomes a somewhat dubious character. On the one hand, he is a documentarian of vital normalization, actively disclosing his data and, for this reason, constantly contributing to the construction of the normal. On the other hand, he is a voyeur, using the data of others as a standard, observing the deviation of his own data from that of the others. As such, he is an example for the fact that voyeurism and exhibitionism intertwine inseparable (cf. Schroer 2010).

4 Conclusion

In this article we have pointed out that modernism is tied to a peculiar notion of life, aligned with a mode of societal control that Jürgen Link described at length under the term *normalism*. In contrast to his dualistic model, we made a distinction between three types of normalism, evoking different ways to normalize the body and the self. We argued that *lifelogging* can be understood as an expression of the third type of normalism. By means of the possibilities of mobile digitalization, this vital normalism is a mixture of flexible normalization and a *culture of life*, thereby profiting from "the dissolution of the category of 'the social'" (Rabinow 1996a, p. 99) and defining it even further, insofar as data are obtained mainly via measurements of vital parameters. However, in vital normalism datafication not only emanates primarily from the subjects, but also tends to become their own responsibility. In the end, the subjects are not only enabled to localize themselves within the curves of normality, they may very well become obliged to do so. Since vital normalism data are mainly data on life that are obtained through various digital devices, the task of comparing oneself with generalized others of normality can be placed in the hands of the subjects themselves and is decreasingly depending on the authority of professionals (i.e., doctors, teachers, fitness coaches). This change implies a certain logic of growth of the biosocial. Life can no longer be imagined as something independent or 'natural', for it has transformed into an

object of constant intervention. The advent and proliferation of mobile devices fortifies vital normalism's idea that life is not something to be discovered, but rather something to be seized and optimized. On a similar note, "nature will be known and remade through technique and will finally become artificial" (Rabinow 1996a, p. 99). Whereas the first proliferation of the artificial around 1900 caused a discovery (at first glance paradoxically) of the idiosyncratic forms of life, the idea of its formability nowadays "almost offers an 'invitation' to artificiality" (ibid., p. 108). *Lifelogging* is part of this movement for which life is not artificial by nature but naturally artificial. Given this development, the rebirth of vitalism, the occasional demands for a "vital-turn" and the recent renaissance of Tarde, Bergson, and others become understandable. In contrast to the culturally dominant notion of life around 1900, articulated as a strict antipode to the artificial, they offer an alternative that proves to be highly topical given the current interlacing of the biological and the artificial, life and technology.

However, at least one crucial question remains: How can we account for the widespread desire for recursive datafication of life and where does it come from? According to Link, in addition to the difference between normal and abnormal, the constitution of subjects is associated with a characteristic fear of normalistic societies: the fear of denormalization. In this regard, "the (often secretly and silently asked) question 'Am I still normal?' became the question of fate in the past two centuries" (Link 2004a, p. 27), with the consequence that "the fear of denormalization establishes the average with an overwhelming power of attraction and the margins of abnormality with the power of repulsion." (Link 2004c, p. 42) In the light of the current increasing demand to account for one's own localization within the various fields and curves of normality, this fear should even gain more importance. Within *lifelogging*, it seems to have merged with digital culture's basic anxiety of invisibility, since being invisible has become nearly synonymous with social exclusion (cf. Schroer 2013). Hence, the interplay of the practices of *lifelogging* with the various technologies of normalization functions as an assurance for the subjects and provides them with the necessary means to take this matter into their own hands. Within the context of this development, permanent active and passive observation as well as its documentation "become democratized and omnipresent" (Schroer 2010, p. 416). So wondering "if you're alive? If you're reading this, you probably are (…) but you can never be too sure!"[19]

In the end, maybe *lifelogging* is just about trapping and holding the ongoing process of reference—momentarily. Now, every data, no matter how irrelevant and

19 https://ting.com/blog/app-of-the-week-runtastic-heart-rate/. Accessed 10 July 2015. (emphasis in original).

marginal, can be an event for change, pushing movements in a certain direction and yielding data at the same time and so on. This digitalized process of life (re-) assembles itself with each and every log, constantly and precariously. However, the question is: Who is moving whom? Does life move data or does data move life? If the former statement is the case, digital forms of life might actually be as ambiguous and gracious as Tarde assumed. If the latter is the case, they might rather be as monotonous as an ECG, precisely reproducing the rashes and their in-betweens and always preparing to interfere if a deviation occurs.

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Lifelogging

A Project of Liberation or a Source of Reification

Peter Schulz

1 Introduction

In *Reification and the Consciousness of the Proletariat* Georg Lukács describes the division of humans into quantifiable and rationable characteristics. Published 90 years ago, this description now corresponds to reality in a confusing way. *Lifelogging* technologies and practices seem to realize all aspects of the Quantified Self (*QS*): the division of human personality, their calculation and finally the optimization of human behavior. It may be astonishing to read their felicitous description in an old and assumedly obsolete text:

> "With the modem 'psychological' analysis of the work-process (in Taylorism) this rational mechanisation extends right into the worker's 'soul' : even his psychological attributes are separated from his total personality and placed in opposition to it so as to facilitate their integration into specialised rational systems and their reduction to statistically viable concepts.
> We are concerned above all with the *principle* at work here: the principle of rationalisation based on what is and *can be calculated*. […] Rationalisation in the sense of being able to predict with ever greater precision all the results to be achieved is only to be acquired by the exact breakdown of every complex into its elements and by the study of the special laws governing production." (Lukács 1971, p. 88)

The contemporary reality of *QS* questions the diagnosis of reification in two additional ways: People practice *QS* voluntary and by themselves. In this manner, *QS*

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seems to be an opportunity for liberation for its apologists: "If you want to replace the vagaries of intuition with something more reliable, you first need to gather data. Once you know the facts, you can live by them." (Wolf 2010) The orientation towards gathered data is supposed to increase the possibility of realizing one's will. The second question is in regards to the area of reification: Lukács describes primary wage labor and the reification of workers. *Lifelogging* practices generally take place in leisure time.[1]

This article takes these questions and discusses if and to what extent *lifelogging* practices can be understood as reification. If they can be understood as reification, there are a series of questions that need to be asked: What is the relationship between reification in wage labor and in leisure time? What is the new aspect of reification in *lifelogging* practices compared to Lukács general diagnosis of reification? Why and how does reification take place in modern leisure time? Finally, have *QS* followers mistaken *lifelogging* practices for a path to liberation and autonomy?[2]

In order to answer these questions, this article is split into five substantial parts: First, I will briefly outline the perspective of the *QS* movement, which sees *QS* as liberation, and the criticism of *lifelogging* as alienation (2) and explain Lukács' concept of reification and Habermas' and Honneth's critique (3). Subsequently, I will introduce my own critique of reification with critical reference to Habermas and Honneth based on the understanding of capitalist society as a society of separation (4). From there I will illustrate how reification moved into the sphere of leisure time in late capitalism (5). Finally, I will examine *lifelogging* practices as alienated coping techniques that react to generalized reification (6).

2 Lifelogging as a project of liberation or alienation

The basis of speeches or articles by intellectuals from the *QS*-movement about *lifelogging* practices is the concept of the constitutively insufficient man. In the *QS* key article, *The Data-Driven Life,* Gary Wolf points out: "We make errors of fact and errors of judgment. We have blind spots in our field of vision and gaps in our stream of attention. Sometimes we can't even answer the simplest questions"

1 Even though *lifelogging* technologies and practices are also implemented in industrial production and logistics. In Germany, it is known under the term *Industrie 4.0* and in the USA under the term *Cyber-physical systems*.

2 cf. the article *Effects of Quantified Self beyond Self-optimization* by Stefan Meißner in this anthology.

(Wolf 2010). Our sensorium as well as our memory are not enough to make well-thought-out decisions. As long as we are limited to decisions based on intuition, we cannot speak of full autonomy because we cannot see the implications of our actions. Wolf takes his stand against this natural heteronomy of man by advocating for a technical project of enlightenment. The measurement and computerized evaluation of human behavior scans the initially opaque self and makes it accessible to the individual. "The goal is […] to discover something about yourself" (Wolf 2010) or, as Stefan Selke appositely expresses: "The point of *Lifelogging* is to recognize the hidden core of the self by questioning the oracle of data." (Selke 2014, p. 63, transl. by P.S.)

Therefore, the project of liberation is ambivalent. On the one hand, Wolf claims that the pursuit of overcoming defects is part of human nature. "It's natural that we would want to reclaim some sort of power" (Wolf 2010). It is in this way that *lifelogging* practices appear to be an extension of human nature itself, as they inevitably follow its natural defects. In the end they are an evolutionary step on the path to overcoming one's defects and humanity. On the other hand, Wolf underlines that "[t]he goal isn't to figure out something about human beings generally" (Wolf 2010) but about the individual. The focus of the project of enlightenment is the individual; the self is a project of individual liberation. The two sides of *QS* as a project of enlightenment do not conflict with each other, but rather show the anthropological core of its concept of liberation: humans have the capacity to realize their individual nature by technologically mastering it. Technological mastery through measurement and calculation aids the consciousness by ruling the subconsciousness as well as the unconscious social and allows one to live a reasonable life.

Thus, the *QS*-movement understands *lifelogging* practices as a project of liberation, there is a dominant contrary perspective beyond the *QS*-movement. Critics consider *lifelogging* practices to be a problematic and unnatural intervention instead of the realization of human nature. By replacing a qualitative reception of the self with technically mediated access to several quantifiable parts and their sum, the self is simulated rather than identified. I refer to Stefan Selke for the German-speaking discussion on *QS*. He sees humans as "alienated" (Selke 2014, p. 266, transl. by P.S.) by *lifelogging*, an alienation that corresponds with "self-reification" (Selke 2014, p. 274, transl. by P.S.). The root of this alienation is the loss of a "holistic view" (Selke 2014, p. 214, transl. by P.S.) and thereby the loss of actual self-recognition. The source of this reification is quantification, which Wolf (2010) also names as central for *lifelogging* practices. Participants in an experiment with *lifelogging* cameras at the Furtwangen University feel "like a tool" (quoted in Selke 2014, p. 292, transl. by P.S.) through the quantification. This feeling results from

the orientation of their own behavior along externally opposing, technically mediated benchmarks. Journalist Enno Park describes the attitude towards oneself that *lifelogging* practices suggest as an attitude of a "controller in accounting" (Park 2014, transl. by P.S.); "we observe numerical values and counteract them if they get out of control." (Park 2014, transl. by P.S.) Likewise, Jennifer R. Whitson describes this economic stance on the self in terms of quantification: "This quantification becomes enrolled in a Taylorism of everyday life" (Whitson 2013, p. 170).

The summarized diagnosis of *lifelogging* practices in general and particularly of the quantification of several quantifiable parts of human life is that they lead to an economic perception of the self. This economic stance reduces the human to reificated objects of quantification; hence humans lose sight of themselves as subjects. This reification alienates humans from their normal ways of self-recognition in particular, and from their lives in general.

Thereby, alienation and reification both refer to anthropological assumptions, which is why alienation and reification are nearly forsaken by the humanities; they believe in the ideal essence of human nature or at least an ideal way of life—as Hartmut Rosa (2009, p. 120) puts it, who defends the concept of alienation. Rahel Jaeggi, who initiated a new discussion on alienation in the German speaking humanities with her book *Entfremdung* in 2005, similarly states that she cannot follow up "the tradition of theories that are associated with the concept of alienation" without reservations (Jaeggi 2014, p. xx). She also expounds the problem of the concept of alienation with its implicitly included claim of an ideal life.

In contrast, reification entails a comparatively weak anthropology. It merely points out that humans are not things and that both classes of entities require their own treatment; although the concept of reification includes potentially problematic normativity (cf. Honneth 2005, p. 16f.). The concept of reification focuses on the practices of a transformative process rather than on the question of an ideal life. Therefore, it is more suitable for answering the question of alienation in *lifelogging* practices by observing the practice itself and its societal embedment instead of taking an anthropological stance. Additionally, as introduced by the opening quote above, the concept of reification is based on observations that are close to descriptions of *lifelogging* practices.

3 Diagnosing reification: Lukács, Habermas, Honneth

Diagnosing *lifelogging* practices with the concept of reification is a challenge. The concept is disputed and even the authors that refer to the concept have difficulties determining what reification is. "'Reification' is not a household word" (Pitkin

1987, p. 263) and nevertheless, Lukács' diagnosis is intuitively obvious. His and others' attempts to determine reification are highly disputed and it seems that, on the one hand, the concept of reification is irreplaceable for the sociological diagnosis of time but that, on the other hand, it is questionable whether or not it is theoretically feasible (cf. Jaeggi and Stahl 2011, p. 698).

At the same time, reification is the core of the paradigm of Frankfurt School critical theory (cf. Stahl 2011, p. 735). Hence, this article discusses reification beyond Lukács' diagnosis by reflecting the discussion of reification within the Frankfurt School critical theory. Their criticism of Lukács helps to develop a theoretically feasible concept of reification. Therefore, in this section I will show the critiques brought forth by Jürgen Habermas and Axel Honneth, who are the most influential protagonists of the second and third generation of the Frankfurt School. In the next section, I will discuss Theodor W. Adorno's critique, he being a protagonist of the first generation. All three prominently worked on an update of reification theory (cf. Stahl 2011, p. 736).

To start with, I will have to very briefly introduce the concept of commodity fetishism in Marx's critique of political economy because it is the basis of Lukács diagnosis of reification (cf. Jütten 2011a, p. 719; Habermas 1984, p. 357). Marx understands commodity fetishism as a reversal, which individuals execute in exchanges in "those societies in which the capitalist mode of production prevails" (Marx 1952, p. 13). To the participants of the exchange, the value of the commodity appears as preceding requirement for the exchange (cf. Heinrich 2011, p. 207) rather than as a product of social practices, wage labor and the exchange itself; the value appears to be an ontological "objective character" (Marx 1952, p. 31) of the commodity. This reversal of the relationship between commodity and practice continues within Marx's theory on a sequence of other fetishisms (of money, interest, capital and wage). The *Capital* in the interpretation of the Frankfurt School is a critique of a fetishistic consciousness of society, in which individuals encounter "their own social actions […] [in the] form of the action of objects, which rule the producers instead of being ruled by them." (Marx 1952, p. 33)

Lukács promotes this interpretation in his essay *Reification and the Consciousness of the Proletariat*. For Lukács, commodity fetishism is the key to "the central, structural problem of capitalist society in all its aspects." (Lukács 1971, p. 83) Following this assumption, he uses the term reification to analyze those reversals that are a result of commodity fetishism in wage labor.

According to Lukács, reification is "this self-objectification, this transformation of a human function into a commodity" (Lukács 1971, p. 92) in wage labor and at last in life as a whole. The individuals who own their own labor power identify themselves with it and treat themselves like a commodity. Marx identifies the

objectivation of social relations in the commodity; Lukács also understands this objectiviation as subjectively executed reification of these social relations. The individuals not only become objects of the social process, they consider themselves to be objects.

The subjective reification disregards particular qualities of the individual in the same way as the abstraction in exchange disregards particular qualities of the commodities to their common, solely quantitatively expressible value. The quantification that accompanies the de-qualification of things and individuals go along with calculability (cf. Lukács 1971, p. 87f.). Lukács exposes some results of this quantification: It divides the self into several quantifiable parts that shall be optimized. This "fragmentation of its subject" leads to individuals that no longer appear as an entity but rather as separate functions and "is a mechanical part incorporated into a mechanical system […] and he has to conform to its laws whether he likes it or not." (Lukács 1971, p. 89) Instead of humans, capabilities that can be quantified and optimized appear as calculated components of the work process that have no qualitative difference to machines. Humans as entities show themselves only as a source of errors and become passive spectators of their own division (cf. Lukács 1971, p. 87f.). The individuals experience their own social reality as divided and quantified in such a manner that it retraces this reality in the same way commodity fetishism does. This perception of itself is no simple deception, but rather "the reification is not only false consciousness but reality because commodities are actually alienated from man" as Adorno said (1962, quoted in Backhaus 2011, p. 508, transl. by P.S.). This consciousness is initially a phenomenon of wage labor (not reduced by Lukács to factory work but rather used in a broader sense, including, for instance, journalists) yet it expands together with the "principle of rational mechanization and calculability [and] must embrace every aspect of life." (Lukács 1971, p. 91)

Lukács himself does not give reasons for this expansion. I will come back to this issue in chapter 5.

Frankfurt School critical theory does not discuss rationalization, quantification, the division of the self and other symptoms of reification that are implicitly or explicitly assumed, but rather the cause of reification and its normative status. Both Habermas and Honneth criticize Lukács' diagnosis in a relevant way and offer conceptions of reification that focus on other social relations besides wage labor. Therefore, they are more suitable for understanding leisure time phenomena.

As mentioned, Habermas sees his theory of communicative action as a reformulation of the theory of reification (cf. Jütten 2011b, p. 701). He describes the concept of reification as intuitively understandable and superficially convincing. His critique of Lukács focuses on the equalization of rationalization and reification

that he sees in Lukács' concept (cf. Habermas 1984, p. 360). According to Habermas, this equalization leads to a concept of totalization, which cannot distinguish between reasonable rationalization and their antithesis of unreasonable reification. Habermas counters this concept of totalization with a concept of colonization (cf. Jütten 2011b, p. 706f.). The rationalization of the System encroach upon the daily practices of the "lifeworld and destroy the ethical order [Sittlichkeit] of communicatively established intersubjectivity" (Habermas 1984, p. 358). Habermas established the opposition between System and lifeworld with his assumption that human actions cannot be reduced to neither labor (in the sense of interaction with nature) nor to interaction with other subjects; a "reduction of interaction to labor or derivation of labor from interaction is not possible." (Habermas 1974, p. 159) Within labor, rationalization and thus reification are not a problem. Insofar, reification that does not overlap with the lifeworld is not an object of criticism. In this way, Habermas explains that "the commodification of labour has been normalized to such an extent that it does no longer give rise to reification effects." (Jütten 2011b, p. 709) This end of reification in wage labor equates to the central position of wage labor and therefore Habermas states that Marx's and Lukács' theories are obsolete. Building on Marx's thoughts on general intellect within the *Grundrisse,* Habermas diagnoses that "[t]hus technology and science become a leading productive force, rendering inoperative the conditions for Marx's labor theory of value." (Habermas 1987, p. 104) In consequence, instead of wage labor, science and technology bring the risk of the colonization of the lifeworld.

Axel Honneth's theory on reification goes against that of Lukács and Habermas. He accuses both of having an insufficient normative basis for their critique. According to Honneth, Lukács bases his critique on "a term of correct human practice" (Honneth 2005, p. 25, transl. by P.S.) without illustrating it. He is only able to judge the quantified division of individuals upon this basis. On the contrary, Habermas develops his critique not on a normative but rather on a functional basis; colonization throws the lifeworld into a crisis, which suggests a normative valuation of this crisis (cf. Jütten 2011b, p. 711). Together with Habermas, Honneth criticizes Lukács for his rejection of rational reification. They claim that successful socialization demands a certain degree of reification and therefore there are identifiable social domains in which reification is necessary and preferable (cf. Honneth 2008, p. 29).

Furthermore, Habermas criticizes Lukács' diagnosis of total reification in commodity exchange. In contrast, Honneth states that "the person with whom we interact in the process of economic exchange are normally present to us, at least legally" (Honneth 2008, p. 75). This judicial recognition is Honneth's key safeguard against reification, despite the fact that Lukács himself criticizes exactly this

legal form as an expression of reification (cf. Lukács 1971, p. 182ff.). In contrast, Honneth combines his concept of reification with his theory of recognition and identifies reification as the opposite of recognition. The one who is not recognized as a person is reified. Honneth understands non-recognition as forgetfulness of recognition (cf. Honneth 2008, p. 64) because recognition is the necessary precondition of the perception of and interaction with other beings. In consequence, Honneth represents a variation of colonization theory in which "[w]herever practices of pure observation, assessment, and calculation toward the lifeworld escape the established framework of legal relations and become independent, the kind of ignorance of antecendent recognition arises that we have described as the core of all intersubjective reification." (Honneth 2008, p. 80) The juridified relations of wage labor that exist at least in the Global North are no longer a subject of critique and Honneth's critique of reification is no longer a critique of capitalism (cf. Chari 2010, p. 593f.).

4 Separation as basis for reification: Adorno

On the one hand, the common ground of both critiques is their point in social theory that not all reification is to be refused but that it is even preferable and that critics must therefore distinguish between preferable reification and irrational reification. On the other hand, there is the argument in the diagnosis of current society that wage labor is now normalized and juridified to an extent, which reduces reification to its necessary degree. The first issue fundamentally misses Lukács' theory; therefore, the second loses its significance. Like the differentiation of objectification and alienation within the theory of early Marx (1992, p. 324), Lukács understands reification not simply as objectification of human relations but rather this specific form of objectification that masks its nature as relation itself (cf. Lukács 1971, p. 83; Henning 2012, p. 260f.). On this basis, Lukács analyzes the appearance of objectification as reification in capitalism and tries to explain this appearance with the commodity form of the objectified entity. Habermas and Honneth both ignore this centrality of the commodity form in reification and therefore their critique misses the point: Neither normalization nor juridification of wage labor suspends its existence as a commodity.

Habermas' and Honneth's critiques contain legitimate aspects. Lukács only gives allusive reasons for the social totalization of reification and he founds reification on the normative basis of an ideal practice (cf. Fechner 2012, p. 226ff). Lukács understands reification as an encroachment upon humans, which are fragmented, dequalified and so on. The problem with these critiques is that they apply to Haber-

mas and Honneth themselves. Both understand reification as the encroachment upon an existing, normatively valuable social practice that leads to a pathological form: colonization. The criticism of reification in *lifelogging* practices, for example by Selke (2014, p. 70), uses the same vocabulary.

Adorno criticized this concept, which I refer to as encroachment theory, in his reception of Lukács' reification theory. In contrast, he presents a diagnosis of reification that understands reification as a result of social separations on which capitalism is based. Contrary to the concepts of Lukács[3], Habermas and Honneth, this diagnosis, as I will argue, helps us to understand why and how Lukács' description of reification applies to contemporary reality and what the relation between *lifelogging* practices and reification is.

Adorno develops his theory of reification out of a critique of Lukács' concept, but he uses Lukács' initial point to explain reification from commodity fetishism in capitalist societies. Adorno's criticism is two-fold: Firstly, he sees idealism at work in Lukács' concept of reification because the perspective of an ideal practice that Lukács introduced formulates a subject independent of its object. Secondly, Adorno accuses Lukács of romanticizing pre-modern societies because Lukács considers them to be unreificated and thereby uncritical (cf. Hall 2012, p. 304f.). Adorno reconsiders the relation between subject and object under the term of "priority of the object" contrary to this abbreviated criticism of reification (cf. Quadflieg 2011, p. 705). Adorno's considerations focus on the mediation between the subject and object. In broader terms, mediation means that a perceived and definite object contains its perception and defining subject and that a subject needs to be mediated through its corporeality, which points to its "dependence on the species" (Adorno 1982, p. 504) as a vital necessity. In the separation of both, "the subject reduces [the object] to its own measure; the subject swallows the object, forgetting how much it is an object itself" (Adorno 1982, p. 498) and simultaneously represses the subjective process of constitution that lies in the object.

This separation is inextricably linked to exchange and commodity form; it misrepresents the mediation and represents both the subject and the object as independent from each other. In exchange, commodities appear as things that are independent from humans and humans appear as subjects who are capable of concluding a contract. These subjects oppose their own desires objectified in the shape of commodities that are excluded if the subjects are not marketable. This

3 Although Lukács hints at this point by stating that "because of the split between subjectivity and objectivity induced in man by the compulsion to objectify himself as a commodity, the situation becomes one that can be made conscious" (Lukács 1971, p. 168), he mistakes the production of subjectivity itself by this separation.

unmediated subject has to be identical with itself in the same way that things have to be identical with itself in the form of commodities. This compulsion of identity represses the objective within the subject as incommensurable (cf. Adorno 1968). The separation of the incommensurable forms the basis for reification, "[i]n an antagonistic society each individual is non-identical with himself, both social and psychological character at once, and, because of the split, maimed from the outset." (Adorno 1968)

A second identification complements this identification of the individual as the subject of exchange that is the focus of Lukács' study: The individual as a commodity bought by wage. Exchange and wage labor identify the individual in two ways, "as subject and as the object of a system of objective compulsions." (Postone 1996, p. 275) It is its own purpose and a purchased instrument for an external purpose at the same time. "Like the commodity, the individual constituted in capitalist society has a dual character." (Postone 1996, p. 164) The individual in the form of the subject puts itself on the market and sells itself to become an object under external command.

The division of the individual in the subject of exchange reflects itself in the societal division "of work and leisure or public and private existence" and "projects it onto the individual lifeform" (Adorno 2003a, p. 159, transl. by P.S.). This division itself is again endangered and nullified by trends. On the one hand, the division of the individual damages it and endangers its entity as an individual because it limits individuality and subjectivity to a fraction of life and thereby transforms it in its core (cf. Adorno 2003b, p. 444). On the other hand, capitalism necessarily incorporates leisure time and private life as a part of its functional interaction even as an enclave. Through this incorporation, they take on their special form (as I will show in part 5) and are "bereft of their qualities which one hoped to preserve." (Adorno 2003b, p. 454, transl. by P.S.)

So reification as Lukács describes it follows the (temporary) selling of human capacities and will in wage labor, which are taken over by external command like an object and are put to work. Unlike the propositions of Lukács, Habermas and Honneth, it is not the encroachment of the logic of things upon the subject which is the origin of reification, but rather the absolute separation of subject and object that is a product of capitalist society. The subject's and object's unambiguous identification with itself is the precondition for reification that cannot arise before subject and object are abstracted from their incommensurate nonidentical and their mediation. Exchange executes this abstraction by equalizing things to commodities without considering their concrete differences and equalizing humans to solvent contractual partners without considering their concrete needs. This separation is the foundation of the reversal of reification.

With this concept of reification, it is possible to close the gap in Lukács' description regarding the totalization of reification and to capture the specific form of reification in late capitalism. This form includes reification in leisure time, i.e., beyond wage labor, and the appearance of reification as self-reification.

5 The Totalization of Reification

I would like to illustrate the development of leisure time as the other side of wage labor time by putting the question of reification into a historical perspective. This will allow me to show the totalization of reification to all other aspects of life. This illustration does not deal with the reproduction of concrete historical processes; therefore, historical contingency, regional and other differences remain invisible.

The key to the totalization of reification is the wage form as time wage. Workers sell specific capacities and their will for a specific amount of time while the other capacities, needs et cetera are excluded. Consequently, they are divided and the separate capacities becomes quantified with the wage and again with the evaluation of work performance. This reification allows the experiencing time and money as convertible into each other. Time as labor time creates value and is, as such, limited (for the workers) and coveted (for the capital). Thus, time gains characteristics of money (cf. Laermann 1988, p. 328f.). According to German sociologist Klaus Laermann, this understanding of time according to the perspective of time shortage leads to a condition in which time "is the only dimension where everyone can play the role of a capitalist in their everyday life." (Laermann 1988, p. 330, transl. by P.S.)

Beginning with the so-called primitive accumulation and the class formation of workers and capitalists, there are antagonistic interests in capitalist production concerning the length of the workday. The establishment of an exchange relation between workers and capitalists and the necessity of measuring the workday generalized linear objective time that was previously limited to the monasteries (cf. Postone 1996, p. 200-215). What followed were struggles regarding the length of the workday (cf. Marx 1952, p. 127ff.), which, along with struggles over the wages, became the central battlefield of organized labor.

In the course of the revolution of relations of production towards industrial production, increasing compression of work time meant an intense temporalization of all work processes and therefore of all production worker activities. This was only possible with the implementation of the measurement of work by mechanical clocks in contrast to the medieval times when the "duration and intensity of daily work changes according to the weather, the amount of work and finally the customs

of the foreman"; in industrial capitalism we can speak of "actual modern time discipline, complex coordination and the implementation of a quantitative concept of time." (Dohrm-van Rossum 1988, p. 112, 117, transl. by P.S.) This implementation already included the workers that used the chronological measurement of work to avoid unpaid labor. The chronological measurement of work and in particular the increasingly common time wage (cf. Marx 1952, p. 267ff.) provided the basis for the internalization of linear time.

The workers experienced their own labor power in this period of capitalism as commodity and thereby as property. They did not understand it as their own capital; they experienced it as part of capital in the work process. They experienced themselves as capital only in an external way; correspondingly, reification was not complete. Within work there was an "identification with the performance standards and temporal structures of the working environment" (Deutschmann 1983, p. 334, transl. by P.S.), but for the totalization of this identification, another factor of contemporary capitalism was needed: leisure time.

The workers' struggles for a limit to the length of the workday, as Marx portrays them in the "struggle for a normal working-day", for example, were the starting point for the emergence of leisure time. They gave the workers the power to dispose of their time beyond their existential reproduction practices. Soon bourgeois cultural associations as well as labor movement organizations were in competition for the regulation of this free time (cf. Tokarski and Schmitz-Scherzer 1985). Workers associations adopted the bourgeois concept of freedom that evolved in capitalism, which highlights the capacity of decision-making. "Thereby they also adopted the bourgeois way of life in leisure time and brought it to workers and craftsmen in the 19th century" (Nahrstedt 1972, p. 263, transl. by P.S.); consequentially, workers used their leisure time accordingly to bourgeois rationality. With that they transferred the comprehension of time as rationalized and valuable to leisure time, and only with "the rise of it maxed the new possibilities of an entirely rationally structured continuum of time." (Nahrstedt 1972, p. 288, transl. by P.S.)

Leisure time was conquered by the time logic of capitalism within its rise as the other side of labor time. "Unintentionally, the socialist and trade-union labor movement transformed the form of 'abstract labor' into 'leisure time' in the spirit of domestication, and practiced behavior in their secondary cultural associations which only required its commercialization." (Kurz 2005, p. 654, transl. by P.S.)

In Western Europe after the end of World War II, following the struggles for the normal working-day and the necessity for time to consume, in late modern mass-consumption capitalism (cf. Nowotny 1990, p. 121) there was an unprecedented division of the day into two opposite parts. The workers transferred the temporal structures of the workday to their leisure time in accordance with the

bourgeoisie concept of freedom. Thanks to time wage and intensification of work, they developed a sense of time shortage (cf. Deutschmann 1983, p. 331) that they applied to their leisure time. Time wage and the securing of intense work proved to the workers the value of their time. Now leisure time was the time they had at their own disposal. Thus leisure time was never an area of freedom, but their free time rather "chains them to the ever-same, the apparatus of production—even when this apparatus is giving them a vacation." (Adorno 2002, p. 28) Therefore, "[f]ree time remains the reflex-action to a production rhythm imposed heteronomous on the subject, compulsively maintained in the weary pauses." (Adorno 2005, p. 175) Leisure time emerged as the continuation of labor by other means.

In their leisure time, workers are not subdued within a specific production regime, but within the capitalist logic of exploitation as such in the form of a "rhythm of leisure time" (Kurz 2005, p. 656, transl. by P.S.). It appears inherently necessary to use leisure time efficiently and in an intersubjectively appropriate way.

The differentiation between needs and capacities transfers to leisure time together with this transfer of the logic of exploitation. Leisure time activities become approved if their application is a rational use of time. The judgment of capacities occurs according to their efficient use of time. The division and quantification of reificiated wage labor transfers itself to self-reification in leisure time in which the workers play the role of their own capitalist.

After the generalization of this social integration of leisure time, stabilized internalization of reification allows the facilitation and pluralization of leisure activities and the blurring of a strict separation between labor and leisure time. Indeed it allows even the "the tendency to sublate [aufheben] the separation between work and non-work" though it means not the dedifferentation but "access to the whole individual lifetime by the capital." (Nies and Sauer 2012, p. 53, transl. by P.S.) Individuals practice efficient self-control over their own use of time and understand it as an investment, which allows the transition to flexible capitalism. Thus, self-reification in leisure time meshes with the requirements of wage labor—and many studies on post-fordistic subjectification describe this process of quantifiable experiences and capacities as "personal capital" (Øian 2004, p. 187), the "entrepreneurial self" (Bröckling 2015), the "entreployee" (cf. Pongratz and Voß 2000) or even as "life-entrepreneur" (Dörre and Haubner 2012, p. 80, transl. by P.S.).

6 Lifelogging as an alienated reaction to reification

Lifelogging practices now merely appear as a digital version of this late modern subjectification. The blurring of a strict separation of labor and leisure time in the form of totalization of labor under the self-control of a post-fordistic subject corresponds to self-reification through *lifelogging* practices, which ensure working capacities—health, aptitude, concentration. Not least because increased precariousness of employment ensures this shift of control to the subject itself. Uncertainty about the prospectively required performance and the resulting precariousness of employment leads to preventively increased performance, which seems to be in the self-interest of the worker. This diagnosis is incomplete in two different ways. Firstly, the demand for self-optimization addresses not only those who practice *lifelogging*, but rather all workers (and the unemployed) by trend and with sectoral differences and is thus mediated through the precariousness of post-fordistic employment. Secondly, and as the illustration of the formation of leisure time shows, self-reification occurs before the separation of labor and leisure time blurs. More precisely, it occurs through the separation of labor and leisure time. To explain the significance of *lifelogging*-practices for this blurring of reifying wage labor and reificated leisure time, I have to come back to the self-interpretation of the *QS*-movement. The answer can be found in the assumption that *lifelogging* practices are a project of liberation from heteronomy.

The relation between wage labor and leisure time in which the worker possesses his own time as does a capitalist equates to the relation of the seemingly unmediated separation between the subject and object. Wage labor reduces workers to an object of the reproduction of capital under external command. After the establishment of leisure time, the same workers have control over their own so-called free time. To an increasing degree, self-reification in leisure time stands vis-à-vis heteronomous reification in wage labor. The blurring of separations in late-capitalism undermines this apparent autonomy. The heteronomous demands of the working world have been extended to life in general, in particular because of the precariousness of employment. At the same time, these demands carve deeply into the subject through the requirement of 'soft skills'.

The argument of this article is that *lifelogging* practices react to this experience of blurred separation and totalization of reification and the associated loss of autonomy. They are an attempt "to reclaim some of this power" (Wolf 2010). The promise that comes along with this reappropriation of reification should, on the one hand, fulfill the requirements of wage labor and exclude its precariousness through technical assistance. On the other hand, it is the promise of sheltering leisure time from the pressure of wage labor and ensuring its qualities. The accusa-

tion that *lifelogging* practices are reification of a new type because of its quantified measurement of one's well-being, for example, ignores the reification of leisure time itself in which one's well-being is equalized with the practice of a specific hobby or the consumption of a cultural-industrial product that are tailored towards its consumers like a TV series. These leisure activities were paradigmatic for Fordism as *lifelogging* practices are an attempt to reappropriate the reificated self. This attempt itself reifies because it follows the rules of capitalism by being one's own capitalist during leisure time.

A critical understanding of *lifelogging*-practices cannot understand reification as the encroachment of the logic of one social domain upon another, but rather understands the separation of social spheres itself as a starting point. This critique of reification is necessarily political because it unsettles seemingly unchangeable social institutions (cf. Jütten 2011a, p. 729). Such a critical understanding of *lifelogging* practices under the concept of reification must take into account these rules of the use of leisure time within capitalist societies, lest it defend one form of reification by criticizing another. Thus, a critique of technology overcomes the false dichotomy of technological optimism and pessimism towards a criticism of the function of technology within specific social relations.

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You are Your Data: Self-Tracking Practices and Concepts of Data

Deborah Lupton

1 Introduction

When an earthquake occurred in the Bay Area, California in the night of August 2014, many people living in the area were monitoring their sleep patterns using a wearable device. The developers of one of these devices, the *Jawbone Up*, released the accumulated data from these users' sleep that night. The data showed that almost all of these people woke up when the earthquake occurred (3.20 am) and took a long time to return to sleep, especially in the areas were the earthquake was the strongest; almost half of those near the epicentre did not return to sleep (Mandel 2014). In the same month *Jawbone* released data that compared sleeping patterns across major cities globally, again drawing on their *Up* users. They showed the average times at which the residents of each city included retired for the night and awoke and compared length of sleep (Tokyo residents were shown to get the least sleep, while residents of the Australian city of Melbourne achieved the most) (Wilt 2014).

While these data are perhaps unsurprising and banal in the insights they offer, they are significant in another way. They represent the use of accumulated data from tens of thousands of people worldwide who are using digital devices to engage in self-monitoring of their everyday routines, behaviours and practices. The reporting of these personal data by *Jawbone* demonstrates not only that people are tracking their sleep using a wearable digital device such as the company's *Up*, but that these personal data may be aggregated and used by developers for their own purposes as part of publicising their product and demonstrating how information

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about an individual's private behaviour (in this case, their sleeping patterns) can be part of gathering insights into populations. This example is representative of broader trends in collecting personal information in digitised forms and the appropriation and commodification of these data as part of the digital knowledge economy.[1]

In this chapter I examine the concepts and uses of data as they are expressed in representations of self-tracking. Data is a keyword in discourses on self-tracking. Most recently and noticeably, detailed quantifiable data have become valorised above other forms of information about one's life, health and wellbeing. I will discuss the valorisation of quantification as a self-tracking data practice, but I also go on to examine alternative data practices with which some people are experimenting as part of self-tracking strategies.

The advent of digital technologies able to assist in the collecting, measuring, computation and display of these data has been vitally important in promoting the cause of self-tracking. While people have been able to monitor and measure aspects of their bodies and selves using non-digital technologies for centuries, mobile digital devices connected to the internet have facilitated the ever more detailed measurement and monitoring of the body and everyday life in real time and the analysis, presentation and sharing of these data. Many forms of data are generated as part of self-tracking. Digital devices are employed to collect numbers on body functions, emotional states, sexual and social encounters, work productivity, physical activities and geo-location, to name just some variables. While much of these data are collected and displayed in quantitative form, several others are qualitative, using words, images and objects to record and display personal details.

When making sense of this cultural phenomenon of self-tracking, it must be sited within other contemporary social and cultural currents related to practices of selfhood, embodiment and data (Lupton 2012, 2013a, 2013b, 2014a, 2014b; Nafus and Sherman 2014; Pantzar and Ruckenstein 2015; Ruckenstein 2014). Self-tracking is not only a technology of the self, but it is also a data practice. Self-tracked data are merely one form of a vast array of methods and strategies related to gathering, interpreting, portraying and acting on data. In an increasingly sensor-based and surveillance society, in which digital data are continually gathered on people as they use digital technologies and move around in space and place, massive datasets are generated. These datasets are having an increasingly important role in shaping policy, commercial dealings, education, social welfare and healthcare, the management of groups and populations and in individuals' personal and everyday

1 cf. the article *Self-Tracking as Knowledge Production: Quantified Self between Prosumption and Citizen Science* by Nils B. Heyen in this anthology.

lives. They have become invested with symbolic and commercial value and status (Andrejevic 2013; Andrejevic and Burdon 2105; Kitchin 2014a, 2014b; Lupton 2015).

Self-tracking may thus be further conceptualised as a data practice that produces data assemblages. A data assemblage is a complex sociotechnical system composed of many actors whose central concern is the production of data (Kitchin 2014a, p. 24). In the case of self-tracking, these data assemblages are configured via systems of thought, forms of knowledge, business or government models, human users, practices, devices and software, and also sometimes by networks of other users and agents other than the self-tracker who seek to make use of the data for their own purposes. Digital self-tracked data, in most cases, are stored in a cloud-based computing system to which the developers of self-tracking tools have access for their own purposes. Once they are digitised, therefore, the array of practices that began as personal and private tend to become inextricably imbricated within the networks of the digital knowledge economy. Some of these data assemblages may be used for personal purposes, particularly if self-tracking technologies are taken up. Many others are out of reach of the individual who generated these data, as they belong to the internet empires, other commercial entities or government organisations.

As social life, social institutions and spaces are increasingly digitally monitored and configured by digital technologies that document and record data, the meanings and uses of these data have become important topics of enquiry. Given the current prevalence of digital data surveillance and monitoring of people by both voluntary and involuntary activities, data practices, data assemblages and data objects have all become phenomena for critical social and cultural investigations. The analysis here presented contributes to a new field of research, *critical data studies*, that seeks to examine the social, political and cultural dimensions of data, particularly as part of the rapidly developing global digital knowledge economy and in the context of sensor society (Dalton and Thatcher 2014; Dumbill 2013; Kitchin 2014b). While critical data studies often focuses on big data, there is also need for a critical approach to 'small' or personal data, the type of information that people collect on themselves. The view that 'data are never raw' (that is, they are always 'cooked' via social, cultural and political frames and practices) (Gitelman and Jackson 2013) is relevant to any form of data, big or small. It should be noted, furthermore, that the boundaries between small and big data are porous. When people self-track using proprietary digital devices and software, when agreeing to the terms and conditions of the developers they often agree to provide their data, which may then be used for purposes by second and third parties that go well beyond the original intentions of the self-trackers (Lupton 2014a). Small data,

therefore, are often implicated in big digital datasets and the data practices that are associated with big data.

2 Representations of quantified self-tracked data

Discussions of digitised self-tracking have often tended to focus on the importance of numbers, or quantifiable data, as key forms of data about the self. *Wired* magazine journalist Gary Wolf, one of the people who first introduced the term 'quantified self' and established the *Quantified Self* (*QS*) website, wrote his first article on the topic for *Wired* that was published in June 2009. It was entitled 'Know thyself: tracking every facet of life, from sleep to mood to pain, 24/7/365' (Wolf 2009). In this initial article, Wolf's first paragraph described some of the numbers he has collected on his own life. These included the time he rose from bed that morning, how often he woke during the night, his heart rate, blood pressure, the time he spent exercising in the past 24 hours, his caffeine and alcohol consumption and his narcissism score. Wolf went on to claim in the article that 'Numbers are making their way into the smallest crevices of our lives' (2009) due to the devices that can now collect such detailed, continuous data on everyday practices, social interactions and bodily functions.

Wolf followed this article with a piece for *The New York Times*, published in 2010, in which he outlined his definition of self-tracking and 'self-knowledge through numbers'. Wolf asserted that: 'If you want to replace the vagaries of intuition with something more reliable, you first need to gather data. Once you know the facts, you can live by them.' He then expounded on the virtues of numbers: 'We tolerate the pathologies of quantification—a dry, abstract, mechanical type of knowledge—because the results are so powerful. Numbering things allows tests, comparisons, experiments. Numbers make problems less resonant emotionally but more tractable intellectually. In science, in business and in the more reasonable sectors of government, numbers have won fair and square' (Wolf 2010).

Wired magazine has played a major role in introducing concepts of digitised self-quantification to its readership. In the same issue as Wolf's 2009 piece, *Wired* published four other articles on quantified self-tracking, each focusing on a specific area: running, exercise in general, health and nutrition. One of these was entitled 'The Nike experiment: how the shoe giant unleashed the power of personal metrics' (McClusky 2009). The article outlined the experiences of people who were using what was then a new technology: the wearable sensor device and associated platform for monitoring physical activity *Nike+*. One woman interviewed for the article described herself as a 'stat whore', who finds these quantified data highly

motivating. 'She attributes much of her newfound fitness to the power of data […] "I can log into Nike+ and see what I've done over the past year," she says. "That's really powerful for me (…) I don't have to question what I've done. The data is right there in white and green"' (McClusky 2009).

According to the author, digital quantified self-tracking using devices such as *Nike+* offer a means of generating data that shed light on the workings of the body and the self. The body/self is portrayed as a conglomerate of quantifiable data that can be revealed using digital devices: 'We tend to think of our physical selves as a system that's simply too complex to comprehend. But what we've learned from companies like *Google* is that if you can collect enough data, there's no need for a grand theory to explain a phenomenon. You can observe it all through the numbers. Everything is data. You are your data, and once you understand that data, you can act on it' (McClusky 2009).

It can be discerned, therefore, that from the beginning the representation of data in *QS*-tracking discourses (as least as it was expressed by its progenitors) included several factors. These include the notions that quantified data are powerful entities; it is important not only to collect quantified data on oneself, but to analyse these data for the patterns and insights they reveal; data (and particularly quantified or quantifiable data) are an avenue to self-knowledge; the emergence of new digital and mobile devices for gathering information about oneself have facilitated self-tracking and the generation of quantified personal data; quantifiable data are more neutral, reliable, intellectual and objective than qualitative data, which are intuitive, emotional and subjective; self-tracked data can provide greater insights than the information that a person receives from their senses, revealing previously hidden patterns or correlations; self-tracked data can be motivational phenomena, inspiring action, by entering into a feedback loop; everything can be rendered as data; and data about individuals are emblematic of their true selves.

Discourses on the 'quantified self 'since these early definitions have continued to articulate these data concepts. The term 'quantified self' has spread into many popular uses. As I found in an analysis of global English-language news reports published from the beginning of 2009 to late 2013, the 'quantified self' as a term to denote self-tracking using digital technologies has been employed with increasing frequency since its first mention. The authors of many news reports and blogs have taken up and reproduced the concepts of data that are outlined above (Lupton 2013b). In recent years, however, there is evidence of a growing cynicism in some popular outlets concerning the value of the data that are gained from quantifying the self. As expressed in an article for *The Huffington Post*, it can be difficult to discern the meaning and value of one's data. The author further notes that simply 'knowing your number' may not be enough to change a person's

behaviour: 'We can visualize the data we collect from countless gadgets, but will we understand what the data means? Even if you know your retirement "number" does that knowledge empower you or unnerve you? How does the data vary under a variety of conditions and factors? For example, does a rapid heart rate indicate an underlying disease or did you forget that before you downloaded the data you ran up the stairs to access the web as fast as you could to use that new supercool health visualization app?' (Coughlin 2014).

From this perspective, *numbers* alone tell us nothing. It is the *contexts* in which numbers (or any other forms of data about the self) are created that are important. As two designers put it: 'context humanizes the numbers and places them back into our lives in meaningful ways. For example, a fitness tracker can tell us that our physical activity is down from the previous month. But it cannot tell us that the inactivity is due to a sprained ankle.[2] Given that context, those declining numbers might tell a different story: that we are recovering steadily rather than slacking off. Even in that simple scenario, it is clear that a small bit of context can frame data in a much more insightful way' (Boam and Webb 2014).

The issues of data security and privacy in relation to the personal data on bodies and selves that self-tracking devices generate have also occasioned concern recently. In the wake of the classified documents that have been released by Edward Snowden since mid-2013, further concerns have been expressed about the uses to which people's self-tracked data are being put by national security agencies and commercial entities. An article in *Forbes* magazine published online in July 2014 examined these issues (Magid 2014). The article refers to a new market research report that found that there were numerous data security risks associated with a large number of self-tracking apps and devices that were examined, meaning that the personal data that were uploaded to these technologies could easily be accessed by others and on-sold to third parties for commercial gain.

The uses of personal data to discriminate against individuals have also been noted in the popular media. The author of one blog, entitled 'You are your data: the scary future of the quantified self', points out that people being denied access to employment, credit or insurance when their personal data are accessed by agencies such as insurance companies, the tax office, potential employers and credit agencies. The author argues that when personal data become the major form of assessing individuals' employability, health or credit status, the notion that 'you

2 cf. the article *Capturing the Ordinary: Imagining the User in Designing Automatic Photographic Lifelogging Technologies* by Vaike Fors, Martin Berg and Sarah Pink in this anthology.

are your data' becomes reductive of the complexities of people's lives, failing to incorporate other important factors (Carney 2013).

Drawing from these discussions, it is evident that a further set of concepts about self-tracked data have emerged since the original euphoria of the early accounts of quantified self-tracking. They include the following: the meaning of self-tracked data can be difficult to interpret; personal data can be disempowering as well as empowering; the conditions in which data are gathered can influence their validity; the contexts in which data are generated are vital to understanding their meaning; individuals' personal data are not necessarily secure or private; quantified personal data can be reductive; and personal data can be used to discriminate against individuals.

3 Self-tracking data practices and interpretations of data

Dominant discourses on big digital data tend to represent these data as generated almost in the absence of human intervention (Boyd and Crawford 2012; Helles and Jensen 2013). In contrast, the personal data produced by quantified selfers are viewed as human-made, wrought from the personalised decisions and individual objectives of the people who gather the data. Unlike the 'passive' forms of personal data collection that are characteristic of many other forms of transactional user engagement with online technologies, self-tracking is often portrayed as an 'active' and purposeful data practice. In most cases people voluntarily take up self-tracking to achieve certain personal objects (although it is increasingly the case that in some contexts, people are now being persuaded or even coerced into self-tracking by other actors and agencies (Lupton 2014a)).

Not only do self-trackers make choices about what data about themselves are important to collect, they make sense of and use data in highly specific and acculturated ways. They seek to make connections between diverse sets of data: how diet, meditation or caffeine affect one's concentration, for example, or how one's mood is influenced by exercise, sleep patterns or geographical location, or the specific interactions of all of these variables. As part of these processes, self-trackers interpret 'the numbers' they produce on themselves in certain ways based on how they want the numbers to represent them or underlying assumptions about what they mean. In interpreting their data, self-trackers often negotiate the meanings of what the haptic sensations of their bodies tell them about themselves and what other forms of data reveal. No form of information, whether derived from one's senses or from digital devices, is necessarily taken as authoritative. The skills of

interpretation that are part of reflexive self-monitoring are employed in evaluating which data to trust, which to take note of (Nafus and Sherman 2014).

The concept of change is central to the process of self-tracking. Data assemblages are constantly open to reconfiguration and hence re-interpretation. Digital data are continually being generated when people interact with online technologies. Data assemblages, therefore, are lively digital objects: mutable, dynamic, responsive to new inputs and interpretations (Lupton 2014a, 2015). Data assemblages representing aspects of the body and self are re-enacted and reconfigured. The data practices that are associated with self-tracking can be viewed as practices of selfhood for those who take them up. These practices involve not only gathering detailed knowledge about oneself in order to act on this knowledge, but also identifying as a self-tracker.

An important dimension of data practices related to self-tracking is the emphasis on self-improvement and achieving one's 'best self' that has been dominant in western cultures for some time. As many posts on websites related to self-tracking or life-logging demonstrate, effecting or maintaining behaviour change is a key motivation for engaging in these practices. Research studies of self-trackers have also identified this motivation as important (Li et al. 2011; Nafus and Sherman 2014; Ruckenstein 2014). Recording enough data over a long-enough time period to identify trends and patterns in the data is part of this endeavour (Li et al. 2011).

While the data in themselves are important aspects of self-tracking, it should also be recognised that self-tracking is a data practice that transcends the types of information that are collected and interpreted. Self-tracking data practices can be understood as self-narratives and as performative of selfhood. Some commentators seek to position the 'qualified self' as a practice involving reflection and interpretation of information, whether this information is in the form of numbers or not (Boam and Webb 2014; Davis 2013). As Davis (2013) contends: 'Self-quantifiers don't just use data to learn about themselves, but rather, use data to construct the stories that they tell themselves about themselves.' She goes on to argue that: 'Tracking mood, for example, is rooted in a value for particular kinds of moods over others (typically, the preference for happiness over melancholy). Tracking physical activity is rooted in a value of a thin body over a large one. If the goal of a self-quantifier is to construct an improved future-self, one must determine who they want that self to be. What is the story that they hope to tell about themselves?' (Davis 2013).

Davis refers to the 'stories that [self-trackers] tell about themselves', but self-tracking is also about the stories that people tell others, or the types of selves that are presented to others. The qualified self involves interpretation and assessment of any form of data, a reflexive engagement with this information that seeks

to contextualise it in relation to other forms of data. The practice of self-tracking can therefore be regarded as a way of thinking through as well as with information, working to make connections between one kind or source of information and others. Indeed selfhood and identity as it is articulated via self-tracking is inextricably entangled with reflexivity—or the 'understanding of data about the self'.

The gathering and use of quantifiable data in self-tracking practices that are undertaken voluntarily might be considered a form of personal Taylorism, or what Costea (et al. 2008, p. 674) refer to as 'the systematic governance of subjectivity'. Auditing the self by engaging in self-inspection and reflection is integral to this mode of subjectivity. The discourses of therapy are also central to the self-tracking subject in which 'the self' is the focus and close scrutiny is important to therapeutic interventions (Costea et al. 2008). As part of the quest to optimise one's life, or even simply to create some order in what might be experienced as a chaotic, out-of-control existence, the principles of self-tracking appear to offer some degree of certainty and self-management. Where once the therapeutic process may have involved the appraisal of expert others as part of achieving self-scrutiny and self-knowledge, of revealing the hidden, the advent of digital devices that can engage in external monitoring and observations of selfhood involves another kind of expert intervention: that of digital data. Personal Taylorism offers one route (again among many) by which a degree of knowledge about one's life that can inform future actions can be achieved. Complexity can be reduced to numbers and therefore simplified, rendering knowledge manageable.

4 Data practices and control

Producing and acting on these data, therefore, is not just about improvement; it is also a form of achieving certainty or maintaining the status quo before it deteriorates even further in the face of competing demands.[3] This raises the issue of using self-tracked data in the attempt to exert control over complexity or uncertainty. People have long sought to use information about themselves to improve their lives and deal with fear and anxiety that are generated by falling victim to illness and disease. The lure of producing numbers about one's body has been evident for some time in medicine and healthcare as a means of taking control over what is considered a chaotic experience (Andersen and Whyte 2014). Gathering and interpreting information about oneself as a means of exerting control is important in

3 cf. the article *Effects of Quantified Self beyond Self-optimization* by Stefan Meißner in this anthology.

self-tracking data practices. Part of engaging in data collection is the idea that the self-knowledge that will eventuate will allow self-trackers to exert greater control over their destinies by managing the complexities of their bodies and lives.

In research studies and as articulated in self-trackers' own accounts in blog posts or in the show-and-tell presentations that self-trackers use to describe how they track and what they gain from it (a common form of knowledge dissemination on the *QS* website), people commonly talk about achieving control over their lives, particularly those elements that previously seemed chaotic or challenging: their chronic or acute illness, body weight, stress, sleeping problems, moods, relationships, medical treatments, physical fitness, hormonal fluctuations, reproductive cycles, work productivity and so on. Some self-trackers find that sharing their data with others, whether these are thousands of people on Twitter or a small group of intimate others, helps their relationships and garners support for the changes they are attempting to make. The data that they generate from self-tracking can be a powerful motivating force if they are seeking to engage in behavioural change. The act of tracking in itself can achieve this effect. This experience is recounted by Rebecca Hogue, a woman recovering from breast cancer, on her blog. She notes that: 'Sometimes just collecting the data itself acts as motivation for positive behaviour. For example, by tracking how much I walk, I can set goals to walk a little further each day' (Hogue 2014).

The anonymous author of the blog *The Unquantified Self* writes about monitoring and measuring aspects of life to gain control when she is feeling under particular stress and life appears to have moved out of control. She describes how she became 'a card-carrying member of the *Quantified Self* movement', using self-tracking devices and apps to document her life in ever-finer detail. Her blog outlines the reasons why she decided to attempt to give up self-tracking, including wasting too much time on the practices, becoming too judgemental of others and of herself, including inciting guilt and self-recrimination, and discovering that her data simply revealed the 'bleeding obvious'. She found it difficult when pressures became intense again: 'I just had to start tracking and counting steps again. I know it's crazy and makes no sense. Just that feeling that my life could go out of control made me reach for the comfort of my numbers' (Anonymous 2014).

The continuous and complex nature of digital data flows, however, can inspire feelings of loss of control and lead to anxiety and frustration. The digital data economy involves the circulation of lively digital data across and between sites, platforms and devices. The liveliness of these data has led to representations that portray them as difficult to manage and control. Popular discourses commonly represent big data as both offering much in terms of potential insights but also as like a natural phenomenon such as a flood or tsunami in terms of their over-

whelming force and volume (Lupton 2015; Lyon 2014). These portrayals of digital data can also be found in accounts of dealing with self-tracked data. Numerous personal accounts of self-tracking on the *QS* website and other forums describe the annoyances that people harbour in relation to wrestling with their data and attempting to make sense of them. The body is often represented in portrayals of digital self-tracking as a data-emitting machine (Lupton 2013b), a chaotic producer of masses of data that need to be disciplined by monitoring, measuring and management. It is not until the data are recorded and produced into some kind of visual form that they can be interpreted, and then understood and acted upon.

Loss of control may be experienced in relation to the use of one's personal self-tracked data by other actors or agencies. In the light of the appropriation of self-tracking by other actors and agencies for their own purposes and the growing awareness of the ways in which citizens are surveilled by security, government and commercial organisations, there may now be developing the idea that there can be 'too much knowledge', or, as Andrejevic (2013) puts it, the problem of 'info-glut'. At this moment in human history, ordinary citizens are under more detailed dataveillance from other actors and agencies than ever before. Producing one's own knowledge may be viewed as counter to this trend. But the inevitable absorption of one's own personal digital data into the agendas of others makes the distinction between personal, private data and public data very tenuous. Even when a personal objective is to produce as much knowledge about oneself as one can, the danger is that this very detailed knowledge about oneself may be repurposed and misused by others (including hackers), perhaps in ways that are antithetical to personal autonomy and limiting of one's human rights and privileges.

Some self-trackers have become frustrated that others are benefiting from their personal data while they themselves are locked out of making better use of their data. *QS* founder Gary Wolf has also expressed concerns about personal data use and security. He has begun to refer to the concept of 'our data' as a way of articulating the idea that individuals' personal data should be accessible to themselves and protected from unwanted use by others. In a blog post on the *QS* website, Wolf notes that people cannot access their own data when these are owned by developers of the commercial tools that are used for self-tracking: 'Your data, which you may have been collecting for months or years using some app or service that you found affordable, appealing, and useful, will be locked up inside this service and inaccessible to any further questions you want to ask it' (Wolf 2014). In response, Wolf announced that the *QS* organisers had worked to establish a campaign for access to personal data.

As more revelations come to light about the ways in which commercial enterprises are using people's personal data for their own purposes, hacker attacks

on personal data archives and dataveillance by national security organisations,, people are also beginning to express concern about data security and the invasion of privacy (Ackerman 2013; Andrejevic 2014; Crawford and Schultz 2014; Dwoskin 2014; Hartzog and Selinger 2013; Madden 2014; Polonetsky and Tene 2013; Rosenzweig 2012). Legal and internet scholars have pointed out that social disadvantage can be exacerbated by the predictions made by algorithms that determine access to these services (Crawford and Schultz 2014; Polonetsky and Tene 2013). The term 'predictive privacy harm' has been used to denote this phenomenon (Crawford and Schultz 2014). The knowledge that the big data empires appear to have about oneself, much less that information that security organisations or cyber criminals are collecting from the internet, often unsettles people (The Wellcome Trust 2013) and is frequently described as 'creepy' (Tene and Polonetsky 2013). The opportunity to exert greater control over one's data, both in terms of what information is collected and how it is used, appears attractive. However given the pervasive nature of digital monitoring it is impossible to completely escape the dataveillance of government and commercial enterprises or hacking attacks.

5 Human data portraits

An integral aspect of self-tracking for many participants is the opportunity to represent their personal data in various ways and to 'make sense' of the data via such representations.[4] Visuality is very important to this dimension of the data practices of self-tracking. Indeed rendering one's data into a compelling visual form is one way of managing and controlling large data masses. In the 'show-and-tell' ethos of the *QS* movement, for instance, finding compelling visual modes to demonstrate the patterns in one's data is a central feature. By showing their data to others in a visually compelling graphic, self-trackers are achieving both self-knowledge and self-expression. Self-tracking becomes performative, both for the insights that a self-tracker may achieve about her or his life but also in terms of the aesthetics of the data that she or he may be able to curate. The *QS* website is full of demonstrations by members of their personal self-tracked data, including videos of their 'show-and-tell' presentations and still images of their visualisations.

In their analysis of interview data from Finnish people using self-monitoring devices for physical activity and heart rate tracking, Ruckenstein and Pantzar

4 cf. the article *The Emergence of Lifelogging and Thinklogging* by Jim Gemmell in this anthology.

(Pantzar and Ruckenstein 2015; Ruckenstein 2014) note that when the participants were shown the graphs produced of their heart rates, new kinds of affective ties were generated between users and their personal data. They suggest that visual representations of personal data are vital to participants responding to the data with high levels of engagement and interest. When a particular part of the body is being closely monitored and its data visualised and displayed to the owner, this body part becomes invested with new significance. Similarly, the numbers acquire new significance and emotional meaning, because they are measuring elements of one's own body.

In their study Ruckenstein and Pantzar observed that for many of the participants, being able to see from the graphs how many steps they had taken or how their heart rate had responded to exercise or how well they had slept was motivating and pleasurable. The well-rested body, as demonstrated by an undisturbed night's rest evidenced by heart rate data, was viewed as an achievement, an accomplishment of the body, as was the tired body produced from a highly active day. Activities such as housework gained new value because they contributed positively to exercise and heart rate data, while stress-alleviating activities, as demonstrated via the graphs, were also valued for their contribution to rest and recovery (resulting in a lowered heart rate). These embodied feelings were attributed with additional value from the data visualisations that 'proved' and supported these feelings, thus engendering pleasurable emotions such as satisfaction and a sense of accomplishment. The data visualisations were viewed as more credible and accurate by the participants than the 'subjective' assessments of their bodily sensations; indeed they expressed the desire for more data about their bodies to add to those already collected, so as to provide further insights. Several commented that the visualisations revealed aspects of their lives that they may have suspected (such as the stressful nature of their work) but the data served to prove these impressions, while others found that the data demonstrated findings that they did not anticipate (they were more physically active than they thought). A new kind of value was therefore given to some everyday activities and interactions.

When the focus on 'quantifying the self' tends to emphasise digital data, the material nature of information can be ignored or lost. As I noted above, other interpretations and practices of self-tracking do not necessarily seek to enumerate phenomena, and sometimes quantitative data are rendered into data forms that rely on meanings beyond numbers. Many self-trackers record non-quantifiable data as part of their practice, including journaling accounts of their daily activities, emotional states and relationships, collecting audio data or visual images and producing visualisations that centre on their aesthetic, affective or explanatory properties rather than their representation of numbers.

We know from studies of material culture, commodities and the social life of things that objects are always already imbued with social, cultural and political meaning as part of their design, production and marketing. This is only one aspect of their meaning, however. The other is the ways in which objects themselves are transformed by use as they are appropriated into everyday lives (Coole and Frost 2010; Harvey and Knox 2014; Miller 2008). This is relevant not only to the physical objects that people handle as part of their self-tracking practices (pen and paper, diaries, cameras, wearables, smartphones and so on) but also the computer software and platforms that are used as part of digitised self-monitoring and the data themselves that are generated from the use of the technologies. As people use and engage with these objects, the objects themselves become transformed via customisation and personalisation. The personal data that are collected using these devices become a biographical repository of significance and meaning to the user. They are 'my data', and as such, they harbour great personal significance.

Self-tracking devices are biographical and personal in several ways, therefore: they collect and record data about one's life; they archive these data; and they themselves become transformed and personalised, marked by the user's body and behaviours, in unique ways as part of appropriation and domestication. Contemporary self-tracking tools and records are the latter-day versions of the paper diary or journal, photo album, keepsake and memento box or personal dossier. Material objects may be used as a form of monitoring change in one's body, state of mind or social relationships. As Susannah Fox from Pew Research has put it, an old pair of jeans can provide a device by which body weight or size can be monitored: too tight, and you know you have gained weight (Montini 2013). Not only photographs but pencil marks on door jambs have traditionally measured children's growth. Similarly a collection of baby and children's clothes may signify to a parent the growth of their children, while a set of drawings, writings by one's child and their school reports collected over time demonstrates their cognitive development, learning and other achievements.

Personal data can be highly sensory and embodied, produced and interpreted via the senses. Some researchers who are interested in the representation of personal data as part of human-computer interaction have begun to experiment with fabricating bodily data into tangible objects as a way of helping people understanding their own data. For example Khot and colleagues (Khot et al. 2014; Khot et al. 2013) have investigated using 3D printing to produce material artefacts that represent an individual's heart rate during physical exertion, as tracked by a wearable digital device. The idea of such artefacts is to encourage people to achieve greater awareness of their personal bodily data and to engage in self-reflection upon being confronted with the material representation of these data. Khot et al.

argue that as physical activity is a material, embodied practice, material representations of the data related to this activity that can be handled and touched help people in making sense of their data. The design principles followed by the team included the following: the material should not only reflect the aspects of physical activity but also be aesthetically pleasing; users should be able to use them publicly without concern that the objects revealed their personal data that the users may not have wanted to share in a public space; each artefact should be unique; and the artefacts should act as a positive reinforcement for physical activity.

The researchers tested their system, entitled *SweatAtoms*, with six households using five different material manifestations of their physical activity. These artefacts included a 3D graph of heart rate data, a flower shape where the length and width of the petals represent heart rate duration and intensity, a frog shape that changed in size according to the amount of physical activity carried out that day, a die representing the six zones of heart beat data and a ring displaying the number of active hours in a day. The participants were supplied with a digital heart rate monitor, an iPod Touch installed with an app to collect the data and a 3D printer for their homes to print out the artefacts from their data. The researchers found that viewing and handling the objects helped people gain a sense of their bodily data and illustrated different levels of engagement with the data. They conclude from their investigations that '[i]n the future, we envision people crafting their world with moments from their lives, using data that was previously only seen in digital form but now re-entering their physical world in an embodied material form' (Khot et al. 2014, p. 9).

Personal data can even be a collection of bodily effluvia, as denoted in the work of artist Heather Dewey-Hagborg. In her work 'A Day in the Life' (Dewey-Hagborg 2014) she displays the collection of her own body products she has gathered from 24-hour period as hair left in her brush, used tissues and nail clippings. These are used to reflect on the ways in which these body products can be analysed for DNA (by oneself or others) as a form of self-tracking or as a mode of surveillance exerted by others. As Dewey-Hagborg's work suggests, as material objects (used tissues, hairbrushes and so on) become invested over time with the marks of our use, they too can become repositories of information and sources of inspiration for reflection about ourselves and our lives.

6 Conclusion

In this chapter I have examined various forms of data and data practices that are part of contemporary self-tracking cultures. While I have acknowledged the importance of quantitative data to these cultures, there is evidence of alternative ap-

proaches to understanding the self that recognise the deficiencies of numbers and the importance of context, the meanings of personal experience, physical sensations, emotion and material objects in configuring personal data and making sense of these data. We still do not have many insights into the nature of data practices, or the ways in which people who are actively engaging in self-tracking are collecting, interpreting and using their data. More research is needed that can delve more deeply into the meanings and cultures of data practices within self-tracking cultures.

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21st Century Men and the Digital Amalgamation of Life

A Science and Technology Perspective on Lifelogging

Peter Biniok and Ines Hülsmann

Introduction: Lifelogging—Hype and Hope

Currently there is a *lifelogging* hype, fuelled by the ideal of self-measurement, self-sufficiency, and self-enhancement. The hype is accompanied by an increasingly heated debate in which topics such as questions of identity and changing social interactions, ethical and legal aspects about data processes and other associated benefits and risks of digital *lifelogging* practices take centre stage (cf. Allen 2008; O'Hara et al. 2009; Sellen 2010; Jacquemard et al. 2014; Selke 2014a, 2014b).

In this article we take a closer look at images and manifestations of these contemporary lifestyle practices by using an advertising campaign created for the company *Apple* as vantage point. The *iPhone 5s* advertisements illustrate the prevalent 'zeitgeist' of *lifelogging* and act as techno-stories of ideal smartphone use: "You're more powerful than you think. You have the power to create, shape, and share your life. It's right there in your hand. Or bag. Or pocket. It's your iPhone 5s."[1] The advertisement series functions as a show-reel of the various intermin-

1 This was the slogan for the new *Apple iPhone 5s*. After launch of later versions of the *iPhone*, the official company site to showcase the *iPhone 5s* has been permanently moved. Its slogan can still be found via http://mac.softpedia.com/blog/Apple-Kickstarts-New-iPhone-Ad-Campaign-Video-438970.shtml. Accessed 02 Nov 2015.

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gling aspects of society and technology and serves as empirical indication of a present in which moments without technology have become rare and living a life without technology has become unimaginable for most. In effect, these advertisements help in the construction of a conception of people who intensely and steadily use smart technologies in order to improve themselves and their world. The promises of range and quality of usability and the emphasis on instrumental rationality in these advertisements coalesce with a digitally structured lifeworld in which we are attracted to practices that have become technologically feasible and are therefore considered to be a viable option—often without sufficient scrutiny and reflection. The machines, devices and artefacts structure various spheres of our lives and potentially alter the world in which we live, think, act and create. Smartphones in particular have become a platform for applications with which to manage both business and everyday life. Their proliferation have greatly increased the popularity and diversity of *lifelogging* techniques. In our understanding, *lifelogging encompasses all practices that record, process and report data from daily actions and interactions of individuals, groups and their environments*.

In the following, we investigate the field of *lifelogging* from the perspective of *Science and Technology Studies* (STS) (cf. Sismondo 2002; Hackett et al. 2007).[2] STS may contribute to the debates of *lifelogging* by adding a perspective and some insights into the complex issues surrounding the development and use of modern information communication technologies. This field recognises that scientific (including humanities and social sciences), technological (in its material forms and as a discipline) and cultural aspects of highly developed societies are so closely intertwined that their relations must be considered and explicitly studied. Rather than aspiring to find definitive answers, STS researchers pose questions about societal issues and point to political implications of 'techno-scientific' developments (cf. Potthast 2010). Studies of the social construction of technologies for example, offer conceptual frameworks for politicising technological culture by looking at vulnerabilities[3] and (sometimes hidden) meaning-making processes surrounding artefacts and technical systems (cf. Bijker et al. 2014). By ascribing agency to technology, STS approaches analyse furthermore the mutual shaping *of* and being shaped *by* technologies, where it takes place and help assess technologies on

2 'Big Data' is an associated topic that we did not discuss in this paper.

3 Technological societies are inherently vulnerable. Vulnerabilities pertain to the natural, social and technical and pose complex moral problems in the face of unprecedented challenges. Cultures shape developments as they create blindness towards some aspects while highlighting other elements (cf. Bijker 2006, 2012).

these grounds. The field of *lifelogging* in particular asks for a reformulation of human-technology relations and questions conservative conceptions of social action.

We discuss the phenomena of *lifelogging* by means of *three interrelated and co-dependent analytical aspects*: usage of technologies (Section 1), development of technologies (Section 2), and technological trajectories (Section 3). A focus on use and development emphasizes existing behavioural patterns and lifestyles. As developers have ideas about the ideal usage of smartphones or *lifelogging* technologies, their intentions pre-set pathways of action. Not only do companies such as *Apple* cater to perceived needs; developers' ideas often have their origin in certain scientific and technical paradigms. These in turn are shaped by social, cultural and economic factors and cannot be studied as isolated phenomena. Lastly, since technological paradigms are blueprints for the development of a society, it is imperative to ask what these paradigms consist of and where they come from. What do the pathways of action imply and what may be the consequences of adhering to them? On the basis of these questions, we allude to processes during which boundaries are shifted or even lifted ('shifting baselines'). On the one hand, we show how technologies become endowed with more agency and, on the other, how *lifelogging* practices may stimulate narcissistic behaviour and meet a favourable socio-economic climate in which excessive self-modulation and propagation have become normalised (Section 4).

In 2014, the *Apple iPhone 5s* was introduced as constant helper, friendly companion and capable 'butler' that guards the users, remembers preferences and supports aspirations. *Apple* chose the slogan "You're more powerful than you think" to be shown at the end of its four one-minute-films "Powerful", "Strength", "Parenthood" and "Dreams".[4] All of which present pathways to become 'good' 21st century people: active, creative, and happy only through technology. Each film features about ten different everyday situations. All presented activities are supported by smartphone apps and gadgets, whether navigated by one or more people.

Taken together, six *lifelogging-techniques* are identifiable in the advertising campaign: tracking, measurement, analyses, tutorials, enhancement, and control. In "Strength", for example, several young adults with various social, cultural, and ethnic backgrounds and of different age do indoor and outdoor sports while the

4 After the launch of the *iPhone 6* at the end of 2015, the advertisements are no longer available on the *Apple*-webpage, but can still be found on *YouTube* on the *EveryAppleAd*-channel. Accessed 01 Dec 2015: https://www.youtube.com/watch?v=5NNbG8BZbS4 (Powerful), https://www.youtube.com/watch?v=9gE-BYssDPI (Strength), https://www.youtube.com/watch?v=rv9q_61anHk (Parenthood), https://www.youtube.com/watch?v=bwf-6N6CqSc (Dreams).

1961 song "Chicken Fat" accompanies the images.[5] The exercising men and women seem perfectly content with their performance and happy about the progress. Activity tracking is one of the functions shown most often in the video (e.g. *Nike+ Running*[6]). Others are apps that count steps, measure the distance of swimming or weight (e.g. *Misfit Shine*). This is followed by apps that support the analysis of actions and movements. For example, a girl's cartwheel is recorded by a trainer and then evaluated, the movements of a golf player are monitored or the finish of a race is captured (e.g. *Zepp Golf*, *SprintTimer*). Some apps feature tutorials in which they show how to perform exercises and encourage to do one push-up or squat more (e.g. *TRX FORCE*, *7 Minute Workout*). The other campaign videos are similar but focus on other aspects of life and other fields of application. The advertisement "Powerful" is on leisure (gaming, music, health) and stresses possibilities of enhancement through technology, for instance processing vocal recordings with effects or checking your vital parameter (e.g. *VocaLife*, *Instant Heart Rate*). All videos feature the same social, cultural, and ethnic mix and age group (young adults). Here, the title song "Gigantic" by the Pixies sets the tone for their everyday adventures—easy to elevate, larger than life. The video "Parenthood" shows how technology makes the lives of families easier—through tracking (e.g. *Pet Manager Pro*), measuring, controlling and monitoring. Control includes the management of smart homes and the monitoring of children (e.g. *Withings WithBaby*). All family members enjoy themselves and the fun factor is always high—"Life of Dreams" by Julie Doiron accompanies the pictures. The video "Dreams" finally visualises self-fulfilment in jobs—with the song "When I Grow Up" by Jennifer O'Connor in the background. Here, tracking and measuring are portrayed as important technology-based activities. Pilots have access to flight information (e.g. *ForeFlight Mobile*), scientists receive information about the natural world (e.g. *Vaavud Wind Meter*), and people use their smartphone as a magnifier or automatic translator.

5 This song, also known as "The Youth Fitness Song", was composed by Meredith Wilson (known for *The Music Man*) in 1961 as part of President Kennedy's Physical Fitness Program. Recordings of this song were sent to school districts throughout the United States to accompany the official *U.S. Physical Fitness Program* of the President's Council on Physical Fitness (cf. http://www.jfklibrary.org/JFK/JFK-in-History/Physical-Fitness.aspx?p=2. Accessed 02 Nov 2015).

6 These are the featured apps.

1 Use of Lifelogging Technologies: Follow the Hype

Users already matter long before they even use technical artefacts (cf. Oudshoorn and Pinch 2003). At the very beginning of the development process of new goods and services, a prospective user is imagined. As soon as the conceptual phase starts and the design process unfolds, technologies are constructed to be used in specific ways. That means that categories of *users are inscribed* in any and every technology: newbie or expert, young or old, man or woman, poor or wealthy. Children need training wheels on their bicycles, child safety locks on computers and the world wide web, the elderly may use special mobile phones and tablets for senior citizens with specific requirements (e.g. devices from ASINA[7]), and family members are irritated if the framing of familiar technologies diverges (e.g. camouflaged blenders, beige drillers, cf. Offenberger 2010). Ideas about potential users originate in actual market research on the one hand, such as needs assessments or public opinion surveys. On the other hand, techno-scientific knowledge (cf. Ihde 2003) and implicit assumptions of designers, developers, and scientists influence technological products and their functionality. Technologies are always socially shaped and constructed within specific frameworks consisting of (technological) paradigms, discourses, images of society, while *technologies also influence social life and societal structures*. Two ways of shaping social life may be distinguished here: a rather *passive* type of shaping that manifests itself in the inscribed user for example, and a more *active* type of shaping that results from the increasing agency of technological artefacts.

1.1 Technology and Action

Using devices and machines in line with the envisioned, ideal usage is to act according to the inscriptions and technological pre-sets. If the users behave in the way the developers expected, actions and interactions of real users reify imagined aspects of potential users. The rationality and logic of the performance of a technology is accepted, adopted and accommodated to and is integrated into one's own patterns of behaviour—that is what we call a *"passive" shaping* of action by artefacts. The devices become part of the day-to-day routine and new techno-practices arise. For example, driving a car requires specific skills and following rules as matters of conventions. Over the course of time, individual drivers incorporate

7 ASINA developed a tablet-PC for the elderly that is senior citizen friendly and easy to use: https://www.asina-tablet.de. Accessed 02 Nov 2015.

these into their behaviour, adhere to the rules or are punished if they do not follow them. Similarly, using smartphones may encourage behavioural patterns like constant checking of emails, messages or status reports or users may produce their own content and become 'prosumers' (cf. Comor 2011).[8]

Technologies are accompanied by lifestyle-figures that manifest within society as ideal type expressions of users (cf. Hörning et al. 1996). In the case of modern information and communication technologies (ICT), the following exemplary variants, defined by intensity and style of use have been identified: non-user, casual user, occupational user, trend-user, digital professional and digital avant-garde (cf. Selwyn 2003; Peterhans and Neubarth 2011; see also Bühl 1999). Technologies and their inscriptions modify life-worlds, restructure communication and social relationships (cf. Hörning 1995). Viewed mechanistically, people follow user scripts, (re)interpret them depending on individual preferences within the confined framework of a technology and align their practices accordingly. One aspect of such restructuration is the redistribution of power. Current *lifelogging* applications make notable that technologies mediate discourse and exert power by disciplining. Moreover, users define themselves in relation to brands, technological products and their functions. They are (led) to believe in technological capacities and adapt to them. Modes of doing things digitally 'creep in' due to their seemingly attractive capability to facilitate everyday routines and because gadgets fascinate people with their technological prowess and intricate make-up.

Technologies also shape human actions and interactions in an *active way*. Technologies directly interact with human actors and guide their actions. The premise is that agency is not a specific human property and has no pre-given actuality. Instead, it comes into being 'in medias res' and as inherent quality of technologies (cf. Geser 1989; Pickering 1993; Fuller 1994).[9] In its simplest facet, this may be observed when a particular technology does not work as expected, thus producing a resistance that in turn causes a reaction by users. In other cases, we 'interact' with machines: our spelling mistakes are corrected while typing in our word processor, we engage software in the search for books or play soccer with virtual rivals via game consoles.

8 Comor (2011) shows that 'prosumption' (particularly its Web 2.0 iterations) constitutes an emerging hegemonic institution—one that effectively frames and contains truly radical imaginations while also tapping into existing predilections for commodity-focused forms of self-realisation (see also the chapter by Nils B. Heyen in this volume).

9 In its most extensive conception of actor-network theory the difference between humans and technologies is revoked and both are equally able to act and interact (cf. Belliger and Krieger 2006).

Anthropomorphisms, like vocal blaming of computers for not working or the hitting of printers, is another sign of blurred boundaries in the interaction of humans and things. Seen from this point of view, technologies and humans are not two separate entities that exist in two different realms. Rather, devices and their users form sociotechnical constellations, ensembles and systems (cf. Rammert and Schulz-Schaeffer 2002; Schubert 2006; Rammert 2007; Weyer 2008). Technologies and humans increasingly converge with one another regarding capabilities of acting and interacting (e.g. multi agent systems, robotics, and artificial intelligence). This is especially true for smart technologies and *lifelogging* in particular.

1.2 Lifelogging as Daily Routine and Practice

In the case of *lifelogging*, a variety of aspects can be identified in which humans are encouraged to be *disciplined by technologies*.[10] This is favoured by a climate in which orientation by and reliance on devices and data is spread by mass media. Taking the *iPhone 5s* advertising campaign as an example, we see that *Apple's* 21st Century man, the inscribed user, is okay but unfortunately inherently flawed. However the positive message is that if a person is willing enough, then there is hope. The images propagate an ideal version of active, sporty, and healthy citizens, who, by following performance standards and aspiring to norm-based ideal bodies, may be able to overcome their weaker selves. They empower the body and pleasure the soul. Especially the video "Strength" illustrates this scenario, its associated practices and the climate in which these take place.

Firstly, smartphones and smart watches will become more important as training partners. Smart devices have built-in sensors that recognise und record mundane activities over the course of the day, analyse training sessions and monitor vital functions. If an application recommends duration and repetition of bench-pressing or states daily amounts of steps (to be) taken—the measures and figures have an aura of *objectivity* around them and may count as truth. Technologies not only accompany and control daily workouts, they also record burned calories and remind users to be active. The specific stimuli to improve one's capacity stem from performance protocols, high scores, and virtual battles with other individual sportsmen.

10 See for instance Foucault 1997 for processes of disciplining and his framework of biopolitics as the project of governing human bodies, populations, and life. According to him, biopower is that ensemble of discourses and practices that exerts "a positive influence on life, that endeavours to administer, optimize, and multiply it, subjecting it to precise controls and comprehensive regulations" (Foucault 1990, p. 137).

Secondly, ideal-type patterns of action and ways to perform are assumed (be it cartwheels or tees at golf). Applications compare the actions of one individual with ideal forms to the effect that learning becomes mediated by tools and effects come about by imitation. Thus, in addition to the afore-characterised inscribed user, there are *inscribed regulations and rules*. This seems problematic insofar as it is not clear who decided on the presumed optimal courses of action, for whom and under what circumstances they apply.[11] Thus, the dominant role shifts to the side of technology—and humans obey.

Thirdly, *technology as medium* modifies and replaces the relationship between trainer and sportsman. As technologies are always available and may be more patient, the experience and the tacit knowledge of trainers may potentially decrease in importance. Courses of action are not legitimised by experience or reputation but by underlying algorithms and comparing data profiles.

1.3 Forms of Hyper-Performance

The message from technology suppliers and marketers is obvious: The next best training partner is your smart phone and if you want to accumulate impressive health records, do what the technology demands. But who sets the parameters and defines the values? Do we do sports just for the competition, or do we rather enjoy the joint training? Who wants to bowl alone (cf. Putnam 2000)? Reflecting on the above indications, some tensions may arise within the field of *lifelogging*. The 'battle' between the inscribed and real users will determine in what way we allow technologies to shape our lifeworld and society. Users have the ability to (not) use technologies, put their own spin on things or deviate from ideal usages in other respects—and they do so. It stands to question whether design and construction principles of *lifelogging* technologies match visions of healthy societies with intact communities or lead users to follow the hype.

Apple presents its smartphone as a device that supports measurement (quantification), knows which areas of action (behaviour) can be improved on and helps control these (management). Since (behavioural) deficits can be compensated by using the technology in the best way possible, flaws can be overcome or even eliminated by following instructions, recording, documenting, sharing, personalising and producing status reports. This will enhance performance, which in turn leads to (re)gaining control over one's life and helps one to become an altogether happier

11 cf. the article *Rational Discrimination and Lifelogging: The Expansion of the Combat Zone and the new Taxonomy of the Social* by Stefan Selke in this anthology.

and more capable person. Again, when speaking about (inter-)acting technologies it is important to consider the level of agency of human and non-human actors. In sociotechnical constellations the distribution of action and cognition has to be analysed and transferred to development processes—something which rarely happens. Furthermore, one has to question the assumption that a quasi-autonomous technology is a probable training partner.

Smartphones demand that we communicate with and through them (other than a landline phone that only reacts when used). Changes in the way communication is mediated and products and services are used also modify our self, behaviour and interaction with others. In moments of doubt, we revert to authorities. If the authority (and internet businesses have a strong voice) succeeds in dissipating doubt, people are inclined to trust in it. While moving through the net or interacting with the smartphone, we have no sense of harm or menace but instead experience certain advantages of gratified and encouraged behaviour. Behaviour that creates marketable and profitable data. There has not been a moment when the thought about boundaries being shifted or even lifted has occurred. We willingly engage in behaviour that takes away part of our right to remain private about certain aspects of our lives.

By framing the *iPhone* as companion and constant helper to overcome daily challenges and realise aspirations, developers and marketers cater to current customer needs and expectations. The more credible the portrayed state of idealised normalcy, the more convincing the product on sale is, and the more likely it is to passively follow user scripts. Under the pressure of all-encompassing individualising tendencies, technology use seems to be a suitable way to discipline oneself and manage health care and corporeality issues. The trust in data, the steady comparison among peers and enhancement clears the way for *new forms of hyper-performance* and as technology becomes a more prominent mediator between actual and target values, rebound effects may arise.

2 Development of Lifelogging Technologies: Unfolding the Hype

Images of users are thought up even before the design process of a technology has begun (cf. Woolgar 1991; Bardini and Horvath 1995; Mackay et al. 2000). Motivations for usage, how users should and could use a technology are estimated. These negotiations about the potential users by innovators, developers and others were inscribed into the technology as '*scripts*' (Akrich 1992). Scripts are implicit directions for action in contrast to explicit manuals. In the best case, a technology

does not need a manual but rather reveals its handling on its own terms through the specific arrangement of its components and assembly. Devices and machines are constructed as ready-to-use and elegantly fall into place within the lifeworlds of users.[12]

2.1 Technology and Capacity

Technologies do not come about 'in vacuo' and do not rest on rationale and efficiency criteria alone. Instead, the design and construction of *technologies are shaped* by social, cultural, economic and many other factors (cf. Mackenzie and Wajcman 1985; Wiebe et al. 1987; Rammert 1993). In processes of 'heterogeneous engineering' (Law 1987) material and social worlds are shaped simultaneously to align them better. Ideally, this takes place at the beginning of a construction process and uses public participation methods to assess needs and requirements. Multiple heterogeneous actors from different 'social worlds' (cf. Strauss 1978; Clarke 1991) will be involved in decision-making and development processes. Alliances, negotiations and power relations take effect on the final outcome of the process (cf. Latour 1998). Such a perspective of '*technoscience*' (Latour 1987) overcomes the distinction between the realms of technology construction and technology use. Technological developments impact society as much as societal developments influence technological ones.

In this relation, technologies often remain 'black-boxes' (Latour 1999). In order to be used, knowledge about the workings of technologies is not required. Users may trust that their modes of operation leads to the fulfilment of tasks. This *trust is company-based* on the one hand and is mediated by products and corporate culture. Companies that succeed in producing high quality, durable and safe devices get credit for their work, reputation and positive disposition towards their

12 The *iPhone 5s* falls into place in a 'health-society' (see also the article *You are Your Data: Self-tracking Practices and Concepts of Data* by Deborah Lupton in this anthology). The prefigured user that lives in this society may either be concerned about his or her fitness and therefore asks for technologies (society-pull). Or we could find a more sinister perspective in literature. At times, literature may react more sensitively to changing climates and oppressions. Juli Zeh's 2012 novel *Corpus Delicti* experiments with a totalitarian regime in which "the 'METHODE' uses the body for moral and political measurement of its citizens' achievement of normativity, but also as a measurement to assess its citizens' failure. The body therefore works as a tool for normalization of the offender and the maintenance of the status quo" (Smith-Prei 2012 as cited in Nover 2013).

future products. This is fuelled by establishing a brand that succeeds in creating competitive advantages in their market position. As they cater to its specific segments, they engage in meaning-making processes. They propagate visions, create metaphors and shape worldviews (cf. du Gay et al. 1997). On the other hand, trust in technologies evolves on *technological standardisation and institutionalisation* (cf. Wagner 1994). Beer brewed in accordance with the German purity law, DIN standard-materials or products with quality seals are believed to be of higher quality than other products. Basically, deployed and well-working technologies may gain 'momentum' (Hughes 1994) and become integral part of society as dominant design. As this process continues, modifications of the institutionalised technologies and the associated technical and social structures become difficult to change.

One of the most pervasive elements the *iPhone* advertisements highlight is its *all-in-one construction*. Designed for particular purposes and environmental demands, analogue technologies further develop by feature enhancement, augmenting technical prowess and often become more affordable over time. All-in-one technologies incorporate tasks of analogue technologies and their packaging and algorithms suggest they are on par with the quality of single-use technology. Additionally, they provide an expert-use system and a supporting environment well-suited for connectivity. The *iPhone 5s*, so the advertisements suggest, has all the ingredients, is the ultimate toolkit to realise *Apple's* dream world of idealised normalcy in which device-supported self-discovery initiates behavioural change and motivates self-enhancement. Apps, gadgets and centralised and personalised databases come as an easy, ready to use complete package with features to allow for tracking (co-operation, delegation of tasks and responsibility), measuring (data generation), analysing (evaluation), control (smart living), tutorials (coaching, disciplining), enhancement (compensation) and manipulation of one's surroundings. Mastering the complexities of one's self and life by using the *iPhone* promises an augmented reality, a more convenient, less risky and challenging, cleaner, more attractive environment. *The smartphone becomes the control centre* to access easily digestible infotainment about the body, overall activity and makes inferences about moods and behavioural patterns.

2.2 Lifelogging as (Life-)Style

How specific user types are assumed and implemented can be inferred from the technology itself as well as from the 'social accessories' of advertisements and promotions like the *Apple* marketing campaign. *Lifelogging* users are young, fit, trendy, technophile. They are willing to keep their body fit, are able to handle life

smoothly and will do their best to perform well in their jobs. Technologies are part and parcel of daily routines. Especially smart devices have become important companions and assist almost any situation. The other side of the coin is less obvious, the implicit inscriptions and scripts users follow by using technologies. Although little is known about the design and development processes of smart devices, the *iPhone 5s* advertisement presents the advantages of *lifelogging* as a lifestyle.

Firstly, the lifelogger hands some of his responsibilities over to smartphone applications but keeps control via *supervisory* functions (tracking of pets, cameras at the child's bed). Secondly, users are encouraged to engage in more *measuring and analysing humans and other living creatures* (measuring the heartbeat of animals). Even at a low-threshold level, vital and/or bio data are digitally recorded and stored, instead of using one's senses or analogue measuring tools. That requires constant checking and comparison of data. Thirdly, (most) people use *just one smart technology (or brand)* for *lifelogging*. Although the *Apple* advertisements should not be taken as exhaustive evidence of the group of lifeloggers, they direct attention to the question of why we buy and use specific products. In our example it is suggested that the *iPhone 5s* offers the best *lifelogging* environment with its apps and gadgets and is the best smartphone on the market. But what is the definition of best? Is it the best functionality, the best design, the best price or the best corporate culture and image of the company?

These are questions which cannot be answered within the scope of this paper. However, we confront *Apple's* current lifestyle image and aspirational campaigning—focus on self by controlling the body—with its own history. In 1984, *Apple* introduced its *Macintosh* Computer as remedy against a George Orwell inspired dystopia. A young female hammer thrower runs towards the larger than life face of the prevailing ideology that is shown on a large screen and utters sentences in front of a grey, lifeless crowd such as "garden of pure ideology […] information purification […] secure from the pests. We are one people, one resolve, one cause […] our enemies shall talk themselves to death and we will bury them with their own confusion. We shall prevail." Simultaneously, the hammer thrower destroys the canvas with her hammer. What follows is a statement by *Apple* that announces the introduction of the *Macintosh* Computer: "[…] And you'll see why 1984 won't be like '1984.'"[13] In an advertisement about fifteen years later, *Apple* showed a range of pioneering spirits from the 20th century: Albert Einstein, Gandhi, Pablo Picas-

13 *Apple* 1984 Super Bowl Commercial Introducing Macintosh Computer: https://www.youtube.com/watch?v=axSnW-ygU5g. Accessed 02 Nov 2015.

so, and Martin Luther King Jr. and encourages to "Think different" at the end.[14] Nowadays we have the situation in which we may speak of enforced conformity by means of bodily and behavioural control instead of different thinking and acting or a life in fear of "Big Brother".

2.3 Forms of Techno-Reliance

A recapitulation of the foregoing remarks on the development of technologies and the imagined user reveals some issues regarding the culture and style of *lifelogging*. By using smart technologies, users gain access to vital information, can make better analyses and advance their career. In addition, the use of smart devices in family life is suggested to lead to more quality and safety. Minimisation of risks, increase of accommodativeness, convenience, ease of use and the range of different life situations unfolds the hype of *lifelogging*. It seems that because certain things have become technologically feasible, they are taken into consideration and the slogan "Science Finds, Industry Applies, Man Conforms"[15] continues to be effective in orienting action—with man willingly caving in.

It is a debatable point whether something like heterogeneous engineering exists in the field of *lifelogging*. This would mean that engineering is sufficiently infused with possible social, cultural and political ramifications of technological developments. However, there are indications that there is a *technology-push* within the development processes. The spheres of constructing technologies and using technologies are (still) separated. The dualism between the technical and the social is present in research and development processes as well as in scientific research. Do we need *lifelogging* technologies? Who will we be if we use them? And what ideal or picture of society do we foster by using these devices in intimate settings and for private purposes? Most often, technologies contain technocratic mind-sets, visions, and premises. The idea of interdisciplinary cooperation and user participation (cf. Law 2011) is subsumed in the concepts of 'participatory design' and 'design thinking'—application of this understanding, however, still lacks scope and intensity.

Likewise, Nick Couldry (2012) has argued for a reintroduction of the "missing social" into technology-led accounts of "new communications" and political and

14 *Apple* 1997 "Think different." campaign https://www.youtube.com/watch?v=SswMzUWOiJg. Accessed 02 Nov 2015.

15 This was the motto of a World's Fair on technological innovation held in Chicago 1993/34.

social processes. As individual values and self-fulfilment meet political gratification, this weakens group control over individual behaviour. In effect, individuals may be less prone to make long-term commitments and sacrifices not immediately driven by self-motivation. Striving for purely individual enjoyment has become value in itself—expected, taken for granted. Gathering experience after experience—one moment is as good as another, those who live longer simply collect more experiences as the digital mediates the experience of time and space. A connected-up instantaneous culture has developed into a dynamic system in which our internal object relations themselves are outsourced. Commodity fetishisms that transform the subjective, abstract aspects of economic value into objective real things that people believe have intrinsic value and then cater to it. Commodification processes outsource intelligence and intellect and relationships by *transforming every sphere of human activity into a product*. As a consequence, the dangers of alienation increase. By now, self-experience can be bought and sold in the marketplace. Another sinister problem is that the true objective of the seller is obscured: to include humans along the value chain. Not as consumers but as marketable products.

Most often users do not know how technologies operate and/or how algorithms work. It seems that especially in the case of *lifelogging* and smartphones, these technologies are more influential than their proliferation is justified. When the 'black-box' is used unquestioned and parameters and calculations are taken seriously, there is a danger that sociotechnical constellations are not looked at in their complexity. While economic premises and benefits, infrastructural dependencies and social inequalities are important background information to understand the attractiveness of the devices, how can trust in technologies be justified in the face of vested interests in personal big data? *Apple* (and other companies) create a corporate world and people willingly accept their dependence. What follows is the imperative that if there is a technology that increases performance, it ought to be used. This is the *new kind of techno-reliance*.

3 (Technological) Paradigm of Lifelogging: Stabilise the Hype

Analysing society as a 'seamless web' (Hughes 1986) draws attention to larger developments at the meso and macro level and highlights the technical, social, organisational, economic and political elements at play in the construction and use of technology. This allows for dealing with systemic issues that relate to economic and industrial developments and regulatory regimes. Usage and development of

lifelogging techniques are influenced by 'technological paradigms' (Dosi 1982) as well as by 'socio-technological regimes' (Geels 2004; Smith 2007). At the same time these patterns are stabilised and fostered by usage and development of technologies. A 'multi-level perspective' (Geels 2002; Geels and Schot 2007) helps to reveal the dependence between regimes and micro-level actions and interactions. It draws attention to levels of pervasiveness that help stabilise the hype surrounding *lifelogging* technologies in which users get wrapped up in constant connectivity and are part of a culture of digitalisation and smartness.

3.1 Technology and Society

The multi-level perspective distinguishes three level of analytical concepts. First, '*socio-technical landscapes*' is a framework that refers to structures that influence the development of a society. Not by determination but by providing the material and immaterial, physical and technical backdrop for cultural developments they make some actions easier than others. To account for changes in the make-up of society it may be helpful to think of the socio-technical landscape as a set of factors that develop and form an external context, which actors cannot immediately change but must perceive and translate in order to exert influence. Landscapes exert not only influence on particular actors that actually interact but may gradually change user perspectives and practices, policies and cultural meaning in the process. Second, '*socio-technical regimes*' refer to relatively large and dynamically stable shared values and routines and ties between diverse actors and communities such as industry, science, policy, technology, culture, markets and users. Third, at a '*niche level*' there are smaller, more unstable networks that support particular trends on the basis of expectations and visions. *Lifelogging* also started at a niche level with early adopters and has begun to show the first characteristics of a regime.

Communities at the regime and niche level share different kinds of rules, which coordinate action and are more or less well-articulated. These rules operate on a regulative, normative and cognitive level. Regulative (institutionalised) rules are formal agreements, standards and laws, while normative rules comprise role relationships, values and behavioural norms. Examples of cognitive rules are belief systems, innovation agendas, problem definitions, guiding principles and search heuristics (cf. Geels and Shot 2007). Since all kinds of social groups are relevant for the construction of technology, the activities of engineers, designers, users and marketers may be best described as 'heterogeneous system building'. They form a 'sociotechnical ensemble' (Bijker 2010) or 'sociotechnical constellations' (Ram-

mert 2007) where there can be no a priori distinction on whether an issue may be treated as technical or social.

Here, *technological frames* come into play. They "structure the interactions among the members of relevant social groups and shape their thinking and acting" (Bijker 2010, p. 69). A technological frame is built up when interaction 'around' an artefact begins. They give insight into the range of perceived needs and the formation of habits, surrounding practices and values around technologies. Apart from this rather fluid and dynamic meaning-making, products and services come with a stated use. Advertised purposes, operability, proclaimed advantages, conveniences, or other benefits to the user are all included in a certain technological frame. Technological frames and the advancement of technical lock-in processes may be conceptualised by a hardness/obduracy continuum. Closed-in hardness is characterised by a high inclusion into the lifeworld and high frequency of use. Hard obduracy by contrast is marked by non-awareness, non-use and/or resistance. Lock-ins (of either fashion) may lead to the blocking of alternatives and pave ways for social (mal)adoption. Additionally, as technological systems and regimes grow through investments in capital, technology and people, they gain 'momentum'—a certain direction, speed and pervasiveness. As a result of these investments, it becomes more and more difficult to change course and the system seems to have an increasing impact on its environment. As the development process of a particular technology unfolds and processes of production and consumption reach stability, alternatives to certain frames of thinking and acting are hard to find.

The notion of 'technological culture' builds on all these observations: technologies do not merely assist in everyday lives but are also powerful forces that act and reshape human activities and their meanings. Today's societies are as thoroughly technological as all technology is pervasively cultural (cf. Bijker 2010). The question, now, is why *lifelogging* techniques thrive in technological cultures and why do they, as socially constructed technologies, follow a certain path and not another?

3.2 Lifelogging as Culture

Smartphones with *lifelogging* techniques introduce more or less sophisticated instruments into everyday life and vocational matters in the context of—ubiquitous—information and communication technologies. ICT as the 'nervous system' (van Dijk 2012) of an information society implies pathways for the interlinked systems of a digitised economy, health care, military, science and recreation. As generic technologies, ICT is an enabling area of technological knowledge that yields

potential benefits (and risks) for exploitation by a wide range of sectors in the economic and societal spheres (cf. Keenan 2003). ICT facilitate the capacity for flexibility, greater transparency, and instant connectivity to share information and knowledge and the generation of large amounts of data by also providing means for their interpretation and display. A *smart-technophile society* thrives on tools that manage risks and ensure low costs, high efficiency and thus great profit.

Lifelogging techniques are themselves appropriations of the technological pathways, specific products and processes that emerge from adapting ICT for particular purposes. Commercial and industrial regimes value digital logging technologies as they promise highly reliable infrastructures for data processing. This is fuelled by the belief in the objectivity of numbers that measure value based on efficiency. Predictions based on numbers eliminate (unnecessary) uncertainty and reduce complexity (cognitive rule). Early adopters of *lifelogging* techniques digitised their activities to optimise self-management. Practices of self-surveillance to increase performance have transitioned from the niche to the mainstream level. The trend has stabilised and has started to gain momentum visibly. Users invest in technologies that allow for extensive data recording and automated analysis, which creates a more scrutinising view upon themselves, a more intellectually tractable account of their performance and surroundings. The supporting sociotechnical regime favours investments in tools for self-measurement, -protection and self-enhancement to account for safety, control and "smart" behaviour. Creators of mobile technologies thrive in this information-rich, increasingly interconnected network society, where "the virtual, social and physical worlds are colliding" (Rheingold 2002, xviii). Especially when they are not only able to cater to perceived needs but succeed in creating consumerist values for this technological culture.

To discover what "*lifelogging* as culture" might mean, we will again turn to one of the creators of mobile ICT as producers of cultural artefacts. Over the last 30 years, *Apple* has created an image of a *friendly helper who merges and coordinates this networked world with stylish ready-to-use products*. *Apple* built its reputation on reliable products and lifestyle concepts that not only echo trends and prevailing attitudes but anticipate aspirations of members of technophile societies. The corporation has become so "tightly associated with the Internet, as to be identified with the net itself" and is "perceived as 'less corporate', 'cooler' and ethically—almost spiritually—better than others" (Wu Ming 2011). They connect more nodes within the seamless web of a digital culture and interlace the virtual and actual of everyday life more appealingly and seamlessly than other producers of smart technologies. As the corporation controls hardware and software as well as content, it ensures customer loyalty by entering into an exclusive service contract

with its users that promises great personal value for their high investment.[16] *Apple's iPhone* advertising campaigns popularise images of ideal users and usages of smart mobile technologies. These fictions are carefully engineered to appeal to an imagined community of users and help shape ideal customers: active users of mobile technology in control of their devices, lives and ever-changing surroundings.

In our case, the *iPhone 5s* advertising campaign "You are more powerful than you think" builds on the hype of *digitally enhanced human activity*. Here, the *iPhone* provides technical solutions and capitalises on some of the hopes virulent in technophile, inherently vulnerable societies. Still, like in any other society, the basic emotion is the fear of being alone or not belonging, of being left out or even expelled. *Apple* is especially successful in constructing pathways of belonging to technophile culture. Building on existing practices, *Apple* reiterates behavioural cues and paves technological pathways by familiarising with lifestyle images and different usages. But they do not stop there: their smartphone interfaces make sure that 'digital illiterates' are able to lead digital lives as well. Smartphone users looking for an all-in-one digital skill enhancer, trainer, nanny or a tool for self-realisation have found their ideal product with this phone. The tasks' complexities are hidden behind user-friendly interfaces. *Apple* produces more than just smartphones. They manufacture both hard and software that is incompatible with other manufacturers' products. In creating this one-dimensional world, the *Apple* environment becomes somewhat like a cave. The exclusive contract they enter with retailers and end users suggests a stable entity in an increasingly complex world. The 'Apple cave' becomes an extension of the self and narcissistic tendencies lead to a willing reduction of complexities and shrink one's world.

This points to the establishment and manifestation of a socio-technical regime. Trusting *Apple's* authority in all things digital seems evidently the right thing to do. With their soft power communication strategies that link rhetoric and ideology, *Apple* outlines strong normative dimensions and spreads non-naive assumptions

16 Digital technologies used by business organisations spur processes of mass customisation as they now have closer proximity to their consumers. Central characteristic of this strategy is the fashioning of products and services for end-users with the means of mass production. In this framework, personal data becomes an asset class: a set of securities with measurable variables, a resource to collect, aggregate, analyse and finally monetise. Here, users are integrated into the value chain to ensure alignment of customer wishes with the products and services on offer. Economic benefits are most lucrative where so-called "high-involvement-purchases" are concerned. These types of acquisitions are marked by comprehensive, deliberate, time and energy consuming processes of decision-making. Other characteristics include frequency of use, high identification with the product and certain financial, social and psychological risks.

about what kind of behaviours and goals are considered 'good' or 'bad' within a society. By means of customisation and location-awareness, smartphones combine and merge all behavioural data and user profiles, individualise and enrich daily experiences for the community of their users. In positive terms, personal values like freedom of choice and autonomy fuel the adoption and 'openness' and 'participation' proliferation of these technologies. However, navigating the environment becomes increasingly controlled by smartphone technology and the customer's agency is situated in an expansive, commodified, and increasingly modulated environment owned by digital businesses that frame individualism as means to regain control and be autonomous.

3.3 Forms of 'Smart Obsession'

Life-management and *lifelogging* techniques promise unprecedented possibilities of self-enhancement and seem to offer means to gain control over one's lifeworld. Through societal transformation processes that encourage this trend, regime-effects may occur on the individual level.

Firstly, there are certain risks when technological momentums lead to regime-supported dominant designs. For example, how we view ourselves, how we make sense of ourselves is increasingly mediated by smart technologies. Were expert tools to screen the body and analyse private data previously used exclusively by doctors, athletes or life-coaches, now new social groups have access to tools for self-analysis. The health data are stored in clouds and automatically compared to other fitness profiles, which has added a new dimension to self-assessment. Wearable fitness gadgets address 'basic' needs and wishes to minimise health risks in order to continue living busy, flexible lives at full capacity. The task of taking care of oneself is delegated to smartphones which monitor whether users get enough exercise, eat healthy, sleep well and manage their weight. Techniques for mapping behaviour and health risks are cheap, available, and simple to use, and deliver a seemingly complete picture based on elaborate data colonies. Based on the premise that knowledge about the body will help improve, better ourselves and be more effective, users create a *data-self* by tracking and being tracked and are encouraged to compare themselves to an ideal self or friends in numbers. The users measure their body according to their friends' virtual bodies and the system's nebulous perfect active body and the user should try to match or be better than them. Instead of aspiring to ideal images, peers become the judges and everyone is compared to ideal bodies based on numbers. While we may appear active, we are actually dormant, because mediated body

competition becomes the focus of health regulation. If the map becomes congruent with the mapped, users may conflate aspects of their imperfectly mirrored digital-self and sense of self; the confusion between utility and lens. The danger of digital culture is that its *quantifiable, improvable and manageable elements become dominant*.

Secondly, *techno-centrism* becomes the connective link within the seamless web of technological cultures. Fuelled by a neo-liberalist view of government and society, the effective message of the ideology of smartness is that by investing in high-tech, we will eventually solve all problems related to aging and scarcity along technological lines. 'Ideographs' such as "smartness" link rhetoric with ideology and function as blueprints for a desirable (or beckoning) future (cf. de Wilde 2000). A society enhanced by smart technology will have better safety, speed, efficiency, concern for the environment, user-friendliness, capacity for learning and progress. Improvable areas of action and behaviour are indicated and instruments for control and life management are introduced through measurement and observation. As "objects are engines of power", smartphones are "able to fully shape the contours of existence through the production of difference and affectivity in the world" (Shaw and Meehan 2013). The very concept of "smart"-phone suggests an almost infallible quality of the device, leading to a deep sense of trust and a strong emotional bond between product and user. On the quest to make the world safer, more controlled and convenient, digital technologies are surrounded by a sense of 'solutionism' (Morozov 2013), they presume issues rather than investigate the problems they try to solve.

Thirdly, there is a danger of *losing autonomy*. In its original sense autonomy means the making of one's own law. Autonomy is about awareness and cognition, sense and self-confidence. It is about self-dependency, self-determination, freedom of will and decision-making, independence and self-administration. With the proliferation of personal management instruments with *lifelogging* techniques, elements from the economic sphere are introduced into the social sphere. Increasingly, people are asked to perceive themselves and their lives as a kind of business. Their self-image should be that of someone who produces and develops a product, their employability and offers and advertises it through individual marketing techniques. In this society, people have to prove time and time again what they are capable of and in what way they are useful. However, the need for autonomy is about building self-awareness without defaults. Trusting one's own sentiment, thought and memory should be allowed without having to fear rejection. Finding stability within and not lean on something else is an important aspect of building identity and means to be able to develop one's own language and modes of self-expression. On the one hand there are more demands placed on people, businesses and organ-

isations in this society, with increasing risks. On the other hand, while there are more chances for working within more flexible structures, they are exposed to new forms of failure and the danger for strain increases.

No matter how convenient our lives may become on account of smart technology, that same development will simultaneously render our lives more demanding and pressured, which increases the desire to be relieved from this pressured environment. Those who thrive in this complex world are people who are psychologically, socially and physically robust and highly competent in all areas of life. As individuals, we have a right to ignore digital paradigms but in the context of society, there is an obligation to strive for sovereignty. These are *new forms of smart-obsession*.

4 Summary: Trust in Hype?

Our analysis has shown: The convergence of an active (section 1), surveilling (section 2), and technophile society (section 3) is about to create the 21st Century men and give rise to new forms of hyper-performance, techno-reliance, and smart-obsession. People are part of a larger societal change characterised by digitalisation and app-thinking, where *lifelogging* is just one facet. Analogue technologies fade from the spotlight, because analogue technologies are seen as far too simple, error-prone, and outdated. But humans process sounds, pictures and touch analogous. A signal in analogue technologies may hold infinite values. This evokes multiple interpretations and therewith a variety of human actions and interactions. Digital technologies are characterised by a specific number of discrete states that limit the course of human action. It is an open question and a challenge how people will interpret and embody this new agenda.

We have argued that *lifelogging*-technologies may have several effects on society and highlighted possible tensions and dangers resulting from the deployment of smart devices. Firstly, people adapt to smart devices and *let them discipline them*. Secondly, people *trust in smart devices* for numerous, albeit vague reasons. Thirdly, people are becoming increasingly *entrenched in technologically mediated relations* with the environment, which may have a corrosive effect on social relations. This change is to some extend controllable. In a first step it is necessary to accept that society cannot be divided into a social and a technological realm. Society consists of sociotechnical configurations, it is a 'seamless web' with distributed agencies. On the basis of this, we further need to analyse and discuss agency embodied in technology in more detail. STS research provides a toolkit

to highlight such issues and offers a scientific basis falling in line with the idea of 'technopragmatism' (Rammert 2007).

4.1 STS-Analyses and Lifelogging

In our view, more empirical studies are needed to prove or falsify the assumed dangers and benefits of *lifelogging* (cf. Price et al. 2011; Staiger et al. 2015). Various concepts are presented that help analyse and understand uses and constructions of *lifelogging* technologies. The range of *STS research methodology* may prove to be a valuable asset to shed light on conventions and practices of *lifelogging*: ethnography (cf. Geertz 1984; Knorr-Cetina 1995; Hine 2007) and its expansion 'technography' (Rammert and Schubert 2006)[17], micro-level analysis via phase models (cf. Weyer et al. 1997), macroscopic studies through a multi-level-perspective (cf. Geels 2002) or institutional analysis (cf. Dolata 2013)—all yield possible benefits for fine-grained analyses. Moreover, *lifelogging* techniques may have the potential to be developed into research methods but need to be elevated from studying oneself to modes of second-order observation.

What has become visible from adopting an STS perspective is the problematic *distribution of power*. Modern information and communication technologies circulate a rather one-dimensional meaning of "smart" that is tied to a product: responding to (new) situations in a fitting way and solving problems in certain (limited) circumstances.[18] Smart in the sense of cunning or free and independent thinking, the ability to guide oneself and the possession of a certain amount of freedom of choice is not meant here. As a side note, artificial intelligence simulate cognition, which guises the one-dimensional meaning of smartness in order to be appear more life-like. As a possible result, forms of intelligence such as calculating and rationality, may become more highly valued than other cultural techniques such as interpretative skills or acting with caution to minimise risk.

The question of agency has not been considered sufficiently—neither during the construction nor the usage of technologies. There is a need to reflect on the influence of devices on behavioural patterns and their effect on the interactions of

17 Technography includes a variety of concepts, approaches and methods, for instance 'workplace studies' (Heath and Luff 2000; Heath et al. 2000), 'videography' (Knoblauch 2009), 'distributed cognition' (Hutchins and Klausen 1996), and 'actor-network-theory' (Latour 1996).

18 Here, it should be added that sensors and algorithms deployed for *lifelogging*-technologies are far from producing reliable data, which stresses the need for empirical evidence and assessment of impact.

human beings. This calls for an analysis of the *distributed cognition and agency of sociotechnical constellations* and not the mere (technical) linkage or coupling of humans and machines. Such an extended perspective helps to discuss what kind and sets of task should be performed by humans and what may be delegated to technologies. In the field of *lifelogging* then, the question of (self)-measurement through technology needs to be posed anew.

4.2 App-Thinking and Digitalisation

Lifelogging is just one of several facets of digital life and use of smart devices. As the example of *Apple* shows, one of the most prominent trends is the assemblage of various functions into a single product with possibilities for extension. The possibility to call somebody—the transformation of spoken words into electronic signals and vice versa—have long ceased to be important. Rather, data storage and processing via applications come to the foreground. Self-measurement is the first step towards monitoring and analysing the life of family members, friends, colleagues and the (living) environment.

A smart device combines standard apps with gaming, tracking (co-operation with technology, delegation of tasks), measurement (data collection), analysis (evaluation), control (smart living), tutorials (coaching, disciplining), and enhancement (compensation). It does not only combine apps; it also personalises and centralises data, databases, and virtual identities. Such a comprehensive package is very "seductive". The development of an autonomous individual is impeded by all-encompassing technological assistance (cf. Selke and Biniok 2015). One can do it alone "like a pro" with the appropriate application and technological gadgets. Trusting one's own inner life or turning to other people for guidance seem to have become superfluous. This is the new *app-thinking*: Widespread satisfaction of needs by way of sufficient modules.

The delegation of self-observation and related responsibilities then go far beyond 'adiaphorisation' (cf. Bauman 2013), and highlight an (inflated) trust in technology—instead of confidence in oneself or other people. The presumptuousness of the individual is reflected in conditions of extreme trustfulness in technologies and in the idea of algorithmisation of life. And this is when the question arises on how digitalisation modifies our society (cf. Baecker 2007; Schirrmacher 2009; Lanier 2010; Pariser 2011; Meckel 2013; Schirrmacher 2015). Instead of a social construction of technology we more often find a *technological construction of society*.

In light of our discussion, we argue to consider more social and societal factors in the construction and use of *lifelogging* technologies. If users follow a hype,

they should *reflect* more on technology use and *scrutinise* the development and construction processes more—and vice versa: if designer and developer unfold a hype they should bear in mind the potential user and their *actual* needs and wants. When combined, this opens up the chance to stabilise a hype that fits both the social *and* the technology realm of society. However, we do not characterise *lifelogging* as an inherently 'wicked' field of technological application. Our aim is to sensitise people to issues surrounding usage, construction and marketing of *lifelogging* technologies that propagate possibly harmful practices for society.

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Experiences—Case Studies

Capturing the Ordinary: Imagining the User in Designing Automatic Photographic Lifelogging Technologies[1]

Vaike Fors, Martin Berg and Sarah Pink

1 Introduction

In the last years, *lifelogging* technologies have become increasingly popular among users and researchers, not the least by provoking questions of how they measure and log various dimensions of our lives and what this could possibly lead to in terms of change and alteration of our imagined future bodies and selves. These technologies are not only used instrumentally but rather become participants in everyday worlds, thus going beyond their role as providers of measurements and *lifelogging* information. Similar to other kinds of media, they tend to permeate cultural and societal spheres in ways that enable them to have a coordinating function (Hjarvard 2013) and generate new types of social and technological presence (Pink and Leder Mackley 2013).

In this chapter, we address a particular kind of *lifelogging* technology, namely The Narrative clip, which is said to provide a photographic memory with minimal effort by taking a high-resolution photo every 30 seconds, thus capturing everything that is in front of the wearer without discrimination. At least every two days, the photos are uploaded to the Narrative database to be stored and processed by algorithms that group them together in moments based on timestamp and geolo-

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cation data along with various forms of machine learning processes that automatically highlight the best ones to resemble real life situations or moments. Technologies of this kind have most often been approached from a user perspective, thus overlooking how designers and developers invest their personal experiences and emotions in the technologies. In this chapter, we therefore address the question of how automatic digital photographing is imagined by its designers based on interviews of a core group of developers of The Narrative clip, and how these ways of thinking relate to the theoretical field of visual *lifelogging* as it is emerging today within mainly the fields of psychology and medicine. We conclude the chapter by proposing an alternative way of conceptualizing the user that might be more in line with the developers aspirations, hopes and anticipated futures for The Narrative clip as a technology, that would create value for the user from an embodied, situated and affective perspective.

2 Conceptualisation of lifelogging and its users within an interdisciplinary field

There is an increasing amount of literature on *lifelogging*, in which "*lifelogging* is considered to be the capture of personal experiences for personal use" (Caprini et al. 2013) and as "the process of automatically, and ambiently, digitally recording our own day-to-day activities for our personal purposes, using a variety of sensor types" (Wang and Smeaton 2013, p. 147), and that includes "visual *lifelogging* [which] is based on using wearable cameras, of which there are several examples now [in 2013] available" (Wang and Smeaton 2013, p. 147). There is also a growing range of uses for *lifelogging* cameras. Wang and Smeaton mention work related, leisure, health applications, and "applications for real time *lifelogging*" (2013, p. 148). In fact while all of these tend to involve people using *lifelogging* cameras to record their activities, these are not necessarily all for personal use, or at least not directly for personal use, as outlined above.

Much of the research published on visual *lifelogging* indeed reflects these fields of application of the technologies. In doing so it appears to itself be creating a body of literature that is defining the fields in which visual *lifelogging* cameras have potential research uses and applications, and is therefore also playing a role in determining the fields for which such camera technologies might be designed. This means for instance that the various uses of these devices and the associated data collection become part of defining the field in which designers and developers continuously conceptualise and advance the development of *lifelogging* technologies.

This is in itself interesting precisely because the existing literature in the field of visual *lifelogging* tends to fall into two camps: work by researchers who are using *lifelogging* cameras to understand a particular social or psychological research question; and researchers who are using *lifelogging* cameras in order to understand user experience—and user needs—and the implication of this for *lifelogging* design. Within these two camps, visual *lifelogging* technologies have at least four sets of possible users due to their increasing application across certain research fields. That is: researchers who use *lifelogging* cameras as research tools; people who participate in their projects as potential users of *lifelogging* cameras, perhaps for clinical or work-based reasons; people who participate in research projects using *lifelogging* cameras for research-based reasons, e.g. to research or understand human interaction or people's everyday life habits for academic reasons; and people who we might refer to as everyday life users who are studied by researchers as a potential market for domestic (as opposed to research-based, clinical or other) uses of *lifelogging* cameras.

Existing articles that report on the use of such cameras in research tend to highlight issues, including light levels, and loss of data through low image quality, as well as the issue of data management and treatment. For example, Oliver et al. (2013), who reported on the use of the SenseCam in a study to record individual journeys. On the basis of this study, they suggest that "Research is now needed to determine criterion and predictive validity of SenseCam image coding of environmental features over a range of settings and situations". They note that manual data coding is time consuming and suggest that "automated concept detection techniques need to be extended to identify environmental features of interest in future research with larger sample sizes" (Oliver et al 2013, p. 6). Another example is from the field of research on dementia, where it has been found that "HDMs [Human Digital Memories] are already offering promising results in aiding dementia patients in remembering the past (Hodges et al. 2006; Davies et al. 2009; Browne et al. 2011; Crete-Nishihata et al. 2012)" (Dobbins et al. 2014). However Dobbins et al. also point out that while for the users they are concerned with there has been an existing focus "on collecting and using SenseCam images in the task of recollecting such events", there now needs to be another step which would involve "incorporating more data sources, such as from physiological sensors, enables a more vivid HDM to be created, and it is posited that a greater rate of recall can be achieved" (2014, p. 228).

Others, such as psychologists who practice "subjective evidence-based ethnography" (SEBE) (see Lahlou, 2011; Glăveanu and Lahlou 2012), using wearable video cameras offer us a vision of the researcher as user, claiming that this method of doing ethnography had much to offer in that: "SEBE answers the old researcher's

dream of knowing what the participant thinks as he or she performs, thanks to considerable progress in wearable capture technology and some interesting characteristics of human memory" (Glăveanu and Lahlou 2012, p. 154). This, they propose, is first achieved through the recording of the activity by the participant and then by them being invited to review the recording with the researcher in a "self-confrontation" interview, where "Viewing the subfilm allows actors to reexperience the journey through their own phenomenological tunnel" (Glăveanu and Lahlou 2012, p. 154). For other ethnographers in this field the SenseCam is also useful as a photographic technology that can photograph in contexts where it would normally be too sensitive or intrusive to take photographs—for instance in "safety critical environments or environments in which sensitive activities are being carried out or where shadowing may not be appropriate (such as in funeral homes, areas within hospitals, care homes, military, police, etc.)" (Byrne et al. 2007).

In another context, researchers have explored the use of the SenseCam in the context of household use, and the implications of this for "technologies that might support *lifelogging* or the development of user-generated content" (Lindley et al. 2009). Here the users of visual *lifelogging* technologies are situated differently than those discussed in the articles reviewed above: they are who we have referred to above as the everyday users. Moreover the approach taken by Lindley et al. focuses on exploring what the SenseCam and the images produced with it can be for the households who participated in their study. They argue that in contrast to photography, SenseCam with its time-lapse image stream significantly emphasises "the changes between stills and making them the focus of attention", and they write that "One watches in anticipation of change rather than pausing to reflect on a fixed moment" (2009). They also point to the specificity of their own findings, and in doing so, the importance of understanding any findings about what people do with a SenseCam as being "as much a feature of the context in which SenseCams are used as it is of the affordances of the device itself" (2009). In this particular project, they argue that "the assortment of images taken by SenseCam could be specifically related back to one's own life, and to that of one's family" (2009). They found that a "particular type of gazing" emerged in this context which included "the enlivening of everyday scenes, the manifestation of personality, the rendering of play" and the bringing to the "foreground" of "certain image sequences". They suggest these findings have "implications that might support *lifelogging* or UGC [user-generated content]; in both cases the means of playback, and the impact that this has on what is rendered most successfully, will influence what users will wish to keep, look back on, and share with others" (2009).

Finally a further way in which developers understand the users of visual *lifelogging* is through the use of "lead users". Caprani et al. (2013) discuss the experienc-

es of "CG", a lead user who had been using a wearable camera for almost 10 years (one of the authors of Caprani et al. 2013). They describe how "Von Hippel states that lead users have two specific characteristics: (1) they are at the leading edge of important market trends, and (2) they have a strong incentive to find solutions for the novel needs they encounter at the leading edge" and claim that "The experiences of lead users are essential for the successful development and adoption of emerging products, such as wearable cameras to capture lifelog data" (Caprani et al. 2013, p. 53). While as they note the experiences of this user are unique, and indeed related to his professional interests, they suggest that "the initial experiences and datasets of individuals such as CG becomes very valuable for informing us of the long-term effects of digital life capture and provide some experiential guidelines on how *lifelogging* could progress in the future" (Caprani et al. 2013, p. 58). This how developers' notions of [imaged] users of visual *lifelogging* can also potentially be constituted through the documentation of the experiences of such individuals.

There are therefore a number of challenges for designers of *lifelogging* applications, one of which is to ensure that the data collected can be used effectively by researchers, by people who are potentially using the technologies for clinical and other wellbeing related activities or purposes, and also by everyday users for personal use. For example Wang and Smeaton (2013) discuss the various uses of visual *lifelogging* in research—such as in medical fields where for instance the SenseCam was used to create visual diaries which could then be used therapeutically for reminiscence, for lifestyle analysis, and for workplace, school and travel activities (Wang and Smeaton 2013, p. 148). As we have noted above there are various issues regarding visual *lifelogging* data management, and some specific needs that have been identified in the different uses we have mentioned. These all have implications for developers. Wang and Smeaton themselves are concerned with the particular issue of how visual *lifelogging* data can be managed, and how they can be accessed "based on their content rather than their metadata" (2013, p. 149). They seek to do this by finding a way to characterise human activity, and draw on a range of fields to do this: motivation theory from psychology and occupational therapy in relation to health and wellbeing. This led to the development of a set of categories against which they then developed and tested an algorithm to detect and categorise different daily activities. This resulted in the creation of a way to use automatic detection, leading them "to aggregate the detection of these concepts and from this to infer the appearance of everyday activities", the intention is then to use these techniques to "explore the lifestyles and behaviours of subjects in visual *lifelogging*" (2013, p. 160).

Therefore through this example we can begin to see how visual *lifelogging* applications are beginning to co-evolve not only through the identification of potential everyday users as consumers, but through research-as-use as a key element of the way in which users' needs and experiences are conceptualised in at least part of this field. This relationship between researchers, research participants and everyday users as a particular category of users for visual *lifelogging* applications invites a series of interesting questions, as we begin to consider the ways in which data is becoming part of everyday life, research, and monitoring via the same technologies. We do not address this question here, but instead build on what we have outlined above. That is, regarding the question of how the user of visual *lifelogging* applications and technologies is conceptualised and becomes part of the imaginary of developers, we now discuss empirical research undertaken with developers themselves.

While, as we have shown above, there is a growing body of user-focused research in the field of visual *lifelogging* research, and much of this crosses the fields of Human Computer Interaction (HCI) and computer science, there is however a lack of research into and understanding of the ways in which users are conceptualised within these fields. Yet, as other research has shown, research on designers themselves, particularly in the field of HCI, reveals significant insight into the ways in which cultural narratives about technologies and people's relationships to them are becoming part of the ways in which such technologies are designed.

A key example in this field is Kinsley's work which seeks "to extend work concerning geographies of technology with a detailed discussion of ubiquitous computing as a form of spatial imagining". Kinsley was particularly interested in the "future orientation within ubiquitous computing R&D [Research and Design] […] as a form of anticipatory knowledge" (Kinsley 2012, p. 1555). In the context of his empirical study Kinsley is concerned with the particular imaginary of ubiquitous computing, which has also formed part of the work of other critical literature in this field (Dourish and Bell 2011). Ubiquitous computing is indeed part of the wider context in which we can understand the work of developers in the field of visual *lifelogging* and indeed the future orientation that drives the imagination/conception? of future data management and sensor technologies that it might be integrated with. However this is not our principal empirical focus here; we are instead interested in how visual *lifelogging* technologies are understood as part of the mundane practices of everyday life and where and how developers conceptualise this.

What is relevant about Kinsley's study is that he draws together a set of empirical examples from research with designers in the ubicomp field to argue that "Ubicomp is thus an important case study in the exploration of how popular forms

of spatial imagination entangle with development techniques to produce settled means of addressing technological futures, as well as their limits" (Kinsley 2012, p. 1565). Without unravelling his argument in detail here, we use this argument to inform our approach to the question of how *lifelogging* camera developers imagine the everyday lives of their users. This imaginary is future-oriented (even if not explicitly articulated) in that, as in the examples we have discussed above, in this field there is an urge to focus on anticipating the ways in which photographs (as data) will be managed, retrieved in relation to the perceived needs of (different types of) users. Thus on the potentiality of this technology to act in/on things/persons in the world—for instance to improve memory, enhance research knowledge, or to create everyday household narratives.

Our own empirical research has advanced this question by specifically exploring how designers of an automated wearable camera imagine what human needs it responds to, and given these assumptions, how this technology can become part of people's everyday practices. To undertake to this we chose to use a small sample of designers and technologists in the core group that developed this product, so that we would be able to work in depth with three participants rather than doing a more superficial and wide ranging study. We also selected these particular participants because they were key players in the innovation process that preceded the launch of the automatic camera our research focused on. The interviews explored how underlying ideas and assumptions that refer to non-representational (i.e. tacit, sensory, habitual) and seemingly mundane elements of everyday life that have influenced the product development process.

Through a qualitative content analysis three interconnected themes emerged from the interview material. We suggest these were key in the developers' understandings of what this camera can do, and of the role it might play in people's lives—that is they show us they ways in which the developers conceptualise the potentiality of the camera. Their conceptualisations pivot around three implicit presumptions about human needs, perception and habitual practices. They produce not a coherent account of the built-in assumptions about human existence, but rather one that is characterised by contradictions and opposites. However, what is of interest in this study is how the different themes highlight tensions between what are said to be crucial features of the camera and what the underlying assumptions imply about the relationship between human bodies, minds and environment in everyday meaning making. This also brings to the fore how visuality is assumed to have become part of the process of creating value in everyday life.

The first theme gives an account of how the camera is supposed to create value for users in terms of bringing them back to a more "natural" state of being in the world, nourishing an alleged basic human need to document their embodied

presence in the environment without disruptive technologies. The second and third themes create a tension within the developers' stories of the purpose and imagined use of the camera, since the ideas that permeate these themes are, on the contrary, grounded in ideas of human existence as divided into realms of mind, body and an objective reality that exists outside of the human experience.

In the next section we discuss these themes. We then discuss how visual *lifelogging* might be conceptualised theoretically, in relation to, and indeed as a critical response to the ways in which it has been understood in the literature reviewed above and as a way in which to situate and contextualise our empirical findings. As we show later, the ways in which visual *lifelogging* is attached to certain ontologies relating to the relationship between mind-body-environment, and the visuality through which this relationship can be perceived, specifically impact on the experiences of visual *lifelogging* camera users (and on how they can be thought of). This, we argue has implications for how we, as academics, understand visual *lifelogging* and its potential as a research tool, and for how *lifelogging* cameras might become embedded into the routines and habits of the way people live, as everyday life technologies.

3 Thinking like a lifelogging camera developer: themes and perspectives

3.1 Theme 1. Documenting a lived and embodied world

The group of developers we interviewed were very clear that besides an obvious economic interest there is a strong emotional and affective motivation to develop this product, and one participant even mentioned love as one driving force in order to create genuine (i.e. basic human) value for as many people as possible. The participant told us about how they were reminded of how ephemeral their memories of their deceased parents were. The participant thus positioned the development of the wearable automatic camera in an affective, emotional and existential context. The existential dimension was emphasised in the interviews in the form of a perspective that suggested that the wearable automatic camera was part of a trajectory of a basic human need to document human presence and thereby become figuratively immortal.

Drawing on historical human activities like writing on rune stones, petroglyphs and later on more book-like documentation such as photo-albums and diaries, the camera was said by the participants to be part of a naturally occurring development of technologies that helps people to capture everyday life both for opening

the possibility of going back and reliving a moment, but also for reliving how it was to be the person that you were at the time of the documentation. One participant saw it as an "incontestable fact" that this basic human need to document one's life for future needs is "known and everlasting". The camera could in this context be seen as a device that is used for both "prolonging your life" by giving you the opportunity to travel in time and to be able to see what you did and achieved in the past, but also a device for personal development. It gives one an opportunity to both reconsider their life as less dull, but rather quite extensive and full of exciting everyday moments. It can also work as a reflective device that gives you an opportunity to think about what one participant referred to in terms of "where I am coming from, and why I think as I do know", and "what experiences I have made earlier that have formed the person I am today".

The context of the development of this camera was described by the participants as part of both other visual-based social media and a *lifelogging* movement toward the use of automatic technologies that document, monitor and expose tacit, embodied and mundane dimensions of everyday life. It was also meant to address the identified problem of doing this documentation without any hassle or irritating technological inconvenience with the product itself, and the social media through which the data could be shared. At the same time in the interviews it was stated that the development of the Narrative clip deviates slightly from the development of other available visual technologies where the photos are taken in more conventional ways and then posted on websites. With this technology the developers wanted to move toward "the origin" and the affective, with a specific urge to not disrupt the embodied sensation of being present. Therefore, according to one of the participants, using this technology is to "both be present in the moment when it happens and enjoy yourself, and at the same time feel safe in knowing that you will have photos of it later". With an automatic camera you will be free from the option of either being able to "sit down and focus on the experience of looking at the sunset or looking into your cameraphone and trying to catch it on Instagram". Thus the participants wanted to enhance the possibility to both be in the present and at the same time know that they can re-live moments by looking through the photos later and that they may also share certain moments with friends.

These emotional and affective dimensions were further elaborated on when participants spoke of the camera use as creating a good "feeling". Just by scrolling through the pictures taken during one day, one the developers explained, he caught himself smiling. Another example of the desirable affective embodied dimension of the automatic camera is caught in a story sent to the CEO of the company from a woman who had just had her first baby. She described how the automatic camera had become very important to her in her relationship with the baby since she

couldn't easily form memories due to medical conditions.. In this context the camera had become a crucial part of her everyday life in helping her to form memories of her babies first year and at the same time embed her relationship with the baby in a sense of security that it will be captioned and remembered by her future self. This story was described as one of great importance for the developers because it pinpointed some of the core values they wanted to build into the company and their product. Firstly, that their camera actually became part of people's everyday embodied experiences without having to take them "out of the moment", and secondly that it would make a fundamental difference in the way it afforded how people make meaning of these experiences.

As states above, the automatic camera is said by its developers to enhance the possibilities for users to become more present in the moment and still have the advantages of having it visually documented. However, as we can see in the two themes below, the idea that the camera will enhance an embodied and emplaced feeling of presence in the moment is contested by two specifically implicit presumptions that separates the body from the mind and the surrounding environment. Firstly, in the stories told by the developers there is a recurring notion of a disembodied cognitive memory that can be supported, mimicked and to some extent replaced by this technology. Secondly, the narrative about how the wearable camera will create value in people's lives is permeated with the conception that there is a more real or authentic life embedded in daily routines and habits that can only be conveyed through the visual evidence produced by the automatic cameras. These two themes are further described below.

3.2 Theme 2. The idea of a cognitive disembodied memory

A recurring theme in the interviews when discussing the relationship between the camera and the body is how it is connected with remembering and memories. Indeed, as one participant expressed it, the core purposes were said to be to "capture memories, capture what you experience in a convenient way". This was specifically articulated in the suggestion that the camera could help users to develop a literal "photographic memory". According to this understanding, memory is mainly construed as a cognitive process situated in the brain, a process that the use of the camera can enhance. The designers spoke about automatic photographing as something that could support the memory, without replacing it, and that the best way to do that would be to understand more about how the memory works and to "create a parallel memory". Such a form of memory was moreover conceptualised as "structured in your head" and corresponded with the idea that the software used

together with the camera would have a similar structural relationship to each other. By extension, handling and sorting of pictures from the camera would make it possible to search for the memories in the same way the pictures can be searched for in the software, given that the technology was understood to mimic what happens in the brain of the user when remembering events.

Thus, following this perspective the use of the camera would not replace the other impressions that users would gain from their experiences, but instead help the user to invoke them. In this way, the camera was understood as a device that makes it possible to not only for users to document what they are doing but also to remember things without putting any effort into doing the actual documentation that invokes the memories. Here visual documentation was very closely tied to the idea of memories and the to idea that the day one would also capture all those moments that have been meaningful to the user in some way through the visual log. The camera was thus seen as a means of extending the memory, to create opportunities for the user to be able to remember more than they would have without the camera.

Even though there was a clear understanding that the pictures taken automatically by the camera invoke memories, the pictures were also described as authentic accounts of what actually happened without the blurring of meaning through a subjective embodied interpretation (see more below in the next theme). As one of the participants said, "you'll capture the honesty in your life. You get people's true facial expressions". At the same time memories were described as happening as a cognitive process of interpreting the personal experience, since "you won't remember your memories. Every time you think back on something, a new memory is registered of this event. It becomes a game of "telephone" with yourself".

Here therefore we see that the developers did not construct a relationship between the documentation as data-memory and the human mind and body. It would be when the human mind was brought together with the data-memory that actual (human) memories of embodied experiences and emotions could be accessed.

3.3 Theme 3. The possibility of a more authentic and real world outside the body

Another recurring theme in the interviews was the developers' idea that the camera allows users to become present in their everyday lives by providing access to certain dimensions of daily routines and habits that would otherwise be forgotten or simply not registered. This notion of everyday life as consisting of different pathways or layers, only some of which would usually be visible or accessible

for users, is important for the design of the camera. The designers interviewed in this study frequently returned to the idea that everyday life contains something concealed or overlooked that could not only be revealed but could also prove to be valuable for understanding and interpreting our everyday life experiences beyond the habitual and routinised. These dimensions are thought of as more or less concealed by the fact that everyday routines and habits and the impressions one gets from day to day are taken for granted. The camera is assumed to bring those dimensions into the open which would render the routinised and habitual increasingly meaningful. However, there is more to the picture than simply an understanding of everyday life as layered this way. The concealed dimensions of everyday life are often argued to provide a sense of authenticity. By looking back on what "actually" happened it is thought to be possible to have an understanding of one's life that goes beyond what is habitually perceived and felt. One of the interviewees explains this view at length in the following quotation:

> "Say that the product is used for a week. You use the product everyday, extract the pictures everyday and then you look at them. You might not necessarily think that you have done anything particularly special these weeks. The pictures are uploaded during the evening and you know 'I was at work, I met my colleague, I did all that"[…] It is fun but not very very exciting. It becomes valuable when you start scrolling back in history. I remember what has happened the last week and seeing that doesn't give me much value. But when I start browsing back in history […] If I scroll back to what happened a year ago I would see […] The pictures awaken my memory really quickly. I don't even have to stop at any particular pictures but simply scroll through them and I'm taken back to the moments I had and I even remember that when they were first downloaded I thought they were like "just pictures you know". But NOW they prove to be so much more valuable to me since they kind of let me go back to all those things and I can see that even if I think that my life is boring and mediocre […] You know, I think that I should go abroad and travel once a month […] But when looking through the pictures you see that I meet so incredibly many interesting people and we prepared all these fantastic meals together or whatever we did. Kind of like that. It becomes much more fun and you appreciate your life much more. You can kind of see what you've actually accomplished."

In the account above, it is clear that the camera is thought to automatically record what "actually" happened without any effort from the user. The interviewee explains that this is a way of taking the documentation of everyday life to the "next level" by not, as would be the case with other photography applications and technologies, focusing on highlights. This matter is important to the case that we are studying since it relies on an understanding of everyday life as containing dimensions that could and indeed should be revealed in order to make it mean-

ingful. There is a certain kind of assumed authenticity involved in the ways that the camera is discussed. On a number of occasions, the interviewee returns to the idea that it captures "what actually happened (…) kind of what is real". In this way he considers the camera as allowing us to understand "the honesty of one's life so to speak" since it captures "people's real facial expressions" while also including the wearer of the camera into the picture. Going beyond the picture as something composed and staged is thought to make it easier to highlight those "real" and "honest" dimensions of everyday life that are supposed to be found in the habitual and routinised patterns of everyday life.

A similar thought is express by another interviewee when discussing the camera as a being a "time machine" that allows users to see and reflect upon their past in order to "prolong their lives" in different ways. This idea has been built into the design of the camera since, as he puts it, "we can never know what would be important to capture in a picture until afterwards". There seems to be a notion here of an everyday life that is always at risk of disappearing, of moments in life that are important but that could be left without attention and remembrance. The interviewee underscores that this is something that one should be anxious about since there is always a risk that we could miss or forget about moments that will not come back. The notion of the camera as a time machine is interesting but it is important to note that it is assumed to transform the unseen past into a perceived present through which the future can be approached and imagined. The camera is not only thought of as bringing back memories and unnoticed moments but also as a means for altering habitualised patterns in different ways. It might be, as one of the interviewees suggest, calling an old friend or otherwise improving one's life. In his view the camera can make us act in ways that "kind of don't have anything to do with the pictures". These accounts point towards an understanding of the camera as a device that does not reveal concealed dimensions of everyday life. Accordingly, they suggest that these dimensions are key to a certain form of authenticity that are to be found beyond the routinised and habitual patterns of everyday life. By taking notice of what is believed to "really" happen in life, it is assumed that the lives of users could possibly become something else and allow us to approach the future differently and in a more "authentic" way.

4 Perspectives on visual lifelogging: an alternative theory

In this chapter, we have, so far, examined how the user is conceptualised in relation to visual *lifelogging* in the published work of developers and researchers, and in the last section in the interview narratives of developers. The literature discussed

at the beginning of this article offers us some insights into how visual *lifelogging* and automated camera users are imagined and designed for. As we outlined, it offers us a range of visions of the user, ranging from everyday users who wish to use automatic photography in their everyday lives, to research participants who have particular clinical or mobility needs, to researchers themselves. Yet this existing literature, situated as it is in the context of discussions on experiments of technology use and what can be done with them, and how they might be "improved", tells us little about—and indeed largely lacks—a discussion of how these technologies and their users might be understood in relation to theories of vision and of practical activities in the world. Where it is theoretically and methodologically motivated, the work we have discussed is largely influenced by psychological approaches via activity theory (Glăveanu and Lahlou 2012) and theories of human subjectivity (Lahlou 2011). Such approaches claim that via the use of *lifelogging* cameras such as the SenseCam, we are able to gain closer insights into other people's subjectivity—and thus into their experiences of everyday activity—than we would otherwise be able to gain without such technologies. Indeed, this is also in line with how the designers and developers in this study conceptualise body, mind and environment as separated, as shown in the previous section. There seems to be certain ways of imagining and talking about users of the *lifelogging* equipment that is related to the theoretical traditions that underpin both research and practice in this field. But there are also tensions where different ways of thinking about the relationship between body, mind and environment collide and contradict each other. That leads us to conclude that the ideas discussed in the first theme, that are based in the developers' personal experiences, aspirations and hopes for what their product will achieve, is in need of alternative interpretations and concepts. Ideas of an externalised cognitive memory and digital photography as visual accounts of an objective world might not be very well suited to capture the complexities of talking about how to enhance the possibilities for embodied appreciation for mundane moments in everyday life.

Based in the findings, we would like to propose an alternative route to understand and theorise the subjective experience of using the automatic wearable camera that deviates from psychological theories used by Lahlou (2011) for example. As Pink has pointed out elsewhere "It would be difficult to argue with the idea that we might achieve varying grades of closeness to other people's experience. Yet it is difficult, if impossible, to determine how we might actually measure these forms of closeness" (Pink 2015). Pink goes on to suggest that an alternative way of understanding what visual *lifelogging* technologies actually do and/or record is to go beyond the idea that they are simply products of observational data, and to consider their potential in relation to theories of movement and place. The key

point we take from the present discussion is connected with the literature reviewed above, in that most of it referred to the ways that images are produced by people as they move through the world and as they experience (and are part of) particular environments. Pink suggests that "Such visual materials can offer us ways of (more literally) reflecting on the situatedness of other people in specific environments/ecologies of place" and suggests thinking of the images that are actually produced in ways that go beyond being data on the observational and representational world that is in front of the camera. Instead she proposes that "the camera records in part a trace through the world that is made not simply of what is in front of the camera but that is forged as the holder of that camera makes their way through and in the world" (2015). This indeed invites us to re-think the concept of the user as personified in the literature reviewed, towards a more anthropological notion of the individual as continually part of, implicated in and constitutive of a continually changing environment (see for example Ingold 2000, 2010). Following this perspective we can then think of *lifelogging* cameras and the images that they produce as being beyond technologies that "capture" and beyond being representational texts that are only interesting for what their content tells us. Instead, this approach allows us to begin to consider visual *lifelogging* as a technique for an embodied and affective way of biographically engaging with the environment in ways that "take in" not just what can be seen—the content that can be detected—but what surrounds what is seen, and indeed what constitutes what is seen but that cannot itself be seen or recorded.

Indeed if we follow the work of anthropologists who suggest that humans continually learn as they move through environments, and that they come to know in new ways (e.g. Harris 2007; Ingold 2000)—that is as part of an incremental process of becoming through life as it is lived—then we could argue that it is precisely this that visual *lifelogging* cameras record. They do not of course record all of it—there is no holistic form of recording (or researching) that can ever be satisfactorily achieved. However the use of such cameras records a part of this.

5 Conclusions

Our findings suggest that the Narrative clip is imagined by its developers as a device that, when it is attached to a human body, produces a shift in agency. There is a strong sense of an assumed authenticity in the ways that the designers frame the camera; as if there were actually a recordable world out there and as if that actually would add to the authentic picture of everyday life. Or perhaps: that the camera allows us to gain access to what is perceived as authentic. The human actor as a

spectator in everyday life is assumed to give up the embodied and emplaced gaze by which he or she interprets what is going on in the particular context that affects the way technologies and the produced visual material are both imagined and treated. Through the use of these devices, an idea of everyday life emerges that the fleeting "magical" moments of our lives are recordable, re-liveable, re-presented and remembered through the use of these technologies.

However, the findings also show that there is tension between how the body is rendered by the participants as both the primary source of experiencing and embracing the moment and as an obstacle that gets in the way for cognitively making meaning of the past experiences in everyday life. Thus, only an automatic camera can produce evidence or invocations for what actually happened which can be remembered through a cognitive process of structuring memories around the produced photographs. The tension becomes evident as an ontological question if the environment is something that is there to objectively be observed and looked at, or as one to be embodied and lived-in. These different angles to look at the relationship between the body, mind and environment also create different possible routes to develop a visual *lifelogging* device. They also provide different ways of thinking about how to develop means for how these devices create new forms of reflexivity by allowing users to review, edit, remix and also submit fleeting moments of their personal past.

Finally, we would like to suggest that the use of *lifelogging* cameras offers an alternative way of approaching meaning making in everyday life from an embodied perspective. This simultaneously means re-conceptualising the use of visual *lifelogging* cameras as part of people's ongoing practical, sensory and emplaced activity, in the world which such activity plays a role in making.

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Deathlogging: Social Life Beyond the Grave

The Post-Mortem Uses of Social Networking Sites

Hélène Bourdeloie and Martin Julier-Costes

"*Lifelogging*" refers to the saving and archiving of data concerning one's own life. With the rise of online social platforms, this practice is very much on the increase. Echoing this trend, questions now arise about the status and future of post-mortem digital identity in the experience of the bereaved. These are questions underpinning an ongoing research project in France[1] that we are currently working on and which forms basis of the present study.

In France, there have been relatively few studies on the persistence of these online "traces" of deceased Internet users, be it the automatic messages from their email account or Facebook profile or those sent by close friends and family to their account or profile, the creation of dedicated websites (blogs, virtual cemeteries, memorial websites, etc.), the uses of such post-mortem social data and the way these affect the mourning process. Although the literature on the subject abounds, notably across the Atlantic (Bubaker and Vertesi 2010; Brubaker and Hayes 2011; Brubaker et al. 2012; etc.), this paucity of studies likely hangs on the fact that digi-

1 Project ENEID Éternités numériques (Research partners: Université Sorbonne Nouvelle Paris 3, Université Paris 13 Nord, Université de Technologie de Compiègne; coordinator: Fanny Georges, Université Paris 3), funded from 2014 to 2017 by the Agence Nationale de la Recherche: http://eneid.univ-paris3.fr.

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tal platforms dedicated to mourning and remembrance are a recent phenomenon in France,[2] where death has long been a taboo subject (Clavandier 2009).

In the Anglo-Saxon world, many authors (Brubaker and Hayes 2011; Walter et al. 2011) have observed that "SNSs [social networking sites] provide a platform both to express grief and by which survivors can maintain connections with the deceased" (Brubaker and Hayes 2011). In line with these works—and contrary to the writings of the French anthropologist L-V. Thomas (1975) and others who uphold the theory of the social denial of death (Ariès 1982; Lafontaine 2008)—we contend that, far from inducing anonymity, digital media highlight the individuality of the deceased and make mourning visible in the shared arena of cyberspace. This allows the living to ensure a continuing relationship with the dead, in a context where the overriding sentiment is one of loss.

In Western society, where people are hyper-connected and individualism is more forcefully expressed, the question of deathlogging (i.e. the digital persistence of deceased persons) and the uses of the data related to post-mortem digital identity are felt all the more keenly. On the basis of preliminary results from some ten interviews[3] with deceased persons' family and friends, as well as observations of their digital traces,[4] we first explore how technical innovations such as memorial websites, SNS memorial accounts, etc. affect the mourning process and enable the bereaved to re-establish a relation with the dead. More specifically, we show that with the use of social networking—which provides a framework conducive to the expression of both private and communal grief—death has ceased to be distant. In fact, as the deceased is digitally present, social networking sites help to combine mourning and mourning rituals with everyday rituals. The former are being integrated into a ritualized quotidian (Javeau 2006) and thus the dividing lines between the sacred and the profane are being redefined. Secondly, we describe the three broad categories of use and non-use that we have identified, but present them here as exploratory findings.

2 According to our 1999 research, the first web-based initiative affecting mourning practices was implemented by Monegasque funeral-home owner who developed funeral services in France so as to avoid the high cost of such services in Monaco. Memorial websites such as virtual cemeteries only made their appearance about ten years later.

3 These interviews, which are part of an ongoing project, were conducted in several cities in France from October 2013 to November 2014.

4 The bereaved accepted us as "friends" so that we could log on to the pages dedicated to the deceased.

1 Mourning and Online practices

Before we proceed with our analysis, it must be understood that we view the relationship between technology and society as being mutually constructed rather than deterministic. This means that digital technologies *per se* do not modify the relationship to mourning or to the associated social rituals. Likewise, social structures do not determine the configuration or functional framework of socio-technology. In light of this, what needs to be taken into account is the social and technological context in which online social platforms emerge, as well as the appearance of *sui generis* practices. These practices are developing in modern post-industrial societies, where social structures are fragmented (Walter 2007) and where traditional socialization frameworks are less influential (Giddens 1991) as they are now in competition with a growing individualism. Such conditions are conducive to a process of individuation that enables the individual, more cut off from tradition, to construct his or her identity (ibid.) and establish social ties more freely. To fully understand these new online mourning practices, the specific social, cultural and religious contexts of the society in which the mourning takes place must be taken into consideration. As T. Walter (2007) has shown, mourning practices are more private in some societies, in England for example, and more collective in more traditional societies such as Japan. These practices are not only culturally rooted but also historically contextualized at a demographic, social, and technological level (Walter 2013). The author identifies four broad developments in mourning practices in the Western world: in the first pre-industrial phase, grieving is shared among members of the family and local community; in the 20th century, the expression of grief becomes a private matter; then, in the late 20th and early 21st centuries, grieving becomes public, with mass media coverage in the case of celebrity deaths, although for the bereaved themselves the actual experience of grief remains intimate and private. Finally, in the recent age of Web 2.0 technology, the pain of grief is once again shared and can be lived in both a private and collective manner.

1.1 Death in the Digital Era: visibility replaces denial

In Western societies, death has been a long-standing taboo. According to the anthropologist L-V. Thomas (1975) and the historian P. Ariès (1982), death has been the object of denial. In other words, death has been separated from daily life and de-ritualized, chiefly due to the increasing pace of scientific progress and the decline of religious practices. A similar reasoning holds that other phenomena have also contributed to this denial of death: urbanization has weakened social ties and

the sense of identity, homogenized certain values, diversified the locales associated with dying (home, hospital, crematorium, funeral home, etc.) and led to a form of anonymity (Elias 2001). The conjunction of the de-ritualization and de-socialization of death has led to the "privatization" of grieving and thus to the elimination of all visible signs of death. This death-denial thesis persists, especially in France, but is nonetheless being challenged. Although many researchers still point out the disappearance of "traditional" mourning rituals and the collective management of the symbolic and sacred aspects of mourning, others note that such rituals have shifted ground (Walter 1991; Déchaux 1997; Clavandier 2009; Julier-Costes 2011; Roudaut 2012), changed form (Péruchon 1997; Déchaux 1997) or been created afresh as in the context of AIDS for instance (Broqua and Loux 1999). Alongside religious actors, other actors such as funeral professionals (Bernard 2009) and professional careers (Schepens 2013) played an increasingly important role during the 20th century. As a result, they have been instrumental in redefining the French social, cultural and religious context that frames the experience of grieving, with online social platforms now also contributing to the redefinition of this experience. As these have brought death back onto the social stage, they encourage tighter bonds between the bereaved and their departed close family or friends (Brubaker et al. 2012; Church 2013; Walter 2013) and reconfigure the relationship to former mourning practices, which were frowned upon and seen as morbid (Clavandier 2009). This prompts us to reconsider the thesis of the social denial of death, as the Internet is clearly a space for the *mise en scène* and celebration of the deceased (memorial pages, virtual cemeteries, video tributes on Dailymotion or YouTube) and where messages from the living to the dead are made visible. Far from making the deceased anonymous, these online social platforms help to make them unique, operating the logic already at work in their socio-technical framework. This framework is basically expressive, as in the case of SNS memorial pages or participative virtual cemeteries, and thus encourages expressivism[5] (Allard 2008): through their actions, the living contribute to performing both their own identity and the post-mortem digital identity of the deceased. Moreover, online social platforms help to restructure the mourning process insofar as they transform the rituals for separation from the dead and the painful experience of death. Yet, they also complicate the "mourning process" in that they create mourning rituals that are embedded in the rituals of everyday life; messages from the living in tribute to

5 The term "expressivism" appears in the works Laurence Allard, in France, who drew inspiration from the Canadian philosopher Charles Taylor (*Sources of the Self: The Making of Modern Identity*, 1989) concerning the origins of contemporary individualism, especially the expressivist current of the Romantic period.

the deceased arrive in our inboxes along with other emails. In fact, just as many studies on Internet usage produce conflicting results—for example, some studies on social bonding find increasing social isolation in the social Web age, whereas others observe the increasing size of social networks (Grossetti 2014)—research results concerning online mourning rituals also come up with conflicting findings. For instance, SNSs can have a function of resilience and provide some people with a comforting presence and a way of working through their grief—which means facing the reality of death and expressing their grief in line with the cultural context to which they belong (Baudry 2003)—whereas for other people, the SNSs actually hinder mourning and prolong grief (Brubaker and Hayes 2011). Another point of divergence concerns the phenomenon of individuation, which some authors associate with death-related practices (Walter 1994; Green 2008). For T. Walter, these practices are individualized and "intimized": the role of the community and traditional ritual declines (Walter 1994). Intimacy replaces community and, as rituals are erased, grief becomes difficult to express (ibid.). This analysis is in line with the theories that affirm a growing individualism in our modern post-industrial societies and highlight its beneficial side (Giddens 1992). However, when analyzed in light of social networking, this type of diagnosis is not entirely robust. Online social platforms, be they generalist SNSs like Facebook or memorial websites, allow for public expression of grief since, like a grave, they enable death to be individualized within a collective, shared space such as a Facebook or MySpace profile[6] (Brubaker and Vartesi 2010; Brubaker and Hayes 2011). Indeed, many studies (ibid., Church 2013) have shown that SNSs enable grieving to be experienced both privately and collectively, and even at a community level: "Interactive Web 2.0 social network sites (SNSs) have enabled mourning once again to become a community rather than a private experience—for both better and worse" (Walter 2013). Since SNSs heighten the presence of death, it is no longer possible to make it a taboo topic. As these sites encourage expression, they enable the bereaved to express themselves freely and subjectively, given that mourning rituals are no longer a collective matter as they are in traditional mourning practices.

6 Before Facebook introduced memorial accounts, MySpace created MyDeathSpace.com in January 2006, with a map of the United States marking all deceased users' MySpace accounts. Most of them mark the tragic deaths of young individuals. Visitors can follow links to articles, photographs or commentaries to learn about the circumstances of a death (cf. http://www.salon.com/2007/07/31/deathspace/). On this count, Mydeathspace.com and Facebook are digital "*memento mori*" reminding Internet users of their own mortality.

1.2 Post-mortem digital existence in question

In hyper-connected societies, the usage of digital technology is difficult to avoid. Since digital technology incorporates traceability functionalities and most people now have traces on the Web, sometimes against their wishes, post-mortem digital life is becoming a salient issue. Moreover, as online practices now support the West's cultural, informational, relational and leisure practices, the use of digital technology when someone dies is almost impossible to avoid, if only for practical reasons (e.g. death announcements: Pène 2011). During one's lifetime, online self-exposition has become so ubiquitous that people who are invisible on the Web become suspect. The self-exposition made possible by online social platforms has radically changed the cleavage between the public and private realms. As Cardon (2009) states: "from being interpersonal and secret, private communication becomes public" (Cardon 2009), as do the boundaries of intimacy for the living (Tisseron 2001; Cauquelin 2003). In fact, these platforms are helping to redefine the intimate—which is not to be confused with the private, as intimacy is a social construct (Baudry 2010). This is also the case for the frontiers between life and death (Schepens 2013), which become more blurred with SNSs as these tend to cloud the reality of a loved one's death. This is even more true when a person's death has not been reported to the digital platform, which is programmed to invite family and friends to interact with the deceased (cf. infra). Moreover, given that any publicized digital trace concerning the deceased could prompt anyone who so wishes to take on management of the symbolic (e.g. when a dead person's cyber account is kept open for tributes), digital media re-introduce mourning into social life and help to shift the dividing lines that formerly set apart what was taboo. These online platforms also transform the frontiers of mourning rituals insofar as their ubiquity now means that death is no longer assigned a specific status or specific location (Clavandier 2009) as in the past. In fact, whatever happens to a deceased's digital data, their traceability has an impact on the memorializing process (Merzeau 2014) and the social mourning process (Wright 2014), given that family and friends cannot overlook this traceability. On the one hand, the so-called "right to be forgotten" (i.e. the possibility for Internet users to have their personal Web-indexed data deleted during their life time) also applies to deceased persons. For living users, removing such traces requires determination, money and know-how (Merzeau 2014), and the same is true for the deceased person's family and friends. They are obliged to give the Web service providers proof of their relationship with the deceased in order to have his or her traces removed. Besides, the question of legal ownership of digital assets is a salient issue. In France, the Commission Nationale de l'Informatique et des Libertés (CNIL), whose role is to protect per-

sonal data and individual liberties in the digital world on French territory, is not authorized to bequeath digital assets: "The law does not provide for the transfer of the deceased's rights to his or her heirs: an heir cannot therefore, under the Data Protection and Civil Liberties Act, have access to a deceased person's data. The law, however, authorizes the heirs to take steps to update information concerning the deceased (registering the death, for example)" (CNIL 2013, p. 74). If a deceased user has made no provisions, the CNIL moreover recalls that it has no "remit to arbitrate the balance that must be found between the need to delete all traces of post-mortem identity and the wish to reach digital immortality by continuing to keep the identity alive beyond death" (CNIL 2013, p. 74). This question of "digital death" has nonetheless been taken in hand by the major Internet companies. Facebook pioneered reflection on the subject by creating memorial accounts in 2009 and several other Web companies have since followed suit. Google, for instance, has launched an "Inactive Account Manager" permitting an entire account and its contents to be bequeathed to a third party. In this area, the Internet companies generally prefer to abide by the legally recognized principle of filiation—most often biological—, without taking into account[7] either the deceased's personal wishes or the fact that the latter would not necessarily have shared their intimacy—as they do on SNSs—with their heirs; family ties and emotional ties do not always coincide. The deceased would not necessarily have wished for what often serves as a digital personal diary to be communicated to their heirs. Besides, this legacy may be disturbing for some of the bereaved should the family decide to delete the deceased user's account, thus removing all of their conversation threads and group of friends. Conversely, keeping a deceased user's traces may also be disturbing if the heirs transform his or her Facebook account into a memorial account. Indeed, this situation limits postings to those who were already his or her Facebook "friends", and digital friendship networks do not always reflect traditional friendships.

On the other hand, if the bereaved take no action to remove the deceased's digital identity, either because the procedures are not known or filiation is unsubstantiated, they will have to resignedly accept this digital persistence. They may then

7 Facebook states: "After someone has passed away, we'll memorialize their account if a family member or friend submits a request" via a completed form. Proof of death is said to be optional. However, in the cases we studied, it was the family that requested the deletion or memorialization of the account. In fact, users are not always aware of this option (half of the respondents were unaware of this). And when friends are cognizant, they sometimes feel that they cannot legitimately make the request. Finally, we were unable to carry out a test as we did not know anyone who had died, but many press articles circulating on the Web give mixed opinions on the subject, some affirming that only deceased's beneficiaries can make this request.

be exposed to the violence of programmed algorithms that often fail to distinguish between living and dead users. One case in point is Facebook's "Year In Review" app, which proposes its users a review of their year 2014 in selected moments they shared on their profile and which extracted the photo of one user's daughter who had died a few months earlier.[8] Similarly, some still "active" profiles,[9] continue to exist as if the user were still alive. This creates a somewhat strange situation as Facebook proposes sending out a friend request to a deceased person, reminds us of their birthday or suggests that we insert a photo of our profile following a friend request to the deceased. For example, a banner at the top of our Facebook account says "Help Vincent Guilpin [deceased] to recognise you". These examples illustrate the unease that mourners may feel (Pène 2011) and also point to a potential clash between the actual reality they experience and what algorithmic reality shows them—which fuels tensions between technology and human sensibility (Dauphine et al. 2014). The question thus arises here of confronting practices that are *a priori* conflicting: on one hand, the relationship to the pain of grief; on the other, the relationship to technology, seen as inhuman, "cold" and governed by computation.

2 Reconfiguring the mourning process in the digital age: disconnecting and online practices connecting with the dead

In order to better understand online practices of the bereaved regarding their deceased loved ones, this study has identified three different types of memorial sites: a group of sites memorialize the deceased (virtual cemeteries); a second group of sites enabling changes to the deceased user's pages (e.g. Facebook's memorial accounts) and a third group of sites that allow individuals to prepare "their digital legacy" during their lifetime (last message service, digital locker, etc.) (Georges and Julliard 2014). Drawing on this typology and the fact that uses also depend on a platform's affordances and presentation options and formats, we focus here on the first two groups of websites. On the basis of our preliminary observations, we were able to identify three broad types of use and non-use: disconnecting with the deceased or the removal of his or her traces (1), creating

8 Peterson A. (2014) Facebook's 'Year in Review' app swings from merely annoying to tragic. The Washington Post. http://urlz.fr/1pUB. Accessed 03 Dec 2015.

9 Deceased's profile: https://www.facebook.com/vincent.guilpin.

specialist online memorial spaces (2) and setting up new digital-age mourning rituals and forms of expression (3).

2.1 Disconnecting with the deceased and removing their traces

Swamped by prompts from social networking sites to log on and provide identity data or simply preferring traditional mourning rituals, people may choose to disconnect (Jauréguiberry 2014). Disconnecting is to be understood here in different ways: suffering from the effects of "generalized connection", mourners may deliberately decide "to limit the negative effects by not using the Web" (ibid.). But they may also wish to disconnect more specifically from the deceased and erase his or her digital presence. In the first case, this may involve wanting to escape the everyday routine of information and communication technologies, which epitomize the materialistic side of life, in order to engage in more spiritual forms of mourning. In the second case, disconnecting with the deceased may involve removing all of their digital traces (Facebook account with its list of friends, telephone numbers, emails, text messages, etc.). Indeed, digital and mourning practices do not necessarily go hand in hand. The discourse of some respondents sometimes reveals a hierarchy between traditional and online mourning practices: the first belonging to the sacred sphere and the second to the profane. This is what is in question when the bereaved wish to remove the deceased person's digital traces or, when unable to do so, they prefer to avoid all digital traces of the person. The reasons may be religious (e.g. human representation is not accepted in Islam). They may also relate to ritual or tradition in the sense that some respondents think that online mourning practices cannot replace traditional practices. Although the two types of rituality are complementary, the importance of digital forms can nonetheless be observed (Odom et al. 2010; Wright 2014).

Mixing the sacred and the profane

As hybrid spaces, online social platforms not initially designed for memorial purposes bring together the realms of the sacred and profane, a mixture of genres that poses an obstacle for family and friends who sometimes resist using memorial SNSs. As the comments posted there sometimes evoke a mundane and materialistic world, they may seem at odds with life beyond the grave and the sacred dimension of death. The interviews and observations of the accounts also bring to light an expiatory exuberance. Objections are voiced regarding the excessive nature of some

postings that resemble a show of suffering or exercises in hyperbole (e.g. poetic messages) or, on the other hand, the "obscene" or "disrespectful" (sic) nature of others. For some respondents, this online posting can turn into a "competition". Judith[10] (student, age 24), for instance, deliberately deleted her friend's Facebook account from her list of friends three months after his death; the excessive messaging on the deceased's account placed her in an awkward position: "for me (…) I found it totally bizarre (…) to post messages on his wall when he was dead (…) it was a bit like an outpouring (…) I had the impression that there was a sort of competition to see who could be the saddest, who would be the most unhappy after Vincent's death". Sofiane (advertising space seller, age 26) also deliberately stopped connecting to the profile of a friend who had died in Australia, with the same feeling that there was a show of sadness that initially gives solace but then quickly places the bereaved in an awkward situation. Talking about his friend's Facebook account and the many messages posted after his death, Sofiane explains: "At the very beginning, me, I thought it was fine, it enabled me to meet lots of people on Facebook (…) to see lots of solicitations, positive sentences (…) When I began to notice this one-upmanship for sadness, me, I felt disgusted and at that point, didn't go onto his Facebook account any more, and also because it was hard for me to grieve because of this bullshit (…) So of course, to make things clearer, it wasn't easy with Facebook (…) at that point, I saw the unhealthy side of it". Yet, this excessive sadness, judged as inappropriate by some respondents, is not unlike the highly ostentatious codes formerly observed for funerals in France with their public, grandiose and demonstrative ceremony (Clavandier 2009). The show of grief on SNSs is also reminiscent of the social dimension of mourning—as it was at least until the 1960s (ibid.). This social and expressive dimension is reinforced by online platforms, which make mourning a public affair (Walter et al. 2011). The comments of a 23-year-old student who had lost her younger sister concur with this view: "(…) we removed it last year. When she died, we wanted to remove it, but (…) people in her class had just posted some supportive messages for my family and me and they put prayers on: the teachers also left messages there. So we decided to leave it, it was comforting (…). After, it started to run out of steam, nobody was posting messages and even though it was comforting at the beginning, it was preventing us from moving on to other things, especially my mother". These accounts confirm that online memorial spaces may have the effect of prolonging grief (Brubaker and Hayes 2011). On the other hand, these new online rituals clearly have a cathartic function, akin to the rituals of the past (Clavandier 2009). These users' behavior thus needs to be interpreted in the light of the grieving process as an act of sepa-

10 We have used fictitious names for the respondents.

ration. At the outset, we see the deceased persons' accounts are very "active" following their death or when calendar events such as birthdays or death anniversaries come round; and that postings fall off over time, a trend that concurs with previous research findings (Brubaker and Hayes 2011). But it is tempting to interpret this diminishing number of postings with respect to the "nature" of SNSs, where the on-screen presentation positions posters within a logic of calculation, showiness and output (Cardon 2009). It is equally tempting to examine the production of tributes in relation to a form of narcissism, self-measurement and personal performance. When mourners make themselves visible by posting tributes and a proliferation of comments praising the deceased, not only are they keeping the post-mortem digital identities alive, particularly the "acting identity" (Georges 2011) through the traffic on the account, but they are also constructing their own identity.

Biological death as opposed to the social persistence of post-mortem digital identity

The reasons for not using digital technologies in a mourning context may also depend on the painful feelings elicited by a post-mortem digital identity. The deceased person exists on-screen in texts, images, sounds and "movements" due to the traffic generated on memorial spaces, whether or not these are specialist sites. While this gives the impression that the person is continually active (Brubaker and Vertesi 2010), this presence can never replace the physical presence of the living person. In fact, the hardship stems from having to come to terms with the separation due to biological death and, at the same time, adapt to digital immortality, should digital traces persist and adversely affect mourners not "authorized" to remove them. As Web technologies affect social and not biological death (Odom et al. 2010; Walter et al. 2011), the bereaved are left with the feeling that they can socialize with the deceased eternally. Christine (age 53, currently unemployed) cannot bring herself to visit the Facebook profile of her daughter, who committed suicide at the age of fifteen, even though the profile is extremely active being regularly updated via messages from friends. Finding it too "alive", the respondent chose to unsubscribe from the news feed of her daughter's friends, using Facebook's "Unfollow" option to stop receiving messages about her deceased daughter: "I removed them from my news feed (…) because, well, it's too painful for me. So I never go and look at their walls". Likewise, she no longer visits the public page created by friends as a tribute.[11] To avoid mixing genres and the dissonance between

11 cf. http://urlz.fr/1pVf. All the account profiles studied were in French (some had comments posted in Arabic).

a person's biological death and their still active digital account, others choose to create dedicated memorial sites. These may be of three types according to the typology referred to earlier: websites allowing tributes to the deceased, that is, virtual cemeteries; existing profiles transformed into a memorial account as in the case of Facebook,[12] or community pages dedicated to the deceased via Facebook.

2.2 Creation of online dedicated memorial spaces: faithfulness to the deceased and semantic concordance

As composite spaces mixing different registers of information and communication, online social platforms provide an opportunity for irruptive expression, as symptomized by postings of an insulting nature. Thus some intimates create memorial spaces dedicated to the deceased, which can thus often serve to ease the tensions that sometimes underlie the management of post-mortem digital traces.

Arenas for expression and ad hoc rules of conduct

These spaces may be virtual cemeteries or Facebook accounts changed into memorials. We met one respondent (office worker, age 38) through the Paradis Blanc memorial website,[13] where condolences can be posted, memories shared and virtual candles lit on the deceased's page. Having lost his 17-year-old son to leukemia, he describes how he chose to turn his son's Facebook account into a memorial account so that only his "friends" could post messages and also to avoid any unwelcome and "disrespectful" (sic) intrusions: "At first, we wanted to leave his account open as we were getting lots of messages of support from his classmates, but little by little, people we didn't know sent negative messages telling us that he wasn't the first person to die of leukemia so there was no need to make such a fuss. We didn't get many but even so, it hurts (…). And worse, his girlfriend had created a blog to pay him tribute, but a few weeks later, people came to make jokes and laugh at those who were leaving messages of support. It was really shocking and my wife suffered a lot because of this". Another woman respondent (office worker, age 40), who had lost her 14-year-old daughter, describes what led her to disable her daughter's account, which she could not control and which was deforming her daughter's

12 When an account becomes a memorial account, it can no longer be modified (it is impossible to add or delete friends), and will no longer appear in public spaces such as suggestions from the user's friends or birthday reminders.

13 www.paradisblanc.com. Accessed 03 Dec 2015.

personality: "My daughter had a Facebook account and it hurt like mad to close it, in the end it didn't correspond to who she was, it ended up being anything and everything, both good and bad". Creating a dedicated space thus makes sense for respondents seeking coherence between sharing the grief of a loved one and the practice of ad hoc rituals. This reminds us that rituals, as Durkheim wrote, are rules of conduct governing how people should act in the presence of things sacred (Durkheim 1912 [1960]). This coherence is indeed what mourners are seeking: "I came across Paradis Blanc by chance[14] (…). There's a serious side to it, there's support among families and you're not alone; it does you good to see someone has written the same thing and that you're not the only one to write what you write". As we have seen, what drives these initiatives is the distinction between the sacred and the profane: escaping the heteroclite behaviors found on SNS sites, which confuse the meanings of messages and detracts from a more fitting spiritual approach. Yet, the creation of such spaces is sometimes problematic for the bereaved in cases where the deceased did not communicate any wishes regarding their digital legacy. How then can one remain true to the deceased's personality and their *desiderata post mortem*? A bereaved mother (office worker, age 40) recounts the dilemma she faced with her daughter's Facebook account after her daughter's death: "My daughter was fourteen and a half. She had a Facebook account like all young girls of her age and I found that she wasn't in her place any more. But I wondered if by disabling her account I might not dispossess myself of what I still had left of her". Here it is a matter of not betraying the deceased person, or at least the post-mortem representation that one constructs for oneself. Certainly, users can challenge message contents if ever these violate the normative codes associated with death. But the ever-present underlying question is how to remain faithful to the deceased's personality, or in other words safeguard their identity or the identity given to them by their close entourage. On this count, Sofia (student, age 24) remarked that a video posted on a group page dedicated to her deceased friend showed the friend singing a song that the deceased's Muslim family viewed as provocative and vulgar. The family was upset about its posting and wanted to remove it. A posting on the wall of the Facebook group's page read:[15] "If you really love LAMINE remove the video that you have posted (…) (just a bit of advice) (…) call on the lord to forgive him (…) and who gives him mercy (…) thank's"). This religious argument was countered by arguing for faithfulness to the deceased and for memory: "A fantastik moment with lamine! We was skipping some lesson or other. Don't regret it today. ♥"; "Not agree with you souhaib this video is a supa memory it brings

14 www.paradisblanc.com/amandine-blet. Accessed 03 Dec 2015.

15 http://urlz.fr/1pVB. Accessed 03 Dec 2015.

mi a bit of a smile to see him me I loved it lots nostalgia we musnt do without, thts all"[16]). Several testimonies are along similar lines: Claire (cultural mediator, age 32) took offense when one of her cousins posted a photograph of her deceased grandmother after her death, as a tribute on Facebook. This action appeared totally inappropriate to the bereaved given that her grandmother, who was not computer literate, "has nothing to do with Facebook". Faithfulness to the deceased but also respect for their family and friends are part of the recognized conventions in matters of death. This is why a widowed female respondent (communication officer, age 38) expressed her shock at seeing the photograph of her marriage posted on Facebook by her sister-in-law, who on top of that had cut the photograph in two and deleted the bride's body and face.

The other issue involves the legitimacy of addressing the deceased if one was only relatively close to them. Can one express sadness, reveal one's presence in the dedicated digital space or become part of the deceased's intimacy, etc.? Multiple postings by mourners who are not considered to be sufficiently close to the deceased may thus be viewed as indecent. The question of proximity to the deceased person is a recurring issue when it comes to funerals and mourning. Faithfulness to the deceased's personality and the legitimacy of paying tribute to them are intrinsically linked since the mourners' image of the deceased must not be sullied by a dissonant use of their Facebook profile. Thus posting numerous messages that reveal the deceased's personality may not only be at odds with the deceased's personality but also with the way the deceased used their account. In this area, filiation ties appear to be tolerated. One respondent regretted that his late friend's family was using the Facebook profile in a way he considered as inappropriate, but he nonetheless admitted that the deceased's sister talked regularly to her late brother out of "need".

The creation of online mourning communities

On these spaces, people share the sacred dimension with others who have had a similar experience. The website users clearly state their need to express and share grief on a fitting space: "on this site [Paradis Blanc], there are lots of people who are there for the same reasons as mine; it's a site specifically made for that" (office worker, age 40). In fact, the creation of these spaces is also designed for diasporic uses: maintaining and sharing mourning with bereaved who are spatially dispersed. This use is notably linked to the geographic separation of families

16 The English translation attempts to reflect the style of the French original. The posters here are Algerian.

and to personal and professional mobility, which implies that the burial site may be far from the place of residence. Research into online social platforms concurs that geographical distance is the most significant variable for the use of this type of platform (Lee et al. 2011). It is one of the reasons that prompted Arielle to create her daughter's profile:[17] "You can visit it without making yourself known; many of our family are far away, so that's why we did it". It is also the case when mourners create a specific online group entirely dedicated to the deceased so as to bear witness to eternal friendship. In this respect, some refer to a "community of mourners" to designate the messages addressed to the deceased on such group pages or profiles. Whether communal in essence or by default, these spaces create new forms of rituals that dovetail to varying extents with traditional rituals.

2.3 The *mise en scène* of new rituals and expressions of grief

The complementarity of digital and traditional mourning rituals

The people interviewed pointed out that, parallel to digital rituals, traditional rituals for the deceased continued without family and friends necessarily taking part. In fact, what is mainly observed is the *mise-en-scène* of diverse kinds if new rituals: the deceased's entourage can pay tribute on the various online social platforms, where one can pay one's respects but also engage in private communing and remembrance: "It is really when I think of him [42-year-old friend who died of brain cancer] (…). I look at his photos, I look at what people put (…) but after a while it makes me want to cry so I stop, and yes that's what I'm looking for in fact (…) Crying (…) is the only time I still think or cry for Antoine, it never happens to me at other times, only when I'm on Facebook." (Isabelle, age 40, tourist agent). Hervé commented: "His grave is five minutes from where I live; I go there much less often than I go on Facebook. Each time I'm on Facebook, I go onto his Facebook to see his photos, see old videos again, to see things on the wall (…). Facebook, it's a new reference point, like someone going back to the place where they met the person and telling oneself that, for me, this is really important (…) It's there I most feel myself; instead of visiting (…) a grave or looking at the sky, even if I do that sometimes (…) because it's easier sitting at home (…). It's really all the memories for me, it's like a memory (…) as soon as I forget his voice a little, as soon as I forget his way of looking, I go back to it and it reminds me straight away" (Hervé, barman, age 27). Thus, while SNSs give rise to fresh forms of ritual

17 www.paradisblanc.com/amandine-blet. Accessed 03 Dec 2015.

they nonetheless complement others: Hervé (ibid.) described how he combined his memorial practices for his late friend—sharing music with him on the deceased's Facebook page: "my ritual is sharing music with him"—and expressed his thoughts and words at a personal altar he had built for his friend in the hallway of his flat. Other respondents described how the deceased person's groups of friends, while still updating their Facebook page, carry on organizing different events for him or her: wakes or evenings for sharing memories, particularly on the deceased's birthday or death anniversary.

Communicating with the deceased person and connecting with the "afterlife" in the social networking age

Ultimately, while online social platforms facilitate communication with the living, they also make it easier to communicate with the dead (Odom et al. 2010; Walter et al. 2011; Georges 2013) and redefine ties. If the death of a loved one creates a feeling of rupture, SNSs can serve as a transition to physically separate oneself from the dead, or even maintain a continuity, which may take different forms depending on whether or not the death was expected. When future death is certain, the dying can continue to communicate through their Facebook page and prepare their entourage for their moment of death. For example, one Internet user who had posted messages on Facebook until one month before his death had chosen the image of a brain split into two for his profile picture, as if to convey his physical deterioration and his approaching death. When death arrives, some see this digital communication as a way of easing its brutal effects: "I find that [Facebook] is super because it's less brutal in fact (…) he's dead but he's still here (…) it's strange but for me it's like that (…). It's not like suddenly the person's no longer there (…). I think he exists (…) She sees this page (…). He's there; it's us who make him exist (…). He didn't just die, full stop" (Claire, age 32, cultural mediator, talking about her late friend). An analysis of postings shows that mourners directly address the deceased. The permanent connection creates continuity in their exchanges, which carry on into the afterlife, but it also changes the nature of this communication. More than tributes, posted messages express a genuine communication with the deceased, a posthumous connection reflecting a relationship that could have existed had the deceased still been alive (ibid.): "I wish you a Merry Christmas from down here. I'm sending you thousands of love presents ♥" (22 December, 2014).[18] Again, following the attack against the French satirical paper, *Charlie Hebdo*, one of the deceased's sister posted: "I'm sure that you would have done it! I'm thinking

18 http://urlz.fr/1pVf. Accessed 03 Dec 2015.

hard of you, my Lucky" (8 January, 2015), meaning that she had no doubt that her brother would have supported the slogan "I am Charlie". Speaking of a Coca-Cola bottle bearing the first name of the deceased, another user states on the deceased's still active Facebook account: "On taking a bottle, I found you (…) Signs do exist (…) ☺". As one respondent (Claire, age 32, cultural mediator) sums up speaking of her late friend: "He's still alive on Facebook", even saying that she goes onto his page to check "how he's doing". This is real digital communication with the hereafter (Georges 2013), although communicating with the hereafter has always existed within different frameworks (ibid.). The social Web thus allows relationships with the dead to continue (Brubaker and Vertesi 2010; Brubaker and Hayes 2011; Odom et al. 2010): "These posts display a symmetry wherein the dead are assumed to still be active 'in heaven' and continuing to amass experiences" (Brubaker and Vertesi 2010, p. 3). What is most noticeable is that this communication reveals a continuum in the relationship that existed before the person's death and which is continued posthumously (Brubaker and Hayes 2011). Moreover, this explains why certain mourners view the lack of a digital existence as a handicap. In this respect, two respondents expressed their feelings of frustration after the suicide of friends with whom they had no social networking ties, remarking that they would have appreciated being able to connect with them again in cyberspace. After death, online social platforms do not appear to change the nature of the bonds that existed between the deceased and the survivor.

Finally, the role played by online social platforms in communicating with the dead (Brubaker and Vertesi 2010; Georges 2013) raises questions about faith and religion. Studies have shown that technologies constitute new media for communicating with God (Douyère 2011) and that believers continue to engage in practices using these platforms (Pew Research Center 2014), as is also shown by the posts of the religious mourners on the profiles dedicated to the deceased. These preliminary observations reveal that regardless of faith and practice,[19] communicating with the dead via SNSs suggest the persistence of a belief in eternal life, even if this is no more than digital. Hervé (barman, age 27), who regularly plays sounds in tribute to his late friend commented: "It's strange but it's as if he were still alive, he might be able to hear it, perhaps find it again, maybe Facebook is in heaven (laughter). You never know!" These new expressions of grief thus also constitute mourning rituals, which still seem to have a role to play. Traditionally, rituals were intended to "be an excellent way of stabilizing a social group affected by the death of one of its members" (Clavandier 2009)—a function supported by the Durkheim-

19 The interviews take into account the extent to which the mourners are believers, as well as their practices.

ian notion of (mourning) rites, which allowed social bonds to be maintained within a community weakened by a momentary imbalance (Durkheim 1912 [1960]).

3 Discussion points and conclusion:

Deathlogging and reconfiguring the relationship between the living and the dead in light of post-mortem digital identity

By making death visible in our everyday life and our most commonplace rituals due to the influx of messages in our electronic inboxes, SNSs are actively changing our habits and social relationships and redefining our relationship with death. By lifting the taboo of death, they have impacted mourning rituals, which have not disappeared but rather have been reconfigured. In addition, if we refer to the Durkheimian conception of ritual (Durkheim 1912 [1960]), we find the social function of ritual and its tendency to create a moral and affective community (ibid.). In this setting, the notion of "ritual" associated with these new practices proves highly appropriate. However, the novelty brought by these technologies involves the hybridization of the collective and the individual, the communal and the unique, which offer the possibility of conversations with a deceased person that are private and public at the same time. Communicating with the dead has thus taken a different turn. The hybrid nature of these spaces also raises deeper questions as to how individual and social dimensions can be articulated, and reveals some ambivalent trends. Because, whilst these platforms do not erase rituals but rather transform them, whilst they play a role in developing communal rituals and create social ties around death, they also foster individuation—that is to say, the fact of marking oneself out and existing as an individual—and intersubjectivity (Brubaker and Vertesi 2010). What is more, they encourage individualism in that the messages posted to the deceased reveal a degree of self-exhibition and heightened narcissism. In guise of conversing with the deceased, could it be that the individual is staging himself by posting messages that can be read by "everyone"? By participating in the construction of the deceased's post-mortem identity, the bereaved are also co-constructing their own identity—through their interactions with the technical platform. These technologies of the self, as Michel Foucault (1988 [1982]) called them, certainly encourage expressivity, but also for individuals "a certain number of operations on their own bodies and souls, thoughts, conduct, and way of being so as to transform themselves in order to attain a certain state of happiness, purity wisdom, perfection, or immortality" (Foucault 1988 [1982], p. 18). As tools used for expression and relationships in the area of death, digital

memorial sites also serve as tools for measuring self. In fact, everything leads one to wonder whether the profusion of messages on some profiles does not reveal a form of individual performance and pathological narcissism (Sennett 1978 [1974]).

Another innovation in the relation to death involves the possibility of an "eternal" post-mortem digital existence and "infinite" communication with the dead, which leads some authors to refer to technospiritual relationships (Brubaker and Vertesi 2010; Odom et al. 2010). In the context of the social Web, the logic of connecting/disconnecting with eternity is taken to the extreme.

To conclude, a question that we were unable to answer within the framework of these preliminary results, and which will be the subject of the upcoming statistical survey, concerns the profiles of users of the different memorial spaces, in terms of social class, gender and age. We have already observed that users are mainly young people who are immersed in the digital world. But what about gender? Studies on gender and ICTs show that women tend to use SNSs more (Bourdeloie 2013): is this finding corroborated when it comes to death-related uses? Is the social hierarchy that exists in traditional mourning practices reproduced on the Web? All of these questions fall within the scope of our upcoming statistical survey on the uses of post-mortem digital data.

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Lifestories as a Lifelogging-Project: Russian Émigré Bloggers and Their Life Stories

Nina Kresova-Iordanishvili and George Tarkhan-Mouravi

1 Toward linguistic analysis of personal e-narratives

In this paper, we study a small amount of autobiographical web blogs by post-Soviet émigrés to trace personal developments within the demanding circumstances of emigration. The objective of this paper is twofold: 1) to arrive at more general claims about autobiographical blogs and their émigré authors and 2) to show the potential and limits of linguistic analyses of e-narratives for personality prediction. As the empirical material is rather limited, the task at hand is not to produce comprehensive coverage of the broad range of individuals and narratives. Rather, we aim at developing an instrument that may be used in larger scale research, involving different communities.

While discourse analysis is a potentially effective research method for these aims, the material we use presents a number of serious obstacles for establishing a direct link between the characteristics of the rather specific sample of narratives, and their narrators. These include but are not limited to: a) not all individuals of the studied group own personal blogs; b) the bloggers do not necessarily corresponds to the distribution of various characteristics among the émigré communities; c) the narratives created by the narrators do not automatically reflect the personalities of the narrators directly, but rather how they want to present themselves either consciously or unconsciously; d) in order to validate the assumed connection between the narrators and their narratives, a researcher would need to check the results with some other instruments, and receive information about the blogger from an independent source. This, however, may be difficult due to possible disguise, reluctance

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to share personal information, or anonymity of bloggers; e) the characteristics of each individual blog would depend not only on the personality and life experience of the blogger, but also on the mood, external events, or comments to previous blogs that are not easily accounted for.

2 Conceptual Framework

While the numbers of publications on discourse and narrative is rapidly growing, there is no general agreement on the meaning of these concepts. In order to avoid the debate about terminology, we briefly outline our understanding of the key concepts used in this paper.

2.1 Narrative

We use narrative in the sense of a discursive message that is represented by a linear sequence of words or other non-verbal semantic units (here e-text or hyper-text) that communicates either a certain temporally organized sequence of events, or a logically organized set of interconnected ideas and concepts, or a combination of both (cf. the classical definition in Labov and Waletzky 1997, p. 4). Narrative is closely connected to the concepts of narrator, means of communication/narration, the act of and the interpretation of a narrative, and its interpreter—audience/readership/commenter.

It is commonplace that any narrative may be interpreted in a number of ways, depending on the perspective, the personality and knowledge base of the interpreter, and the internal (e.g. mood, attitudes) or external (e.g. information flow, distraction, suggestion) context. So, one such way implies the formal description of a narrative that can be algorithmized and automatized, although the developer of the algorithm will of course project his/her own worldview onto the interpretation. The second way may refer to how the narrative is interpreted by the audience/readership, as it is clear that different readers of any text see different things in it, depending on their life experience, general attitudes, intellectual profile, attitude toward the perceived author of the narrative, and specific interests. Any narrative carries a certain set of messages, either intentionally or unintentionally added by the narrator, which may have taken the potential audience into account, and the desired effect the narrator would like to have on the readership (in line with ideas on theatrical communication by Erving Goffman). The triad of reader-text-narrator is complicated by the fact that the narrator may consciously or unconsciously

modify the projection of his/her self into the narrative by creating an expression/impression of him/herself that may hide/reveal or distort certain aspects of the narrator's personality. Finally, any narrative says something about the narrator, as seen and interpreted by the reader but also as revealed by the 'formal' analysis of the narrative; however, any interpretation of a narrative also reflects the personality of the reader, and may be influenced by the respective context.

2.2 Modalities and other characteristics of an (autobiographical) narrative

As mentioned above, narratives can be characterized in a number of (interlinked) ways, from the perspectives of an author/creator and narrator(s), commonly conflated in the case of autobiographical texts, implied reader/audience and real audience/reader and according to its formal characteristics. Moreover, in some cases additional information exists on the personality or life experience of the narrator (which may or may not be contained in the narrative itself). Some of the former factors find their expression in the content of a narrative: the number of narrators, included/omitted information, descriptive vs. interpretative tendency, chronotope (Bakhtin 1997), emplotment (Frye 1958), structure (length, genre) and the linguistic characteristics of a narrative (style—emotional, evaluative, poetic vocabulary; linguistic modality, and so on). We are interested in the perspective of the narrator who, in the case of autobiographical narratives, is usually singular and focuses on individual experience. The incomplete (but still redundant for our task) list of possible variables and perspectives is as follows:

- Formal characteristics, such as: means of communication; language/dialect and the usage of words/signs; length/number of words/signs; distribution of various (grammatical) forms used; frequency/distribution of words (e.g. described by Zipf's law);
- Grammatical modality that describes the expressions of belief, attitude and obligation in various parts of a narrative, or a narrative as a whole;
- Emotional, intentional and volitional structure of the narrative and its fragments, including the general emotional mood expressed by the narrative as a whole;
- Descriptive vs. interpretative nature of the narrative;
- Whether a narrative presents a finished or unfinished story, or a number of loosely interconnected stories;

- Whether a narrative expresses the experience and the thoughts of the narrator/one perspective or of two or more other people, or other objects of narration (supernatural beings, animals, things, other essences);
- Whether a narrative describes a sequence of events, a set of ideas or concepts, or some sort of mixture of both;
- Allegorical elements or nature of the narrative, the level of realism, mysticism, fantasy, exoticism, familiarity or innovation, perceived trustworthiness/truthfulness or mystification;
- The level of critical/positive/negative attitudes toward the story and its elements, including leading figures, and the self-criticism of a narrator;
- Compositional, logical, causal for functional structure (skeleton, story/'fabula', 'syuzhet', plot), interconnectedness of elements and consistency of a narrative/logical fallacy, application of meta-stories, also genres; one such dimension is related to 'emplotment' (assembling of a series of events into a narrative with a plot);
- Number, identities and interrelations of the leading figures/'heroes' of a narrative and/or the narrator; their loci of control and psychological types;
- Temporal (past/present/future) and spatial (space covered and its structure) aspects;
- Focus on historical, psychological, aesthetical, ethical, philosophical or social aspects of the narrated reality;
- Value system and teleology creating the ideological basis of the narrative;
- Style (quality of text, vocabulary used, elevated or down-to-earth, sense of humour, etc.)
- Self-reflection and self-concept of the narrator and meta-narrative present within the narrative;
- The most general characterization of a narrative as a whole is through the notion of narrative modes, or modalities.

The latest dimension is of particular interest to us, and while derived from literary theory (Frye 1958) could be well adapted to the concrete type of material being studied. We define narrative modality as a typological characterization of a biographical narrative depending on a number of interrelated characteristics or dimensions:

- Interrelation of a narrator and the social environment described in the narrative, meaning whether the narrator considers him/herself superior, equal or inferior to ordinary participants and communities described in the narrative (or—implied by reader).

- Interrelation of the narrator and the environment, meaning that the narrator either adjusts to the environment, accommodates it to meet his own needs, or rejects it and remains alien to it; (romantic/heroic vs. realistic vision); The related concept of the locus of control of the perceived narrator, i.e. whether he considers him/herself controlled by external forces or whether he/she him/herself is the (heroic) creator of their own destiny.
- Self-reflection of the perceived narrator—i.e. whether he/she takes him/herself seriously, tragically, or with irony/humour, treats him/herself with respect and the level of self-satisfaction and self-confidence.
- Emotional balance and profile expressed (emotionality vs. indifference; positive vs. negative emotions; other types of emotions).
- Worldview based on realism/romanticism/cynicism/victimisation—i.e. whether the narrator's worldview demonstrates a realistic picture of the world as a complex and multi-coloured pattern of life; or based on elevated and simplified pictures of Good and Evil, with mystical powers at work; or based on a world ruled by primitive, materialistic needs and desires in which the majority of people and institutions do not deserve respect; or, the world as cruel and merciless, and the narrator as the victim of overwhelming forces and fatum. This last point is closely related to the above-mentioned narrator-environment relationship.
- The narrative's modality, which is defined by the narrator's attitude expressed in his/her narrative as presenting and engaging him/herself, the narrative's world and the outer world, social or physical environment.

Naturally not all narratives would enable us to study all of these variables in their combinatorial multitude, due to specificity of the narratives and the limited resources at the disposal of the researchers. Therefore, it is useful to concentrate on those variables which best contribute to characterising and understanding the studied phenomenon, which is of course subjective.

2.3 Narrators as authors and as personalities

Every narrative is created by someone, may it be one or several people. Even if it is an accidental text generated by a computer, there is some human-made algorithm behind its creation. For reason of simplicity, let us consider a single author, although it is possible that more than one person may be responsible for the narrative while the author is usually perceived to be a single person.

A narrative is an expression and a reflection of its author, but this expression may have taken a rather complicated form. On the one hand, if the creation of a

narrative takes a relatively long time, its realization may reflect the complexity of changing knowledge, influences, emotional or intentional dynamics, or even the communicational skills of the narrator. Even when the narration takes place during a relatively short period of time, or even in real time (e.g. during a live broadcast or a talk) its creation is still influenced by long-term personality traits, knowledge and communicative skills of the narrator as well as by the more immediate states of mood, accidental associations and emerging memories, the level of distraction/concentration, a conscious or unconscious account of the psychological and social environment/audience at the time of narration, or a desire to create certain impression and reveal/hide certain facts, their personalized meaning, or certain aspects of the narrators personality.

While the transient personality characteristics make an interesting subject of research, here we will be dealing with the more stable personal traits that change slowly. Thus, by ignoring the more rapid changes to a certain extent, we create a sort of model assumption. This necessitates the study of not a single, one-off narrative from each narrator, but a sequence of narratives formed during a more or less prolonged period of time. It is such narratives that can be found in personal blogs.

The personality traits of a narrator (their theory rooted in the pioneering works of Gordon Allport of 1930s) that we take to be relevant should be brought into some kind of connection with the characteristics of the respective narratives, which are finding expression in both quantitative (statistical correlation) and qualitative interrelationship between the narrator's characteristics and those of the narrative. If such relationships can be observed in a significant number of pairs of narratives/narrators, we may hypothesize that there are some functional links between the narrators' psychological traits and the characteristics of the narratives, on one hand; On the other, we may assume that the repetitiveness of such relationships themselves validates the abovementioned hypothesis.

There are a number of personal characteristics of the author related to his/her worldview and identity, including those s/he would like to project in the narrative. In addition, of numerous possible traits, the following psychological characteristics are of particular interest for us, as related to the modalities and other dimensions of the narrative described above:

- Locus of control/resoluteness;
- Emotionality/Alexithymia (inability to recognize and describe emotions in the self);
- Worldview—how the external (physical and social) world is organized, what are the leading forces, the level of determinism in the outer world, religiosity, mysticism;

- Degree of trust in and positive/negative attitude toward others;
- Living in past memories, present or future;
- Optimism/pessimism;
- Self-confidence and self-satisfaction/acceptance;

It is obvious that depending on the type of narrative, all of the above-described characteristics may be more (in an autobiographical narrative) or less revealed. This may also depend on the sheer size of the narrative. Nevertheless, it is further assumed here that any narrative may be classified in one or another way, and would to some extent express at least some of the characteristics of the author, whether they are those s/he would deliberately want to show or those that are showed unintentionally.

3 Research methodology

The general approach used in our paper is based on the idea of piecemeal extension of theoretical framework in the process of analysing data, which is similar to the approach proposed in the classic *The Discovery of Grounded Theory* by Barney Glaser and Anselm Strauss (1967). We have used a step by step analysis of the material, starting with the initial conceptual framework based on an intuitive interpretation of the phenomenon and gradually moving to the more unambiguous determination of the parameters of analysis, parallel to the designing or redesigning of the working hypotheses. In this approach, a researcher starts building a theory from empirical material that allows them to take into account the specifics of the most unusual data, while not being restricted by established conceptual paradigms.

Our description of narrative modality utilises both the formal, linguistic analysis of text, and the content analysis of the narrative. The latter is used to describe the narrator's assessment of his/her migration experience as presented in the narrative. In our analysis we identify four recurring themes: life before departure; departure; life after the departure; and, future plans. Interestingly, the past and the present life in exile is presented by the narrators as a continuous process, regardless of the duration of their stay abroad. In order to simplify the presentation of the results of our content analysis, each topic is evaluated using a 4-point score system (see Table 1).

Table 1 Assessment by the narrator of his/her migration experience

Topic / presented as	1	2	3	4
Life before departure	not good	with certain pros and cons	satisfactory	better than life in exile
Decision to emigrate	a mistake	a questionable move	rather right than wrong	certainly right
Life in the new country	worse than at home	no clear-cut change for the better	better than at home, even if not all of intitial plans have worked out	certainly better
Assessing the future	return to the homeland or moving elsewhere is necessary	difficult to anticipate	there are hopes for the better	will certainly be better

Linguistic analysis was carried out according to three stages: open coding, selective coding; substantial coding (Corbin and Strauss 2008)[1]. At the first stage, an initial set of variables was determined, although it was further developed and adjusted at the second stage. Substantial coding dealt with variables that were related to the tools of linguistic analysis, and the majority of these variables contributed to the formation of linguistic modalities (Palmer 2001). When describing the narrative modality, selected materials allow us to reflect on the following aspects of a narrative.

'Protagonism and resolutenes'—refers to those certain aspects of a narrative that indicate the degree of participation of the narrator in the narrated events, the agency. 'Protagonism' refers to the degree of ego-presentation, the degree of one's own role in the events described. 'Resoluteness' corresponds to what they call the locus of control in personality psychology—the propensity of an individual to attribute the causality of what is happening to him/her to external or internal factors (Rotter 1954). Accordingly, positive resoluteness, or resolute optimism, reflects a high degree of an internal locus of control as opposed to negative resoluteness and an external locus of control.

1 The codification of data was carried out by a single researcher, which of course introduces a certain level of subjectivity.

Protagonism finds expression in the frequent use of personal pronouns and, in particular, the pronoun 'I', also in the use of active verbs that express the action of the first person singular. Positive resoluteness, linked to self-confidence and successful performance, is manifested in: the use of verbs in the active voice; the first person singular and plural forms (I, we); perfective verbs; modal verbs of obligation, personal obligation (e.g. I must); possibility or capability (e.g. I can); preferences and desires (e.g. I want, I like); as well as introductory words conveying confidence (e.g. certainly). Negative resoluteness is expressed through: the verbs in the passive voice (e.g. I was fired, or I had to resign); impersonal expressions of obligation (e.g. there was a need to); the lack of ability (e.g. I cannot/could not); introductory words for expressing an opinion (e.g. in my opinion); doubt (e.g., perhaps); and the conditional clause and causal references to fate, luck or chance.

'Emotional-evaluative'—refers to those aspects that reflect the narrator's assessment of the narrated story, and his/her emotional engagement. These are expressed by using specific evaluative vocabulary: adjectives (e.g. interesting, weird); nouns (e.g nonsense); quantifiers (e.g. quite a bunch); verbs (e.g. to yell); adverbs (e.g. very); and, expressions (e.g., to get off one's ass). These also include those words/concepts that refer to existential values, perceived as or actually capitalized (e.g. home, life, path); as well as evaluative introductory words (e.g. fortunately); and the expressions of preferences/personal relationships to the described item (e.g.: I love, it annoys me, I am glad to…). Emotional and evaluative framing of a narrative may also depend on the use of exclamation and question marks, emoticons, interjections, dots, swear and taboo words and expressions.

'Logical-reflexive'—refers to those aspects that are related to the orderly structure of the narrated story and its expounded interpretation. These are expressed by the words of generalization and summation (e.g. therefore, in general); order (e.g. after that, in the first place); specifying introductory words (e.g. for instance, by the way); cause/effect (e.g. because of that, respectively) and subordinate clauses reflecting logical causality; numbered lists; additional clarification in parentheses; and, the inclusion of direct speech. These may include: a description of the actions of a narrator in the second person singular (e.g. "you are shown a video and you press your mouse button"), a shift of perspective which leads to observing a situation as if from a distance make it look more universal. The presence of irony and self-irony, estimated in totality for each text, are also indicators of reflection, as attemps to look at oneself and one's own life from the outside.

'Literary-aesthetical'—refers to those aspects that are related to the previous two characteristics as they may express a poetic, emotion-filled attitude toward a story (for example, by using epithets and tropes from evaluative and bookish vocabulary); or they may serve to create a likeable and attractive narrative concept, or

to play a literary game targeting readers (irony is often used for this). Pinpointing this aspect in the study of narratives primarily allows one to identify a tendency to poetize or romanticize the story, or an attempt at its ironic, playful rethinking.

Expression of the literary-aesthetic aspect is related to the use of bookish and/or colloquial wording; original and expanded tropes; literary allusions and reminiscences; as well as rhetorical phrasing. In the analysis of this aspect, the appeal to readers is also taken into account, i.e. the author deliberately targeting the audience and the ratio of words to phrases indicating the syntactic complexity of the story.

The evaluation of some variables requires a slow and careful hermeneutic process (close reading), while others may be measured by automatic text processing. The latter includes the numbers of: words and phrases; punctuation (exclamation, question marks and emoticons); specification in parentheses; quoted fragments; using capital letters (caps lock); and so on. For this, the researcher should specify certain variables in order to automatically find the range of usage of personal pronouns, modal verbs, introductory words, and the word-concepts. The content of these variables is defined in the process of analysing the lexical frequencies.

The results of computerised analysis are corrected and complemented during the slow reading. During the same process, an analysis is carried out of variables such as usage/frequencies of predicative forms, bookish, vernacular, evaluative and conceptual vocabulary, appeal to readers and replacing the first with the second person, tropes and other literary tools, and the presence of irony. If the predicates in the active and passive voice, or perfective verbs are easily identified in the Russian text due to clear-cut criteria, the identification of the bookish, vernacular and evaluative vocabulary, or literary tropes and techniques, is much more problematic. It is here that the greatest possible subjective differences may emerge in the case of parallel coding.

Finally, we may add that while we do know some formal characteristics of our narrators, but all other personality traits that we discuss below are based on available narratives. If some assumption is based on a relatively small and rather specific sample of authors, it may be verified when studying a much bigger and more diverse sample, and this would corroborate respective assumptions and would enable a researcher to build a more reliable (although still a probabilistic) model for the expression of the personal traits of a person in a narrative he or she produces. We need to keep in mind that in each individual case (text fragment) such relationships will not necessarily exist or be overtly demonstrated, as Erving Goffman's theory (Goffman 1956) teaches us. Humans tend to present an expression/image of themselves that for one reason or another reason diverges from their self-concept and thus the former should not always be taken at face value. However, it may be assumed that if the sample is big enough, such divergence could be accounted for.

4 Empirical material

This paper is based on thirty analysed narratives[2] and presents a sample from a multitude of Russian-language émigré blogs[3]. Their authors were born in Russia or now the independent former Soviet states that have chosen countries of the so-called first world as their place of residence, such as the USA, Australia, UK, Israel, New Zealand and Japan. The duration of their life in emigration varies from zero to more than 30 years. In the analysed sample, there are three texts written by bloggers on the eve of his/her departure. Among the authors there are 16 males and 14 females. With the exception of one high school student, all posts are written by adults with higher education, aged between 20 and 65, predominantly professionals in the fields of software development, science, education, or translation. Judging by the information that the authors either provide in their profiles or that can be found elsewhere in their blogs, the bloggers in question have a stable level of prosperity and good living conditions. Most bloggers live with their families/spouses. The wives of male authors tend to also have been born in the former USSR, while female bloggers, in contrast, have often connected their lives to people outside the former Soviet Union.

It is obvious that the age distribution of the blogger correlates with the time they have spent in emigration. Hence, among first-generation emigrants who have lived abroad for more than 20 years, it is rare to find a person under the age of 40-45. The analysed sample contains six narratives written by expatriates with an emigration experience of 20 years (respective posts are mostly linked to such anniversary), two posts are by authors who have lived abroad for 22-23 years, and two—have lived abroad for more than 30 years. The blogger with the longest emigration history of 36 years) is a woman whose parents had taken her away from Leningrad when she was 13 years old.

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2 This paper has been prepared within the framework of the project "Storytelling on web 2.0: the case of migrant's personal blogs", carried out with the financial support of Estonian Research Council program and Marie Curie Cofund. As part of this project a database was created covering 100 blogs by Russian émigrés. The method used for their selection was based on automatic search through the system https://blogs.yandex.ru in order identify the first two dozen blogs, with subsequent use of "snowball" approach for pinpointing the rest of the blogs. Content analysis of blogs from the database revealed the correlation of the age and the gender of selected bloggers with the general statistical data for the RuNet blogosphere (Kresova 2013).

3 According to more or less standard definition, blogs, or weblogs—are "frequently modified web pages in which dated entries are listed in reverse chronological sequence" (Herring et al. 2005). The first blogs appeared in the mid-1990s (Lovink 2008).

All the blogs of the sample are hosted by the popular Russian blogging network *LiveJournal* (Gorny 2004; Alexanyan and Koltsova 2009), which was founded in 1999 and adapted to the Cyrillic alphabet in 2001. Respectively, the first blogs by Russian émigrés in their native language appeared in 2001-2002.

Here we only consider the posts representing the genre of online diaries, which is the most popular kind of blogging (Personal Journals; Herring et al. 2005). The content of such blogs is usually made up by stories about various episodes from the author's life, mixed with his/her thoughts and observations. Entries may also include photos and video material, however, these are not considered in this paper. The average length of the analysed posts is about 50 phrases, although the shortest post accommodated only 4 phrases, the longest being 124 phrases.

Autobiographical posts containing a description and an assessment of the narrator's migration experience are not frequent, and are mostly confined to specific dates: New Year's Eve or an anniversary of the life in emigration (such anniversaries are most often celebrated after 1, 2, and then 10, 20 and 30 years away from the original homeland). Still, in general such narratives are quite diverse: some authors narrate what happened to them over this period of time, sometimes in detail, in other cases just in short passages; some recall the details of departure from the native country, and the first impressions after arrival to the new country of residence. There are those who recall the homeland with nostalgia, and others who claim that their home is where they currently live, and that the world where they had once lived is gone, and no longer exists. Some compare "here" and "there", and a part of the bloggers express their expectations for the future.

It is important to emphasize that the blog narratives seem invite reader's feedback, including immediate reaction in the form of comments. The authors seem conscious of their "face to face" interaction with their readers through the latter's comments, and prepare to encounter different interpretations of what they had written, often anticipating and reacting to expected questions and comments, proactively responding to them in text entries. Despite frequent claims, bloggers usually do not write their posts for themselves (Lovink 2008). They need someone to read these, and evidently rejoice when the number of their followers reaches round numbers such as 500 or 1000, or when their posts generate a flurry of comments, getting into the top-rated posts of the *LiveJournal*. They also care about creating and maintaining their unique image, trying to be coherent with respect to their previous posts. Unlike the fate of the posts on social networks such as Facebook or Twitter, the life cycle of a post runs for years—sometimes—a repost or a comment emerges long after the original posts were submitted. The bloggers themselves often provide links to their previous posts, monitor the statistics of visits, and single out their most interesting postings. All these factors contribute to the fact that

a blogger, in general, scrupulously works on preparing his/her posts (which may sometimes takes days) and in particular works on refining the form of expression of one's own thoughts (see Georgakopoulou 2011, pp. 101f.).

5 Analysis

We have analysed the selected blogs from a number of perspectives. Although not all of the obtained results are of equal importance or have been used for final conclusions, we believe it is still worth including a few dimensions of analysis in order to demonstrate the power and the potential of such a study.

5.1 Content analysis

The initial hypothesis was that the bloggers can be divided into at least three main groups depending on how much time they have spent in their new countries of residence, with different patterns characterizing their blogs and posts. Indeed, such grouping could be easily observed even at first glance. Let us look at selected text samples from each of the groups. This is written by an émigré at the early stage of his adaptation to the new foreign environment, who clearly perceives it as hostile and his his life as a frantic fight for survival and finding one's own place:

> "For already quite some time I see my life as a fight in the ring against some figurative Tyson, and every time I get a punch, I think: 'it cannot get more painful, this is the end, this is the end, end of everything.' But somehow I manage to get up again."

At later stages of emigration, the tone of the blogs change, becoming more positive, balanced, and confident. This group of blogs present their authors as winners of a struggle, successful in adapting to the new homeland, although not superheroes, rather remaining ordinary human beings who achieve success through persistent effort:

> "At about that time I ended working 'for other guy' and together with a friend of mine we opened our own studio, an agency called Sliday. Since then I bought a house, got a son, and planted a Californian palm tree in my garden."

Now, finally, representatives of the group who emigrated more than 20 years ago reveal a totally different pattern in their postings, look at their past with a certain

sense of humour, even somewhat condescendingly. They are ready to admit their weaknesses and failures, and even reflect on the relative nature of the values they hold. Here is one of the respective text samples:

> "Then comrade Krupski [the husband of the female author of the post] would receive a car from the company, and also a cell phone from it, and we would start living almost like under Communism. Four years later, Satan would decide to test us, having offered comrade Krupski a tenure track position at Boston University, and we have failed this test."

Prospective migrants unequivocally describe their decision to leave as unreservedly positive, and they are set to expect significant improvement in their lives. The assessments of migrants with an experience abroad of up to three years demonstrate the highest variability. In their case, more ambiguity regarding their emigration decision is rather common (not sure; there are pros, there are cons; I cannot say for sure…); it is in this group of bloggers that we observe the single negative assessment, i.e. that life now got "worse" after emigration. Not all émigrés were able to find a job and settle down as they would have liked to. On the other hand, during this period, there are the maximalist scores by all four measures in three male blogs: 2-4-4-4, n/a-4-4-4, and n/a-4-4-3. It should be noted that in this group the highest frequency of statements along all three dimensions can be observed.

All bloggers who have lived in their new county of residence between 3 and 20 years assess their experiences rather positively. Interestingly, the highest evaluation scores are found in the posts by male bloggers. With an increasingly long residence abroad, the posts hardly ever mention any future prospects, giving place to the analysis of past events. Out of the 10 veteran authors (over 20 years as ex patriots), only two have expressed their thoughts on what they expect from the future. At the same time, out of eight posts written by bloggers with experience between 3 and 20 years, three contain thoughts about the future. However, among the 12 prospective émigrés and new migrants (up to three years), as many as ten authors wrote about their future life expectations. 19 authors make references to their life before departure and these references show the tendency to positively evaluate that period. It is also interesting that in the case of women who have lived abroad up to 10 years there is a clear tendency toward more conservative estimates of their experience, female authors with longer experiences expressed the maximum satisfaction with their past decision to leave and with their current life more often than the males.

5.2 Egocentricity and Locus of Control

The analysis of the indicators of locus of control showed significant differences depending upon the duration of life in emigration. Prospective migrants and émigrés with experience living abroad of up to three years produce the most egocentric postings[4]. They are also conspicuous in tending to express their preferences and desires, as well as talk about their personal responsibilities or capabilities. Furthermore, it is in their postings that the sense of confidence is most frequently expressed by such wording as "for sure, of course, certainly". In general, the usage and frequency of active verbs increase consistently in the narratives of bloggers with experience from zero to ten years, then decline over the next decade, to start rising again in the texts written by authors living abroad for more than 20 years. The same trend is observed in the use of verbs in perfect tense, which is related to completeness of whatever is being done.

Below is a phrase from a woman's post who changed her place of residence from Ukraine to Australia less than a year ago. It proves to be highly egocentric, expressed by the use of the personal pronoun 'I' twice, nine transitive verbs in the first person singular, and two modal verbs in the finite form.

And yes, I feel better now with my rank of marketing specialist than previously with any impressive business card, if only because when I step out of the front door of the house where I live, I do not step in the neighbour's dog's poop every other day , I do not need to clean out cigarette butts from the sand on the beach—I am able to use toilet paper in any toilet anywhere, I feel the air of consideration coming from my boss, and I can be friends with her, I can see the joy of my child coming from school, and I know that no person would humiliate him there simply because he is a teacher, and finally, I don't have to worry about the quality of water that a restaurant used to cook with.

A characteristic feature of the discourse of bloggers who have lived in exile between 3 and 20 years is the high frequency of singular verbs in active voice and verbs in perfect tenses. The latter are used to describe a holistic, indivisible and completed action in the past, the present and the future, referring to successful performance. Although to a lesser extent than for the group of the new émigrés, those with emigration experience between three and 20 years are also characterized by a high frequency of modal verbs in the finite form.

If we compare the rates of the use of personal pronouns and active verbs, it turns out that in the posts of emigrants with experience of 20 years abroad, the

4 The results of all the quantitative indicators have been divided by the number of sentences in the narrative, making it possible to compare the texts of varying length.

value of the first variable is most often higher than that of the second variable. In the narratives by emigration veterans, the respective ratio is less pronounced than the numbers of personal pronouns, and active verbs usually show a small gap.

Among the analysed posts there are a number of texts where a clear trend toward an inverse relationship is observed between the number of personal pronouns and the number of active verbs and verbs in perfect tense. In the text fragments where the use of personal pronouns is minimal, the number of active verbs and perfective forms increases dramatically. Respectively, in the narratives with frequent use of 'I' and other personal pronouns, the number of active verbs and perfective forms drops sharply. This latter pattern is found in the analysed narratives 50 percent less than the opposite pattern, i.e. with high number of active verbs/perfective forms.

In order to illustrate the trends described above one may consider the post by a blogger who has lived in Australia for seven years. It contains 42 phrases and 65 predicates, of which 64 are expressed I-verbs, and 38 are perfective verbs. In turn, the number of personal pronouns is only 11, and there are only eight cases of verbs in the first person singular. For example, in the phrase quoted below there are no personal pronouns, but there are three predicates expressed by perfective verbs in the active voice:

> "A month later received an offer from the, still operating, company Netactive, applied for a work visa, and in January 2007 began to work on the line of duty."

The curve showing the usage of passive verbs in the analysed narratives generally follows the same trends as in the case of active verbs. Predicates related to the situation where the narrator is affected by external forces are the least likely to be found in the narratives of migrants with migration experience between three and 20 years; however, the authors from of same group demonstrate the increase in impersonal passive constructions. Together with the expression of successful performance, this may indicate the desire to show objectivity. This assumption is further confirmed by another characteristic of this group: a decline of egocentricity against the backdrop of narrated career success.

Most passive verbs reflect that the narrator sees oneself as an object affected by external forces and is found in the posts of those who have lived abroad for 20 years or more. In such posts there are quite frequent references to fate, luck and chance, which are even more frequent for the posts by migrants living abroad between three and 20 years, and are completely absent in the texts of those preparing for emigration.

Using predicates in the passive voice in the texts where there is an inverse relationship between the frequency of personal pronouns and of active verbs correlates

with the general trend: the frequency of passive verb forms and in particular those related to the situation in which the narrator is the object of external forces, is high in the posts with higher numbers of personal pronouns compared to those of active verbs, and, conversely, is low in texts where active verbs and perfective verbs are much more frequent than personal pronouns.

Prospective migrants and those with a migration experience up to three years often express their opinions and preferences, however references to what is likeable, annoying, or pleasing gradually becomes less frequent already after the first year of living abroad. In this group one can observe the most frequent reference to one's own desires and intentions, as well as to new opportunities and personal abilities.

The veteran émigrés, by contrast, rarely express their preferences and desires, but often talk about their responsibilities. More than anyone else, they express their doubts, although they also sometimes express confidence. The group of immigrants, who have lived in exile between three and 20 years, is characterized by moderation in almost all indicators. They are less likely to express their opinions, preferences and desires. They say little about their personal responsibilities, abilities or opportunities, but make some assumptions expressed by the conditional tense. The only indicator that distinguishes these authors from the other two groups, those of beginners and of veterans, is the relatively high frequency of the words expressing impersonal obligation. For example, in the phrase quoted below from the post of a blogger who has lived in Australia for seven years, three actions are described that the author was forced to perform under the pressure of external circumstances:

> "I had to go home, go on the Internet and wake a New Zealand friend, so he called the school and forced them to send the correct document."

While assessing the overall results of the linguistic analysis a common characteristic of all narratives should be emphasized: the prevalence of predicates expressed by verbs in the active form, and perfective verbs. The percentage of active personal predicate forms ranges from 28% to 155%, while the same index for passive forms varies between 0% and 47%[5]. In all posts, positive performance (personal im-

5 The percentage of personal predicate forms calculated in proportion to the number of phrases in the narrative. In this case, the low rate of utilization of both predicates can be explained by the fact that, in the calculation, there were the only two forms where the subject or object of the action was in the first person. Thus, in the narrative with the lowest amount of active verbs (28%), passive verbs were also found very infrequently

plicitness, personal responsibility for own actions) is expressed stronger than the negative performance/failure.

Comparing the results of the expression of responsibility and ability/opportunity in personal and impersonal forms, impersonal responsibility or obligation take the first place in the frequency of usage, while the respective personal forms are the rarest in the analysed postings. In contrast, the rates of expression of opportunities and abilities are the most frequent in personal forms. Considering these data coupled with the strong positive performance of narrators, it can be concluded that the studied texts are build the image of narrators with the prevailing internal locus of control, that is, of active personalities and creators of their own destiny.

5.3 Emotional and evaluative dimension

Migrants who had lived abroad between three and 20 years appeared to be the most reserved in their assessments. Their discourse is usually serious and devoid of self-irony. They do not use taboo language, though prefer vernacular to bookish and high style wording and expressions. Emotions in the posts by these bloggers are expressed using a limited set of language tools, usually word-symbols, capitalized letters or with exclamation marks.

Émigrés with experience of more than 20 years abroad use the evaluative wording the most frequently. However, as already mentioned, their narratives have weak emotional colouring, and they are less likely to express preferences. They rarely use emoticons and interjections, do not express overall valuation by such introductory wording as "alas" or "fortunately". It is in this group that irony and self-irony is the most frequent. Incidentally, this discursive feature is more characteristic of women's narratives. Of the fourteen posts written by women, ten contain ironic modality. In comparison, of the sixteen male narratives, irony was found in only five. Below is a sample text written by a female blogger:

> "Our arrival to this country has been, to put it mildly, rather stressful—HIAS refused to help us, we were not met by anyone, and no one could explain anything. After several hours of horror and uncertainty (in a foreign country, sitting on suitcases, with no documents), I called my aunt who has lived in NYC since the mid-1970s. And she told me so calmly that there is nothing to worry about, we are already in America; told us to relax. At that time it sounded cynical, if not rude."

(5%). In this sense it is interesting to note that women talk less about themselves and events they participated than men.

Émigrés who have lived abroad for more than three years would often use initial capital letters to highlight certain words, making them sound more general and / or symbolic. Among such concepts, the most common are "Homeland" and "Home". Posts by prospective and new migrants usually have consistently high emotional and evaluative colouring. Emotionally, they are distinguished by a variety of linguistic means, as in many texts, exclamation, interjection, emoticons and capitalized words are used in the same text to express emphasis. All of such posts also actively use evaluative vocabulary. This bloggers in this group speculate most often about such concepts as life, death, and their path. It is here that various maxims and slogans are common. Finally, the postings in this group are the least characterized by the use of irony and humour.

5.4 Literary and artistic dimension

When talking about the stylistic and literary framing of narratives, one obvious yet somewhat paradoxical point is that the longest posts belong to the new migrants, and the shortest texts are written by prospective migrants. Authors who have lived abroad between three and 20 years create stories of medium length. The texts by the latter group consist of short sentences, that is, the average number of words in each sentence by these bloggers is less than in the narratives by veterans and prospective/new migrants.

It is also interesting to note that out of the five longest posts, only one is written by a male, however, when it comes to the vocabulary, men are more verbose. Women, therefore, use more sentences, but shorter ones than men. This may be the result of literary editing of the text, which women care more about than men. Women use single word phrases more frequently, put in the form of separate sentences in order to achieve more emotional and aesthetic effects. Men, in turn, write shorter postings. So, the shortest narratives consisting of 4, 8 and 15 phrases belong to male authors.

It has already been said that immigrants with an experience between three and 20 years do not use taboo language. In their postings there is no significant gap between the use of colloquial and more bookish vocabulary, although the former usually prevails. The largest gap is observed in the narratives by prospective/new migrants, in which case there is a tendency to the predominance of bookish vocabulary. Veterans, however, often use both language styles for aesthetic purposes, choose their wording carefully and play with respective meanings. Particularly revealing is the case of a man who lived in the US for 30 years, in his post, swear words and high, bookish wording are used as appropriate:

> "My attitude over the years has changed from "I, if necessary, am ready to defend this great glorious country with a gun in my hand" (…) to "you, the used and darned rubber johnies, where do you pull us, to what kind of vomit-swamp of socialism and political correctness?"

Irony, sarcasm and self-irony, widely present in positions of veterans émigrés, is often achieved by the collision of low- and highbrow wording and concepts. In particular, sarcasm can be easily felt in the above text fragment, this effect achieved by putting such words and phrases as "vomit-swamp" and "political correctness", "great flourishing country" and "darned condom" side by side.

Still, the analysis of the use of rhetorical forms, literary allusions, original and periphrased tropes, as well as interactive dialogue with the reader, do not allow coming to a clear-cut conclusions with respect to any of the migrant groups. Differences in these indicators seem to be of more individual nature, and depend on the goals that bloggers set for themselves when writing specific post or blogging in general, and on erudition, literary talent, and even the mood of each blogger.

5.5 Logical and reflexive aspects

It is the new migrants who apply the logical framing of their statements the most actively. They also try not to miss any details, indicate the causes, consequences and purposes of any activity described and sum up the main idea at the end. They often use quotation marks to introduce neologisms, foreign-language terms or stress a special meaning of words and expressions. Finally, it is in their narratives that ellipsis is used the most often.

In the posts by prospective migrants, on the contrary, the logical and reflexive features of the posts are the least developed. Bloggers, who have lived abroad between three and 20 years use almost the entire range of the expressive tools, but do this very sparingly. They are less likely than new immigrants and veterans to quote someone else's speech. They do not talk about themselves in the second person in order to attribute a universal, abstract nature to a particular case. It is also atypical for them either to summarize a narrative or provide generalizing conclusions.

Veterans, on the other hand, often use insertion of somebody else's quotation, and almost always resort to replacing the first with the second person when narrating their experiences. As a rule, they pay special attention to temporal ordering of their stories, pointing out if an event took place "before", "after", or "later" than another, and in which year.

Comparing two posts: one written by a man (82 phrases) and other by a women (93 phrases), with immigrant experience of one and twenty years respectively, eclipses are used in the former post several times more than in the first one, along with introductory words of generalizations, summaries and conclusions, as well as clauses of cause, purpose and effect. In the second narrative by the female veteran there are much higher rates in the use of quotation marks, and in particular, direct speech, as well as more words that provide a chronological order of the story.

6 Personal e-narrative as a tool for social adjustment

Although the scale of the studied empirical material is somewhat limited, still some of the results described above allow us to make certain general assumptions that may need further study and confirmation.

Our findings suggest that the time factor is an important factor as the dynamics of change of the migrants' worldviews develop in accordance with certain temporal patterns that depends upon the time spent abroad, which is necessarily related to some extent to the migrants' average age.

The data analysis shows that most of those bloggers who share their experience and ideas about their life are either those who are preparing to emigrate or the relatively new immigrants. Out of our sample, 11 narratives belonging to this group of bloggers have been written either a few days before departure or during the first two to three years in exile. Their narratives are distinguished by a particular heterogeneity in attitudes and appraisals, as this is the time when active adaptation takes place, when the émigré bloggers experience either a sort of honeymoon or first crises (described as acculturation parable in Berry 1997). It is during this period that frequent and profound identity changes of a migrant may take place, along with gradually weakened ties with the native country and the former social circle, when new interests, habits, acquaintances, and 'relevant others' tend to emerge and develop.

It is also during this period that the new space is mastered, the foundations are laid for possible future stability and success, and the horizon of career opportunities is determined. These are reasons why the narratives of this first group demonstrate frequent discussions of expectations and plans. The narrators of the first group assess and generalise their new experience, create mental maps, develop their vision of the new world they now live in. Their stories are much more future-oriented than those by the authors of the other two temporally-organised groups.

In contrast to the orientations of the first group of migrants, narratives of émigré bloggers with an experience of living abroad between three and 20 years are much more focused on the present. These bloggers seem least likely to feel the need to talk about their lives, maybe because they are in the process of an active and persistent construction of their new lives, therefore, being more certain of their future and path-searching than the first group (the sample contains eight narratives from this rather extensive period). These bloggers seem to know where they are going and what they want and work to achieve their goals. Their stories are filled with action, and they do not have time for long reflections and digressions, as they express a focus on order and clarity. The authors of this group do not, as a rule, speak about the difficulties they encounter, or their failures to cope with these. On the contrary, their narratives are optimistic, though usually careful in their assessments.

The homogeneity itself of the narratives by the second group of bloggers suggests that a much narrower group of émigrés with a certain integration pattern would continues writing autobiographical blogs after the first two to three years of the adaptive period, as we do not see such bloggers that have failed or rejected the path of integration into the new communities and lives. Neither do we see the particularly successful migrants who were able to achieve outstanding careers and social positions, or those who chose the path of complete adaptation and identity change. It seems that autobiographical blogs have lost functionality and relevance for these migrants, who may either not want to narrate the stories of their failures, or do not need to share their success with others due to other or better channels for doing this. Another reason could be that finally, they are no longer interested in maintaining the audience in their native language. Such a line of thinking lead us also to assume that émigrés start their autobiographical blogs for different reasons than those who continue doing this at a later stage: on the one hand, initially it may be a way to maintain active communication with their home audience and other new migrants to help them to go through the painful uncertainties (but also to share their satisfaction with every success) of this early period after emigration. On the other hand, personal journals help them to formulate their future plans in interaction with commentators, to share and test their ideas, plans and experiences and thus navigate through the uncertain waters. Later on, after the first several years of adaptation, the moderately successful migrants continue writing personal blogs in a certain self-assertive style in order to demonstrate their success in adapting to the new reality while not forgetting their old roots. Finally, we may assume that after years of writing personal blogs, bloggers may have developed a habit of doing so, and even if the need for and functionality of writing blogs may have changed, at least some of those authors may continue by inertia and habit, although the change would be reflected in the content and style of the blogs.

Indeed, judging by the ten veterans' narratives written by migrants who have lived abroad between 20 and 36 years, the blogging veteran émigrés are more willing to share with readers their thoughts about their own lives and experiences than the second group of bloggers. It is necessary to take into account that the composition and the behavioural patterns of the third group is influenced by the age factor (normally they are over 40-45), including the fact that, among migrants aged over 50, there are less active internet users and, in particular, less bloggers (the average age of bloggers is found to be about 32)[6]. On the other hand, it has been demonstrated that often times it is the slightly older migrants who rely more on remote communication and hence the average age of bloggers may be somewhat higher[7]. Narratives of this group are usually more retrospective, recollecting past experiences, and there are frequent commemorative posts and those dedicated to jubilees. There are more general reflections in these narratives, more assessments of one's own life achievements, a rather moderate amount of emotional expressions. However, these blogs show more attention to literary form. The lives and careers of these émigrés have reached a certain stage of stability, some goals have already been achieved, others abandoned or revised, while the social environment has long ceased to be unusual or exotic.

It is obvious that a more extensive sample could have demonstrated different results. For example, it could enable us to split the second group, or move the boundaries between the groups. However, we assume that this would not change the observed dynamics of narratives, i.e. their change depending on the migration experience of the authors and its duration.

The analysis of narrative modalities also shows the presence of three general (ideal) narrator types, each predominantly characteristic of the respective 'temporal' group.

Hence, some posts of prospective and new immigrants give the impression that the narrator is experiencing something unusual: the authors mention the dualistic notions of life and death, happiness and unhappiness are mentioned; symbolic notions of a chosen path, and circumstantial descriptions that are full of contrasts and oppositions are present. Such a narrator resembles the literary author who is "superior in degree to other men and to his environment" (Frye 1958, p. 33).

Another type or 'mode' following Frye, is found in the posts of the second group of migrants—in these texts the narrator draws on the image of a fighter

6 See the overall statistics given by *LiveJournal*. http://www.livejournal.com/stats/stats.txt. Accessed 26 July 2015.

7 Analysis of 100 blogs by Russian émigrés showed that the average age of their authors is approximately 37 (Kresova 2013).

demonstrating resolve and perseverance in achieving his/her goals. Although there nothing really extraordinary or unusual seems to happen in what the person is doing or achieving, but the picture drawn in the blogs shows persistence and will of the narrator as everything proceeds mainly due to his/her personal efforts and adaptability.

The last type of narrator is represented by somewhat more literary-style posts by veteran émigrés; These bloggers present themselves as ordinary, "one of us" people who experienced ups and downs but who can smile at themselves and at their life achievements or assets, who are able to openly speak about their weaknesses and joke about past mistakes.

The assortment of modes described above is dynamically reflected in the narratives depending upon the duration of life abroad, starting from a more romantic description of searching for one's place in a new and less than friendly environment at the start of the migration path, to the down-to-earth picture of the persistent and successful fight for a better life. Eventually, after about twenty years after the move, these develop into an outline of past achievements and failures full of irony. Each mode provides a framework for portraying and interpreting the narrators, and the world depicted in the narrative. Such frameworks impose certain patterns both upon the author who should "fit the genre", forcing him to choose a certain style and means of expression, and the reader who perceives and comments on the story.

Our research leads us to another meaningful observation: there are no bloggers in our more or less random selection that would represent oneself as a loser, a victim of external forces (whether people or circumstances). The Russian internet, especially the e-forums and e-communities, is full of stories about the difficult lot of émigrés, their exploitation, and the lack of personal and professional regard. Frequent complaints can be found about the host communities and their traditions, the laws of the respective country and its governance system, among other aspects. None of this could be found in the studied posts, which project a certain image of the narrators: as creators of their own destiny, responsible for their actions, ready to act in order to achieve well-being and success.

But why are not there any stories written by "losers" in our sample of autobiographic blogs?[8] Following a more thorough study of the profiles of the bloggers and personal information retrieved from their blogs, it can be concluded that autobiographical blogs are maintained exclusively by relatively successful émigrés, while neither super-achievers nor losers write blogs. Moreover, it is probable that

8 Analysis of the other posts and comments by Russian émigré bloggers showed the same pattern: there are no 'losers' among the authors/narrators (Kresova 2015).

only this type of person continue blogging after the first three years of life abroad (see also: Kresova 2015).

Russian émigré bloggers from our sample demonstrate satisfaction with life in the new country and assess their decision to emigrate and their migration experience as rather positive. At the same time, they do not lose connection with their former homeland and continue to communicate in their native language, Russian. Moreover, they do not come out with harsh criticism of their country of origin and often note the positive aspects of life in both former and current home states. Verbal behaviour of narrators from the analysed sample is typical for migrants oriented toward an integration strategy (Berry 1997). In contrast to those who have chosen or were forced to choose either the strategy of assimilation and radical change of identity, or separation (alienation), they chose, in the words of a woman blogger from our selection, a balance "between the two worlds, trying to preserve the semblance of equilibrium". Their blogs seem to be the tools for achieving such a balance, platforms for adapting their identity through positive self-representation, for accepting past life experience and designing future strategies (Baker and Moore 2008; Moon and Sanders 2006; Elias and Lemish 2009; Khvorostianov and Elias 2012; Mesch 2012; Beyl 2012).

7 Conclusion

We have discussed some ideas that stem from the analysis of our rather modest and specific sample of autobiographical blogs of Russian émigrés. While the narrow scale, diversity of our sample and research tools applied may limit the decisiveness of our results, our study helps to ask a number of questions that may benefit further analysis of autobiographical narratives of different kinds. The most general question is of course that of the relationship between the three members of the complex—author-narrator-narrative-context-interpreter, which requires a multidisciplinary approach and set of instrument. Yet another important question relates to methodological means conceptual basis and adequate terminology, which may enable us to dig into this extremely complicated knot of interrelations, processes and factors. However, it is clear that without an essentially multidisciplinary approach, the possibility for obtaining any robust results is minimal. In addition to the interpretation of the narratives, our research has posed an additional question of how our own results could and should be interpreted, an intellectual challenge that requires more thinking and even more empirical research.

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Making Emotions Count: The Self-Tracking of Feelings (Extended Abstract)[1]

Sarah Miriam Pritz

The paper provides a critical assessment of existing self-tracking programs that try to make emotions count.

Firstly, I suggest conceiving of self-tracking and the tracking of feelings, emotions and moods as specific practices of modern subjects examining, actualizing and representing themselves[2] (1). Secondly, I will present an analytic reconstruction of various self-tracking techniques that focus on emotions (2). Finally, I will position the tracking of emotions within current analyses on the development of the social regulation of feelings by focusing on the implicit concepts of emotion underpinning those tracking techniques (3).

The self-tracking of feelings combines materialistic-rationalistic concepts of emotions with romantic notions of the special importance of emotional expressivity and—as I argue—therefore stands for a crucial change in the social regulation of emotions. Similar to other contemporary programs of emotion management—such

1 The extended abstract at hand relies on Pritz, S.M. (2016). Mood Tracking. Zur digitalen Selbstvermessung der Gefühle. In S. Selke (Ed.), *Lifelogging. Digitale Selbstvermessung und Lebensprotokollierung zwischen disruptiver Technologie und kulturellem Wandel*. Wiesbaden: Springer VS.

2 In this context I use the German concept "Selbstthematisierung" (i.a. Hahn 1982, 1987, 2000; Bohn and Hahn 1999) as a heuristic strategy. "Selbstthematisierung" has no real equivalent in English, therefore I refer to these specific kinds of practices with the terms "self-examination", "self-actualization", "self-representation" etc.

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as "emotional intelligence" for example—it contributes to generating a whole new understanding of emotions as phenomena that can be mentally chosen, formed, optimized and used for self-knowledge, self-fulfillment and personal success.

1 (Emotional) Self-Tracking as Practice of Self-Examination (Selbstthematisierung)

Institutionalized forms of subjects examining, actualizing and representing themselves (e.g., confession, autobiography, diary etc.) vary over time and culture and depend on respective notions of subjectivity (i.a. Hahn 1982, 1987, 2000; Bohn and Hahn 1999). In self-tracking, however, the current very influential subject concept of the self-governing, neoliberal subject (i.a. Burchill et al. 1991; Lemke 1997; Rose 1998, 1999a, 1999b; Lemke 2000; Bröckling et al. 2000; Dean 2010) is most strikingly expressed. Through various techniques of observation, measurement and analysis, self-trackers aim to create a lifestyle of self-responsibility that is supposed to minimize potential risks. Neoliberal governance, however, is essentially a form of governance that addresses its subjects as affective beings (i.a. Isin 2004). Individuals are encouraged to comprehend their emotions and the emotions of others as "emotional capital" (i.a. Hochschild 1998; Illouz 2007, 2008a; Neckel 2005, 2014). In so far, it is not surprising that emotions and feelings besides "health" and "improved performance" are central categories that self-tracking focuses on.

In contrast to other—historical and contemporary—forms of self-examination, self-actualization and self-representation, self-tracking can be conceptualized as a technical-numeric form that relies on specific software and hardware, statistical operations, algorithms and visual display formats such as charts, diagrams, curves etc. Measurement practices that have been developed in other areas (e.g., natural science, medicine, sports, economy) are transferred to the context of individual self-examination.

Taking a look at the history of self-examination, confession in a religious context constitutes one of the earliest, and for a long time in the history of the Western World quite powerful, institutions. It is the nexus of guilt, self-examination and self-control that can still be found in the latest "technologies of the self" (Foucault 1988), such as self-tracking. Here the history of confession is particularly insightful regarding the tracking of feelings, emotions and moods. As an important institution of self-examination, in various stages of development, confession led to a specific kind of socialization of feelings and emotions and an increased awareness of one's own subjectivity (i.a. Hahn 2000). Since their early institutionalization, practices of self-examination, self-actualization and self-representation

have directed the focus on the exploration of one's own inner life, feeling and emotions. Over time this exploration has intensified and further differentiated itself regarding contexts, functions, types and dissemination and has been accompanied by various kinds of emotion management (i.a. Burkart 2006; Schroer 2006). The specific coupling of rationality and emotionality that can be found in techniques of tracking feelings and emotions thereby constitutes neither a contradiction nor a historical coincidence, but can be regarded as a characteristic feature of the (emotion) culture of contemporary modern Western societies (i.a. Becker 2009; Illouz 1997, 2007, 2008b; Flam 1990; Neckel 2005, 2014).

2 Making Emotions Count: Self-Tracking Programs Focusing on Emotion

In which ways are emotions subjected to observation and measurement and how are they 'produced' in the process? In which ways are emotions made 'visible', which new perspectives on emotions are generated and what remains unseen?

Basically, two categories of programs that try to track emotions, feelings and moods can be reconstructed[3]:

The first category relies on a specific kind of standardized self-observation and self-logging of emotions[4]. Self-trackers observe, label and document their emotions via specific software programs on their computers, tablets or smartphones. Thereby a statistical overview of one's own emotionality and mental state is supposed to be provided. Emotions are 'fixed' via different symbol systems, e.g., scales and emoticons.

It's worth mentioning that within programs using scales, positive feelings and emotions consistently form the upper end of the scales. Emotions, therefore, are not only categorically arranged—and therefore also 'generated' as specific categories—by these self-tracking techniques, but also hierarchically ordered and rated as 'positive' or 'negative' emotions. There is a striking similarity with the logic of computer games: The higher the 'score'—which always means: the more positive the emotions—the better. Mood trackers operate on a teleological notion of 'good feelings'.

3 I use the terms "emotions", "feelings" and "moods" synonymously. All three terms can be found within the discourse on self-tracking. "Mood tracking", however, is the most frequently used umbrella term.

4 E.g. mappiness, T2 mood tracker, How Are You feeling?, mood 24/7, moodscope, mood pulse, mood O scope, mercury app and mood panda, among others.

"Gamification", defined as the use of game thinking and game mechanics in non-game contexts, in general is characteristic of many mood tracking-programs (Whitson 2013). For example, tracking one's emotions in a playful way with funny and colorful emoticons constitutes the operating principle of many mood trackers. It is common practice of a 'digital embodiment' of emotions through emoticons in media communication, which mood trackers can build on in this context. In contrast to mood-tracking programs using scales, mood trackers using emoticons generate and 'fixe' emotions as discrete phenomena.

Both kinds of representation and documentation of emotions, however, contribute to a process of standardization and 'disambiguation' of emotions. This process is also associated with effects of normalization. Many programs—in addition to instructing the self-tracking of emotions—provide a forum for sharing one's tracking results and for emotional exchange. This emotional exchange can take place between user and app ('mechanical empathy') or between user and nominated friends or within a bigger, mostly anonymous community.

While some self-tracking-programs fully decontextualize the observation and documentation of emotions, others explicitly focus on their contexts. Context factors, however, are mostly gathered rather unsystematically with 'free comment boxes' and rarely through defined context variables.

By tracking their emotions, moods and feelings, users are promised to gain a better understanding of their own happiness in order to make better decisions based on the data gathered. Emotions are treated as something that essentially 'creates' identity, and happiness appears as something that can be 'made' and individually chosen. The tracking of one's emotions, feelings and moods is not only supposed to broaden a user's self-understanding, but also proclaims to perform preventive or even curative functions.

The second category of emotional self-tracking programs operates on the principle of a black box. These programs claim to 'objectively' record emotions from an external perspective through a range of sensors and analysis software (e.g., measurement of cardiac frequency, facial expressions, certain features of spoken/written speech, the way people use their phones and emotive wearables etc.)[5]. The possibilities of commercializing such programs seem endless, which is highly em-

5 E.g., emWave2, emotient, facereader, affectiva—affdex, realeyes, contextsense, streamcrab, beyond verbal—moodies, precire, EEG data visualizing pendant, among others.

phasized by their providers: marketing, service, communication, even dating could be optimized with the help of automatic emotion analysis.[6]

What all these programs have in common is that they present themselves as black boxes. They focus on input, for example speech, facial expressions or bodily processes, and output, the thereby 'extracted' and 'produced' emotions—, while the internal mechanisms remain in the dark. In this context, I heuristically refer to Bruno Latour who described "black boxing" as "the way scientific and technical work is made invisible by its own success" (Latour 1999, p. 304). Those programs, however, also induce some kind of "black boxing" process themselves: the "black boxing" of one's own feelings and emotions. This process of substituting subjective bodily experiences with data is characteristic of the project of the "quantified self" in general. Referring to the body-phenomenological distinction between "Körper", the 'objective body', and "Leib", the 'subjective' and 'lived body', which has no real equivalent in English, Paula-Irena Villa (Villa 2012, p. 16) describes self-tracking as being obsessed with the 'objective body' (Körperbesessenheit) while ignoring the 'subjective body' (Leibvergessenheit). Self-tracking clearly privileges the 'objective' over the 'subjective body' because it seems that the latter cannot be trusted and is not reliable enough (i.a. Wolf 2010). It is this characteristic process that can be found in its most condensed form within the self-tracking of feelings.[7]

6 In this context it is evident that the measurement of one's own feelings and emotions is joined by the measurement of those of others. Together with the Anglocentrism of most tracking programs it is this very fact that shows the urgent need for a genealogy of tracking programs focusing on emotions.

7 The role of the 'subjective body' (*Leib*), however, has to be rated differently in respect of both reconstructed categories of tracking techniques. While the thesis of self-tracking being obsessed with the 'objective body', while ignoring the 'subjective' one, characteristically applies to the second category of programs (automatic emotion analysis), programs of the first category (standardized self-observation and self-logging) actually depend on some kind of residual subjective bodily experience that is 'translated' by users into different symbol systems (e.g. scales, emoticons) or (written) language (comment boxes). Empirical research, indeed, is urgently required in order to comprehend the complex feedback processes between self-tracking and subjective bodily experiences.

3 Positioning Emotional Self-Tracking within Current Analyses on the Development of the Social Regulation of Emotions

Broadly speaking, two opposing views on the social regulation of feelings in modern Western societies have been put forth in the contemporary sociology of emotion (Neckel 2005): on the one hand the hypothesis of a further domestication, discipline and instrumental objectification of emotion leading to social suffering and alienation (exemplarily: Hochschild 1983; Meštrović 1997), on the other hand the hypothesis of an informalization (exemplarily: Wouters 1999; Maffesoli 1995, 1996) of feeling rules since the 20th century, which is thought to increase personal autonomy in the shaping of emotional expression. Discipline and informalization, however, seem no longer to be incompatible, but converge in a new understanding of emotions and emotion management (Neckel 2005; Becker 2009). Against this background, regarding the various emotional self-tracking programs portrayed earlier, two aspects are striking: emotions are scientifically rationalized and domesticated—but essentially as highly cherished personal resources of expressivity. For one, the implicit concepts of emotions underpinning emotional self-tracking techniques are characterized by a materialistic-rationalistic understanding of emotions that mostly originated from neuroscience. Emotions are treated as phenomena that can be ordered, regulated and normalized. They are objectified by processes of observation and classification—either by the reflexive subject or the technical black box—and are remade into phenomena that can be willfully regulated and purposively shaped. At the same time, emotions are held in high esteem as personal resources of self-knowledge and self-fulfillment. A 'better' understanding, which always means better 'management' of one's own emotions and those of others, is supposed to bring about happiness and success in nearly every aspect of life. Emotions are considered to play a very important role regarding processes of decision making and orientating actions. This special characteristic and ambivalence of emotional self-tracking shows a lot of similarities with other contemporary programs and practices of self-examination and emotion management, such as "emotional intelligence", for example (i.a. Goleman 1995, 1998; critical: Baumeler 2010; Fineman 2000, 2003, 2004; Krell and Weiskopf 2006; Neckel 2005; Pritz 2012; Sieben 2001, 2007).

Finally, one important question remains to which only empirical research can find an answer: Which consequences will this intertwining of materialistic-rationalistic concepts of emotions and notions of the special importance of emotional expressivity have for social actors? Keeping in mind the central function of emotions regarding the coordination of human action, namely to inform an actor

about his own inner state and the subjective meaning of certain situations, persons, objects or events (exemplarily: Hochschild 1983), it appears as if the self-tracking of feelings aims to take over this very function. Emotion signals are transformed into data, they are decontextualized, standardized and normalized, while ignoring the dimension of what is called '*Leib*' in German—the dimension of what is subjectively felt from a first person perspective. Within the first category of programs, social actors 'translate' and interpret their emotional experiences based on standardized interfaces that the respective programs offer. Emotions are categorized and brought into a hierarchical order, which also creates normalizing effects. While these programs still try to contextualize emotions, either via a qualitative appendix of quantitative emotion data or correlating emotion data with other variables, emotions within the second category appear as output of technical analysis software without any reference to the original situations. Both versions generate a new, seemingly objectified 'visibility' of emotions that is supposed to inform social actors about their inner states in a much better way than without emotion data. The project of the self-tracking of feelings is similar to a magic mirror: Looking into it, a happier life is promised; but it also carries the danger that the reflecting and reflected self can no longer be experienced by the actor as one unit.

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Built Environment, Physical Activity and Social Participation of Older People

Is Lifelogging an Effective and Valuable Assessment Method?

Daniela Kahlert

1 Background

Based on the demographic transition, most European societies are getting older. Ageing is often accompanied by changes. These include physical phenomena such as the reduction of muscular mass (DiPietro 2001), for instance, thereby increasing the risk of falling (Schott 2007). Social changes may occur due to premature deaths of family members and friends (Lampinen and Heikkinen 2003), possibly resulting in the feeling of (social) isolation among older people. Despite these prospects, getting older is not associated with negative changes per se. Even in older age, physical activity fosters people's health and well-being (Hamer et al. 2014). As such, active engagement, including social participation and physical activity, is an essential component of successful ageing (Rowe and Kahn 1997). Research has shown that physical activity and social participation reduce premature mortality (Glass et al. 1999), disability (Bassuk et al. 1999) and increase cognitive performance (Beland et al. 2005).

Given these positive outcomes, it is important to identify factors that promote older people's physical activity and social participation. Socio-ecological models (e.g. Glass and McAttee 2006; Sallis et al. 2006) and approaches from environmental gerontology (Rowles and Bernard 2013) posit that elements of the built

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environment affect older people's behaviour because they provide 'opportunity structures' (Baum and Palmer 2002). These in turn increase or decrease the likelihood of being physically active and participating socially in the living environment. The living environment is of high importance for older people since they spend most of their days within this environment and would like to age in the same place later in life (Michael et al. 2006).

Accordingly, increasing attention has been paid to studying the elements of the built environment that hinder or promote people's physical activity and social participation. To do so, a variety of different assessment methods have been applied. This chapter briefly introduces the terms 'built environment', 'physical activity' and 'social participation' and summarises how they have been investigated so far. Afterwards, it will be discussed whether or not *lifelogging*, and more specifically the use of wearable cameras, could be a valuable and effective method for assessing older people's physical activity and social participation in their living environment. Wearable cameras might be a promising approach since they provide information with a high ecological validity that goes beyond standardised assessments.

2 The research topics: Introduction and common measurement methods

The built environment

The built environment is the physical infrastructure of people's surroundings and the space in which (older) people live their everyday lives (Renalds et al. 2010). It comprises the transportation system, land-use patterns (e.g. type and use of houses) as well as macro and micro-scale environmental features, such as the connectivity of a living environment, building height, aesthetics, the sidewalk quality or the presence of street furniture (Brownson et al. 2009).

Concerning the impact of different environmental elements, both conceptual models and available research results suggest that the impact varies depending on the specific (activity) behaviour being studied. For instance, walking for transportation is affected by the availability of transport systems as well as the connectivity of walking routes within the district. Older people's decision to go for a recreational walk is affected by means of aesthetics, sidewalk quality, the availability of street furniture (e.g. park benches, street art, lighting, plants) and people's perception of safety (Kerr 2014; Lee and Moudon 2006; Yen et al. 2014).

Common methods to describe and assess the built environment could be divided into three categories (Brownson et al. 2009): a) subjective measures, which

are applied by interviews or questionnaires, b) observational methods such as audit tools and c) objective measures by using geographic information systems (GIS).

While questionnaires differ in their length and content, most of them assess traffic and safety issues, aesthetics and land-use. One example is the Neighbourhood Environment Walkability Scale (NEWS; Cerin et al. 2006), a renowned questionnaire that is available in different languages. Audit tools gather specific data for environmental details, such as the number of trees, quality of street furniture, street crossing time, and sidewalk width. For instance, the Pedestrian Environment Data Scan (PEDS; Clifton et al. 2006) assesses pedestrian facilities, road attributes and walking, as well as cycling amenities. GIS are computer software and hardware solutions that capture, store and analyse spatial data that can be obtained through address or census boundary identification or geographically referenced information. An example for such an objective assessment is the so-called walkability index (Frank et al. 2010), which could be used to study the relationship to people's types of physical activity (e.g. walking for transportation; Reyer et al. 2014). The walkability index combines information about the connectivity, mixed land use and density of a given area using geo-spatial information that is available on the ArcGIS toolbox.

Physical activity

A common definition of physical activity is that it is any bodily movement by skeletal muscles that leads to an increase of energy expenditure (Casperson et al. 1985). Therefore, physical activity can be anything related to exercising, activities of daily living or just strolling around. Its volume can be quantified by a combination of duration, frequency and intensity. It can be described according to the setting in which it occurs, the type of activity, the location and its purpose.

Objective as well as subjective methods could be used to assess physical activity (for an overview: Strath et al. 2013). Pedometers and accelerometers are common objective methods. They count steps or acceleration and quantify people's activity. Further information, such as the context, type or purpose of the activity could be gathered using subjective methods such as questionnaires, (activity) diaries or interviews. Depending on the specific content of the questionnaire, people report their behaviour for a given period of interest as well as the setting, the type or the purpose. For instance, the BAECKE questionnaire (Baecke et al. 1982) is often used to study people's physical activity at work, during leisure as well as sport activities. The International Physical Activity Questionnaire (IPAQ; Craig et al. 2003) assesses job and recreation-related physical activity, but also focuses on

physical activity as a means of transportation (e.g. volume of motor vehicle transportation, bicycling and walking).

Social participation

Although social participation has been studied since the 1960s, a common definition is still lacking (Piskur 2013). As a consequence, the term 'social participation' has been used and defined in varying ways[1] (Piskur et al. 2014). One of the definitions understands 'social participation' as involving people in decision-making processes in policy, health or community (Bathgate and Romios 2001). Most often, however, social participation refers either to interactions and contacts people experience during their everyday life (Koster et al. 2009) or the involvement in relationships and community life (Levasseur et al. 2010).

Levasseur and colleagues propose a taxonomy of social participation that distinguishes six levels (see Fig. 1; Levasseur et al. 2010). These levels respect the individual proximity of involvement with others, the activity's goal and whether or not activities are performed with others.

1 Other concepts such as social networks or social capital could also be differentiated. While social networks pay attention to groups and their intra- und inter-relationships, social capital focuses on people's (social) resources as gained by through social connections or networks (Putnam 2000). According to the International Classification of Impairment, Disabilities and Handicaps (ICIDH), the term 'participation' needs further distinction. Correspondingly, participation focuses on the impact of disabilities and impairment of a person's life and is most often used in rehabilitation (Piskur et al. 2014). This chapter does not refer to studies that investigate social participation among individuals with physical disabilities, in which social participation most often refers to functional independence of people in their daily life (Noreau et al. 2004).

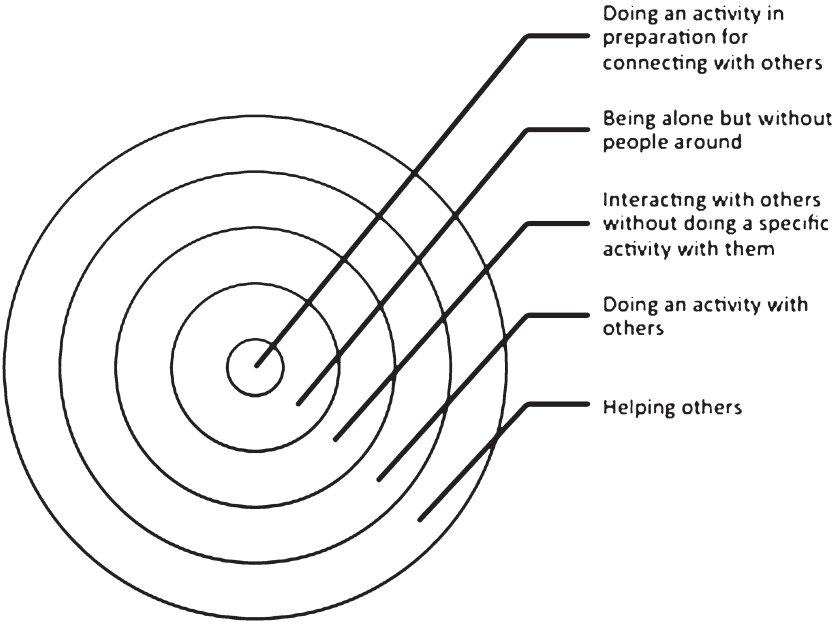

Fig. 1 Taxonomy of social participation (Levasseur et al. 2010)

In line with this taxonomy, being alone implies a lower level of social participation than being alone but having others around. Furthermore, interacting with others is a higher level of participation compared to the two former levels, but it is lower than doing activities with others. Helping others would be an even higher level of social participation compared to the others categories of interaction.

Social participation could be assessed using qualitative interview techniques as well as varying questions or questionnaires, which are sometimes combined within a study. Most often, people are asked to quantify how often they attend (social) activities, such as going to church, club meetings, cultural events or the like (e.g. 'Elderly Activity Inventory Questionnaire'; Lefrancois et al. 2001) or how often they engage in social, cultural or political associations (e.g. Buffel et al. 2013). Furthermore, counting the number of contacts, the number of visits during a typical week or the number of phone calls one makes have also been applied (e.g. Hodge et al. 2013; Rosso et al. 2013). Further emphasis is paid when social participation is studied in the sense of community integration or community participation. The community integration scale measures the sense of belonging to or

identification with a community. The community participation scale assesses the degree to which people are involved in social activities in their community (Gracia and Herrero 2004).

3 Putting the pieces together: Challenges in studying older people's activity and social participation in their living environment

In order to investigate physical activity current studies focus, for instance, on people's active behaviour compared to their sedentary behaviour, due to the latter's status as independent risk factor for health (Bucksch and Schlicht 2014). Here, questions may address the rates and types of (older) people's physical (in)activities. Most studies so far try to assess sedentary behaviour by asking people about their screen-time (e.g. Dunstan et al. 2010). However, sedentariness is more than sitting in front of the television or computer. Sitting while reading a book or travelling passively (e.g. by car) are further examples of sedentary behaviour. Accelerometers are also used to investigate sedentary time by defining 'cut points' of assessed activity in order to distinguish sedentary compared to active behaviour. Laboratory studies, however, found that about 50% of sedentary behaviour are accurately classified by accelerometers (e.g. Oliver et al. 2010).

Studying active and inactive travelling is another interesting research field. For instance, walking is a preferred type of being physically active among older people (McPhillips et al. 1989). Studying older people's physical activity or 'mode of travelling' in their living environment in relation to their social participation is complex. Applying questionnaires would be challenging because people struggle to remember all activities and context information throughout a typical day. Reviewing the assessment methods mentioned above, a physical activity or travel diary would be the most appropriate solution among the common methods, especially if it is applied as an ambulatory assessment study (Schlicht et al. 2013). However, diaries are time-consuming, which could increase the number of study dropouts or data loss.

Research questions related to older people's social participation in their living environment are, for instance: What level of social participation do older people experience in their living environment? Are there any 'typical' destinations or places where older people experience social participation? How could those destinations or places be described? For instance, Osmond (1959) differentiates 'sociopetal' and 'sociofugal environments'. A sociopetal environment reduces the distance between people, brings them together and encourages sitting together.

In contrast, sociofugal environments are 'pushing people away'. In this sense, the design of places in general and the placement of seats, benches and tables might contribute to people's social participation. Furthermore, it would be worthwhile to find out how older people reach those places and whether or not people who are walking around experience more social participation compared to people travelling by car. It could be assumed that travelling by car could decrease the chance of meeting other people accidentally.

As it was described above, most of the studies aiming to describe and investigate the built environment are either based on *quantitative* subjective assessment or on objective methods. However, applying those methods may limit the information details. Questionnaires quantify predetermined elements of the built environment, such as the availability and accessibility of destinations or aesthetics and quality of footpaths or places. However, these instruments do not provide in-depth information about typical individual places and characteristics of these destinations, as illustrated in this next example: There are two different public places available and accessible to two different people and both people rate the both places as accessible and pleasant. However, one of these places has benches that invite people to interact (sociopetal environment) while the other place has no benches at all or they are placed 'back-to-back' (sociofugal environment). Such details and differences are usually not assessed by questionnaires or objective measures. However, it might have an impact on older people's decision to visit a certain place and, as a consequence, on their social participation at this specific place.

Another possibility in studying the given research questions could be the application of *qualitative* studies that provide more in-depth information and details about the qualitative elements of the living environment (e.g. aesthetics, quality and specifics of places). Qualitative studies reveal the importance of micro-scale characteristics, such as the quality of sidewalks or well-maintained natural elements (Moran et al. 2014). Such qualitative studies are most often conducted as interviews or focus groups, which provide detailed, however not spatial, information. For instance, the ENABLE-AGE project (Iwarson et al. 2003) brought to light that men felt excluded from many places and opportunities for social contact. This is quite interesting and leads researchers to ask why this is the case and how it could be explained. Furthermore, it would be interesting to know where men are involved in social participation and if there are any visible differences in these places and the places in which women are involved in social participation. This would require methods that relate both the level of social participation as well as the characteristics of the built environment.

However, a further challenge is related to studying social participation itself. The methods described above do not distinguish the level of social participation

as it is proposed by the taxonomy from Levausseur and colleagues (2010). The complexity and level of social participation as shown in Figure 1 go beyond the number of contacts, the number of visits with other people or the involvement of social activities such as attending cultural events (Levasseur et al. 2010). As a consequence, breadth, depth and complexity of these levels of social participation are hard to measure with typical assessment methods.

4 Lifelogging: Wearable cameras as a novel approach in health behaviour research

Ambulatory assessment refers to the use of methods that assess the on-going behaviour of people and environmental aspects in their natural setting. It is a suitable approach to collect valid and reliable data about people's behaviour in their living environment and by doing so, collecting data with high ecological validity (Schlicht et al. 2013; Trull and Ebner-Priemer 2013).

'*Lifelogging*', the use of wearable cameras that passively capture digital lifelog-images, is a relatively new way of applying ambulatory assessment. Devices, such as the *SenseCam* or the *Autographer*, have to be worn on a lanyard around the neck. Depending on the device, several sensors are integrated (e.g. accelerometer, temperature, light level). Images are captured automatically at a pre-determined rate (e.g. every 15 to 20 seconds).

The use of wearable cameras is a recent approach that has been applied to investigating different health behaviours. It has been shown to be a suitable method to assess dietary behaviour (O'Loughlin et al. 2013) or people's physical activity (Kelly et al. 2011), as well as everyday activities (Wang and Smeaton 2013). Kerr and colleagues studied different sedentary behaviours of 40 people (Kerr et al. 2013). They compared images taken from a SenseCam with accelerometer-based classifications. They concluded that administrative activities, TV viewing, and other screen use were correctly classified with the accelerometer. However, standing as well as driving a car was misclassified (Kerr et al. 2013).

Besides that, wearable cameras have also been applied to assess different contexts of physical activity. Doherty and colleagues studied the feasibility of wearable cameras to categorise the type of activity behaviour[2], such as gardening or walking. Furthermore, they tried to identify the context, such as 'indoor', 'outdoor', 'transportation' or 'social/interaction' as well (Doherty et al. 2013c). In this

2 The type of activity was based on the Compendium of Physical Activity (Ainsworth et al. 2011)

study, 49 study participants were asked to wear an accelerometer and the SenseCam for approximately three days. A random sample of 386 episodes (out of 3,017) was analysed. 81% of episodes could be categorised with respect to the activity type and the context of the behaviour. The reasons for the failure of analysis were blurred or dark pictures (Doherty et al. 2013c).

Spatial methods, such as photo-observations, have been recognised as useful approaches for understanding the built environment from a first-person perspective (Moran et al. 2014). Oliver and colleagues used wearable cameras to audit and quantify built environment features along work-related cycling and walking routes (Oliver et al. 2013). Fifteen study participants wore a SenseCam and filled out travel diaries for three weekdays. A coding scheme was used to differentiate features of the built environment that are related to active transport (e.g. footpaths and their conditions, temporary or permanent obstructions to walking). About 25% of the pictures could not be coded because they were too dark or blurry. The remaining 75% of the pictures (n=1,749) were assigned to a total of 30 environmental features (e.g. temporary and permanent obstructions, grass verges).

How much and which kind of social participation older people experience was the focus of a study that was recently conducted by the author. Six men and five women living in a rural area were asked to wear the *Autographer* for two days. In total, 28,937 pictures were taken. First preliminary results show that approximately 65% of the analysed time was spent alone. The assignment of levels of participation will be done in the next step. The importance of different levels of participation is examined by qualitative interviews that were done shortly after the two days during which the cameras were worn.

The studies mentioned so far describe the current effort to overcome the method's limitations by applying wearable cameras for different research questions. However, the question is whether this approach is valuable and effective.

5 Advantages and disadvantages of using wearable Lifelogging cameras

One advantage of using ambulatory assessment in general lies in its high ecological validity and context specificity (Fahrenberg et al. 2007). Since the data is taken from the perspective of the individual and the information is given at the time of exposure (Oliver et al. 2013), images may have the potential to complement gaps in existing methods that measure and audit the built environment (Mavoa et al. 2013). Wearable cameras and their passively collected images provide multiple visual information in one picture. Therefore, they could provide information about

the context and characteristics of the places where various forms of social participation occur. Furthermore, wearable cameras could reduce the workload of study participants since they replace (parts of) questionnaires or other data assessments. In addition, recall biases could be avoided.

However, there are also issues to consider. So far, wearable cameras have been applied to evaluate other assessment methods (e.g. detecting sitting time by accelerometers). Wearable cameras are, however, also a method that should fulfil methodological requirements. The photographs are only the means of information, which is why attention should be paid that the given information is interpreted and categorised correctly. Standardised participant instructions, a coding scheme or protocol as well as an inter-rater reliability test are a minimum requirement.

Another point pertains to the feasibility of studying large samples, which is highly cost intensive[3]. Further, applying wearable cameras and passively collecting images leads to a very large amount of pictures. The above-mentioned study conducted by Doherty in which 49 participants wore the SenseCam for approximately three days resulted in more than 441,000 images (Doherty et al. 2013c). Oliver and colleagues reported that it took 25 research hours to process the coding of all the images for approximately 6.4 hours of one study participant's travel time. The size of data from images and combined sensors, such as accelerometers or GPS, is time-consuming and requires efficient data storage and monitoring. As a consequence, researchers have expressed the need for an automated detection technique (Oliver et al. 2013). Reducing the number of images by merging similar images automatically into 'events' has already been tested[4] (Doherty et al. 2012). Additionally, a special technique and algorithm supporting event segmentation and event identification has been proposed (Doherty et al. 2013b). The computational and technological challenge lies in the identification and detection of cues based on available sensor data, such as colours in images, acceleration changes, temperature changes and GPS data, among other data (Doherty et al. 2012).

The so-called *FoodLog* (Aizawa et al. 2013) was able to show how far the scope of technological possibilities reaches. The *FoodLog* is a web application that offers at least two functions: a) Uploaded food images are categorised as 'food' or 'non-food' and b) the nutritional information of the meal on the detected 'food

3 Currently, one SenseCam device costs approximately US$ 775. (http://gizmodo.com/5715148/spare-775-microsofts-sensecam-lifecaster-is-available-now-as-the-vicon-revue. Accessed 28 Jan 2015)

4 Event-segmentation was based on identified boundaries that signify a change of activity.

images' can be estimated based on the number of servings in different categories (i.e. grains, vegetables, meat/fish/beans, fruit and dairy products).

Dark images, incorrect camera positioning as well as subject compliance are other challenges that have been reported (Doherty et al. 2013a). Going beyond those practical problems, using images in studies also has ethical implications. These implications are related to several aspects (Kelly et al. 2013): The passive capturing of images may be unwanted or unflattering and could concern the study participant in its daily activities, or other people around them. Privacy and confidentiality of images might also be a problem, again especially if third parties are involved. Third parties may claim their right to their own picture. But, sometimes they are not aware of being (indirectly) part of a study. Due to the high importance of these ethical implications, an ethical framework for the use of automated, wearable cameras in health behaviour research has been published by Kelly and colleagues (2013). Study participants as well as third parties should have the right to advise researchers to delete photographs with or without the researcher. Every person that might possibly be involved (e.g. family, friends) should be informed about the study and researchers might help their participants by providing them with information for third parties that ask about the camera. Further, nobody but the research group should have access to the photographs, which have to be safely stored. The framework summarises the critical aspects and offers ethical guidelines (Kelly et al. 2013).

6 Conclusion

Wearable cameras and their passively recorded images provide new opportunities and information in studying (older) people's behaviour, such as their physical activity and social participation in their living environment. This would help advance the research field. However, there are also different challenges that reduce the feasibility and effectiveness (e.g. dark pictures, time-consuming analysis). The ethical considerations are another main point of interest. Data security and data preservation and its pros and cons are controversial, at least among politicians but also within the society. Independent of that, a growing number of people are voluntarily logging their life without being a study participant. They capture activity profiles, monitor health indicators, such as heart rate, use wearable cameras to record their life and they are organised in networks such as *Quantified Self*. This implies the need for further research and discussions regarding this ambivalent trend.

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Quantification—Knowledge

Self-Monitoring

Embodying Data and Obliviating the lived body!?

Lisa Wiedemann

1 Introduction

After an introduction of Michel Foucault's pivotal diagnoses as well as Foucault-inspired *gouvernmentality studies* specifically interested in medical matters, this article critically relates the practice of self-monitoring to his conceptual framework. While the data-double[1] of the population is part of a historically familiar policy of preventive risk management, in the Foucauldian perspective the virtual self represents itself as a place of microscopic self-management. Furthermore, an empirical extension to this perspective is suggested, aiming at the illustration of how and to what extent such numerical practices deeply reach into the phenomenological duality between the lived body and the corporeal body.

2 Methodology

Foucault's terminology has proved to be appropriate for critically locating self-tracking in historical context. The terms *technologies of the self* (1988), *care of the self* (1989) or *gouvernmentality* (2006) allow for considering *QS* to be a

1 The concept of "data double" is used in surveillance studies (Haggerty and Ericson 2000). "Data doubles are configured when digital data are collected on individuals, serving to configure a certain representation of a person." (Lupton 2014, p. 83)

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new microphysical expression of a culture that advocates personal responsibility for a healthy body. Furthermore, this terminological framework facilitates the identification of social role models used for individual self-reference, as well as assumptions about the intention behind the use of self-monitoring practices (cf. Langemeyer 2007, p. 240), by linking them to prevailing power-knowledge relations. Apart from these connections, the Foucauldian perspective also allows for the conceptualization of the body as a "cultural artefact" (Fox 1997, p. 45). Taking self-hacking as a digitalised blue print of Foucault's labyrinthian system of terminology seems to have become commonplace in the critical analysis of this phenomenon. (i.e. Albrechtslund 2013; Lupton 2013a, b; Ruckenstein 2014; Whitson 2013). As an overview of previous research, different attempts to link self-tracking to Foucault are described first. Subsequently, these applications of Foucauldian power analysis are extended by an empirical perspective in order to illustrate that the 'numbers' produced by self-tracking are capable of encroaching on the phenomenological triad of self, corporeal body, and lived body.

Based on the analysis of narrative reflections on self-tracking collected in narrative interviews and participant observations of quantified self meetups the question should be answered regarding what kind of relation between corporeal body, lived body and the self emerges and how this relation is rendered as problematic in the Foucauldian sense. Practice theories that have been developing in recent years (Schatzki et al. 2001) have shown how theories of subjectification in the Foucauldian sense can be linked to the analysis of practical everyday accomplishment (i.e. Gelhard and Alkmeyer 2013). So, in line with Dimitris Papadopoulos, in this article self-hacking is considered to be embodied subjectification, which then allows to observe how discourse is realized through the body by means of quantification practices (Papadopoulos 2010, p. 151).

3 Findings and Argument

Due to the new ways of problematizing everyday life that digital self-monitoring devices provide, the body is increasingly becoming a place of improvement as the new possibilities of gaining insight into the body by sensors create, in quantitative terms, even more starting points for further problematization. Similar to other visualization technologies in medicine, digital mobile technologies that measure bodily movement and body functions produce a spectacular body (c.f. Lupton 2013b, p. 398). that displays as well as visualizes internal workings" Bodily sensation then becomes a phenomenon that is mediated through devices and , thus, can be augmented. The question that should be answered based on the empirical

material, therefore, is: How do the 'self-described' self-trackers reflect on collecting data on themselves?

The analysis of the interviews and participant-observation has revealed: Self-tracking serves as something between automated prevention and necessary introspection. Many self-trackers consider collecting data on themselves to be random prevention. Most of the interviewees indicated that, to them, the engagement with the data goes along with convenience. Hence, a central argument of the article is that whether or not self-tracking becomes a technology of the self[2] in the Foucauldian sense depends on context.

Therefore, a follow-up question that needs to be posed is: How much (inconvenient) work does a technology of the self imply? As the practices and uses observed here are characterized by a high degree of automation, it can be assumed that this automation might supersede the discipline previous technologies of the self required. Most of the rather technically versed self-trackers seem to practice mediated self-tracking as a hobby: through self-tracking they acquire self-knowledge of the body in a playful and experimental way. Other interviewees again seem to consider the collected data to be in fact a kind of "significant other" (Mead 1973) since, to them, the visualization of the automatically produced data represents objective access to oneself. Additionally, they regard the necessity of collecting personal data as a reaction to the impossibility of introspection in the modern world. Numbers either substitute the quiet moment of reflection or trigger it. Thus, the new technologies are regarded as means of augmenting senses in a world that is becoming more and more complex. So as a result it can be noted that the engagement with the data and their visualizations can differ widely depending on the context.

Ethnographic studies in Science and Technology Studies show: "Methods of metering (partly) construct the practices they sustain" (Pantzar and Shove 2005, p. 2). According to this perspective**,** metrics or digital metering devices always have the power to represent reality and, moreover, the body is not just the result of a particular discourse; rather it is repeatedly updated in the respective practices. Annemarie Mol and John Law (2004) showed for example that body perception becomes a mediated process for diabetics through the use of measuring instruments. Equipped with a metering device, the individual turns into a "knowable, calculable and administrable object" (Pantzar and Shove 2005, p. 4). However,

2 Technologies of the Self "permit individuals to effect, by their own means or with the help of others a certain number of operations on their own bodies and souls, thoughts, conduct, and way of being so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality" (Foucault 1988, p. 18)

does this necessarily lead to the oblivion of the body or even to the emergence of a new numeric-sensual experience?

The empirical material supports both interpretations. Through self-tracking, everyday and bodily processes are transformed into information represented in the form of graphs, charts and figures (Lupton 2013a, p. 27), thus, they are synthesized in a way. According to the quantified self movement, the body is conceived as a data producer, which Gary Wolf makes explicit when he writes in his Guardian article: "Your body isn't a temple, it's a data factory emitting digital exhaust"[3]. Even if the data are often decontextualized, desensualized in Selke's words (2014, p. 20), they achieve reduplication. "The focus of perception shifts from personal perception to statistical series" (ibid., p. 78). Paula-Irene Villa assumes that this obsession with the body goes along with body oblivion since one is always an "objective" body while gaining self-knowledge by means of metering devices (c.f. Villa 2012, p. 16). In the reflections of the interviewees there is hardly any evidence of conflict between lived body and corporeal body. The body turns into a decision-making center; the capability of listening to one's introspection that the modern man—within the *QS*-logic—seems to be loosing is completely embodied in, and broken down into, a statistical cause-and-effect-relationship. According to the promise of *QS*, technology creates new ways to gain access to oneself by providing insight into the body and the capability of inner experience can by learned through disciplined data control.

Thus, it can also be said that numeric forms of sensual experience are emerging in as much as the data allow an evaluation in terms of whether you correspond to social expectations of what is normal. It is sometimes difficult to verbalize bodily experience; numbers might then serve as a surrogate for this incapacity by operating in line with normal distribution. Ruckenstein points out that the information measured by self-trackers produces, promotes and intensifies "emotional attachments" (Ruckenstein 2014, p. 77).

4 Conclusion

Central critical discourse is reflected in self-tracking strategies and the relation between corporeal body and lived body is changing. There seems to be any number of starting points for optimization, the body by itself becomes larger and bodily experience develops into something that can be objectified and standardized in as

3 http://www.theguardian.com/commentisfree/2013/jan/25/body-data-factory-digital-exhaust-data-tax. Accessed 05 Dec 2015.

much as, for example, even sleeping becomes a competence (Ruckenstein 2014, p. 77). According to this perspective it is precisely the disciplined control of the data that leads to the emergence of an autonomous subject capable to govern and construct itself and then again to turn itself into an object. However, empirical studies have illustrated that this view is only half true. Annemarie Mol describes that it is impossible to completely calculate the body: "For while people with diabetes are encouraged to persistently live in a calculative mode, they are expected to simultaneously accept that their bodies never behave according to the rules and refuse to completely fit into carefully made calculations." (Mol 2000, p. 19).

Surprising metered values will always occur. A notion of the body which emphasizes that the soma is shapeable through behavior and environment quickly leads to frustration (c.f. Niewöhner et al. 2008, p. 136). Corporeal body and lived body can never be quantifiable substances, for they are erratic by nature. "New self-relations, unforeseen bodies" (Harrasser 2013, p. 127) will always emerge. The Digital Age is represented by a "data-double" so that, similar to the data set of a company, it serves self-monitoring.

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Reflect Yourself!

Opportunities and Limits of Wearable Activity Recognition for Self-Tracking

Manuel Dietrich and Kristof van Laerhoven

Abstract

In this paper we introduce an interdisciplinary investigation into technology of wearable activity recognition and its applications for self-tracking and *lifelogging*. Wearable activity recognition are computer systems capable of automatically detecting human actions. Using these devices for self-tracking provides the users with a new perspective on their actions. Thus people can reflect on their actions in a new way. We work on the topic of wearable activity recognition in an interdisciplinary way, both with a theoretical analytic direction and a concrete system design perspective. The theoretical part of this article is about understanding how people relate to their actions using an activity recognition *lifelogging* device. It is based on the philosophical theory of action. For the concrete design perspective of wearable activity recognition, we introduce two cases from our current design practice. We bridge the theoretical thoughts and the practical perspective by introducing the (critical) design theory. Based on that, opportunity and limits for self-tracking and self-reflection are the results of the interdisciplinary approach.

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1 Introduction: Activity Recognition for Self-Tracking

Wearable activity recognition is about detecting human activities (activities related to physical movements) using sensors placed near or on the body. The technical research mainly belongs to the field of computer science, especially to ubiquitous computing. The most common of these are simple, miniature sensors, for example motion and posture sensors (accelerometers), which can be worn like a wrist-watch. Smartphones as a multi-sensor-platform are equipped with similar sensors. The paradigm of *anytime* and *anywhere* is one of the key characteristics of this technology. Using wearable activity recognition for self-tracking and for self-reflection is already common in the field of life-style products where, e.g., *Nike* Fuelband, *Fitbit* or *Jawbone* UP and apps on smartphones are used. There are also research projects which log sleeping behavior (Borazio and Laerhoven 2012), detect smoking (Scholl et al. 2013), fitness activities (Seeger et al. 2014) or leisure activities (Berlin and Laerhoven 2012). Eventually, the results should help individuals to become more aware of their activities, the goal being to change habits in a positive way, or to analyze a certain work process.

In all of the above-mentioned applications the wearable activity recognition device for *lifelogging* enables a *close* relation to the user. Here, close means both that the device has the potential to be near the body and also that it is designed for long-term usage with the goal of 24/7 assistance in everyday settings. These factors were described as *anywhere* and *anytime*. Technically this is possible because the sensors are small (and can therefore be integrated anywhere) and they can be worn for a long time without needing to be recharged. This means that they can be used day and night without one noticing them as explicitly present. Accordingly, the activity can always be monitored in the background and can either be used as input for the interaction with the wearable device or for a retrospective evaluation of the user's behavior. We think the phrase *in interaction* best describes the user's close relation to the wearable device from which the user cannot distance himself: The device is always with the person and is fully integrated into daily life.

For our approach, the close relation to the device and the new perspective that the technology provides for the users regarding their actions are the starting points for a deeper understanding of this relation. It can be assumed that the possibilities of activity recognition will grow in the future, whereby access to the activities does not have to be explicit. Activity recognition is and will be used for context-aware systems which adapt their assistance to the user's activities. For instance, when a smartphone detects that the user is jogging, it blocks incoming calls in order to prevent the person from being disturbed. In our approach we focus on self-tracking and *lifelogging* applications where daily activities, habits and routines are explic-

itly visualized for the user, either directly or retrospectively. Can self-reflection be supported by this new, technology mediated perspective on everyday behavior? We want to answer this question by analyzing the role of reflection using philosophical theories of action. In the second part of this paper we aim to bring the theoretical ideas into a concrete design practice. In the following chapter we start by briefly introducing the technology of wearable activity recognition and showing the possible self-tracking applications regarding this technology. For this, we have a so-called *preliminary systematization* of how self-reflection regarding the wearable activity recognition can be structured. In this systematization we intend to include all aspects of the interactive process in four steps, namely sensor data recording (raw data), the technical system's interpretation of the activities based on the raw data, visualization of the results for the user and how this can be used for reflection. The discussion of two cases based on our current research practice exemplifies this systematization. Next, we will discuss the reflection on technology mediated activity information with reference to philosophical concepts of action theory. Based on that, we discuss basic concepts of critical interaction design and conclude by answering the question regarding the possibilities and limitations of using wearable activity recognition for self-reflection.

2 Preliminary Systematization and Introduction of Two Case Studies: Self-reflection as an Interactive Process

The systematization is realized by a closed loop scheme which focuses on action, detection and reflection. The goal of this chapter is to provide deeper insight into the applications. Thereby we introduce two case studies from our own ongoing projects. The cases should also be used to concretize the phases, which are shown in Figure 1.

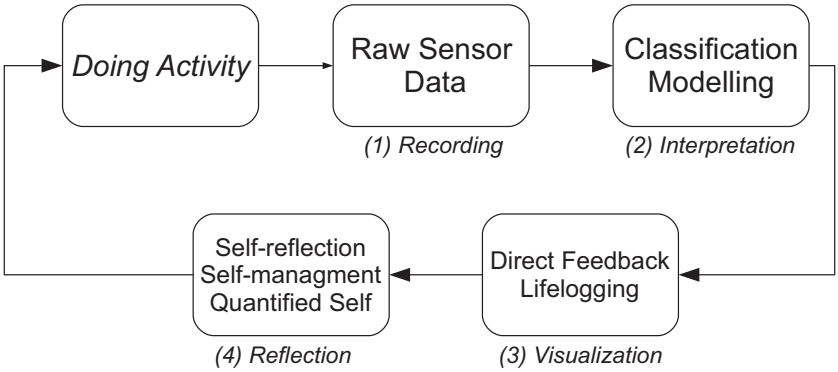


Fig. 1 Preliminary Systematization: Action, Detection and Reflection

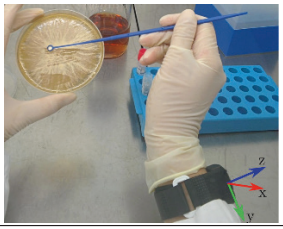
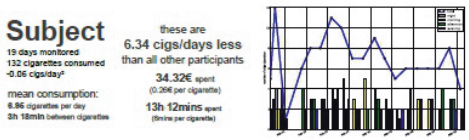
Case A studies the use of wearable activity recognition to detect smoking with the further goal of increasing the awareness of the person regarding their smoking habits. We used a motion sensor (accelerometer) which can be worn like a wrist watch to detect the typical movement of the arm while smoking (Scholl et al. 2013). The sensor makes long-term usage possible (low energy consumption) and thus enables monitoring for up to one week. The goal of the automatic detection of smoking is to combine it with information on the time spent smoking and the number of cigarettes smoked to visually depict this information for the user. This information can then be used by the person to find out more about their behavior, with the potential result of becoming more aware of this behavior or finding out what triggers smoking and, in the end, changing their behavior.

Regarding the diagram in Figure 1, the sensor provides the raw sensor data by recording the accelerations in three dimensions (X, Y, Z). Then the raw data stream is preprocessed by cutting the stream into segments and by isolating specific features. These features are investigated by probabilistic algorithms with the goal of detecting typical motifs. The result of the detection is then visually depicted for the person and can be used for reflection.

Case B studies a recognition system supporting scientists who work in a biological laboratory. In this project, possibilities are being explored for the detection of individual working steps in different experimental settings in a biological laboratory as well as for the visual depiction of the data for the scientists. Thereby, the same wrist-worn sensor was used to detect, for example, the activities *using a pipette*, *stirring* or *pouring*. The system's structure and ways of interpretation are equivalent to the detection of smoking in case A. This automatic detection results in a protocol which makes it possible to compare different executions of

the experiment and makes it easier to reflect on possible errors. Users thus can reflect on the order of the procedural steps and also on their performance, which can make the behavior manageable, for instance, in order to find the most efficient procedure.

Table 1 Two Cases

Phases	**Case A**	**Case B**
Recording (1)	A person's arm motions and postures are recorded from a wrist-worn sensor 	A person's arm motions and postures are recorded from a wrist-worn sensor 
Interpretation (2)	Frequently repeated movements of the arm when bringing the cigarette to the mouth are interpreted as a smoking activity	Frequently repeated movements of the arm when e.g. stirring or position of the arm when e.g. pipetting or poring
Visualization (3)	A visualization showing when a person was smoking over the day (combinable with information about the costs of cigarettes) 	A visualization showing a protocol of the experiment 
Reflection (4)	Using this information for increasing the awareness of smoking behavior	Reflection on the results and comparison of different executions of the experiment

3 Understanding Actions as an Object of (Self-)Reflection

The introduction of the case studies has shown the potential that current activity recognition devices have. In technical research, activity means nothing more than physical activities, movements of the body. For example, the frequent movement of the arm is characteristic for walking, or if it is faster, for jogging. In order to answer the question of whether or not the movements characteristic of jogging are actually being used in a different situation, for example, to catch a train, the context must be consulted for more information: If the persons are in the woods, they are jogging, at a train station, they are trying to catch a train. Thus, activity is a kind of measurable entity. But human activity is more complex than this, it is related to *intentions* and *purposes*, it is a medium for social interaction and structures expectations of the behavior of others. The goal is to analyze human activity, or rather actions, in a wider and deeper sense. Here, we are interested in the mechanisms of how people relate to the actions in their daily life and how this changes when activity recognition technologies are introduced. Following these questions, the basis of our analysis is a concept of how people *normally* perceive their actions and thus how perception and action are related. Here, we rely on the philosophical theory of action which provides distinctions which might be helpful to investigate technology mediated reflection on actions.

Activities of interest in self-tracking applications are generally routines or habits of everyday behavior. Actions are an intrinsic part of our everyday experience and they influence how we perceive the world. Smoking, for example, is embedded in an everyday context regarding locations and time, but it is also related to stressful (a break after a meeting at work) or relaxing situations (after sex). Benefits that are commonly mentioned in the research are the possibility of *retrospective* observation of actions and the contextual interpretation of them along with heightened self-awareness and reflection.

We discuss the role of activity as the observable object in a wider context of actions with a more complex understanding. The understanding of self-perception under everyday circumstances and technology-aided self-perception form the basis of this technology's possibilities and limits, which we will discuss in the last section. This discussion is embedded in a critical theory of interaction design.

3.1 Introduction to a Theory of Action Perspective

We will briefly introduce the concepts and problems of understanding actions with respect to a philosophy of action: it asks for the essence of human action, espe-

cially the possibilities of describing and explaining it. We begin by sketching the *classic* interpretation of action in philosophy: A person behaves in a certain way because he or she has the intention of doing so. If there is no intention of doing so, the person has not acted at all, rather the behavior of the person was a reflex or a random movement. According to this, in order for actions to be classified as (intentional) actions, there has to be a *relation* between action and the intention. One of the challenges of the theory of action is describing this relation with regards to the question of what the action truly encompasses: is the intention the action, or is only the performance (the actual or objective event, for instance, the movement of the arm) the action? In both readings, the intention, seen as a mental act, causes an effect in the objective world, for example, physical movements of the body[1]. This relation between intention and the actual performed action is controversially discussed. Taking a classic position, John Stuart Mill, for instance, says that actions are both the will and a physical effect. Harold Prichard argues to the contrary by saying that only the intention ("will") is the action and that what happens in the physical world, the movement of the arm, for instance, is only the effect and not part of the action itself. Both concepts were criticized from different sides because they remain unclear on how this relation should be explained (for an analysis of these different classic positions, see Leist 2007, p. 523; Thalberg 1985). The question is formulated under the term causality-problem: can we assume a causality between intention and the actual action that is performed? Davidson is one of the most influential philosophers on action and the strongest supporter of the causal relation. Donald Davidson tries to reveal this relation by introducing an additional dimension to the analysis, which he calls the "reason to act" (Davidson 2004). He says that there can be multiple reasons to do something but there is a main reason which can be seen as cause for the actual action. Others see in his addition of reason a refining of the relation of intention and actual action, but criticize that the core problem, the assumption of causality, is not solved. Following this critique, one cannot explain how intentions or reasons that are not actual events can cause an effect in the world. Other theorists of action reject the causality assumption, for example, George von Wright or Elizabeth Anscombe suggest a more logical-terminological relation between these two entities, namely building intentions and interpreting actual actions (von Wright 1963; Anscombe 1957). The theory we present in the next section mainly follows this second tradition.

What was discussed in the previous paragraph is how to understand or explain in which way people act and with which intentions. A further philosophical ques-

1 It is also discussed in which way, for example, calculating something or willful default fit into the world of physical actions, which we will not go into detail about here.

tion of actions with another focus is how to describe actions from a third-person perspective (external perspective). This refers to how action is seen as an observable entity. The focus is on a third-person in contrast to a first-person perspective (as we have described in the previous paragraph). It is clear that intentions or reasons behind actions are not observable. Questions on how to evaluate actions as ethical or responsible are related to this. In the philosophy of action it is a common assumption that action is not an ontological entity. Action is dependent on the description and interpretation, thus Leist says that the movement of a body can be explained differently with an open sphere of possibilities (Leist 2007, p. 522). Holding up an arm can mean different things depending on the situation or the cultural and social context. Most gestures are clear and everyone would, for example, see the difference between raising an arm to indicate *give me the word* and *take a cup out of the cupboard* (in contrast, for an activity recognition system, this is not very easy). But there are other gestures which are more difficult to decode, for instance, when there are cultural differences. An example is shaking one's head for saying *no*, which in other regions of the world can mean the opposite.

3.2 Actions as a Construct of Interpretations

After introducing some basic ideas of the theory of action, we now present concepts on human actions which take up the open questions we outlined above. The direction we choose is a more interdisciplinary one and includes aspects found in theories of psychology and sociology, it is different from philosophy of action, which works on single and isolated types of actions, as the classic theories do. To stress this distinction even more, traditionally, the theory of action focuses more on ideal (fully intentional, conscious and planned) actions. An interdisciplinary perspective includes spontaneous, in situ actions as well as routines, which have a mature role in the functions of action. Additionally, the aspect of reflection is more prominent, which fits our interests.

In this section we describe and bring in a suitable order the different dimensions of intention and execution of action, the subjective perspective of the agent and the third-person perspective of observation in order to understand the technology mediated activity of self-observation.

The concepts we refer to, which are mainly discussed by Hubig and Lenk, conceptualize actions as a construct of interpretations (Hubig 2006; Lenk 1987). The basic assumption is that actions are dependent on the interpretation, which is not a controversial assumption, as we have mentioned above. But the question is how this dependency is related to the relation of intention and action. Therefore, they

analyze how interpretations are individually and socially created. Thereby, they focus on the personal experience of individuals and the social exchange with others. Hubig says that interpretations of actions are determined by the community of interpretors (Hubig 2006, p. 125). It is important to say that people not only interpret actions of others, but rather their own actions are objects for different readings. The resulting self-conception is influencing how people both set an intention and decide on the corresponding performance in the future.

To explain this complex relation we will introduce some further distinctions. First, the distinction between actions as an event (act-token) and action as a concept or schemata (act-type). In order to explain this, we refer to the classic concept of how people act in an analytic way (similar to our first outline). The so-called *practical syllogisms* describe the relation of intention and action in the following way (cf. Hubig 2006):

1. A person has the intention to do P,
2. and believes that the only way to reach this goal P is by doing Q
3. in the end the person does Q.

Following this concept, there is an intention (1) which is related to a schemata or concept, namely if you want to reach this goal P, you have to do Q (2). The intention of doing something plus the concept of how to do it is (referring to the above-mentioned term) the mental act, better known as the imagination. It is important to understand that intention (1) and the schemata of the action (2) cannot be separated because intention implies more or less explicitly the imagination for reaching it. (Hubig 2006). It would otherwise be a wish which is not connected to concrete performance. For example, having the intention of opening the window also includes the imagination of how to open it. This conceptualization from Hubig and Lenk is based on ideas from von Wright (1963), among others, which see a logical relation between the descriptions of actions and the motivating reasons (intentions).

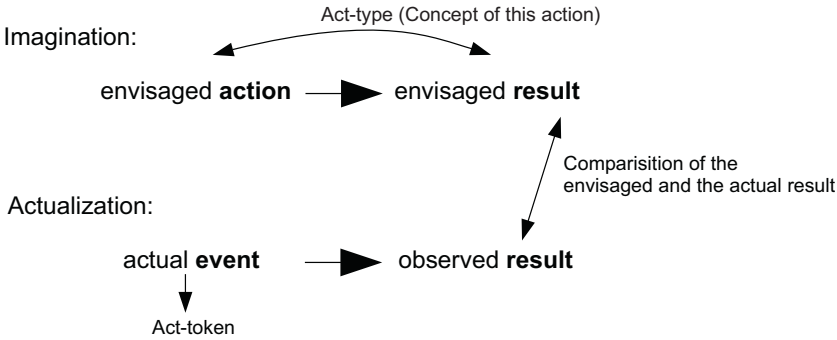


Fig. 2 Relations and Distinctions in Understanding Human Action

Coming back to the distinction, we are going to explain the concept or schemata we called act-type. This is the imagination of which performance of an action can reach a certain result. In Figure 2 we show the different dimensions. It is crucial that the act-type is distinguishable from the performed action, the so-called act-token (*in the end the person does Q*).

Now we will see how the distinction between act-type and act-token works referring to the two perspectives (first-person and the third-person) we have already introduced. The first-person perspective is about how a person's actions can be understood as subjective experience, that means how intentions are developed and how they lead to actual performance. The third-person perspective is about how to conceptualize actions from an observer perspective. The interpretation of a person's movement as an action can only happen based on a concept. For example, people have a concept of the action (act-type) *opening a window* in mind which they use to interpret the action-events (act-tokens). The act-token consists of *more characteristics* which could be the basis for interpretation. It means that the actual event (token) can also be interpreted with another concept or schemata (act-type). Regarding the above-mentioned example, the physical act of *opening the window* can alternatively be described with the sub-schemata *moving the arm* and *turning the grasp*, for instance, or with other high level interpretations such as *airing the room* or *cleaning the window from the outside*.

Referring to the first-person perspective, the intention of doing something is based on the schemata or concepts (act-types). The concept leads to the actual performance of actions. But it is a mistake to understand this as a *causal* relation. We have seen that only if people know which results they can achieve by performing a certain act, they set the intention of doing so. And this knowledge can only be gained by actually performing actions (token). According to this, there is a

mutual requirement of the intention based on act-types, which is also based on the experience and the observation of one's own concrete actions and those of others. Hubig explains that the modeling of actions (in the sense of its act-types) includes the self-understanding of the subject as a subject of action (agent) which is only possible through the reflection of the actual actions—ex post (Hubig 2006, p. 130).

Anscombe (1957) argues for a similar relation between intention and action as mutual conditioning. She defines *intentional action* as a conscious operation without having a concrete plan, that means not all elements are explicitly imagined beforehand. This means that the imagined actions, the result as well as its relation are not present before the action in a strict sense. Intentional action is, for instance, a routine action which is built on established action schemes. Also in situ, spontaneous actions, trying new thing (e.g., devices, products) are this type of action. We might say that most daily behavior belongs to this category. A reflection on the types or schemata as well as the construction of new schemata happens when experiencing disappointment. This happens (see Figure 2) when envisaged results (implicit or explicit) are different from the actual results. It is a mutual relation between the first-person perspective (participating perspective), which refers to the act-type, and the third-person perspective, which refers to the act-token. According to this concept, Hubig says that action is a reflective term, meaning that interpreting the action (token or event) as a type of action makes it possible to reflect on successful or less successful action strategies and influences the performance and the interpretation of actions in the future (Hubig 2006).

3.3 Conclusion of the Theoretical Discussion

It can be concluded that it is wrong to say that intention causes the action, it is more of a *mutual requirement*. There are differences between in-situ or routine actions and the retrospective interpretation of these actions. Lucy Suchman has a similar finding, distinguishing in-situ actions from a later interpretation (Suchman 1987). She states that most actions, such as those routinely performed, are not as purposeful and planned as they seem in retrospective interpretation: "The fact that we can always perform a post-hoc analysis of situated actions that will make it appear to have followed a rational plan says more about the nature of our analyses than it does about our situated actions" (Suchman 1987, p. 53) Anscombe makes the same distinction when she talks about "intentional action" (as in-situ action) and the retrospective reconstruction of the actions as "actions with an intention" (Anscombe 1957; Hubig 2006). Bringing it to a final point: the retrospective evaluation of one's actions (self-reflection) constructs intentions for future actions. If you want to talk

about causality here (which you should not), you have to say that intention causes the actual action and vice-versa.

This understanding of actions' functions is highly interesting for the analysis of the technology of wearable activity recognition. We will go deeper into this in the next section and look at the consequences this has for the analysis of technology.

3.4 Action Theory with Respect to Activity Recognition Technology

The discussion on action theory has shown how people relate to their actions. This can help to answer the original question, which is about how this relation changes when using activity recognition technology.

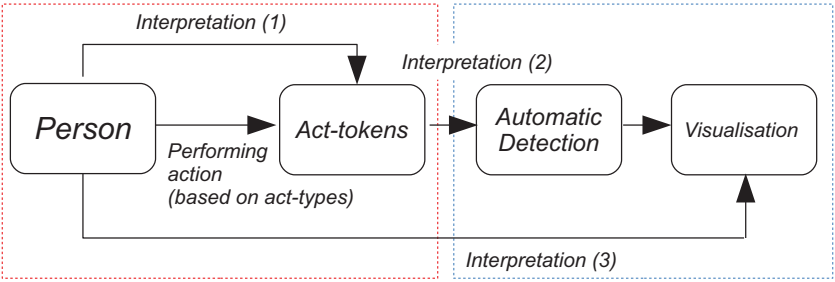


Fig. 3 Extended Relation Between People and Their Actions

Figure 3 will help to answer this question. The graphic is a combination of Figure 1 (*Preliminary Systematization*) and Figure 2, which explains the concepts of action we have presented above. On the left side of the figure, the relation of people to their actions is shown in the way we already know. People perform actions determined by a scheme, explicitly or implicitly (act-types). Retrospectively they relate to their actions (as act-tokens) from a perspective of observation. On the right side we show the *extension* with respect to the wearable activity recognition technology. It shows that the system's activity recognition is based on the observable part of the action, the act-token. Movements of the body (of the arm, when looking at our wrist-worn sensor) are automatically interpreted by the system as a certain action. For example, regarding existing detection systems, these can be smoking, sport, leisure or household activities. In our examples, the detected activities are visually

depicted for the person wearing the activity recognition device, in combination with additional information about time and duration, depending on the system and the context information, such as location. The person relates to this visualization which is shown in Figure 3 named *interpretation (3)*.

Based on the extended relation between users and their actions, the actual design practice is of main interest because the design of the system influences which activities can be detected and, in the end, which perspective is provided. In the following, we briefly introduce some basic ideas on the design of activity recognition systems.

Activity Recognition Design Practice

The automatic system's activity recognition is based on learning from typical performances of actions. This learning is based on training data created in typical situations in which the activities were performed and is, so to say, learning from realistic real world data. That means that the system has a training and a runtime phase. The training influences how the system works at runtime. More specifically, the training data consists of a raw data stream and the corresponding information on the activities, the so-called ground truth. Situations in which these data are acquired should be as realistic as possible, but always have an artificial component because there has always been an observational aspect, which is required to produce the annotations for the data (ground truth). In Case A (described in chapter 2), a special cigarette lighter was developed to capture the annotations and in Case B the annotation was done by video-observation. This training results in a general understanding of actions or different ways (types) of performing them, the so-called stereotypes. The stereotypes influence what is detectable and thus mediate the users' perception of their actions.

Three Levels of Interpretation

This leads us back to the question: How does the additional perspective, which the automatic system provides, change the users' relations to their actions? For that we refer to the functions of the mutual influence of intention and actual action, which we have conceptualized above.

Answering this question, we discuss the three levels of interpretation which can be seen in Figure 3. It is an understanding of interpretation in a broad sense. The following distinction will clarify what is meant by interpretation.

1. Interpretation of the person's own actions (act-tokens) by the person doing the action, based on the act-types (in a retrospective manner)
2. Interpretations of the automatic system based on the conceptualization of the designers and the training data
3. The interpretation of the user based on the visualizations of the recognition system

Following these three levels of interpretation, we can see that the interpretation of actions is extended when using activity recognition technology. Regarding the shown concept of action, the retrospective interpretation of action is an intrinsic element of how we act. The way we retrospectively reconstruct the action we have performed, for instance, by adding intentions and reasons (acknowledging which intention was the fact), influences how we act in the future. This reflective process is affected by the automatic detection system in a way that readings on actions are predetermined by what is detectable and what is visualized. We have seen above how the automatic system's interpretation works. The interpretation is based on designers' assumptions. They decide which activities are detectable, which learning algorithms to use, and especially how the training situations are conceptualized. That is also why we use the term interpretation here, instead of talking about representation (in the sense of mirroring). Using the word representation would imply that the activities are clearly recognizable, ignoring that there is a scope of possibilities. At the same time, we do not think that the interpretation by the technology can be fully reduced to the designers' assumptions. The real conditions of usage determine which and how performances of actions are recognized, for instance, when people act in an atypical way.

For example, referring to Case A, besides smoking, additional information on time and place as well as other activities (e.g., sports) can be detected. When they are visually depicted for the user, certain readings of the relation between the entities are suggested by the system. For instance relating sport activities with smoking. However, only the visually depicted information comes into focus.

Social dynamics, for example the exchange of activity data (as it is already common with fitness trackers), can be another influencing factor because interpretations of actions are built in communities (communities of interpretors, Hubig 2006, p. 125).

4 Towards a Critical Design: How to Really Support Self-Reflection

We have seen how the discussion of philosophical concepts on human action can help to understand the relation of people to their actions, mediated through technology.

In this chapter, we will follow the path of our interdisciplinary approach by introducing the interaction design theory. The design theory is where we bring the philosophical concepts and the practical design of activity recognition systems together. Design theory in computer science, especially human-computer interaction (HCI), has different interdisciplinary directions and we show how our approach fits into that. Based on that, we present ideas and concrete ways of implementation aiming at a better design. We end this paper by concluding the possibilities and limits of using wearable activity recognition for self-reflection.

4.1 Design Theory: Interdisciplinary Approaches for Design Research

With our approach, we have so far mainly worked on a conceptual level. It was about understanding how people may interact with their devices. In this section we show how the concepts fit in the discourse of design theory. Doing this, we do not strive to provide a full analysis of the theoretical background of design theory. Rather, we show some major trends, especially regarding the ubiquitous computing and human computer interaction research. The so-called *interaction design* is one of these trends[2]. In this paper we will focus on more specific concepts, namely *critical design* (Bardzell 2011), *HCI theories* (Rogers 2012) and *Value Sensitive Design* (Friedman et al. 2013).

Bardzell (2011) argues for a critical design theory based on the philosophical critical theory and refers to the critical tradition of other disciplines such as art and architecture. He ascertains that there is no discussion, especially no critical discussion, in the community of design-practice about background concepts, theories, methods and critical evaluations on existing systems and devices. Here, he especially refers to the lack of a strong intellectual infrastructure which can motivate such discussion. Intellectual infrastructure could facilitate a discussion on social norms and how to include them in the practical design. Here is a link to the *Val-*

2 For more general concepts on interaction design we refer to “thoughtful Interaction design”, for example (Löwgren and Stolterman 2007).

ue Sensitive Design which needs such infrastructure to effect concrete practical projects. The cultural significance of HCI grows and makes the need for a critical debate and practice inside the design research even more necessary. "It is a strategy helping practitioners cultivate more sensitive, insightful, and imaginative critical reactions to designs and exemplars" (Bardzell 2011, p. 606). His concepts go further than classic usability studies or human factors in interaction design which mainly focus on "simply measures of user satisfaction". Usability is, according to him, "no longer a sufficient indicators of good interaction design" (Bardzell 2011, p. 605). Bardzell does not provide concepts of a critical investigation from the perspective of a different discipline, rather points out that it is necessary that the designers themselves develop a critical practice of these systems. This can include an analysis of existing products and interfaces from a practitioners position. Critical design means both the practice (which we have focused on) and the result of a design process, the product, the device or the system. A result of a critical design can also be to enable the user to act, think and perceive critically. For example, critical design should produce devices which enable new insights for the user and do not hide certain perspectives. In Bardzell's list of characteristics of a critical design, the most important for our approach is "reflectiveness": "Encouraging users reflectiveness, that is, facilitating the user's shift from direct perception and action to a more reflective or self-aware stance" (Bardzell et al. 2014, p. 957).

Bardzell highlights theories and frameworks in critical design as a medium for the community to exchange information on values, design concepts and visions. In his work, not the theories have priority but rather the infrastructure and practice of exchange. There are already different theories that often have their origin in psychological, sociological or psychological concepts, which are more or less strong in the practical design. A detailed discussion of the different HCI theories can be found in Yvonne Rogers' work. In her conclusive discussion of the theories and frameworks, she focuses on past and future challenges of HCI and the role of theories (Rogers 2012, p. 86). She predicts a shift in HCI approaches from applications where the user is in the foreground as an isolated entity to applications where user-communities, context, social and cultural aspects become more important. Thereby the role of theories and methods are changing in a way that "strategies, theories and design methods" have to be combined explicitly. Here Rogers sees the need for interdisciplinary approaches to fulfill the complex challenges. The following strategy she suggests fits perfectly into our approach. "The application of philosophical theory to technological innovation, where conceptual philosophical analysis is fed into design process and the experiences of being engaged in user studies are fed back into the philosophical analysis" (Rogers 2012, p. 87).

In this overview, we will focus briefly on a popular theory, called *Value Sensitive Design*. It can also be seen as a critical design theory which especially focuses on human values. As a simple first definition for values, Friedman et al. say, "a value refers to what a person or a group of people consider important for life" (Friedman et al. 2013, p. 2). Thereby, human values have to be distinguished from usability in design. The latter "refers to characteristics of the system to make it work in a functional sense" (Friedman et al. 2013, p. 13) such as easy to use and easy to learn, among other characteristics. Human values instead have an ethical dimension which cannot be discussed in a functional sense. Even when people are comfortable with a system and permanently use it, it does not have to be valuable. That valuable design can indeed raise the acceptance of a system and thus the usability is possible but not defining. Friedman et al. provide a set of human values which should be considered with respect to our approach. We will not show the complete list because not all of them are important for our topic. For our topic, privacy, trust, autonomy and identity are of special interest. We will come back to them in the next section, especially trust and autonomy, when discussing a concrete design case. At this point one example for privacy should be given: in the design process the question can arise on whether the data should be calculated on the device or on an external server. There can be good reasons for an external calculation (the algorithms can run faster and it is less energy consuming for the device) in a functional sense but from a privacy perspective, a local calculation can be better because the access to the data is better controlled.

This was a brief discussion of popular concepts and an analysis of design theory and its role. The interaction design and HCI theories are, as we said before, the link between the philosophical understanding aspect (insight) and the design practice and its challenges. In the next part, we will focus on the latter and discuss a specific case.

4.2 Towards a Better Design

In this section we will demonstrate the implementation of one design approach which some of the ideas and concepts we discussed in this paper are part of. The complex understanding of the relation between people and their actions mediated through the technology of wearable activity recognition is the background of our critical design practice. It should be clear that practical implementation always lacks the complexity of the conceptual and theoretical thoughts. Many HCI researchers/practitioners have problems with such theoretical approaches and the lack of concrete suggestions for the design practice. Our approach should show

how the transfer from theoretical thoughts to a practical design is possible and why it is useful.

Case: Supporting Reflection in a Wearable Activity Recognition System

We briefly show a design approach which shows how (self-)reflection can be supported following the *deeper* understanding of reflection. The idea is based on the theoretical analysis and the demands of a critical and valuable design. In the theoretical chapter we have shown how the mutual reflective process of building intentions and actions is influenced by the activity recognition device. One limiting aspect of this technology is that the perspective on actions is predetermined by the technology and its mechanisms of detection (training phase, algorithms). Therefore the new perspective on a person's actions does not by all means provide for better self-reflection. One reason for this is that the mechanisms of the automatic detection are black-boxed for the user. A black box can, for example, mean that self-deception or deception of others is possible. Our practical approach intends to support the reflection of one's own actions. The idea is that the user of such a system has the possibility of reflecting not only on the results (for instance, smoking at a specific time) but also on the system and its functions. For that, we provide two additional levels of reflection based on the stages of the automatic system. The automatic system works in a way that the actions of a person are recorded by a wrist-worn accelerometer sensor, which you can see in Figure 4 (which is a modified graphic of Figure 1). The raw data are 3D internal data, this means accelerations in three dimensions. In a second step, the data is processed by searching for characteristic movement patterns in the data. In the learning phase of the system these characteristic patterns (typical patterns) are found based on training data. The results of the second step of the system are the so-called characteristic motifs. Based on these motifs the system predicts which action has taken place at which time. The levels of the automatic systems are the raw data (1), the characteristic motifs (2) and the system's predictions (3). In the figure the two additional levels (the system's predictions are the normal perspective) are drawn in with arrows. We think the additional stages of reflection, first on the origin and second on the mechanisms of interpretation (motifs), can support a more trustful handling of the system. This design concept fits the demands of a critical and valuable design.

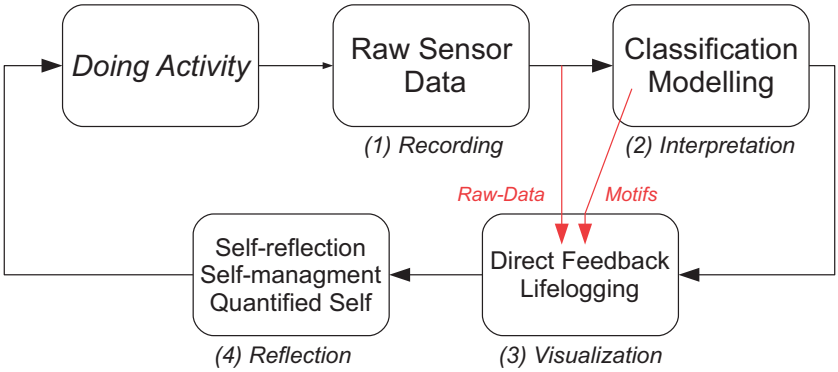


Fig. 4 Modified Loop of Mediated Reflection

A study on how people work with the different stages of reflection will be part of a future publication.

4.3 Conclusion: Possibilities and Limits

In this last section we conclude the results of the analysis by answering the question: What are the possibilities and limits of the technology for self-tracking and self-reflection?

Wearable activity recognition tools can detect most human activities of everyday life. The activity recognition technology we focused on is based on accelerometer sensors. The activities which are detectable with these sensors range from activities characterized by fast movements, for example sports (jogging, badminton) to slower ones, for example, smoking or working steps in the laboratory. With these wearable detection systems a long-term and decent observation is possible. Referring to its *possibilities,* this makes the technology of wearable activity recognition an efficient tool for self-tracking and *lifelogging.* The detectable activities thus become an object of permanent reflection by providing perspectives on a person's own actions, which was previously not possible. Additionally, interrelations with other logable data as well as exchange with data from other people are possible.

The claim that self-reflection or self-awareness will increase using this technology can not be maintained, which is where we also see the *limits* of this technology. This is due to the fact that the automatic system predetermines perspectives on activities and their interpretation in a way in which the predetermination is not

accessible for the person. In the practical critical design approach on the stages of reflection, we have shown how additional insights in system functions can be made possible. Here further steps are imaginable, for instance implementing mechanisms to make the labels for detection (the act-types) intervenable in runtime.

In our article we have brought different dimension together, from very theoretical philosophical thoughts and theories of interaction design to practical thoughts on concrete implementation. With this we have shown that such an interdisciplinary approach is useful and necessary for understanding the relation between humans and technology on the one hand, and for practical design on the other.

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Effects of Quantified Self Beyond Self-Optimization

Stefan Meißner

Quantified Self (*QS*) refers to the widely accepted self-characterization of a loose group of people who track different kinds of data about themselves and their activities. There is a broad spectrum of aspects tracked by those people ranging from everyday physical activities through the documentation of emotional states, blood pressure, nutrition and caloric intake to sleep habits or brain activity. The establishment and spreading of the notion of the "Quantified Self", also referred to as "life logging, "se coacher", "personal analytics" or "self-tracking", and of a network including numerous regional conferences started in 2008 (see Lee 2014, Wolf 2010).

Although the concept seems to have existed for a long time: "The tracking and analysis of aspects of one's self and one's body are not new practices" (Lupton 2013, p. 25f.). It was in this way, for example, that Benjamin Franklin kept a detailed record of his endeavors and his progress with regard to thirteen different virtues, including parsimony and industriousness, but also silence (see Morozov 2013, pp. 226-267; Neff 2013, p. 118).

However, there seem to be three rather new aspects to the concept: *Firstly*, sensors have facilitated if not enabled the measurement of data in the first place. Every smartphone is equipped with GPS, thus facilitating the automatic measurement of covered distances, and, if combined with an acceleration sensor, can determine whether the distance was traveled either on foot, by bicycle or by car, or how many stairs have been climbed per day.

The measurement is facilitated and not every step needs to be counted by the Quantified-Selfer since "sensor-based systems can collect information without the

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user needing to actively engage with them" (Rooksby et al. 2014, p. 1164) automatically via smartphone or specific small devices such as fitbit, jawbone or bodymedia. Tracking is enabled in the first place since, without sensor-based systems, we would not have any means at our disposal to measure our sleep cycle or blood glucose. Rather, we would have to deduce details about those aspects from mere assumptions, as Pantzar and Ruckenstein (2014, p. 9) state that "selftracking devices measure and interpret body-related evidence that would otherwise remain hidden and undetected". However, since sensors are constantly becoming more economical and smaller, they allow an increased application for everyday purposes.

Secondly, due to the facilitated measurement by sensors and, as a consequence, the creation of large amounts of data, manifold options of representation and visualization of those data are conceivable and applicable. Furthermore, the examination of raw data becomes less prevalent as sophisticated visualizations and expressive representations of processed data become more common. The reason for the popularity of the condensed reproduction of measured data is the fact that, instead of a scientifically valid and precise analysis of data, users prefer a rather comprehensible and tangible display of results. In this way, for example, Alpinereplay concisely displays complex movements at a glance and Hapifork instantly depicts a user's eating speed. An individual, quick and easy-to-understand personal profile is processed and delivered through the use of diagrams, curves, progress bars, numbers and benchmark data (see Ruckenstein 2014).

Thirdly, the nature of those mostly digitally stored data allows an uncomplicated and quick comparison with other individuals on platforms specifically designed for that purpose. Due to standardized measurement and visualization, data once collected may not only be compared to a user's own data history, but may also be easily compared to those of other Quantified-Selfers. Thus, the weekly number of kilometers jogged, the balance of calories or even emotional states can be shared on social platforms. With regard to a competitive setting, this means of comparison may be envisaged and used as a motivational resource (Kamal et al. 2010).

Despite the fact that its function as a platform for convenient comparison with other individuals is pointed out as a crucial argument to use the product by many manufacturers and platform operators, the resulting competition does not seem to sufficiently account for the attractiveness of *QS*, in my opinion. The data collected are admittedly referred to for comparison with others and are also employed for use in gamified applications (see Meißner 2012), although social comparison does not constitute the primary focus, which can be concluded from presentations at various regional *QS*-Meetups where individual data and their correlations repeatedly emerge as a major point of interest (see also Choe et al. 2014; Lee 2014). This is also supported by experiences made by Rooksby et al. while conducting their

study: "The social features of apps almost became a running joke during the study. People would often say that the app connected to social networks such as Facebook, but when directly asked if they use that feature they invariably said 'no'". (Rooksby et al. 2014, p. 1165; see also ibid., p. 1170)

For this reason, the comparison with other users and a possible subsequent hypothesis of the establishment of an unlimited logic of competition caused by a permanent comparison with other Self-Quantifiers will not constitute the pivotal point of the following argumentation. Rather, I am going to focus on the shaping or even transformation of the self, or, more generally, on changing self-relationships through observation and comparison with accumulated data about the self.

As a first step, academic and public discussions with regard to the phenomenon will be briefly outlined (1) in order to subsequently clarify the following two aspects: First, the question regarding what is generally meant by optimization and, furthermore, self-optimization, shall be addressed (2). Secondly, the possible consequences of self-tracking, i.e., the collection of quantitative data about oneself, will be examined (3). Finally, based on those two aspects, I will discuss the current interpretation of the Quantified Self as self-optimization in the corresponding public discourse as well as in a social scientific analysis (4).

1 The Quantified Self Discourse

Even a rather superficial analysis of the discourse including newspapers and journals, blogposts as well as websites of manufacturers reveals an undifferentiated equation of *QS* and self-optimization. Correspondingly, for example, *Wired* magazine promoted the Quantified Self as self-optimization (Wolf 2009). Furthermore, optimization seems to have become an integral part of the concept of *QS*: "The theme of optimization has become an important element of the *QS* movement via maintaining an optimistic and solution oriented quality to the discourse on personal analytics." (Ruckenstein 2014, p. 70)

Within this concept, the protagonists of the Quantified Self are regarded as being the manifestation of a society striving for consistent enhancement, thus forcing the individual into optimizing themselves and their lives. Accordingly, during a broadcast of PBSNewsHour, an interviewee claimed: "'Personally, like, my goal is to basically be—an optimal human being in every aspect of my life.'" (quoted in Lupton 2014a, p. 3) "The rhetoric in these areas is to 'live by numbers', to quantify and then optimize areas of one's life." (Rooksby et al. 2014, p. 1164)

However, supporters or self-trackers don't seem to recognize their concept of *QS* within this negative perspective: "of big data, data mining, surveillance, loss of

privacy, loss of agency, mindless fetishization of technology, even utter dehumanization" (Boesel 2013). In fact, they rather employ arguments referring to information and illumination thereby demonstrating a certain interest in knowledge about themselves and their habits which they claim cannot inherently be a bad thing. Moreover, self-monitoring and the comparison of data are claimed to be motivational, engaging people to lead healthier, less strained and, therefore, better lives.

Overall, however, both seem to come to the same result, although under different auspices. Both groups share the view that the Quantified Self is a vehicle contributing to a desirable amelioration and self-optimization of the individual (Wolf 2009).

Being a sociologist trained in discourse analysis, such a mutual consent between discursive opponents creates a certain sensitivity and attentiveness and causes scrutiny regarding the aspects both protagonists do not seem to discern (Foucault 1984). Therefore, in the following I would like to first and foremost explore what is being hidden behind the self-optimizing thesis' plausibility and what could be revealed if the phenomenon *QS* was examined beyond the concept of optimization. Or, to put it in other words: what are unintended consequences of *QS* for the individual, which would not be discernible with an equation of the Quantified Self and optimization?

However, firstly I would like to clarify a number of aspects by means of the following questions: What do critics as well as advocates intend to say when they claim that the Quantified Self is to be understood as self-optimization? And what is the meaning of optimization here?

2 Optimization

As a first approach, optimization is derived from the Latin word optimum meaning as much as the best or most advantageous. Thus, in common usage, the achievement of this optimum is prevalent, which is why optimization can be described as a process by which a given aim can be achieved to a maximum extent. This is reminiscent of so-called extremum problems in school, when, for example, surface and volume of a given shape were supposed to be optimized as to allow the biggest possible volume to be covered by the smallest possible surface. In this context, optimization would mean the calculation of the specific optimum.

This perspectivation of optimization as supporting the decision for one among a number of possible options is also characterizing the aforementioned discourse concerning the Quantified Self. It is, for example, by means of the logged data that people are supposed to be enabled to decide whether or not drinking coffee

boosts their productivity, and, furthermore, how many cups per day consumed within which dosing schedule would be optimal. Thus, optimization seems to be a means of reducing contingency. The contingent question as to whether the individual is supposed to act this or that way can be decided consolidated by *QS*. In this respect, optimization could be regarded as a method providing orientation to the individual, or, as Lupton (2014a, p. 4) claims: "Self-tracking, therefore, at least as it is undertaken as a private enterprise, may be understood the apotheosis of self-reflexivity in its intense focus on the self and using data about the self to make choices about future behaviours."

At the bottom of this intertwining of the Quantified Self and optimization lies the longstanding faith mostly ascribed to management guru Peter Drucker: "if you can't measure it, you can't improve it." Hence, as a body and its potential performance, just as emotions and sleeping conditions, are measured, this allows an amelioration and optimization of those aspects of human existence. In this way Lupton (2013, p. 28) sees the understanding of patterns in one's life as "the starting point for making changes based on these observations, and new digital technologies support this endeavor." In my view, the analogical conclusion that self-tracking refers to self-optimization is drawn too quickly.

While optimization as understood above aims at a decision between several specific options, the question arises as to what optimization refers to within the context of unspecific alternatives which can be assumed to characterize the modern relationship of an individual to its self. Because, as opposed to a manager whose final aim of optimization can be regarded as ultimately definite, there seems to be no definite and irrevocable final aim for the private self. Is it health? Happiness? Money? Fitness? Or is it a generally higher intensity experiences and life in general that is being identified as a personal aim? There seem to be various disparate objectives, which can hardly be organized into a hierarchy. Therefore, self-optimization is by no means as homogenous and dominating as it might first appear, but rather seems as tenuous and versatile as the self.

Thus, the convergence of the notion of optimization with efficiency and productivity captures only one dimension of the concept of optimization. However, a second perspective alters the concept of optimization, and, therefore, of perfectibility by not prematurely regarding it a formalized process. In fact, it includes not only the choice from a range of given and fixed options of human condition, but rather contains an indefinite number of possible yet unspecified options as adumbrated in the general idea of self-realization.

In particular, self-realization is not understood as the choice of an explicit aim from among a number of alternatives, but is pictured as an open-ended process of self-development (Makropoulos 2000, p. 87). In this respect, self-optimization

means more than the mere realization of specific modes of human condition, it rather implies the development and composition of new characteristics of the human condition (see Makropoulos 2002). Thus, the focus no longer lies on choosing an optimal decision from among a set of options, but on unlocking realizable, although initially vague, opportunities in the first place. In this second sense, optimization could be described as a method which does not reduce contingency, but, on the contrary, enhances it (Makropoulos 2000, p. 88). Optimization then does not refer to a resolvable extremum problem, but rather to an infinite process of enhancement.

The consideration of both dimensions of the notion reveals that, paradoxically, self-optimization refers to a twofold meaning: Firstly, it can be regarded as a method of obtaining *self-effectiveness*, meaning the improvement of individual performance and an increase in productivity. Secondly, self-optimization can also refer to a kind of *self-enhancement* which does not necessarily manifest itself in terms of productivity logic, but which is capable of dismissing the term's first meaning while aiming at an aesthetic form of self-realization. If self-effectiveness is related to the idea of an optimum which can realistically be achieved, then self-enhancement is based on the opposite notion, seeing that, generally, no optimum exists because each option can potentially be surpassed by other options yet to be defined. However, the general discourse concerning self-optimization is primarily focused on self-effectiveness while losing sight of possible modes of self-enhancement.

3 Quantification

Following this problematization of the notion of optimization, I now would like to focus on a second aspect of the Quantified Self, namely the individual's collection of their quantitative data instead of qualitative data. Possible questions might include: What difference do numerical data about oneself make? Does the data's numerical character automatically lead to self-optimization in the sense of self-effectiveness? In the following, six probable consequences of the collection of quantitative data retrieved from accounting research literature (Armstrong 1994; Morgan 1988; Hopwood 1978; Vollmer 2003; Heintz 2010; Chua 1995) will be applied to the phenomenon of *QS*.

One *first* consequence of the collection of quantitative data or numbers seems to be that they convey a certain tangibility to the subject matter (see Wolf 2010). Hence, instead of only sensing one's weight, one look at the scale facilitates the latters' cognitive processing. Instead of enabling the articulation of a rather vague feeling, quantitative data support the specification of this feeling by means of numbers.

Therefore, and that would be the *second* effect of self-tracking, the collected data allow a sort of surprise for oneself. Self-trackers might be confronted with unexpected patterns which help to visualize their own contingency and, thus, possible aspects of themselves and their lives which could be modified. The individual experiences themselves will be surprisingly versatile. In this way, people who tracked themselves "are not building a description of their lives, but are wayfaring in information" (Rooksby et al. 2014, p. 1171).

The *third* consequence of the collection of data results from their decontextualizing nature. Generally, this aspect is considered one of the major advantages of quantification since this allows a comparison of matters which are otherwise incomparable (Heintz 2010). On the one hand, this implies that numbers simplify specific facts. Accordingly, for example, the rather complex question as to how I feel can be broken down to a number between one and ten. On the other hand, decontextualization by means of numbers allows a less emotional approach to the problems recorded (see Wolf 2010). Thus, the collection of quantitative data can also be regarded as a mechanism of dissociation. Dissociation in this sense does not imply estrangement or disaffection, but a rather positive opportunity to relate to oneself. This concept of dissociation shows some similarities to the concept of data doubles, although the latter seems to be more refined: "Data doubles are configured when digital data are collected on individuals, serving to configure a certain representation of a person. They have their own social lives and materiality, quite apart from the fleshy bodies from which they are developed. [...] Data doubles representing aspects of the body and self are continually re-enacted and reconfigured." (Lupton 2014a, p. 6)

Thus, decontextualization by means of numbers does not necessarily need to be equated to self-estrangement but can rather be regarded as a vehicle that delimits the mobility of the self and allows a detachment from the self, and, as Rooksby describes it: "Knowing oneself may involve collecting and reflecting on information about oneself but is for the purposes of a life being lived." (Rooksby et al. 2014, p. 1171)

Therefore, the *fourth* consequence of the collection of quantitative data on oneself is that the interpretation of data becomes increasingly important. Furthermore, precisely because of the fact that numbers can be put into different contexts, this allows substantial leeway for interpretation. Lupton (2013, p. 29) also sees this interpretive aspect of self-tracking, so that *QS* could also mean: "the qualified self".

This feature resulting from quantitative data also becomes manifest when *QS*-meetings are analyzed. In half of the presentations, data were not only visualized but also put into context with further information, which Lee calls "data reconstruction". The data of the self constitute "an inherently intimate relation-

ship with the data that are collected because they are about 'the self'" (Lee 2014, p. 1035).

However, the weight of correct interpretation is stressed with various visualizations such as diagrams, progress bars and historical trends. "Self-tracking devices break down the body into culturally legible images such as fitness graphs" (Pantzar and Ruckenstein 2014, p. 10). The original raw data will no longer be seen, because often they are pre-processed by, for example, productivity tracking apps such as RescueTime, which deliver a tentative interpretation in terms of productivity (see also Choe et al. 2014, p. 1148).

This brings us to the *fifth* effect: not only do recorded data represent an existing reality, but they also create this reality in the first place (Morgan 1988). The tracking of the self changes the latter's reality. The individual's very own reality simply becomes a different one as soon as, for example, brain activity during sleep is being recorded because that aspect of reality previously had not been accessible to the individual. Those data may cause changes for the individual because they create an altered visibility with regard to certain aspects of life, as according to Lupton: "The notion that digital self-tracking devices render visible elements of one's self and body that are not otherwise perceptible is also expressed in many accounts of self-tracking" (Lupton 2014a, p. 6). However, those data do not determine life because those data that provide information as to the quality of my sleep are paralleled by my personal impressions which tell me whether I have had a good night's sleep or not. Still, the decision with regard to those likely inconsistent data is not made by the data, but by the person recording the data. Thus, those data do not per se seem to enslave the human user but, quite the contrary, provide the opportunity for some leeway. Users may trust those data and use them as evidence against their own impressions or they may take their bodily experience seriously and interpret this inconsistency as a measurement error or as a problem due to automated interpretation. However, measurement and experience may also align over time and may mutually contribute to a common reality (Pantzar and Ruckenstein 2014, p. 12).

However, this evidence-based reality could be an argument against an expert's opinion when a physician's diagnosis can be compared to the patient's own interpretation of the data. This is not only applicable to health problems but also to personal fitness. Why should I entrust my fitness to a commonly shared diet plan when the measurement of my personal vital signs, including my perception of happiness, provide me with detailed information as to what is good for me and what is not?

This leads to the *sixth* effect: The measurement of the self may defend the self against society's calls for optimization and, therefore, compliance. Nafus and

Sherman (2014, p. 1785) argue that the protagonists of *QS* "represent a profoundly different way of knowing what data is" and that is why the "Quantified Self movement proliferates diversity, and, as such, offers the possibility of a much more nuanced understanding of what else large data sets are capable of, and how dominant forms of data practices might be confronted."

Instead of being stranded in and subject to common societal expectations and demands to be "Fitter, happier, more productive" (Radiohead on "OK Computer", 1997), numbers could support a "soft resistance" (Nafus and Sherman 2014).

In particular, this is true for *QS*-meetups because "*QS* is one of the few places where the question of why data matters is asked in ways that go beyond advertising or controlling the behaviors of others" (Nafus and Sherman 2014, p. 1788). Data is not only seen in modes of self-optimization, because in the first place, data tracking "introduces purposefulness and intention into [...] everyday actions" (Nafus and Sherman, p. 1789). Furthermore, their study indicates that "most *QS*ers do not grip too tightly to normative understandings of what is and isn't 'healthy'" (ibid.).

Compared to uniform, scientifically controlled statistical analyses, *QS*-methods are rather heterogeneous (see also Choe et al. 2014). Healthy practices are quite different from each other, "not just in terms of what they think or believe, but at a data level. The difference cannot be thought of as a standard deviation from a norm; rather, they are not on the same curve" (Nafus and Sherman 2014, p. 1791).

It is this distance to preset categories and behaviors that characterizes the "soft resistance" of *QS*ers. Thus, the self-tracking movement does not constitute a normative discipline approach but rather encourages its protagonists to act sovereignly. Self-monitoring is perceived as "a productive way of creating an alternative mode of working with data" (Nafus and Sherman 2014, p. 1791). Furthermore, since they focus on what is best for themselves, they can face society's demands and expectations by opposing them with their self-tracked existence. "*QS*ers use their bodies and the cultural resources around them to see outside the frame that devices set for them. They interact with algorithms not as blind, mindless dupes, but as active participants in a dialogue that moves between data as an externalization of self and internal, subjective, qualitative understandings of what the data means." (ibid., p. 1793)

As demonstrated on the basis of those different effects of tracking, the conclusion equating the Quantified Self and self-optimization, referring to self-effectiveness, falls short of the actual concept and should be avoided. Self-tracking does not, by any means, automatically lead to optimization in the sense of self-effectiveness. Rather, it is numbers that allow an enhanced and detached self-relationship which then allows ways of self-assertion and a certain independence from society's expectations. Self-trackers can create a zone free from society's demands

and expectations which, realized through different ways of self-enhancement, can oppose general trends in society, as for example in forms of self-aestheticization or self-education.

While self-trackers were helplessly exposed to the demands of society without their own data collection, now they can employ those numbers as a stronghold against society's expectations of optimization. Thus, instead of delivering themselves to an uneasiness caused by the ever present feeling of insufficiency regarding society's demands for "fitter, happier, more productive", the numbers generated may serve as a barrier against this. Thereby, the individual normality can be put in opposition to normality as communicated by society. Moreover, since those benchmarks produced by society can hardly be negated, the individual creation of alternative reference points seems to provide the only opportunity to effectively oppose society's demands (see Heintz 2010, p. 172).

In summary it can thus be established that even the recording of numeric data about oneself does not necessarily need to result in self-optimization in the sense of complete self-effectiveness, although this has been much feared by the public discussions while having raised the hopes of various companies and venture capital providers. On the contrary, since they are numerically supported, previously rigid and preset self-relationships may now be perceived as contingent and flexible. The creation of a distance from the self or a detached self-relationship does not need to be interpreted as expressing conformity with society's imperative call for optimization. Hence, *QS* does not generate a stable and fixed self whose ultimate goal is to become an optimized self. Rather, contingent opportunities of self-enhancement can be experienced and tested for plausibility.

4 Discussion

Now if both aspects—complete self efficiency and self-enhancement—were factored into the notion of optimization, the broad array of self-descriptions and external attributions of the Quantified Self could be reorganized. For example, some users employ self-tracking as a means to gain a global understanding of everything in their lives: "I want to understand the changes that are actually happening [in my life], not just my perceptions of them." (Hesse 2008). This style of personal tracking could be described as "documentary tracking", where the participants are more interested "in documenting their activities rather than changing them" (Rooksby et al. 2014, p. 1167f.).

Although this points out a supposed difference between self-optimization and self-awareness, both could be reorganized and considered two aspects of the no-

tion of self-optimization. Most protagonists do not focus on action control as a means of obtaining self-effectiveness, but rather on generating specific and data-based knowledge about themselves in order to enhance their selves in the sense of delimitation (see also Lupton 2014b, p. 5f.). As soon as they have been discerned, the connections between different self-tracking data outline a new horizon of possibilities. In this respect, the motivation for self-tracking can also be described as self-optimization, as the sort of self-enhancement which increases contingency and, thus, possible manifestations of being oneself. Therefore, the actual methods of self-tracking appear to be a slavish subjection to society's frenzy for optimization on the one hand, while on the other hand, the information gain and their interconnection are described as an act of liberation. Interestingly, this momentum—the discovery that *QS* allows new experiences and makes an altered self-relationship plausible—is hardly fortified within current discussions in social sciences. It is rather the determining forces of society's demand for optimization which are stressed with loose reference to Michel Foucault (see e.g., Lupton 2014a, p. 3). In this perspective *QS* will be "theorised as a practice of selfhood that conforms to cultural expectations concerning the importance of self-awareness, reflection and taking responsibility for managing, governing oneself and improving one's life chances" (Lupton 2014b, p. 12).

However, in my view, this accentuation of the demanding character of the Quantified Self can only become plausible if an extensive economization of the social is assumed. Because only then can it be understood why the reduction of contingency can follow but a single scheme, namely that of technical optimization or economic competition.

This can also be seen in the works of Till (2014), who understands "exercises" as "labor" simply because of the fact that the data which are recorded by means of free apps, as for example "MapMyRun", are subsequently sold to other companies for marketing purposes. However, this argumentation could also be set in different terms. Thus, an increasing scientification could be identified here due to the fact that daily exercise is being scientifically analyzed. On the other hand, since exercise is tracked through an app's licence and according to its specific data security regulations, one could also refer to a growing juridification. Lastly, one could claim that there is an increasing aestheticization because people exercise in order to create an aesthetically pleasing appearance.

Yet, if the assumption of economization of the social is not supported, the latter argumentation concerning the rather paradoxical demand for self-optimization collapses. For then it is no longer plausible that those altered self-experiences facilitated by technical self-relationship simultaneously constitute a compulsion for productivity. That does not imply that *QS* could not also be used as a means to

further economize social issues, as can be observed, for example, with regard to new discount models of life or health insurance providers (see Rooksby et al. 2014, p. 1168). This threat is already being implemented so that the "self-impelled and voluntary aspects of self-tracking [...] are becoming harnessed to broader collective commercial, economic or social imperatives" (Lupton 2014a, p. 8).

As already mentioned above, instead of viewing this from a perspective of an economization of the social alone, one could also assume one of the following positions and label it as aestheticization, politicization, scientification or juridification of the social, all of which do not follow the logics of economic productivity. One of the fundamental findings of differentiation theories is that modern society is not based on one primary function, but that its decisive feature consists of the coexistence of different functional logics which cannot be reduced to each other or deduced from each other (Luhmann 1992, 2013). Neither can truth, art or political decisions be made exclusively based on economic calculation, nor can their "production" be optimized. They develop independently according to the principles of their own logics.

In this respect, self-tracking as practiced in *QS* truly seems to be self-optimization in the sense of self-enhancement, since it leads to the establishment of a detached self-relationship and, thus, to the dissolution of the boundaries or limits of the possibilities of an individual's horizon. However, this self-enhancement does not automatically include the compulsion to self-effectiveness and to an accentuation of economic productivity. This would only be the case if the economization of the social was assumed. Therefore, instead of impetuously emphasizing the compulsive nature of *QS* and describing its protagonists as blind or at least affirming society's demands for optimization, the attraction of the Quantified Self and its specific empirical nature could rather be presumed to originate from its enabling of a completely new experience of the self and, thus, possibilities for self-enhancement (see also Choe et al. 2014, p. 1146). It is this expansion of possibilities for self-observation and self-awareness that leads first and foremost to specific attention and care of the self that can create incentives for different forms of action, for example concerning aestheticization, scientification or politicization and, of course, also for productivity-related trust in optimization of the self. However, the latter does not necessarily need to be the case.

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Measuring the Entrepreneur of Himself

Gendered Quantification in the Self-Tracking Discourse

Simon Schaupp

1 Introduction

"If reputation capital is the new currency of online interactions, you need to check what's in your wallet", writes *TrustCloud*[1], advertising it´s application, a kind of rating agency for individuals. *TrustCloud* and similar providers of individual ratings like *Klout* monitor digital communication of their users and the reactions to their online behavior to calculate a score that indicates their trustworthiness or their influence. *Klout* states that their secret algorithms have generated such a score for more than 620 million users, evaluating 12 billion "social signals" on the internet every day.[2] These applications are an example of the booming phenomenon of self-tracking, the automatic self-monitoring and quantification of individual activities by means of digital technologies.

In this article I will follow the question of which implication the self-tracking discourse has for contemporary regimes of subjectification. Foucault´s concept of the "entrepreneur of himself" (Foucault 2008, p. 226) will serve as a starting point for this undertaking. This concept refers to an economic program that understands workers as entrepreneurs of their labor force. What is specific about the entrepreneur of himself for Foucault is that he is "being for himself his own capital,

1 https://trustcloud.com/blog/2011/12/07/klout-is-out-why-reputation-is-more-valuable-than-influence.html. Accessed 26 Sept 2014.

2 https://klout.com/corp/about. Accessed 26 Sept 2014.

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being for himself his own producer, being for himself the source of [his] earnings." (Foucault 2008, p. 226). Along with this goes the understanding of any personal activity as corporate activity. The notion of rating agencies for individuals already shows that the imagination of the self as an enterprise in which resources have to be invested in the most profitable way is quite present in the self-tracking discourse.

The theorem of the entrepreneur of himself has been developed prominently by Rose and Miller (1995) but also by German sociologists Voß and Pongratz (1998) and especially Ulrich Bröckling (2005, 2011, 2013). The latter identified an imperative of never ending self-optimization at the core of the enterprising self.

The argument that I will develop here on the basis of a short analysis oft exemplary self-tracking applications is that two important aspects have been underestimated in most studies of the entrepreneur of himself. The first is that the subjectification as an entrepreneur of oneself is possible only on the basis of a quantitative rationality. The second is that this subjectification is a gendered one.

To this end I will first present a number self-tracking technologies. Although the selection cannot be fully representative of the huge field of available technologies, it should be adequate for a first overview of the structure of the self-tracking-discourse. On the basis of these examples I will show that the subjectification as entrepreneur of himself requires an economic rational self-relation that is made possible in the full sense only by quantitative accounting data.

In a second step I will show that the theorem of the entrepreneur of himself, at least in the self-tracking discourse, has to be understood in the context of processes of gendering and degendering. When Foucault speaks of the entrepreneur of *him*self there are no clues that he uses only the male form with the intention of highlighting the androcentric structure of the discourses belonging to this figure. I will stick to the male form here to highlight exactly this andorcentrism that is also visible in the self-tracking discourse.

Under these premises I will elaborate which insights on contemporary male regimes of subjectification can be derived from the self-tracking-discourse. Thereby I will show that the discourse implies a conception of masculinity that I will call an enterprising masculinity, which relies mainly on an economized self-realization.

2 Technologies of the quantified self

The many oddities that are produced in the field of self-tracking can easily lead to the reduction of the phenomenon to an isolated curiosity. But self-quantification is in no way a phenomenon of the "internet-age" only. Instead it can be traced back to

older technologies such as the book of household accounts, the diet-log and others. Self-Tracking can be understood as the radicalization of these technologies.

Foucault pointed out that in ancient Greece, the regimen of dietetics tried to systematically analyze and master the body: "At all times and encompassing all of a man's activities, [dietetics] problematized the relation to the body and developed a way of living whose forms, options, and variables were determined by a concern with the body." (Foucault 1990, p. 102) It included exercises, foods, drinks, sleep and sexual relations—"everything that needed to be 'measured'" (Foucault 1990, p. 102).

With explicit reference to the ancient Greek philosophers, the practice was further developed by Benjamin Franklin. In order to optimize his moral qualities he kept a book

> "in which I allotted a page for each of the [thirteen] virtues. I ruled each page with red ink, so as to have seven columns, one for each day of the week, marking each column with a letter for the day. I crossed these columns with thirteen red lines, marking the beginning of each line with the first letter of one of the virtues, on which line, and in its proper column, I might mark, by a little black spot, every fault I found upon examination to have been committed respecting that virtue upon that day." (Franklin 1916, p. 66)

He always carried this book with him so as to be able to immediately note down his sins (Franklin 1916, p. 69). Like many self-trackers who suddenly have access to processes that were partly unconscious before, Franklin "was surpris'd [sic] to find myself so much fuller of faults than I had imagined". But at the same time he experienced what many self-trackers report to be the most motivating aspect of the practice: "I had the satisfaction of seeing them diminish." (Franklin 1916, p. 69)

While such an obsessive engagement with one's own moral improvement was clearly a privilege of the ruling classes, there were other practices of self-monitoring, such as household-accounting, that spread much further. Accounting technologies might not have been as different from Franklin's technology of confession as it seems at the first glance. As James Aho (2005) has shown, accounting has its medieval roots inextricably connected with moral, religion and especially the confession. The most interesting type of accounting in this context is the book of household accounting. By the early eighteenth century, a literature of guides to household accounting had appeared, which offered standardized models of tracking all economic activity of the household (Vickery 2013, p. 19). In these guides, self-transparency through quantification is set as the basis of rational planning. Only household accounting, as one of them comments, makes it possible "to recognize whether the household-boat is on a perishable course,

and thereby offers the possibility to change that course" (quoted in Schmidt 2007, p. 239 transl. S. S.).

By now there are self-tracking technologies for nearly every aspect of life from sleeping to meeting friends, from sex to nutrition, from trust to jogging. What unites them, and also links them to older technologies of self-quantification, is the quest for rational insights into one´s own life through the collection of quantified data. In the following I will present a small selection of these technologies via discourse-fragments that originate from advertisements for these technologies. Advertisement is especially useful for an analysis of the self-tracking discourse because it best discloses the interpellations of the ideal subjects of self-tracking. Therefore, the analysis will not be about uncovering some hidden meaning. Instead I assume with Foucault that discourses are transparent and do not need anyone to interpret or give a special meaning to them (Foucault 1978, p. 29f.)

2.1 The universal platform

The online application *TicTrac* offers an aggregation of data from all kind of *QS*-technologies such as body-loggers, time management software, online calendars, email services, music websites and many more. Other data such as coffee and alcohol consumption, stress level and mood have to be entered manually. The data can be correlated in a number of different ways and the possibility of longer periods of data collection is said to disclose eventual connections, for example, between diet and "productivity". Or the data from email-programs, social networks or internet telephony can be used for "relationship tracking". This can be used for adjusting ones relationships exactly to one's current needs. Thus a relationship-tracker reports that "only 14 per cent [of my contacts] are important for my happiness" and that therefore he developed a program that he calls "Reducing Relationship Fat Percentage—RFP"[3].

On its welcome-page *TicTrac* advertises its platform with the photo of a man in a mountaineering outfit standing in front of a sign that indicates that he is on a peak 5,895 meters above sea level. This photo is surrounded by various diagrams, numbers and graphs.[4] In the written advertisement, *TicTrac* states that through the sheer amount of data it collects, it would become possible to "provide a *complete*

3 http://qsdeutschland.de/beziehungs-tracking/. (7:20) Accessed 08 June 2014.

4 https://www.tictrac.com/. Accessed 04 Oct 2014.

picture of what it takes to maximize success on and off the field. From sleep to speed, nutrition to endurance"[5].

2.2 Sports

Sports are the biggest area in which self-tracking technologies are employed. The most prominent provider of self-tracking for sports is most likely *Runtastic*[6]. It offers different kinds of measuring technologies from digital scales that automatically sends weight, body fat etc. to the computer which in turn uploads it to the firms servers[7], to digital activity sensors such as the "24 hour activity, fitness & sleep tracker".[8]

Runtastic mainly advertises with quotes from satisfied customers who are shown in athletic wear. Next to the photos one can read texts such as: "*Runtastic* is the perfect tool for me to track my runs and analyze them after the training, so that I can improve my performance constantly."[9] It is noteworthy that only men are portrayed in these advertisements. Furthermore, it is striking that the prominent depiction of performance and achievement is the photo of a very hairy—and therefore male connoted—arm that is smeared with mud and is holding up a gold medal towards the sky.[10]

2.3 Biotracking

In addition to sports, health is another main field of application for self-tracking. There are many different technologies in this field as well. One example is testosterone-tracking that is introduced on the website of quantified-self Germany in a video in which a self-tracker explains how he "set out to become Wolverine"[11]. But more popular are companies like *Biotrakr* that offer the analysis of health-relevant results from blood and saliva tests. Just as with other self-tracking applications, the

5 https://www.tictrac.com/business. Accessed 21. July 2014.

6 https://www.Runtastic.com/. Accessed 08. July 2014.

7 https://www.Runtastic.com/shop/en/Runtastic-libra-scale. Accessed 20. Oct 2014.

8 https://www.Runtastic.com/shop/en/Runtastic-orbit. Accessed 20. Oct 2014.

9 https://www.Runtastic.com/shop/en/weidlinger. Accessed 20. Oct 2014.

10 https://www.Runtastic.com/. Accessed 20. Oct 2014.

11 http://qsdeutschland.de/wie-werde-ich-wie-wolverine-ein-versuch-testosteron-zu-entschluesseln/. (4:21) Accessed 08. June 2014.

test results are uploaded on the company's website to be represented in graphs, tables etc. to analyze them. *Biotrakr* is advertised with the slogan: "We make health measurable. Because you can only manage what you can measure."[12] The welcome page of the website is illustrated with a photo of a male person in a mountaineering outfit standing on a snowy peak looking into the horizon.[13]

Diet-tracking technologies can also be subsumed under the category of bio-tracking. The most well-known provider of diet equipment is *Weight Watchers*, which also offers a variety of self-tracking technologies. Especially interesting in this context is a range of products that is directed particularly at men. With relatively high effort, the female connotation of diet-techniques is contested to make them attractive for men. Under the slogan "lose like a man", *Weight Watchers* produced different commercials that offer men a special "male" form of losing weight, for example, in which they do not have to abstain from "manly food".[14] In another video a soldier explains how he became an officer and a "role model for my men" by using *Weight Watchers* self-tracking products. "Like you, I thought *Weight Watchers* was just for the ladies", he starts, but then he realized that with the help of different self-tracking technologies he could "lose like a man". "*Weight Watchers* Online for Men isn't some random app or calorie counter — it's a weight-loss plan, customized for guys", it says on the website. "Like toys? You get a suite of digital tools so you can stay on track".[15]

3 Measuring the enterprising self

Obviously "self-knowledge through numbers", as the slogan of the quantified self movement goes[16], is not an end in itself but a precondition for self-optimization, which is the central aim of self-tracking. What is almost always optimized is performance. Not only in sports is everything about "improving performance constantly", as *Runtastic* says.[17] Instead, every area of life "on and off the field, from sleep to speed, nutrition to endurance",[18] as *TicTrac* says, must be analyzed and optimized in terms of performance. It is striking that the image of the mountaineer

12 http://biotrakr.de/. Accessed 04 Oct 2014.

13 Ebd.

14 http://www.youtube.com/watch?v=EtOUjOHMbW8. Accessed 11 July 2014.

15 http://www.weightwatchers.com/men/. Accessed 11 July 2014.

16 http://quantifiedself.com/. Accessed 21 July 2014.

17 https://www.Runtastic.com/shop/en/weidlinger. Accessed 20 Oct 2014.

18 https://www.tictrac.com/business. Accessed 21 July 2014.

on top of a mountain peak is often used in self-tracking advertisement. This image viseotypically stands for the link between performance and success (Ludes 2001).

The optimization of performance is imagined in terms of optimizing the allocation of resources in an enterprise. Reliability becomes "reputation capital"[19] that is ranked similar to the capital of an enterprise in order to help other enterprises decide whether or not to invest in it. Even health becomes a question of rational "management" of one's own body, as we have seen in the example of *Biotrakr*.[20]

3.1 Optimizing the enterprise of the self

The instrumental self-relation is expressed in self-tracking in a very radical form, but it is not at all new. It had already been analyzed by Foucault in the 1970s in the subjectification theorem of the entrepreneur of himself (Foucault 2008, p. 226). Foucault distilled this term from the works of the economist Theodore W. Schultz who primarily understood education, and later all activities and consumption, as an investment in one's own human capital (Schultz 1971). The works of Schultz have been analyzed by Foucault in his lectures on neoliberal governmentality. There, he reads Schultz' thesis on the economic subject as a human capitalist going against the grain. For him, it is not interesting as an economic/anthropological diagnosis but as a powerful discourse that plays an important role in the constitution of the subjects themselves. Foucault understood subjectification as a form of power that "categorizes the individual, marks him by his own individuality, attaches him to his own identity, imposes a law of truth on him, which he must recognize and which others have to recognize in him" (Foucault 1982, p. 781).

According to Foucault, bodies therefore cannot be seen as economic units a priori, as for example the model of *homo economicus* implies, but have to be constituted as forces of production. This constitution of the economic subject appears in different forms throughout history. Towards the end of his life he saw the form of the entrepreneur of himself as the one towards which "the economic policies of all the developed countries, but also their social policies, as well as their cultural and educational policies, [are] orientated" (Foucault 2008, p. 232).

In European politics, this program became dominant at the latest during the end of the 1990s when Tony Blair and Gerhard Schröder published a paper inspired by Anthony Giddens titled "Europe: The Third Way". In a self-critical manner, they

19 https://trustcloud.com/blog/2011/12/07/klout-is-out-why-reputation-is-more-valuable-than-influence.html. Accessed 26 Sept 2014.

20 http://biotrakr.de/. Accessed 04 Oct 2014.

declared that in traditional social democracy "Values [...] such as personal achievement and success, entrepreneurial spirit, individual responsibility and community spirit, were too often subordinated to universal social safeguards." (Schröder and Blair 1998, p. 3) Instead they proposed to "promote a go-ahead mentality and a new entrepreneurial spirit at all levels of society." (Schröder and Blair 1998, p. 5)

According to Ulrich Bröckling, the self-tracking discourse can be understood as essentially constituted by interpellations of the "enterprising self", i.e., interpellations of self-optimization. Bröckling does not understand the enterprising self to be a Weberian ideal type, but rather as a goal that cannot be reached, an imperative of a never ending self-optimization: "One is not an enterprising self, but is rather becoming one." (Bröckling 2005, p. 11) One reason why one cannot *be* an enterprising self is that it´s interpellations are directly contradictory. For example, at the same time there is a requirement for spontaneous creativity and rational planning (Bröckling 2005, p. 14).

3.2 Cybernetic accounting for the enterprise of the self

As the term "quantified self movement" implies, quantification is the central feature of self-tracking. This quantification is supposed to fulfill a need for objectivity and rationality which is addressed in nearly all self-tracking advertisement. Examples are *TicTrac´*s promise of a "*complete picture* of what it takes to maximize success"[21], or the slogan of the time management-software *TimeDoctor*: "Track your time. Track your team´s time. Know EXACTLY what is REALLY going on."[22] (sic).

This rationality is inextricably connected with quantification. And quantification is present in the advertisement as well: The illustration is dominated by numbers, diagrams and graphs. Most of the times the meaning of the numbers is not recognizable. Their presence seems to speak for itself.

Nikolas Rose understands numbers as "techniques of objectivity that establish what it is for a decision to be 'disinterested'" (Rose 1999, p. 199). This means their main social function is to discursively create objectivity. Objective insights into one's own life seem to be one of the central attractions of self-tracking. Indeed advocates of self-tracking mourn "our selective perception: People tend to unconsciously push some things aside while at the same time not being able to get

21 https://www.tictrac.com/business. Accessed 21 July 2014.

22 http://www.timedoctor.com/. Accessed 21 July 2014.

other things out of their heads. This is not rational but rather a prehistoric survival instinct." (Janssen 2012, p. 75, transl. S. S.)

With reference to the shift of subjectification regimes towards an entrepreneur of himself and the generalization of market logics connected to it, the rationality that is interpellated in self-tracking, can be understood as an accounting rationality. It is an accounting rationality insofar as it aims towards the constant optimization of the allocation of resources with the aim of maximizing utility. Such an optimization of resource allocation becomes possible in a rational way only if the enterprise has quantitative accounting data at its disposal. All the data that is produced by the technologies described above is quantitative. And it has to be insofar as all activity of the entrepreneur of himself is aimed towards surplus value. The enterprise or the commodity of the self is worth as much as work (not individual but abstract) has been invested in it. The value of the investment has to be known, first of all, and second of all, it has to be less than the surplus value expressed in the profitability of the body.

If the human capitalist goes jogging, for example, to prolong the life span of his body and make it more attractive, he has to know how much time he needs, how many calories are burned, when and how often he has to go jogging to achieve the most efficient training effect and so on. Thus the individual can only become an "entrepreneur of himself" if it has accounting data about its enterprise at its disposal. The *homo economicus* is thus a *homo calculans*. Because "you can only manage what you can measure"[23], as we learned from *Biotrakr.*

Concerning official statistics, Foucault remarked that it was to be understood not as representing what is, but rather as an art of government (Foucault 2011, p. 252). The same is true for the technologies of self-quantification. Similar to official statistics, they are not only technologies of knowledge but they themselves create a new field of intervention that was previously invisible and thus inaccessible for rational planning and decision-making. Thus, if political statistics allowed for a rational art of government to evolve (Foucault 2011, p. 252), it can be added that the technologies of self-quantification allow a rational governing of the own body and thereby contribute significantly to the production of the enterprise of the self.

It can be argued that, for the first time, the technologies of self-quantification allow what Foucault called the "political economy of the body", in the full sense of the concept (Foucault 1995, p. 25). Before the automated and quantified monitoring of the body, the human capitalist was not able to develop a rational relationship with himself because important spheres remained detracted from rational access.

23 http://biotrakr.de/. Accessed 21 July 2014.

Accounting, with its economizing access to the world, necessarily constitutes the self as quantified as well, because for anything to be counted as human capital it needs to be quantified with a value. According to Horkheimer and Adorno, for the quantified self "anything which cannot be resolved into numbers [...] is illusion" (Horkheimer and Adorno 2002, p. 4).

In the history of self-quantification self-tracking plays a special role insofar as it automatizes the information function of accounting in a cybernetic way. While the statistics of accounting had to be interpreted with a time-delay, in self-tracking every divergence from the course of optimization is immediately fed back to the user. Thus in the enterprise of the self self-tracking not only plays the role of accounting but also of a cybernetic feedback-module that allows for an automatic and preventive control of the system it watches.

3.3 Economized self-realization

It could now be argued that the technologies of self-quantification described above are in no way measuring only economic activities in the classical sense. They even explicitly call upon their users to take breaks or do sports.

In fact the ideal of self-actualization seems to play an important role in self-tracking, which is not at all about imposing the same abstract norm on everyone. In the self-tracking discourse there is an aspiration of emancipating individuals from external authorities so as to find out what works for *them*. Or, as a *TicTrac* advertisement puts it: "Each of us leads our life in our own way. This is what makes us unique."[24]

Optimization here has two reference-points. One is relational competition, that is interpellated in ranking-functions that can be found in almost every self-tracking technology. The other is individual improvement with emphasis on uniqueness. Comparison plays an important role, but in most cases it is about comparing within a group of members who are similar. This can be the digital "circle of friends" or people who pursue the same goals, or even one's own records that are to be beaten. These are, as *Runtastic* stresses "individual goals, no matter how defined"[25]. Seemingly, the aims are generated and amplified more by group feedback than by universal standards.

If, however, human capital, as Bröckling states, means "nothing other than that knowledge and skills and the state of one's health, but also outer appearance, social

24 https://www.tictrac.com/. (video 00:02) Accessed 29 July 2014.

25 https://www.Runtastic.com/shop/en/baumann. Accessed 30 July 2014.

prestige, working ethos, and personal habits, need to be seen as scarce resources requiring investment" (Bröckling 2011, p. 258), then a work-life balance and the seemingly opposing requirements of the enterprising self are antagonisms only at the first glance. Similar to economic portfolio theory, here, all aspects focus on investing in different segments of human capital. For example, emotional intelligence becomes an important competence for the entrepreneur of himself, but it remains within the boundaries of economic rationality (Reckwitz 2010, p. 72).

Therefore, it seems appropriate to speak of an imperative of *rational self-actualization* which dominates the discourse. On these grounds, Bröckling´s thesis that the entrepreneurial spirit finds its role model in the "genius of the artist" rather than in the "rationality of the accountant" (Bröckling 2013, p. 124) seems to be only partially valid. Indeed the "genius of the artist" is more visible on the surface of the entrepreneur of himself than the rationality of the accountant. But at the core he is deeply dependent on exactly this accounting rationality without which no genius can be commercialized.

An apt illustration of this are the tips that the time management software *RescueTime* gives to novelists in order to help them increase their output. For example, they suggest they "Set a 'no sleep till wordcount' goal. People who logged the most [writing] time tended to write the most between the hours from nine to midnight." Also, "occasional marathon-days" would significantly increase the output. But still "Don´t forget to eat dinner! There was a clear trend among the top 30% of the people with the most writing time: they took a break between the hours of 5pm and 8pm".[26] Therefore, it is clear that even this creative occupational area has to comply to the accounting rationality.

4 Enterprising masculinity

The processes described above can be understood as an expansion of economic rationality. This rationality is not limited to an "economic sphere" of professional life, but is present even in the field of self-realization, which is discursively upvalued at the same time. These shifts are described by Cristina Morini (2007) as the feminization of labour. As such they are intimately connected to the crisis of the male "standard employment relationship", i.e., unlimited full-time employment which grants inclusion into systems of social security as well as the position of the male breadwinner. This model was primarily put under pressure by the increasing

26 http://blog.rescuetime.com/2013/10/23/are-you-ready-for-national-novel-writing-month/. Accessed 06 July 2014.

importance of service work, the decreasing welfare state and the increasing inclusion of women into the labor market. However it is important to highlight that here, the term "crisis" should not be thought of as a singular contemporary event. Instead the topic of crisis has a rich tradition in modern masculinity discourses per se (Meuser 2010, p. 327). This steady contemporaneity of the topic of crisis can be understood as an expression of the instability of gender constructions as well as the power relations between genders.

In masculinity research there is a relative consensus that wage work constitutes an important point of reference for the construction of masculinity. Therefore, in the light of the crisis of the "standard employment relationship" the construction of masculinity oriented at this model was also put under pressure. The discourses of self-tracking are relatively enlightening with regard to male subjectification after the crisis of the "standard employment relationship".

While Foucault's concept of subjectification is relatively gender-neutral, I understand subjectification according to Judith Butler as primarily being the performance of interpellations that are always gendered (Butler 2004, p. 41). Butler speaks of interpellations as the act in which a person is addressed with a specific identity, which always contains gender-aspects, even if gender is not its main content (as for example in "girl"). This process of interpellations depends on its continuous repetition. The subject stays subject only if it exposes itself to these interpellations and reacts by quoting and performing them. It is only this "reiterative and citational practice by which discourse produces the effects that it names" (Butler 1993, p. 2).

Even if first samples concerning gender relations within the quantified-self movement indicated a proportion of men of about 80 per cent (see, for example, Cornell 2010) it shall not be stated here that self-tracking only addresses men.[27] Instead, my point is that self-tracking discourses are male-dominated. For example, the technologies are generally advertised with images of male bodies in triumphant or martial postures. The omnipresent image of the mountaineer, that can be understood as a symbol of male autonomy and performance, is one example of this. Another is the hairy dirt-smeared arm that holds a medal towards the sky.

This is somewhat surprising if one takes into consideration that, for example, the diet log, which can be seen as one precursor to self-tracking, has a strong female connotation. But in contrast to self-tracking, the diet-log is hardly connected with images of autonomy and performance but rather with passivity (not eating).

27 An analysis of female regimes of subjectivation in self-tracking would also be interesting, but cannot be done here.

In this context the figure of the soldier also attracts attention. In Weightwatcher´s commercials the soldier explicitly appears to indicate the male qualities of the advertised technologies. But it is also implicitly interpellated in many other technologies with the omnipresent simulation of medals. This can be understood as a symbol of the connection of performance and toughness, but the interpellation of discipline and the willingness to fight also seem to play an important role. All in all, it can be concluded that the soldier and, perhaps even more so, the mountaineer are central images to the construction of masculinity in self-tracking.

Obviously the interpellations of the enterprising self are, at least in the discourse of self-tracking, connected with an underlying androcentrism. That means that a male discourse position is taken for granted without being named. Bröckling draws similar conclusions in his analysis of how-to self-management literature (2005). That indicates that androcentrism might be inherent to the interpellations of the entrepreneur of himself as such.

An interesting exception in which masculinity is explicitly debated is the *Weight Watchers* program "lose like a man". The explication of masculinity here can be attributed to the strong female connotation of diets. This condition must be discursively contested to make the corresponding technologies accessible for men without endangering their male identity.

In her new studies, Raewyn Connell argues that the masculinities oriented toward the model of the male breadwinner are replaced by a figure that she calls "transnational business masculinity" (Connell and Wood 2005). This model of subjectification is oriented toward the figure of the manager and is composed of ideals quite similar to those that constitute Bröckling's enterprising self: Economic rationality and increased ego centrism aligned with high efforts in polishing up ones reputation, decreasing loyalty towards a firm or a family, and liberal sexuality (Lengersdorf and Meuser 2010, p. 96). The interpellation of flexibility finds its radical expression in techniques such as "relationship tracking", where social contacts are transformed into numbers and manipulated or terminated according to present utility. "In effect, one's life is constituted as an enterprise" Connell and Wood conclude from their studies on business masculinity. "One's emotions also become assets of the enterprise" (Connell and Wood 2005, p. 355).

The economic relationship towards oneself and others, which is described by Connell and Wood as one of the central features of business-masculinity, can be recognized in the self-tracking discourse in a radical form. Almost every self-tracking technology includes some form of ranking. This relational character of self-optimization is reminiscent of what Bourdieu called the "games of domination" (Bourdieu 2001, pp. 75ff.) in which men constitute their masculinity through competition. However, self-tracking can certainly not be called a homo-

social space in which women are constricted to the role of the audience, as in Bourdieu´s games.

Traditionally, "rationality", especially economic rationality, plays a central role in the construction of masculinity (see, for example, Connell 1995, pp. 164ff.). The image of male rationality is closely tied to claim for objectivity as the non-situated, distanced standpoint. This objectivity in turn is put into the center of male identity—always in contrast to female non-objectivity or emotionality (Jones 2004). As we have seen, in the self-tracking discourse objectivity assumes a central role as well (as in the promise of a "*complete picture* of what it takes to maximize success" or the interpellation to "Know EXACTLY what is REALLY going on."[28]). Thus it might be concluded that "rationality" still plays a central role for the construction of masculinity in the self-tracking discourse. The economic aspects of this "rationality" might even have increased in importance, as many interpellations lean towards an accounting rationality.

All in all it seems appropriate to consider the techniques of subjectification described here in the context of broader processes of gendering and degendering (see Reckwitz 2010). Thus, an important aspect of the interpellations of the self-tracking discourse can be understood as reactions to the crisis of a construction of masculinity oriented towards the standard employment relationship. This reaction is composed of the partial perpetuation of the norms of the male breadwinner, such as rationality, performance and toughness, on the one hand, and the inclusion of new norms that previously had a rather female connotation, for example, emotional intelligence and self-realization, on the other hand. However, the aspects that used to have a more female connotation are not allowed to be used freely, but have to conform to rationalized ways and rely on repeated discursive reassurances of their compatibility with the norms of masculinity.

5 Conclusion

In order to answer the question on which implications the self-tracking discourse has for contemporary regimes of subjectification, I have extrapolated different interpellations of the discourse: Firstly, an economic rationality, expressed mainly in terms of accounting, that potentially extends to all areas of life. Secondly, an imperative of economized self-realization which discursively revalues different areas that were previously thought of as "female" and "non-economic", while remaining within the borders of economic rationality. Thereby it becomes possible to "be

28 http://www.timedoctor.com/. Accessed 21 July 2014.

oneself" and at the same time gain economic advantages. Thirdly, an imperative of performance in all areas of life, which is intimately connected with never-ending self-optimization and often accompanied by interpellations of discipline and flexibility towards people, institutions and norms.

These interpellations, which are partially contradictory, coincide for the most part with what Ulrich Bröckling called the enterprising self. The theorem thus proves to be useful for the analysis of self-tracking. However, it has also been shown that subjectification in the mode of the enterprising self has important preconditions, especially the implementation of a quantitative accounting rationality. Individuals can only become entrepreneurs of themselves if they have certain accounting data about their enterprise at their disposal. Thus, maybe one reason for the growing interest in self-tracking is that it helps to meet the omnipresent demands to become an enterprising self.

Another important aspect that has been under-theorized so far is the role that gender plays in the subjectification as an enterprising self. The interpellations of the enterprising self seem to have a special significance for contemporary constructions of masculinity. This is indicated by the androcentrism of the self-tracking discourse and by the fact that it interpellates ideals that have been identified by other studies as central aspects of contemporary constructions of masculinity (see, for example, Connell and Wood 2005).

I have argued that self-tracking technologies should be understood in the context of processes of gendering and degendering. "With the invention of technology man has successively emasculated himself", writes Walter Holstein, "[h]e has delegated strength, power, personality, authority, distinctiveness and pioneer spirit to ever more efficient devices and instruments." (quoted in Meuser 2001, p. 10, transl. S. S.) My analysis shows that, at least in self-tracking, the opposite is true: If we follow the self-tracking discourse for acquiring strength, power, personality, authority, distinctiveness and pioneer spirit, men are *dependent* on certain technologies and instruments. Self-Tracking not only supports these ideals, it demands them.

These interpellations are to be understood in the context of a crisis of the constructions of masculinity that are oriented mainly towards the standard employment relationship. They mix traditional norms of masculinity with the inclusion of new requirements. Borrowing from Bröckling´s enterprising self and Connell´s "transnational business masculinity" this set of norms can be understood as an *enterprising masculinity*. The interpellations of this enterprising masculinity can only develop their power in the acts of individual performance. With regard to that self-tracking technologies can be described as disciplining technologies that allow for a performance of enterprising masculinity in a broad sense.

At the current state of research, the question cannot be answered regarding the extent to which the interpellations extrapolated here are actually performed, and if they constitute a new dominant form of masculinity. However it is obvious that the interpellations of an enterprising masculinity are spread much further than the discourse of self-tracking. While self-tracking can be said to be a prosperity-phenomenon, Niels Spilker (2010), for example, has shown that quite similar interpellations can be found in job center discourses.

One consequence of these interpellations is a shift of responsibility for well-being from social security systems to the individual. This shift is intimately connected with technologies of self-quantification. In 1894, Carl Landolt, household researcher at the Swiss *Eidgenössisches Statistisches Amt*, wrote that through household accounting "it will then be seen whether or not they [the paupers] and the habits of their dependents themselves are to be blamed for the actual grievances" (quoted in Schmidt 2007 p. 234, transl. S. S.). This rhetoric can also be found in the suggestion of the British Health Ministry hat physicians should prescribe self-tracking apps to their patients "to allow them to monitor and manage their health more effectively." This, it concludes, "will give patients more choice, control and responsibility over their health"[29].

Social security thus is replaced by the imperative of economic self-realization with the aim to know and to master the self so as to be able to use it efficiently. This, as Bröckling remarks, cannot be reduced to an individual decision because "[i]f life becomes an economic function, disinvestment amounts to death." (Bröckling 2011, p. 264) Self-tracking can be understood as one of the interfaces where life is translated into such an economic function. Therefore it must not be analyzed as a curious individual practice but as an answer to the demands that contemporary neoliberal capitalism places on its subjects.

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29 https://www.gov.uk/government/news/gps-to-prescribe-apps-for-patients--2. Accessed 02 July 2014.

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Calorie Counting or Calorie Tracking

How Quantified Self Transforms Feminized Bodily Practices Into New Ways of Performing Masculinity

Corinna Schmechel

1 Introduction

Whether self-tracking, *lifelogging* and *Quantified Self* (*QS*) are discussed as emancipatory self-empowerment through one's own body, or as self-objectification, alienation and complete loss of the private, whether discussed in or outside of the community, there is one thing that everyone can agree on: *QS* is a male-dominated domain.

Statistics on comments in digital discussions and participation in *QS* meetups conclude that around 70-90% of participants are male (see e.g. Cornell 2010). But a closer look at the self-observation gadgets and apps users in question tells a more balanced story, if not one of female domination.[1] This does not come as a big surprise if one takes into consideration the traditional female gendering of observing one's own body, through weight control and menstrual cycle calendars, for example. Shouldn't contemporary digital self-tracking therefore be seen as the modern, masculinized form of that? Or to use the words of US sociologist Whitney Erin

1 For example, Florian Schumacher, the founder of *QS* Germany, states the following: http://www.srf.ch/wissen/digital/quantified-self-gesunder-trend-oder-grosse-gefahr. Accessed 05 Dec 2015.

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Boesel: *"Given all of this, who's probably self-tracking but not doing so as a part of Quantified Self?"* (Boesel 2013)

This essay will examine the differences between and similarities of self-tracking and *QS*, which are regarded as masculine, and the feminine forms of self-observation. How does manly dieting differ from female dieting? To which extent can *QS* be seen as a transformation of the gendering of body-focused self-technologies and to which extent does it reproduce dominant gender roles? Is an analysis which uses gender as a single-standing factor even capable of describing and explaining the reality of contemporary self-tracking?

Therefore the existing debates on gender in *QS* will be amplified with a more historical and interdependent perspective. The focus will be on weight loss and menstrual cycle tracking, as these are areas in which tracking was practiced long before *QS* and which have a strong female connotation. Boesel claims that *"the feminine gendering of 'dieting' and 'fertility tracking' plays a role (…) also in their seeming absence from Quantified Self* (…)."(Boesel 2013; see also Boyd 2012)

The word 'seeming' needs to be emphasized here because diet tracking actually is a substantial part of male-dominated *QS*. This is the exact issue which raises the question of the difference between "classic" calorie counting—which is regarded as feminine—and calorie tracking in *QS*.

The development of *QS* is to be seen as an ambivalent transformation process in which gender connections are used, adjusted, changed and reproduced at the same time. Masculinity and femininity, as a gender-binary in general, are products of a permanent process of social construction, they are not essential entities. These socially produced binary gender roles materialize in and through bodily self-technologies and the corresponding discourses on dieting, for example, as will be showed in the following.

2 "Be the man with the online plan"[2]—'Manly Dieting'

Boesel starts her post "The missing trackers" as follows:

> "Let's play a guessing game: How far do you have to read before you can guess what I'm describing?
> To begin, it's both an organization and a group of people. It's quite large; over a million people participate. They don't all participate together, though; rather, they

2 See: http://www.weightwatchers.com/men/

> meet up regularly in much smaller groups, in cities all over the world. Participants are almost all doing some kind of self-tracking, which usually includes things about their bodies, their activities, what they eat, and sometimes how they feel. When the smaller groups get together, meetings include both presentations and time for participants to get advice from each other about their self-tracking projects." (Boesel 2013)

To assume Boesel is talking about *QS* would not be incorrect. But what Boesel has described above is *Weight Watchers* (WW), the world's most renowned weight loss enterprise and dieting concept, which was founded in 1963. Boesel concludes: *"It would seem that Weight Watchers could make a good case for being 'the original self-tracking meet up group'(…)"* (ibid).

Besides the fact that the focus of WW is body weight control, an interesting difference between *QS* and WW is the social gendering: *"The typical Weight Watchers client is an upper-middle class women (sic) living in the suburbs."* (Leonard 2012)

A WW campaign titled "Lose like a Man", presented by the basketball player Charles Barkley in the US and by soccer star Oliver Kahn in the German version, demonstrated that dieting and watching one's figure generally dissents from the performance of hegemonic masculinity. The fact that it is emphatically articulated that men are the target group stresses how unusual the idea of the "dieting man" is. The traditional construction of a male gender role includes the aspect of paying the least possible amount of attention to one's own body. The image of the strong, confident and independent male subject is comprised of independence from aesthetic judgements of others, no fear of health problems and no need for medical advice or help (Scheele 2010, esp. pp. 95ff.; Bordo 2003, p. xxii). The German sociologist Sebastian Scheele sees this as an opposing image to that of the genuinely pathological female resulting from the traditional asymmetrical medicalization of the sexes (Scheele 2010, p. 64). He and others point out that a change is currently under way concerning the public discourses on health and body norms: men are going from an unmarked standard to an object of this normative discourse. But it would be an over-simplification to simply say that beauty norms and standards are now also putting men on display as well. With plain theses of expanding body norms, the specific of the manly type of bodily self-regime is neglected.

Practices such as dieting, tracking calorie intake and physical activity are considered to be "technologies of the self" in the Foucaultian sense, meaning they are ways in which people "*not only set themselves rules of conduct, but also seek to transform themselves, to change themselves in their singular being, and to make their life into an ouvre that carries certain aesthetical values and meets certain stylistic criteria*." (Foucault 1990, pp. 10ff.) Even though this has never been ex-

plicitly worked out by Foucault, gender does play a role in this process of subjectification through technologies of the self. The specific criteria through which the ethical self creates itself are defined by the respective social position the individual holds. Contrary to traditional androcentristic rhetoric in (social) science, there is no such thing as *the* self, but rather certain (gendered) subjects are created through certain (gendered) technologies. Counting calories does not (only) create just any figure-conscious subject with increased health awareness, but most likely a (*white*[3] and middle-class) female subject[4].

To bridge the gap between traditional concepts of masculinity and dieting, WW developed an explicitly manly way of dieting by presenting features of their program as especially important for males, although they are essential for every user. Modern technology use, digital tracking and measuring, purposefulness and predictability are the emphasized features in the campaign directed towards men. This is exemplified in the sub-slogan "Be the man with the online plan" and a campaign in which an army-officer tells the audience that he also used to think WW was "just for the ladies" before he discovered all the great features of the WW concept. He lists all the elements of digital tracking, planning and calculating as guarantees of weight loss success, while other elements of the WW concept, such as group meetings, are not even mentioned in the manly dieting campaign. Here, calorie counting is translated into a masculine technology, of showing one's discipline and ambition. Techniques of digital self-tracking provide a way of transforming the feminine practice of dieting into a masculine one. It enables men to count their calories without breaking with Gayle Rubin's "sameness taboo" (Rubin 1997, p. 39), which states that men's and women's activities always have to be distinguishable, by transforming it into the masculine activity of calorie tracking.

3 I have written this in italics to emphasize the fact that *white* or *fat* are socially constructed categories and to avoid them being understood as entities. I additionally capitalize the word *Black* to empathize the character of a political identity.

4 Susan Bordo shows this in her convincing analysis of an advertisement for low-carb bread. See Bordo 2003, p. 114.

3 "Self-tracking tools are a 'guy thing'."[5]—the Gender of Self-Tracking

As mentioned above, participants as well as observers of the *QS* movement agree that there is a male majority within the movement. One explanation for this, which is also very consensual, is the strong association with modern technology, electronics and scientific knowledge. When asked in an online discussion about the absence of women in *QS*, even women used this argument. One example is the following:

> "Speaking as a woman, and not a young one, I can say that a lack of science education has kept me out of all kinds of discussion, reading and thinking in science. I'm a huge quantifying and tracking geek. I love spreadsheets, charts, and technological tools. I have an Android phone and I use it. When I discovered that there's such a thing as self-quantifying (very recently), I was completely galvanized by it, and by all that it can do for me.
> But when I started an experiment on your Edison site, I immediately ran into problems with my internal dialog: do I really understand what an experiment is? Is my purely female experiment subject (tracking hot flashes) too girly for this place? Am I really able to apply some kindergarten version of the scientific method to my daily and personal concerns? (…) and so on."[6]

But aside from the clearly expressed "lack of science education", there are other elements to find: "*Is my purely female experiment subject (tracking hot flashes) too girly for this place?"* Taking into consideration all the topics which are tracked and presented in *QS*, one might think that there is hardly anything in the world that would be too trivial for a *QS* experiment. But at the same time, the traditional androcentrism of (medical) science is at work here. It sets the male body as the unmarked norm and marks phenomena as special if they don't apply to it. This can be observed in the following experience of a female app business founder:

> "Recently, I had a phone call with an editor here in Berlin about why he should write about my company's cycle-tracking app, Clue. Yes, I'm a little biased, but I thought we had a strong pitch: we were the No. 1 app in Germany in the Health & Fitness category, have been covered in major publications and have just raised a half-million euro round from prominent investors in both Europe and the US.

5 http://quantifiedself.com/2010/12/is-there-a-self-experimentation-gender-gap/. Accessed 05 Dec 2015.

6 http://quantifiedself.com/2010/12/is-there-a-self-experimentation-gender-gap/. Accessed 05 Dec 2015.

> His response was, 'Why should I cover a niche app?'
> That's right: an app targeted at women—51 percent of the world's population—is still considered 'niche' by the tech world and the media."(Tin 2014)

Along the same lines as Boesel, the author of this post argues that the *QS* movement might be male-dominated, but that self-tracking should be regarded as a traditionally female domain: "*The other is that fertility tracking is not a new habit, but one that goes back literally thousands of years. Women have always tracked their cycles—with pen and paper, with calendars, and now with technological tools."* (ibid.)

As seen with manly dieting, it is the connection with modern technology and the emphasis on scientificity and rationality that make self-observation a male activity.

4. "…too damn busy…"—Self-Tracking in relation to financial resources and available time

In addition to these more or less cultural reasons, there are also more material reasons for the male majority in the *QS* movement, which can be observed in the following post made by a woman in a debate on gender relationships in *QS*:

> "Also, frankly, I'm just too damn busy to measure almost anything regularly except my bank balance, which is calculated for me. Like most women, I'm on a triple shift life plan. I work, I write, I keep a house and raise a big family, I eat mostly vegan and practice yoga every day, contribute in the community, and do it on generally less money than the guys. Plus I am culturally obligated to a time consuming grooming standard. So, no, I don't have time for gadgets and measurement."[7]

First of all, there is the reference to a "time consuming grooming standard" as a latent link to the argument that practices of self-tracking apart from *QS* are a basic element of the majority of women's lifestyles in western societies. The author does not mention what she regards as her grooming standard, but one might assume that watching one's weight and figure, for example, is part of it.

But what is even more interesting is her reference to the time management and financial resources necessary to participate in *QS*. Resources are still unequal-

7 http://quantifiedself.com/2010/12/is-there-a-self-experimentation-gender-gap/. Accessed 05 Dec 2015.

ly distributed amongst the sexes. We do have a gender pay gap and women still hold significantly more responsibilities when it comes to reproductive work in the private sphere, in raising kids and housekeeping. To participate in *QS* requires a certain amount of time and energy, focused simply and egocentrically on oneself. This is something which contrasts sharply to the requirement of the traditional female gender role.

Moreover, this should remind us of the fact that gender can never be separated from other elements of social positioning, such as class or rank. The author of the cited post says: *"I eat mostly vegan and practice yoga every day, contribute in the community,(…)"*

Taking into consideration what has been found out about the dependence of lifestyle and economic status, mainly by the French sociologist Pierre Bourdieu in his well-known work: "Distinction: A Social Critique of the Judgment of Taste", one must suggest that the author is an (upper) middle-class woman. She therefore suffers from unequal distribution of resources within her status group, but at the same time has access to *QS* chats and her post shows that she participates, at least to a certain degree, and has tried self-tracking.

But the recognition of the habitual and material resources which are necessary for an intense participation in *QS* raises the question on whether or not it is enough to call the movement male-dominated. Accordingly, one has to ask which kind of men participate here and how high or low the proportion of working and lower class men is involved in the movement. This has yet to be discussed. In his study, even Bourdieu often stressed how a lifestyle concerning self-reflection, self-optimizing efforts and self-care are constitutive for the upper middle classes. This is connected to a longer tradition in the history of self-tracking, as we will see in the following.

5 "Everything that needed to be measured…"—the History of Self-Tracking[8]

The phenomenon of self-tracking is very modern on the one hand but anything but new on the other. Michel Foucault summarizes the essence of ancient dietetics as "*everything that needed to be measured*" (Foucault 1990, p. 101). He points out that the entity of dietetics was to create a reflexive relation to the self and to

8 This sub-chapter is based on my unpublished master thesis "*Dietary Crimes—a Genealogy of the Problematization of Dietary Practices and their Gendering"*, handed in at the Humboldt University of Berlin in August 2010.

observe and measure that self in all its elements: "*At all times, and encompassing all of a man's activities, regimen problematized the relation to the body and developed a way of living whose forms, options and variables were determined by a concern with the body.*" (ibid, p. 102)

So it seems that what is known today as self-tracking or *lifelogging* is merely the modern form of the Caring Self arising from the development of technical standards and social and political configurations—in keywords biopolitical governementality. Furthermore, this seems to be a predominantly male activity just as it was in the past, which is very interesting.

The ethical self of the *Ancien Regime* was a free male. Women, slaves and poor people did not have the resource of subjectification through aesthetical body-focused self-creation. These practices functioned as a mode of (re)production of the privileged social status. To which extent this can be seen as analog to today's practices of self-tracking will be discussed later.

It is therefore worthwhile to take a look at one more precursor to the *QS* movement, which is the discourse on hygiene at the beginning of the 20th century. At that time, this included an explicit reference to the ancient dietetics, which was connected with Enlightenment's ideas of self-responsibility and the power to form one's own living.[9] What currently circulates under the slogan of "knowledge through numbers" was at the time a basic element of hygiene, as one of the tools to ensure the independence of the rational mind through experimenting with the individual body in order to find the optimized rational way of living.

Self-care and one's own body was thereby mainly a characteristic "self-technology" of the bourgeoisie. Self-observation and personal hygiene was the way to create an identity of one's own aesthetics and values, which at the same time functioned as a mode of separation from what was constructed as "primitive", "uncivilized" or "wild" and at the same time transformed the individual lifestyle into a rationality which made it compatible for the new capitalist system (Sarasin 2001, p. 22). In combination with the advancement of natural (human) sciences and capitalism, the idea of the body as a machine and economic factor was born. The individual body became something one possessed and therefore had to care for, calculate with and whose well-being had to be cared for. The bourgeois class did so not because they were forced to, but because it was part of their identity. Dietetic regimes, may it be in the antiquity, in the hygiene movement or today's appeals of public health and fitness culture are always forms of ethical self-government. The self-governing of the body is where strategies of power and technologies of the self interlace. Similarly to the dietetics of the *Ancien Regime*, the self-government

9 Philip Sarasin (2001) gives a detailed analysis in his work.

of the individual body functioned to (re)produce, represent and defend a position of social privilege. However, a difference can be found in the very way this body was seen. In ancient dietetics, the actual goal was the government of the soul. This was symbolized by the body, but the body was not the final target of the practices that were carried out.

On the contrary, in modernity, a new form of Alimentary Ethics (Finn 2009) has developed in which the leading ideal is the very body and its concrete physical appearance.

With the establishment of a national state system and modern (human) science, the social appearance of the body is transformed from a pure symbol to a concrete calculable entity of individual conduct and statistical biopolitics[10]. In ancient times bodies could be distinguished as big or small, skinny, plump or athletic and could be more or less compared to each other. In modern times however, each body can be referred to in relation to a norm, which can be precisely calculated on the basis of different indexes, such as the BMI, and can therefore be defined and individualized as abnormal. And it is not only the "result" of behavior that is transformed into a system of numeric relations; behavior itself is becoming increasingly scientifically quantified. Nutritional sciences, which were very ambivalent in its impact, is exemplary of this. With the "discovery" of the kilocalorie and the metabolism, people gained more power over their physical appearance and nutritional science was one of the first professional fields dominated by women. But similarly, newly produced knowledge, armed with the legitimacy of scientific truth, has created a whole set of new norms and appeals to the individual and the organization of their everyday lives. This primarily addressed females, who carry the responsibility for the whole family's health according to gendered labor division, which was accompanied by the capitalist division of public and private work. Abigail Bray describes:*"The private sphere of the kitchen/dining room was transformed into a quasi-chemical laboratory, where middle-class women juggled with various kinds of scientifically coded food or fuel in order to produce meals which would ensure the normalisation of their families' body weight and health."* (Bray 2005, p. 127) They did so on the basis of a booming new handbook market, among other things, such as the first best-selling weight loss and dieting book "Diet & Health: With Key to the Calories", published in 1918 by Lulu Hunt Peters, who said: *"Instead of saying one slice of bread, or a piece of pie, you will say 100 calories of bread, 350 calories of pie."* (quoted in Bray 2005, p. 127) This, combined with the increase of handbooks with health advice at the beginning of the 20th century, personal scales conquered everyday spaces in western societies. They appeared in medical offices,

10 About the term and concept of biopolitics see e.g. Foucault 1990, Chapter V.

public places such as train stations and swimming pools and private households. One can observe the impact of the scientificity of life and the body regarding the topic of dieting: *"The impact of the seemingly innocent and trivial calorie, (…) recodifies consumption and body weight to the extent that every single calorie is calculated in the act of consumption just as every single pound lost or gained is measured."* (ibid, p. 128)

5.1 … became female

Here we come back to the dimension of gender within the field of self-tracking. Indeed, the diet culture Bray describes here is no longer a field of self-production for the privileged free man. Instead, it has become an essential part of women's everyday experiences. The permanent observation of one's own body was transformed from a bourgeois self-technology to a female one, crossing the boundaries of social distinction between women. *"New too is the spread of this discipline to all classes of women and its deployment throughout the life cycle. What was formerly the speciality of the aristocrat or courtesan is now the routine obligation of every woman, be she a grandmother or a barely pubescent girl."* (Bartky 1988, p. 42)

That does not mean that male subjectification did not happen through bodily technologies of the self, but what used to be voluntary ethics of aesthetical behavior for them has transformed into a set of norms, rules and appeals for modern women. Here one has to consider the role the body plays for female subjects. Since the Enlightenment, women have gained increasing formal equal rights through ongoing political struggles. But their real power and resources were, and sometimes still are, very limited and dependent on men in their roles of husbands or fathers. One's own body has continued to be one of the only areas over which the female subject has concrete power.

Moreover, Susan Bordo and Sandra Bartky, for example, have worked out that the strengthening of women's emancipation on the political level correlated with an intensification of beauty norms regarding the female body (Bordo 2003, p. 166; Bartky 1988, p. 35). The more public spaces women occupied, the less space their body was supposed to take up physically. *"The processes created a need to state new criteria that would clarify that women still were not men and still were not equal. The notion that they had a special weight problem was an obvious gender-defining substitute." (*Peter Stearns, quoted in Gesing 2006, p. 212)

Therefore, parallel to females continuously finding more ways to control their lives and their political surroundings, (self-)control over their bodies became increasingly relevant for them.

A good example for processes of gendering self-tracking techniques is the history of the menstrual cycle calendar. Long before it became a tracking app on our smartphones, it was established as an everyday tool in the 1920s, around the same time that daily weight monitoring and calculating calorie intake became popular. The idea of tracking and observing one's menstrual cycle and putting it in a regular and calculable framework was not promoted by people with a menstrual cycle, but rather by the growing medical practice of gynecology, which at that time was practiced strictly by men. At the time, menstruation appeared to be one of the last phenomena which had not yet been completely explored on the basis of scientific rationality and therefore can also be seen as a metaphor for femininity in general, as the menstrual cycle was regarded as unpredictable, unsteady and therefore genuinely pathological (Schlünder 2005, p. 158).

Similar to today's *QS* experiments but under much more misogynistic parameters, diverse elements such as body weight, mood, motor skills and sexual desire were tracked in relation to the menstrual cycle in order to find causal relations. But this could not have been called self-tracking, as the first menstruation calendars were not tracked by the menstruating women, but by the doctors who had to trust the accuracy of the information their patients provided (ibid., p. 158). Therefore, in the early 1930s, the medical institution started to call on women to independently track their cycles, as it was obvious that this would bring better results (ibid., p. 176). What nowadays might be considered "too girly" to be of any interest was of great concern at the time. The attention that was paid to the female body and its functions can be understood within historical contexts which led to the construction of the female body as the "other" from the standpoint of the male standard, making it the primary object of medical curiosity. Therefore, although the subject doing the tracking in everyday life was the female, the actual subject behind the scenes of the self-tracking were medical and similar institutions, and, therefore, male

The use of the menstrual calendar as part of a female's everyday routine was advertised as a way to gain more insight into one's own personal fertility patterns and general health. This practice can be seen as one of the precursors to self-tracking. On the one hand, it shared the same ambivalence of being a practice that would contribute to more self-awareness about personal bodily functions and more possibilities to control/monitor these and related factors. On the other hand, it was also a practice that was the result of disciplinary power, as its implementation was controlled by doctors, teachers and advisers. Moreover, the idea of controlling/monitoring the processes of fertilization was not actually an emancipatory interest, but rather a biopolitical task. The propagation of the use of menstrual calendars as everyday routines of *white* privileged women occurred around the time that eugen-

ic ideas and policies were disseminated. The "knowledge through numbers" that was gained on infertile menstrual cycle phases was to be used for the conscious procreation of politically "required" politically desirable offspring (ibid., p. 180). For this "scientific management of fertilization" (ibid., p. 181), SS men were even officially granted leave during WWII if it could be medically attested that he and his wife were likely to beget a child during that time (ibid., p. 185). Here, a further aspect comparable to the modern reality of self-tracking in *QS* and Big Data is the shifting of boundaries of privacy, as the calendars and the will to have sexual relations on specific days had to be submitted to the responsible offices to be granted leave. This unequivocally shows the indivisible link of self-observing technologies with strategies of power.

6 Conclusion

As we have seen, the more or less scrupulous objectification and observation of one's bodily phenomena are not new practices per se. Ancient dietetics and bourgeois hygiene claimed the supervision and monitoring of the elements of life as a technology of the ethical self. Through the objectification and rationalization of one's own body, ancient dietetics realized ideals of self-restraint, discipline and the pursuit of optimization. However, these were privileged self-technologies which created lines of distinction between the "uncivilized" and represented (economic) freedom and the power to autonomously shape one's own life.

The paradigms of civil hygiene—self-responsibility through rational behavior—were based on the Enlightenment and made references to the *Ancien Regime*. By doing so, inherent androcentric biases were adapted and made self-observation a male practice of self-creation. With the establishment of modern (human) science and the construction of biological legitimacies for patriarchal structures, the female body became the "other" and the "deficient". Therefore it needed to be supervised and controlled by menstrual cycle tracking or concepts of dieting, for example. But modes of gendering are always contextual and therefore shift over the course of history. One can see this, for example, in the profession of the secretary. This used to be a "male profession", requiring virtues such as reliability, rationality, organizational talent and representational skills. But this picture transformed due to changes on the job market to the modern, feminized image of a low-skilled occupation.

Such a shift might also be seen in the gender connotations of self-observation. What used to be a masculine technique for status reproduction and representation came to be a feminized metaphor for submission under social pressures and

norms, and now seems to have once again become masculinized. The context of that shift is the establishment of governmental biopolitics, which made self discipline for self-enhancement the main field of governance. The freedom and power of aesthetic self-creation is no longer a privilege, but rather part of a culture in which self-care is everyone's duty.

QS-related self-tracking combines the traditional masculine picture of the body as a machine with the requirements of a neo-liberal social system. Now the male body is also the focus of political and cultural standards of health and appearance. But to simply see this as an expansion of the same mode of submission would be rash because there are relevant differences in the ways this submission is carried out and framed. Traditional dieting for weight loss has a clearly feminine connotation and is associated with passive submission under external norms and demands. This is why *Weight Watchers* had to create a concept of "manly dieting", which consists of actively monitoring the body with technically supported rationality. A main element of self-tracking within the *QS* culture is one's status as a responsible subject. *QS* provides a modality to introduce feminized practices into the repertoire of male subjectification and gender performance without breaking Gayle Rubin's "sameness taboo". While self-observation transformed into a general appeal for (self-)responsibility, *QS* shifts gendering boundaries and has established a masculine way of self-care which is associated with ancient dietetics through elements of masculinized features such as "scientific objectivity" and modern electronics.

But this also leads us back to the question of more factors than just an isolated version of gender. The interdependency of gender must be taken into consideration in order to see the complex reality of modes of subjectification through self-tracking. There are no such entities as the one and only masculinity or femininity. Rather gender is always created depending on the concrete social context. The culture of self-care is also not structured in a simple binary gendered way. In fact, one has to take social positions within economic, racial and ableist structures into account, among others. The neoliberal imperative of taking full responsibility of one's health and appearance might indeed be a general one, but there are very diverse possibilities that can be taken advantage of in order to fulfill these ideals. Self-tracking as proclaimed in *QS* is clearly to be seen as closely related to class or rank, due to financial and habitual reasons, just as its pioneering modes of ancient or civil self-observation were. Moreover, the field of modern self-tracking provided great potential for critical perspectives on *disability studies,* as it is also shifting boundaries of medical tools and knowledge in everyday life. The studies on self-tracking and *QS* should take a detailed look at the subject of its field, as an interdependent analysis might be very helpful in finding out more about the diverse meanings and modes of actual body culture in general.

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Self-Tracking as Knowledge Production: Quantified Self between Prosumption and Citizen Science

Nils B. Heyen

Quantified Self is the name of a rapidly growing international movement of people mainly united by one thing: an interest in collecting data about their own bodies or lives in order to obtain insights into their everyday health or performance. For this so-called self-tracking, the movement's followers predominantly use smartphone apps but also other appliances such as activity and sleep sensors, scales or devices to measure blood pressure or blood sugar levels. The data that are generated at least once a day are automatically analyzed, plotted and evaluated using the relevant statistics and graphics software. Often, they are uploaded to web platforms where they can be shared with other users, talked about and discussed with regard to the possible consequences for the person's own (health-related) daily behavior. Web 2.0 here enables not only a high degree of networking, but also a low-threshold exchange of data and analysis results.

The movement was founded in the USA in 2007 (Wolf 2011), but it took until 2011 for the first followers in Germany to join in. A year later, the German mass media already featured articles on the self-trackers for the first time with headlines such as "The body inspectors are coming" (Laaff 2012) or "Your mobile phone as your doctor" (Rauner 2012). Since then, almost every newspaper, journal or magazine has written something on the topic of Quantified Self. Correspondingly, it is increasingly conquering scientific discourse. However, this mainly concerns the international, more technology-based or medically-oriented discussions of Medicine 2.0, Health 2.0 and Big Data (see, e.g., Hughes et al. 2008; Swan 2009, 2012a,

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2013; Marcengo and Rapp 2013). The genuinely social-scientific debate is lagging behind in comparison, even though it has increased in recent years. First studies view the Quantified Self as a *cultural* phenomenon: They tend to focus on aspects of body measurement and optimization and ask questions about the meaning and consequences this has for body image, self-image and society (see, for instance, Lupton 2013a; Rettberg 2014; Selke 2014).

In contrast, this paper explicitly approaches the topic from a *sociology of knowledge* perspective: Although the movement's slogan "self knowledge through numbers"[1] conspicuously highlights knowledge, it remains unclear what type of knowledge is actually being acquired here, how this knowledge production is to be characterized and how it relates to science.[2] This paper argues that the knowledge production of self-trackers can be positioned in-between prosumption, on the one hand, and citizen science on the other. Correspondingly, the focus is on the prosumption—a neologism of production and consumption—of knowledge to start with and then on the relationship of self-tracking and citizen science as well as science in general. Finally, a short summary of the arguments made is given and open research questions are formulated.

1 Knowledge production for self-use: the self-tracker as prosumer

The term prosumption or prosumers was essentially coined by the futurist Alvin Toffler in his book "The Third Wave", which was published in 1980 (Toffler 1980). Therein, Toffler describes how the production of goods up to the industrial revolution was predominantly done for self-supply ("production for self-use"), but how this was then increasingly oriented at a mass market ("production for exchange"), so that for the first time the role of producer became separated from the role of consumer (cf. Hellmann 2010, pp. 14ff.). This separation would only start to be reversed again towards the end of the 20th century in the wake of a third wave, which is why Toffler speaks about the (re-)emergence of the prosumer. "[W]hether we look at self-help movements, do-it-yourself trends, or new production technologies, we find the same shift toward a much closer involvement of the consumer in

1 See the movement's main website: http://quantifiedself.com/. Accessed 10 Nov 2014.

2 These and other questions form the focus of an ongoing research project funded by the German Federal Ministry of Education and Research (BMBF), which is the basis for this paper (see Brüninghaus and Heyen 2014 and http://www.wissenstransfer2punkt0.de/. Accessed 10 Nov 2014).

production" (Toffler 1980, p. 275). Even if the term is not clearly defined by Toffler (cf. Hellmann 2010, p. 25), the focus is on production for self-use. To put it simply: "The moment someone produces something for him/herself, he/she is acting as a prosumer" (ibid., p. 22; author's own translation).

For a long time, Toffler's considerations were given a lukewarm reception, but this has changed, especially since the appearance of Web 2.0 and social software (cf. Hellmann 2010; Blättel-Mink and Hellmann 2010). Furthermore, with regard to this "participatory internet" (cf. Gscheidle and Fisch 2007), the economic reference of prosumption that is characteristic for Toffler's thinking becomes less relevant because here, it is about data, information, experience and knowledge and no longer just about products and services in a narrower sense. Axel Bruns (2008) examined numerous forms of this "user-led content creation" (ibid., p. 2)—such as open source software, blogs and Wikipedia—and came up with the related concept of "produsage", which was also inspired by Toffler:

> "The concept of *produsage* [...] highlights that within the communities which engage in the collaborative creation and extension of information and knowledge [...], the role of 'consumer' and even that of 'end user' have long disappeared, and the distinctions between producers and users of content have faded into comparative insignificance. In many of the spaces we encounter here, users are always already necessarily also producers of the shared knowledge base, [...] they have become a new, hybrid, *produser*." (ibid.; emphasis in the original)

Regardless of whether the term prosumer or produser is preferred, what these two concepts have in common is that they both refer to a comparatively new, hybrid social figure which combines the activities of producing and using a good. And it is precisely this that also applies to the self-tracker of the Quantified Self movement. For example, a self-tracker who measures his blood pressure several times a day produces a large amount of data encoded in figures that is used by himself as he processes and analyzes the data with the help of software. In doing so, the self-tracker again produces information, for instance, on which days his blood pressure reaches a critical level and, ultimately, knowledge, such as the insight that blood pressure usually rises over the course of a working week.[3] He might then use this information or this knowledge to consult a doctor, adjust his behavior directly or to simply feel pleased by what he observes. In other words, self-trackers no longer consume (only) generally accessible knowledge or that compiled by others, such as general recommendations for healthy living, but (also) produce their own knowledge, whether about the change in certain measured values over time (e.g.,

3 For the distinction between data, information and knowledge, see Willke 1998, pp. 7ff.

blood pressure, weight, activity) or about the correlation of different variables (e.g., blood pressure and work load, activity and sleep). They themselves are the primary users of this knowledge.[4]

Understanding the self-tracker as a prosumer or produser emphasizes the fact that, within the Quantified Self movement, something is not just being quantified and optimized, but also actually produced, namely knowledge (and data). In addition, it draws attention to two points that are also relevant for the following considerations. First, it is remarkable that this knowledge production is being performed by people normally deemed laypersons, i.e., who are not considered to have any specific expertise to start with, certainly not scientific expertise (cf. Hitzler 1994). However, at second glance, this dividing line blurs because the question immediately arises on whether the self-trackers are actually developing a specific form of expertise during the process of producing this knowledge (cf. Brüninghaus and Heyen 2014). At the same time, the field of view widens to include other areas in which laypersons are also involved in the process of knowledge production. Alongside the above mentioned "collaborative content creation spaces and communities" (Bruns 2008, p. 24) of the internet, these mainly concern phenomena that are increasingly being described as citizen science. Second, it also becomes clear that the knowledge production of self-trackers is primarily for their own requirements, i.e., the self-produced knowledge is intended for *personal* applications and use.

2 Quantified Self and science: the self-tracker as researcher

That knowledge production for self-use can be considered something special will be shown in the following sections when referring to citizen science and science in general as a template.

4 That other stakeholders, especially commercial enterprises and insurance companies could be or are interested in utilizing this knowledge, or at least the data produced, is another matter and raises the generally fully unresolved problem of data protection and privacy (cf. Karaboga et al. 2015).

2.1 Citizen science

What is usually subsumed under the term citizen science are research activities in which the people involved are not professional scientists. However, so far, there is no widely accepted definition (cf. European Commission 2013, p. 21), which is probably also due to the fact that the degree of involvement varies strongly depending on the approach, namely

> "from active participation in hypothesis-led science through to passive movement of sensors; from addressing highly-focussed questions to educational exercises generating data of little scientific value; from using people as data collectors to participants forming the projects, assessing the data and using the information themselves." (Roy et al. 2012, p. 10)

Even though the roots of citizen science as described above extend far back in human history, at least to the very beginnings of modern science (cf., e.g., Finke 2014, pp. 25ff.; Silvertown 2009), and despite citizen science repeatedly playing a role in past centuries (cf., e.g., Miller-Rushing et al. 2012; Mahr 2014), it is still often treated as though it were a recent phenomenon of the early 21st century. This is not an entirely incorrect assumption to the extent that, again due to the internet and Web 2.0, the potential number of participants and the resulting amount of data able to be processed has now reached a new dimension. Accordingly, citizen science is currently being discussed especially in those research fields where huge amounts of data are involved, such as astronomy, geography, the environment and biodiversity (see Xue 2014 for prominent examples).

The geographer Muki Haklay (2013), one of the proponents of citizen science, has suggested a typology that distinguishes four stages of participation and engagement in citizen science projects (see Figure 1). At the first level of "crowdsourcing", citizens primarily provide the computing power of their own private computers for research purposes (e.g., "Rosetta@home")[5] or, equipped with a technical device, collect data more or less automatically (e.g., GPS data) that are later analyzed by professional scientists. Their cognitive abilities are only required at the second level of "distributed intelligence"; after a certain kind of training they are assigned a specific task, for instance, interpreting and classifying data according to specific criteria (e.g., "Galaxy Zoo")[6]. At the third level of "participatory science", citizens are already involved in formulating the

5 See http://boinc.bakerlab.org/rosetta/. Accessed 14 Nov 2014.

6 See http://www.galaxyzoo.org/. Accessed 14 Nov 2014.

research question or problem, or even do this themselves, and also participate in data collection, but leave its final assessment to professional scientists (e.g., "Grassroots Bioblitz")[7]. At the fourth level of "extreme citizen science", citizens and professional scientists work together on all phases of the research process including data analysis; or the project is even exclusively planned and carried out by citizens without any professional scientists being involved, although the dividing line here is often blurred because professional scientists can of course engage voluntarily in citizen science projects (e.g., "Riverfly Partnership")[8]. It is important to emphasize that, according to Haklay (ibid., p. 117), a citizen science project should usually not be assigned to one single level alone because the citizens engaged in a project can vary in their degree of participation. Accordingly, the examples shown in parentheses are to be understood as rough illustrations only.[9]

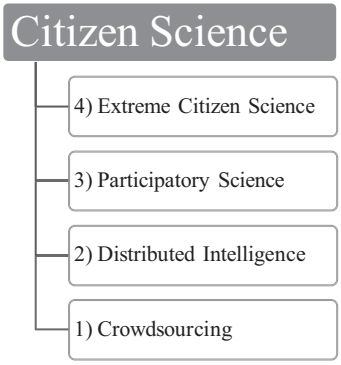

Fig. 1 Typology of citizen science projects
Source: Haklay 2013.

Also Peter Finke (2014), a philosopher of science and one of the proponents of citizen science in Germany, points out that citizen science can assume very different forms and refers to the two poles of the spectrum as "citizen science light" and

7 See http://nerdsfornature.org/bioblitz/. Accessed 14 Nov 2014.

8 See http://www.riverflies.org/. Accessed 14 Nov 2014.

9 Roy et al. (2012) make a similar categorization following Bonney et al. (2009): They distinguish between "contributory", "collaborative", "co-created" and those citizen science projects that are managed without the involvement of professional scientists at all.

"citizen science proper" (cf. ibid., pp. 41ff.). The former denotes a kind of science that is ultimately not independent; citizen science appears here more as a specific method of "professional science" (cf. ibid., pp. 13f.). "Citizen science proper", in contrast, refers to an autonomous form of science that is ultimately independent of "professional science". Finke would probably only include Haklay's fourth level of "extreme citizen science" here and perhaps "participatory science" with some restrictions. "Distributed intelligence" and "crowdsourcing", in contrast, are clearly forms of "citizen science light" from his perspective.

2.2 Self-tracking and citizen science

Now, how can the knowledge and data producing activities of self-trackers be classified with regard to the very different forms of citizen science discussed above? To be able to answer this question, it is essential to also distinguish between different types of self-tracking activities. Inspired by Haklay (2013), the typology presented below also differentiates four levels of engagement in self-tracking (see Figure 2). Again, it must be stressed that in the majority of cases the self-tracker as a person can probably not be allocated to one level alone, but only his individual tracking activities that are likely to differ considerably from each other; the typology is directed only at these activities.

Fig. 2 Typology of self-tracking activities
Source: The author's own illustration.

The first level ("*no concrete goals*") includes those self-tracking activities that are conducted in a largely unplanned manner and without a specific intention or objective—to some extent "just for fun". As the co-founder of the Quantified Self movement, Gary Wolf (2010), states: "For many self-trackers, the goal is unknown." For these people, the initial primary motivations are curiosity or entertainment, thus the "pleasure bringing aspects of self-tracking" (Nißen 2013, p. 67). When measuring moods or sex (cf. Rettberg 2014, pp. 72f.), for example, concrete goals or optimization plans are presumably rarely involved. Nevertheless, this still includes the production of data and knowledge for self-use (see section 1). Self-tracking conducted in the context of a scientific study also counts as the first level if the self-tracker acts primarily as a test person and does not have any explicit self-interest in the data collected. This could be a classic clinical trial (e.g., for diabetes research), but also so-called crowdsourced health research studies, initiated and conducted via health social networks like *PatientsLikeMe* or *CureTogether* (see Swan 2012b). These networks offer their members possibilities for self-tracking and even access to clinical trials (cf. Swan 2009). The scientific studies themselves, of course, are aimed at specific goals; thus, the expression "no concrete goals" refers exclusively to the self-tracker's own personal goals.

Such personal goals are present at the second level ("*monitoring & optimization*"). Self-tracking here is done either to monitor specific, mostly biometric data at regular intervals or explicitly with the desire to improve performance. Healthcare-related self-monitoring, which is becoming increasingly significant, is an example of the first case (see Lupton 2013b), for instance, someone who checks his blood pressure at least once a day after having suffered a stroke in order to know when to consult a doctor if the results are beyond a normal range. Many members or patients in the health social networks mentioned above conduct this kind of monitoring for a large number of symptoms (see Swan 2009). All the many kinds of wanting to optimize everyday behavior belong to the second case, not least the now common practice among sports enthusiasts of measuring running distances, times and calories burned in order to be able to monitor any progress more accurately. In both cases, self-tracking fulfills a specific function; pure knowledge objectives are not the focus, in contrast to the next level.

At the third level ("*research*"), self-tracking activities take on the form of small research projects. The goal is knowledge acquisition to start with, from which conclusions for daily life can then be drawn. Correspondingly, this usually concerns possible correlations of various parameters or variables, for example the influence of certain foods or substances on sleep quality, the correlation of sleep quality and productivity or that of productivity and mood or contentment,

among many others. In principle, there are two possible approaches here: a hypothesis-based one and one along Big Data lines. The former formulates explicit and ex ante suppositions about the correlation regarded and designs the study accordingly. To give a completely random example: In one case, a self-tracker puts forward different hypotheses for his "experiment" as he himself calls it, including "if my calorie intake goes up, so does my weight" and "if I cycle more, my weight will decrease". The analysis of the self-tracking data he collected over a period of three months finally produces the results that the first assumption is (surprisingly) incorrect and the second is correct, and he goes on to further specify the type of correlations.[10] Of course, the study can be designed to be even more similar to a classic experiment by deliberately altering a specific factor and then observing what impacts this has on a dependent variable (see Roberts 2004). The second of the two possible approaches, in contrast, starts from a certain data pool and then looks for correlations, in other words, asks non-specifically whether variable A is somehow linked to variable B. An equally random example for this approach is the case of a self-tracker who measured his physical activity, blood pressure and weight, among other things, every day for two years and then analyzed these data without making any concrete assumptions beforehand, just with a general interest in discovering correlations (epistemic goal) and depicting them visually.[11]

Finally, at the fourth level ("*research & development*"), the self-tracking aimed for reaches its technical or methodological limits to the extent that, according to the self-tracker, there are no (satisfactory) apps, software or even measurement devices available to address the pertinent research question. If the research question or general knowledge objective is to be pursued, the self-tracker has to create the technical or methodological requirements himself, for example by developing the relevant app. Obviously, this process cannot take place without the developer's own self-tracking activity, because data are needed to test the different versions and to further develop them. Take the example of a self-tracker interested in measuring his "cognitive performance" at different times of the day and night.[12] To do this, he has programmed an app that sets the user small tasks and measures both the time needed to solve them and whether they are solved correctly. The self-tracker

10 The self-tracker's own presentation is available as a video at http://quantifiedself.com/2014/09/kouris-kalligas-analyzing-weight-sleep/. Accessed 18 Nov 2014.

11 "I enjoy working with data, exploratory analysis", as the self-tracker stresses on one of his presentation slides. The video can be viewed here: http://quantifiedself.com/2014/10/jamie-williams-exploring-data/. Accessed 18 Nov 2014.

12 Source: The author's own interview with a self-tracker on 18 Sept 2012.

uses this app several times a day for more than a year and continually improves and develops it. Looking ahead, the intention is to develop a model through several such approaches of operationalization in order to be able to express "cognitive performance" as a total value at the end. These kinds of research and development projects do not necessarily have to but can result in a corresponding start-up of self-trackers if linked with a business model.[13]

If these four types of self-tracking activities are related to the four forms of citizen science (see section 2.1), it becomes apparent that self-tracking (so far) is basically connected with citizen science in two different ways (see Figure 3). There are the above mentioned *crowdsourced health research studies*, on the one hand, and, on the other, the personal research studies and activities of the self-trackers themselves, which will tentatively be called *personal science* here.

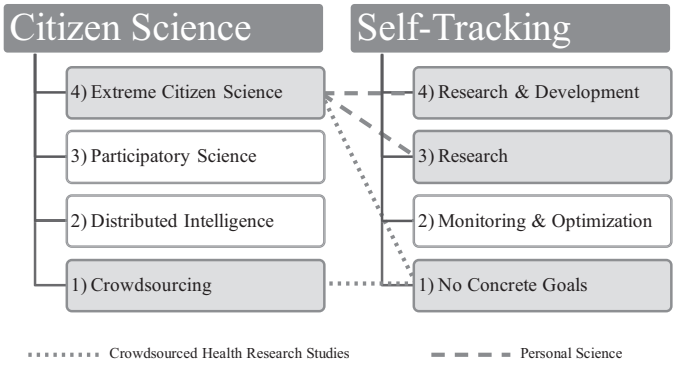

Fig. 3 Two ways of linking citizen science and self-tracking
Source: Haklay 2013; the author's own illustration.

Crowdsourced health research studies can be initiated and conducted by both professional scientists and laypersons or the participants of the study themselves (see Swan 2012b). Correspondingly, Melanie Swan speaks about "researcher-organized studies" and "participant-organized studies" (ibid.). The former concerns classic "crowdsourcing" in Haklay's sense (2013) or Finke's "citizen science light" (2014). At present, these studies are mainly being conducted by *PatientsLikeMe*,

13 Examples include Addapp, BioTRAKR or Medando; cf. websites at https://adapp.io/, http://biotrakr.de/ and http://medando.de/. Accessed 20 Nov 2014.

meaning by the professional scientists employed there, and may well be published in peer-reviewed journals (see Swan 2012b). The latter, in contrast, concerns Haklay's "extreme citizen science" (2013) or Finke's "citizen science proper" (2014). They can be found, for instance, on the web platform *Genomera* (see Swan 2012b). Here, in principle, any registered user can initiate his/her own healthcare study and recruit participants for it via the platform, for example, concerning the question of whether wearing glasses of a certain color can improve sleep quality.[14] Both forms have in common that the participants of the study have to perform self-tracking in one way or another in order to participate at all. Conversely, this means that the participating self-trackers primarily have the function of test persons here. The corresponding self-tracking activity can therefore be classified as the first level ("no concrete goals").

It is a different situation concerning the personal research studies and activities of self-trackers as discussed above in the third and fourth levels ("research" and "research & development"). Based on the fact that professional scientists are usually not involved here, they can be considered "extreme citizen science" in Haklay's (2013) or "citizen science proper" in Finke's sense (2014). Since, in addition, this involves the investigation (and measurement) of the self, the expression *personal science* suggests itself. In connection with Quantified Self, it was mainly used by Seth Roberts,[15] a psychologist who has since died, and who was not only a self-tracker, but also a professional scientist, and correspondingly also spoke about "self-experimentation" (Roberts 2004, 2010). Others from that scene dislike the term and would prefer Quantified Self to be understood more as art (Fajans 2014). Independent of such self-descriptions, the question to be asked is: To what extent can this actually be considered as science? The following section will not be able to provide a final answer to that question, but presents some initial considerations.

2.3 Self-tracking as personal science?

Scientific knowledge is regarded as a special kind of knowledge because in modern society it is generally acknowledged to be verified, true and universally valid (Weingart 2003, p. 15), quite in contrast to other forms of knowledge such as ev-

14 "Orange you sleepy?" is the name of the study, see http://genomera.com/studies/orange-you-sleepy/. Accessed 25 Nov 2014.

15 See his two blogs: http://blog.sethroberts.net/ and http://www.psychologytoday.com/blog/personal-science/. Accessed 25 Nov 2014.

eryday or religious knowledge. At first sight, the self-trackers' personal research studies seem to be about the production of *practical* knowledge insofar as the findings obtained should at least be potentially relevant for the self-trackers' daily routines.[16] For the same reason, however, the knowledge also has to be considered *verifiable*, otherwise it would be difficult to legitimize (vis-à-vis oneself or others) making any change in the self-tracker's daily behavior.

To fulfill this demand or be able to meet the target of verified knowledge, not only procedures and methods known from science are applied (e.g., experimental test set-ups, standardized questioning, descriptive statistics, significance tests, correlation analyses), also traditional scientific quality criteria of empirical research play a role in the self-trackers' research activities, albeit often an implicit one. For instance, at a so-called meetup of self-trackers in Zurich, the accuracy and precision of diverse measurement devices and operations were explicitly discussed and thus implicitly their reliability and validity.[17] One of the presenters, for example, had employed several sleep tracking devices over a longer period in order to compare their data and analysis results. Ultimately, the questions being asked were: How reliable are the measurements? And to what extent do the devices actually measure what they are supposed to measure?

Objectivity, in contrast, is only a topic in the discussions to the extent that the self-trackers declare their self-collected data free of subjective influence—whether this is always the case is another matter, especially as this may involve recording explicitly subjective variables such as mood or happiness. Anyway, objectivity in the sense of the intersubjective verifiability or replicability of measurements plays almost no significant role at all. Indeed, only the self-tracker him/herself is able to reproduce the study because researcher and test person are one and the same. Correspondingly, the self-tracker doing research has absolutely no interest in repeating the study of another self-tracker, unless it was on him/herself which, in turn, would generally lead to different results. In other words, not only does "n = 1" in self-trackers' research studies, but "n = me" (Swan 2012a, p. 108).

In an essay that is now regarded as a classic text of the sociology of science, Robert Merton (1942) described four norms or "sets of institutional imperatives" (ibid., p. 118) that together constitute the "ethos of science" (ibid., p. 116) and characterize modern science along with knowledge accumulation and the methods applied for that. On the one hand, this ethos is now considered an outdated

16 A self-tracker spoke along these lines in an interview with the author on 06 Nov 2014.

17 cf. the meetup's program http://www.meetup.com/Quantified-Self-Zurich/events/209084932/. Accessed 25 Nov 2014.

form of describing and explaining the actions of scientists (Weingart 2003, p. 21); on the other hand, academic and sociopolitical debates repeatedly confirm the prevailing relevance of the Mertonian norms (Hasse 2012, p. 49). Independent of the question of the current or even past validity of these norms, they are instructive as a template for analyzing the research activities of the Quantified Self movement.

With *universalism,* Merton (1942, pp. 118ff.) means the principle that the acceptance or rejection of truth and validity claims do not depend on the personal or social attributes of their protagonist, so that ethnic group, nationality, religion, sex or social milieu do not play a role in this regard. Also with a view to Quantified Self, there are absolutely no indications that these kinds of attributes are in any way relevant for the movement. On the contrary, in line with its Californian origins, it seems particularly colorful, liberal and cosmopolitan; events are open to everyone. However, one has to ask to what extent truth and validity claims are at all relevant to the discussions among self-trackers doing research. They are certainly (implicitly) formulated, but in many cases the validity claim of the obtained insights does not seem to extend beyond the individual person or his/her everyday life. It can therefore be supposed that truth and validity claims are not frequently contested, or at least not as frequently as in professional science.

Communism refers to the ownership of scientific knowledge (Merton 1942, pp. 121ff.). The substantive findings of science are regarded as "a product of social collaboration and are assigned to the community" (ibid., p. 121), i.e., belong to everyone. Correspondingly, they should be communicated fully and openly so that the community can access them at all times. Interestingly, the latter point also seems to apply to the research of self-trackers. This is remarkable in that, in many cases, very personal and private data are being published and made available to others without any reservations. With regard to collaboration and communality, on the other hand, it appears that the findings of the Quantified Self movement (at least up to now) are too loosely related to actually create a common stock of knowledge, let alone one with recognized validity. The knowledge acquired by individual self-trackers, even if it is claimed to be verified, seems to be too personal for it to make sense to ascribe it to a community. To this extent, it is difficult to move the Quantified Self community or the self-trackers doing research closer to the concept of a *scientific community* (see Gläser 2012). There may be some similarities of form, for example with regard to networking, the low degree of organization or the coming together in smaller and larger conferences with presentations and discussions. However, a common stock of knowledge used for orientation by the self-trackers doing research, or even collective knowledge production is not

(yet) visible.[18] It is in keeping with this observation that, when presenting their own research activities, self-trackers hardly ever make reference to other self-trackers—their peers—or the studies conducted by them.

Disinterestedness, according to Merton (1942, pp. 124f.), should not be equated with altruism, nor is it directed at a particularly high moral integrity of scientists (cf. Weingart 2003, p. 17). It is rather based on the public and verifiable character of science and this contributes to scientists not using illicit means to their own advantage, which is why fraud in science is comparatively rare. There is certainly the biggest discrepancy to the research of self-trackers here because the self-tracker's interest in his/her research is precisely this (potential) personal benefit or own advantage, which rules out disinterestedness in the true sense of the word. It is true that the interaction of daily behavior and data feedback is not as large as at the second level of self-tracking activities ("monitoring & optimization"), where relevant behavioral adjustments may be explicitly desired. And also a conscious manipulation by self-trackers, for instance, when measuring mood, does not have to be implied. Nevertheless, questions arise about the role processes of self-awareness play in the measurements and how good self-control can be during data production if the corresponding hypotheses and possible consequences from the results are already in one's head, for example, when studying the relationship between food consumption and weight. Even if such factors and other potential influences can be methodologically controlled (similar to the problem of social desirability in empirical social research), there is the additional issue that has already been mentioned in relation to objectivity: The research of self-trackers is indeed usually made public, but it is only verifiable to a very limited extent—because the collection of data cannot be replicated or because other self-trackers have no (self-) interest in checking the analysis of the data provided. Conversely, it should not go unmentioned that any damage from falsified data or even fraud would probably be limited to the self-tracker doing the research.

Finally, *organized scepticism* refers to institutionalizing unbiased, critical checks of scientific contributions and the tendency to delay making final judgments until "the facts are at hand" (Merton 1942, p. 126). With regard to the Quantified Self movement, first of all, it must be stated that critical questions are indeed asked at the scene's meetups—for instance concerning measurement accuracy or

18 This clearly distinguishes the research of self-trackers from web-based forms of collective knowledge production like Wikipedia. It could be expected that a common stock of knowledge is most likely to develop with regard to different tracking methods and analysis software, which are used by many self-trackers so that the corresponding experiences and knowledge could accumulate here.

the relevance and meaning of data or the respective state of knowledge of professional science—but there is certainly no question of there being an institutionalized method of testing or reviewing such as that established in science, for example with peer-reviews. Once again, the fact that the self-trackers' produced knowledge is more of personal interest and hardly contributes to a common stock of knowledge plays a role here. Furthermore, this concerns primarily practical knowledge, as already mentioned, that should indeed be considered verified, but which may still very quickly find its way into the self-tracker's everyday actions and is not checked and re-checked again and again.

The recurring theme when considering the relationship of self-tracking research and science is that of *self-use*, for which self-trackers conduct their research and produce knowledge (see section 1). In the words of a self-tracker: "I want to know that for myself."[19] On the one hand, it is patently obvious that the self-trackers doing research are working along the lines of scientific knowledge production: They aspire to verified knowledge, make claims of truth, employ scientific methods and procedures, are oriented towards scientific quality criteria, make their data and findings public, exchange information, network with each other, expose themselves to criticism etc. On the other hand, the equally undeniable distinction to science is also repeatedly shown in the fact that the self-trackers not only conduct research on themselves, i.e., researcher and test person are one and the same, but also do this solely for self-use, i.e., for their own everyday practices. This becomes obvious when they begin to allocate a place for their research results in their personal lives, thus subject their results to a deeply subjective interpretation and give them meaning and a narrative framework with a view to their social environment (cf. Pharabod et al. 2013).

The term *personal science* therefore remains ambivalent. On the one hand, there are several arguments against using the term "science"; on the other hand, this is also essentially corrected by adding the term "personal". The research of self-trackers can, after all, be counted as *personal science* insofar as it attempts to produce verified knowledge using scientific methods and according to scientific criteria, although its object is the researcher him/herself and its goal is practical knowledge for the person's self-use.

19 Source: The author's own interview with a self-tracker on 06 Nov 2014.

3 Conclusion

Self-tracking generally implies the production of knowledge. Which form this knowledge production has, however, depends heavily on the type of self-tracking activity involved. With the exception of self-tracking for scientific studies, if the self-tracker is primarily a test person and has no personal interest in the data collected, all the self-tracking activities distinguished here concern *prosumption*, meaning the data and knowledge are produced by the self-tracker for his/her self-use, i.e., produced and consumed at the same time. This includes not least the self-tracking for monitoring and optimization purposes, but also self-tracking without a concrete goal or specific intention. On the other hand, there are multiple points of contact to *citizen science*, whether the research studies and activities of the self-trackers themselves, self-tracking for studies organized by professional scientists, or self-tracking for research studies that are conducted by self-trackers or other laypersons. Therefore, the knowledge production of self-trackers can be positioned in-between prosumption and citizen science.

From a sociology of knowledge and sociology of science perspective, primarily the research activities of self-trackers, which is termed *personal science* here, are an interesting and promising subject for one's own research efforts. They obviously also constitute the core of the Quantified Self movement. Its more committed followers, and especially those who have placed themselves at the head of the movement, are not just satisfied with monitoring and optimization goals like the recreational athlete who only monitors his/her daily jogging route, but in addition develop personal knowledge and research interests right up to developing the necessary apps and software. Beyond that, some have the ambition of involving other self-trackers through crowdsourcing in self-organized research studies, which can no longer be considered *personal science*, but certainly citizen science. In light of the considerations presented here, there are a multitude of open questions regarding this core of the Quantified Self community conducting *personal science*, for instance, what makes this community a community and what function does it fulfill for whom; which norms are action-guiding and what happens when norms are not complied with; which form of expertise do the self-trackers doing research develop, what role do their peers play in this and to what extent is a specific form of expertise or even reputation assigned to individuals within this community. Last but not least, the question arises what resonance does *personal science* have within professional science circles and to what extent do its results and findings stand up to professional scientific tests and reviews. The corresponding answers would help to better comprehend to what extent the knowledge production of the self-trackers doing research can be regarded as scientific.

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Risks—Visions

To Log or Not to Log? SWOT Analysis of Self-Tracking

Na Li and Frank Hopfgartner

1 Introduction

Our body is constantly emitting signals that, if listened to carefully, allow us to better understand the state of our personal well-being. For example, feeling weak and tired after a long sleep can be seen as indication of poor sleep quality. It might reveal evidence regarding our personal fitness level or our mental state. Being aware of the importance of our body's signals, medical doctors heavily rely on them when they have to make a diagnosis. Adopting these methods, a growing number of people have started to constantly measure the performance level of their bodies, using a variety of equipment to collect and store the data. These individuals can be considered as part of the *Quantified Self* (*QS*) movement that uses instruments to record numerical data on all aspects of our lives: input (food consumed, surrounding air-quality), states (mood, arousal, blood oxygen levels), and performance (mental, physical). Such self-monitoring and self-sensing, which combines wearable sensors and wearable computing, is also sometimes referred to as *Lifelogging*, although *lifelogging* describes the process of recording and storing *any* type of personal data rather than just user-centric sensor data.

The technology research and advisory company *Gartner* predicts that by 2017, the *QS* movement will have evolved into a new trend with around 80% of consumers collecting or tracking personal data and creating lifelogs. Moreover, they predict that by 2020, the analysis of consumer data collected from wearable devices will be the foundation for up to five percent of sales from the Global 1000

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companies[1]. Given these predictions, it comes as no surprise that more and more companies are trying to enter the market with novel wearable devices. In fact, a multitude of devices, services and apps are now available that track almost everything we do nowadays.

Although there are certainly some situations when such information can be useful, the creation of lifelogs is not without risk. In 2011, the European Union agency ENISA[2] evaluated the risks, threats and vulnerabilities of *lifelogging* applications with respect to central topics such as privacy and trust issues. In their final report, they highlight that *lifelogging* itself is still in its infancy but nevertheless will play an important role in the near future (Ioannis et al., 2011). Therefore, they recommend further research in order to influence its evolution to "be better prepared to mitigate the risks and [to] maximize the benefits of these technologies." Following up on this study, in this paper we focus on the benefits and pitfalls that derive from the use of self-tracking activities. As common in business strategy analytics, we will concentrate on the strengths, weaknesses, opportunities, and threats (SWOT) that should shed further light on the use of self-tracking devices.

This paper is organized as follow: in Section 2 we give a brief introduction to *Lifelogging* and *QS*. Section 3 details a SWOT analysis on self-tracking. Discussions and conclusions are given in Section 4.

2 Background

The activity of recording personal bio signals and metrics using software and tools is referred to as self-tracking. Different reasons can be found that motivate people to start recording and analyzing personal data. A large share of self-trackers include people with chronic medical conditions who rely on technology to track their personal well-being. Other self-trackers are motivated to observe and to increase their personal fitness and wellness levels. At the same time, an increasing amount of users track their own activities for their own infotainment. A prominent movement that promotes self-tracking is the so-called *Quantified Self* movement.

1 http://www.enterpriseefficiency.com/mobile/author.asp?section_id=1129&doc_id=269098. Accessed 03 Dec 2015.

2 http://www.enisa.europa.eu. Accessed 03 Dec 2015.

Quantified Self

Quantified Self (*QS*) has received increasing attention from academia (e.g. Rapp et al. 2014; Li et al. 2014) and industry. Swan (Swan 2009) defines self tracking as the action of regular, voluntary elicitation and collection of all types of metrics that can be related to an individual. This includes health-related data like body weight, sleep quantity and quality, blood results, blood pressure, nutrition habits and mood[3], but also other information such as location, work time or weather and finances. The gathered data is often visualized in diagrams, graphs or by tag clouds. Apart from health-related information, *QS* also includes keeping record of social interactions, emails, networks, and social media status updates, or activities such as viewing television, using the computer, general use of time, driving habits, work productivity, monitoring environmental conditions, or other activities that can be analyzed to achieve personal goals.

Regarding the motivation to start *QS*, Wolf explained in a 2010 TED talk (Wolf 2010) that their main interest was on seeing how people incorporate technologies into their lives and what changes in society this adaptation causes. Fascinated by the significant increase of technologies that allow us to keep records of our daily activities, they started organizing meetings to discuss the personal and social impact of the development of the smartphone and other technologies that could serve as mobile sensing platforms. In 2012, "some 19% of smartphone owners have at least one health app on their phone. Exercise, diet, and weight apps are the most popular types" (Fox and Duggan 2012). A more recent study revealed that as much as 70% of adults in the USA keep track of at least one health indicator" (Fox and Duggan 2013).

Nowadays, *QS* focuses on two dimensions of the impact of self-tracking. First of all, it concentrates on gathering personal information by quantifying and analyzing personal data. This is expressed with the slogan "self-knowledge through numbers", the main motto of the movement. Secondly, the movement promotes the idea of sharing track records of certain aspects of one's life with a worldwide audience. Here, their blog serves as the central hub of this community, but it also includes many other channels such as real-life meet up groups, regional and global conferences (Labs). As of December 2014, over 500 tools and apps are listed on this website, indicating the high popularity and diversity of the movement. On top of that, large numbers of wearable devices have been introduced to the market.

3 cf. the article *Rational Discrimination and Lifelogging: The Expansion of the Combat Zone and the new Taxonomy of the Social* by Stefan Selke in this anthology.

A recent report by ABI Research[4] suggests that by 2018, the number of wearable computing devices will have reached 480 million units.

While *QS* mainly focuses on gathering bio-metrics to track personal well-being, gathering additional personal information is referred to as *lifelogging*.

Lifelogging

Lifelogging is the process of automatically and unobtrusively recording one's life and storing it in digital format, hence granting the lifelogger easy access to this record. Lifelogs can consist of heterogeneous sensor data such as images, GPS, WiFi, accelerometers, light level, etc. The *lifelogging* vision is that the lifelogger never forgets anything since everything they do is being tracked, photographed and recorded. Consequently, lifeloggers can have direct access to the most important moments of their lives if they used tools to record it.

One of the early adopters of *lifelogging* techniques is Gordon Bell of Microsoft. Within the "MyLifeBits" project (Bell and Gemmell 2010), they captured all of their personal data in digital form and created software that allowed them to access this data.[5] The goal of this technology was to create a personal archive, or a "portable, infallible, artificial memory" that can be exploited to increase job productivity, serve as a basis for medical treatment, improving performances in school and many other scenarios.

Another *lifelogging* pioneer is Steve Mann, who uses wearable computing to create a record of his life. He performed significant studies on visual memory prosthetics that transformed his eye into a camera and his body into a Web server. He refers to this technique as 'cyborg logging' or 'glogging'[6]. Wearable cameras play an important role in research on *lifelogging* since analyzing camera data streams can reveal a lot of information. One wearable *lifelogging* device, the *SenseCam* (Hodges et al. 2006), automatically captures images every 30 seconds, resulting in thousands of recorded images per day. It is a camera with a fish-eye lens, about the size of a cigarette packet. The camera is usually worn around the neck and can be set to take photographs when triggered by such things as changes in the light, ambient heat or body temperature. The *SenseCam* has since been improved with new models and competing devices available for purchase.

4 https://www.abiresearch.com/press/wearable-computing-devices-like-apples-iwatch-will. Accessed 03 Dec 2015.

5 cf. the article *The Emergence of Lifelogging and Thinklogging* by Jim Gemmell in this anthology.

6 http://wearcam.org/glogs.htm. Accessed 03 Dec 2015.

The *SenseCam* has received a lot of attention from scientific researchers who focused in 100+ papers on various aspects of *lifelogging*. Examples are critically assessed in the next section where we evaluate self-tracking by performing a SWOT analysis. For a detailed description of state-of-the-art *lifelogging* techniques, see Gurrin et al. (Gurrin et al. 2014). An essay about the potential effect of *lifelogging* on our society is provided by Selke (Selke 2014).

3 SWOT Analysis

Although the idea of self-tracking is not new, the quality and quantity of quantifying activities is currently gaining momentum. This is mainly due to the increased perception of self-tracking as being a key factor for individual personal achievements and success, but of course also due to the increasing availability of software and tools to support self-tracking. Given the personal nature of the data that is recorded by these tools, issues arising from the existence of such data should be carefully considered by every self-tracker. Most of all, this includes implications for privacy and security, but also for other aspects that can have a strong impact on the self-tracker, on society and on the economy.

In business environments, a common technique to assess the challenges arising from new situations is to perform a SWOT analysis. SWOT is an acronym for *S*trengths, *W*eaknesses, *O*pportunities, and *T*hreats. Assuming that our aim is to achieve a specific goal, strengths can be seen as a resource, a unique approach, or capacity that assist us in reaching this specific goal. Weaknesses are limitations, faults, or defects that hinder progress toward this goal. Opportunities pertain to internal or external input factors such as trends that increase demand for what can be provided when achieving the goal. Threats refer to unfavorable situations that can serve as a barrier or constraint for achieving the goal. SWOT analyses are commonly performed to better understand specific aspects and to support decision-making by looking at a situation from different perspectives and from different entities involved. A SWOT analysis provides a framework to review strategies, the position and direction of a company or business endeavor, or any other aspects that can be important for a company. Strengths and Weaknesses are often considered to be *internal* factors, while Opportunities and Threats generally relate to *external* factors. For this reason, a SWOT analysis is sometimes called Internal-External Analysis and the SWOT Matrix is sometimes called an IE Matrix.

Generally, a SWOT analysis serves to uncover the optimal match between the internal strengths and weaknesses of a given entity and the environmental trends

(opportunities and threats) that the entity must face on the market. In this section we perform a SWOT analysis to evaluate self-tracking activities.

3.1 Strengths[7]

In a SWOT analysis, the strengths should indicate what is to be gained from adopting a new technique or direction. In our case, we analyze some benefits that a user of self tracking techniques can expect, including raising self-awareness, total recall, leaving digital heritage, and creating collective memories.

Raising Self-Awareness

Swan (Swan 2013) argues that the heterogeneous tracking sensor streams which can be recorded and stored in a personal archive can be exploited to analyze users' lifestyle. An automated analysis of all input streams could, for example, reveal that the self-tracker has poor sleep quality due to external factors such as a noisy environment, stress factors, an unhealthy sleeping position or other factors that could be captured by sensors.

An obvious domain that can benefit from self-tracking is the monitoring of one's food consumption. Unhealthy nutrition is one of the main reasons for diseases of affluence and, consequently, there is a great need to raise people's awareness on their eating habits. Self-tracking can be helpful for keeping an eye on diseases, health indicators, and the effectiveness of care. Various studies (see Tsai and Wadden (2005) for an overview) have shown that people who keep track of what they eat on paper, in an App, or in some other form, have better success at losing weight, managing their diet, controlling their portions, and sticking to healthy habits. Food tracking apps (e.g. Kitamura et al. 2009) in particular raise users' awareness on the quantity of food that they consume on a daily basis. This constant awareness can lead to a change in personal eating habits, leading to improved personal well-being. Personal success stories, e.g. promoted by the *Weight Watchers* company provide further evidence that the ability to record and also share food intake plays an important role in personal well-being.[8]

7 cf. the article *Self-Tracking as Knowledge Production: Quantified Self between Prosumption and Citizen Science* by Nils B. Heyen in this anthology.

8 cf. the article *Calorie Counting or Calorie Tracking* by Corinna Schmechel in this anthology.

Furthermore, various studies (e.g. Warburton et al. 2006) report a direct connection between physical activities and personal well-being. Regular physical activity is a resource for body and soul (HHS 2006). On the one hand, an active lifestyle can contribute to reducing the risk of cardiovascular diseases, obesity and complaints of the muscular and skeletal system (Blair et al. 1989). On the other hand, regular physical exercise can reinforce the mental well-being. The *World Health Organization* (WHO) describes lack of exercise as the fourth important risk factor for mortality (WHO 2010). For adults they recommend a moderate-intensity activity for 2.5 hours per week. Various studies suggest that personal achievement is one of the main driving forces behind sports activities. Nicholls (Nicholls 1989) argues, for example, that one of the main reasons for the success of competitive sports such as running, tennis, or swimming is the possibility to directly compare one's physical abilities with others. Another motivation is to experience (and to extend) physical limitations. This can in particular be observed in extreme sports such as base diving, or other dangerous activities. Within this context he refers to task-oriented and ego-oriented sports. In both cases, individual achievement, either by outperforming others or by reaching new limits, is the main reason to perform sports. Hence, in order to motivate people to get more physically active, personal aims need to be identified and targeted. Members of *QS* rely on the power of numbers to measure personal achievements. By recording their physical activities using step counters, accelerometers, or other wearable sensors, people can directly measure how far they are from reaching their personal goals (e.g. Swan 2009).

In a work scenario, services such as RescueTime[9] allow tracking the amount of time spent on applications and websites. By showing how often web browser, email client, chat clients or other applications are used, this particular service helps to better understand how efficiently users work in front of a computer. RescueTime advertises their service as a means to "find your ideal work-life balance". They suggest that increasing self-awareness can lead to a change in behavior that will consequently lead to a more efficient use of time.

Total recall

One of the key selling points of *lifelogging* technology is that everything that lifeloggers experience will be recorded and stored in memory. Memory is the process by which information is encoded, stored, and retrieved. Given enough stimuli and rehearsal, humans can remember information for many years and recall that information whenever required. However, not every stimulus is strong enough to

9 https://www.rescuetime.com/. Accessed 03 Dec 2015.

help trigger every specific memory. Therefore, using external memory to help people to compensate for memory deficits has been considered to be one of the most effective methods to counteract the effects of age-related memory loss (e.g. Arcega et al. 2013). Studies have shown that *lifelogging* can successfully be applied to create such external memory aids. *Lifelogging* tools create comprehensive digital archives that can act as an extension of human memory. The most important input for such lifelogs are visual information that show personal activities through the medium of images or video. For example, visual lifelogs consisting of pictures have been shown to help people with Alzheimer's decease; there are many applications for dementia and aging memory loss (e.g. Hodges et al. 2006).

Apart from supporting users with memory deficits, visual lifelogs can also capture life moments that are worth remembering.[10] Cathal Gurrin, who has been an active lifelogger for many years, revealed in a keynote speech (Gurrin 2013) given at the Second International Workshop on Lifelong-User Modelling that his lifelog contains a picture of the first time, he met his then soon-to-be girlfriend. What initially was a trivial moment in his life turned out to be a significant event for his life. Obviously, capturing such "trivial" moment on camera would have been a great coincidence without the use of a *lifelogging* camera.

Leaving a Digital Heritage

Assuming that lifelogs are created over a lifetime and are also constantly backed up to avoid loss of data, chances are high that these lifelogs will survive their own creators, thus leaving a detailed view of the lifelogger's life experience. A similar situation can be observed on social networking sites such as *Facebook* or *GooglePlus* where the user profiles of deceased users remain online. Therefore, one strength of *lifelogging* technologies is the ability to leave detailed evidence of the very own existence behind. A detailed investigation into this topic is provided by Burneleit (Burneleit 2011), who argues for the creation of a digital shrine, or "digital space" that is left behind as digital heritage.

Picking up on this issue, the following scenario has been addressed by *Bluepatch Productions* and *Floating World Productions* in their play *Oh look, hummingbirds*, which premiered at the 2012 Dublin Fringe Festival. In this play, a journalist is given the opportunity to view the memories of a loved-one who has passed away. This service is provided by a futuristic company that specializes on

10 cf. the article *Capturing the Ordinary: Imagining the User in Designing Automatic Photographic Lifelogging Technologies* by Vaike Fors, Martin Berg and Sarah Pink in this anthology.

keeping one's *lifelogging* legacy and enabling selected people to access this data. Although this remains fiction from today's point of view, a few companies[11] have started working on creating such lifelogs and preparing them as digital heritage. This indicates that leaving digital heritage can also be seen as an opportunity that arises from the use of *lifelogging* technologies. In summary, self-tracking technologies provide tools for those who fear being forgotten after death.

Collective Memory

Since ancient times, libraries such as the famous Alexandria have been used to keep material that is of some cultural, scientific or other value. Libraries and librarians have tools to appraise material, assessing it, indexing it, and preserving it for long-term access so that it can be found later. Besides preserving material, digital libraries maintain and disseminate an accurate and compelling record of the heritage of our past cultures from ancient cave paintings, to verbal storytelling, written manuscripts, the printing press and audio and video recordings in the recent past. Nowadays, our digital libraries make preserved documents related to the heritage of past cultures more accessible, but thus far we have still mostly preserved essentially the same materials as we did before, and we are not preserving our present culture. By aggregating and analyzing individuals' lifelogs, we can even go one step further and create a kind of collective memory of a group of people or citizens. We argue that by aggregating lifelogs into community views, these lifelogs can represent a comprehensive archive of our cultural heritage. In other words, lifelogs can create a collective memory of life in the 21st century. Collective memories are memories fed from multiple individuals. Examples are the collective knowledge created through collaboration in digital social networks or the collective memory of a city built on the individual memories of its citizens.

3.2 Weaknesses

Weaknesses in a SWOT analysis should indicate the main risks that should be considered when adapting a new policy or direction. From the point of view of a self tracker, this includes misinterpretation, privacy issues and security leaks. The weaknesses are outlined in the remainder of this section.

11 See for example http://eterni.me/. Accessed 03 Dec 2015.

Misinterpretation

With the growing importance of the Internet, one could also witness the growth of online health-oriented information platforms such as *PubMed*[12] and *Scopus*[13], which enable researchers and professionals to check up on the latest research results on biomedical topics (Falagas et al. 2008). While these databases provide detailed access to state-of-the-art research results, they are less suitable for the general public who would like to check up on symptoms that they are experiencing. According to Morahan-Martin, up to 4.5% of all Internet searches are about health-related topics (Morahan-Martin 2004), indicating the significance of this topic in our life. A negative side effect that appeared with the rise of such information platforms is "cyberchondria", i.e. people becoming anxious about their health based on the data they collect (White and Horvitz 2008). With the increasing amount of devices and apps available that suggest detailed insights into personal well-being, people might be tempted to over-interpret this data. This is particularly challenging since the accuracy of this data remains unclear. Therefore, the self-tracker is always advised to question the data they are receiving. Wolf (Wolf 2010) considers this to be a serious issue since health self-trackers often try to find their own way to improve symptoms without any professional guidance. Relying on such data can be dangerous if done without professional training and an amount of skepticism.

Privacy and Security

According to Rainie et al. (Rainie et al. 2013), approximately 86% of adult Internet users in the US have taken steps to protect their online privacy, such as setting up encrypted communication or using anonymity services (proxies, VPNs, Tor network, or using aliases instead of their real names). This indicates that there is a general awareness of the risks to their privacy through Internet use. In the context of self-tracking, privacy concerns are very important since this data can reveal significantly more personal information than the average interaction on the Web (e.g. Hopfgartner and Jose 2010). Health apps for smartphones and tablets, for example, support saving and transferring sensitive information on user's blood sugar and blood pressure in the cloud. Given the sensitivity of this data, high demand for privacy and security protection are required with apps and gadgets that track a person (Rawassizadeh and Tjoa 2010; Brake 2014). Assuming that in the not-too-far future, everything we do will be tracked and traced (e.g. in a Smart Home, or

12 http://www.ncbi.nlm.nih.gov/pubmed/. Accessed 03 Dec 2015.

13 http://www.scopus.com/. Accessed 03 Dec 2015.

Smart City environment where a multitude of sensor streams come together), an analysis of this big data can reveal a lot of personal information (Nafus and Sherman 2014), with serious implications for the users' security and privacy.

Lifelogging systems usually consist of different components that are responsible for collecting, storing, analyzing and presenting data (e.g. Albatal et al. 2013). Each component must be able to protect the lifelogger's privacy and security by making sure that the data cannot be accessed by third parties. As common in software systems, the more components that exist, the higher the effort to guarantee such privacy (McHugh 2001). Each additional component (e.g. additional sensors or platforms that are included in the *lifelogging* process) in the system increases the risk of attack as each component introduces new potential weaknesses that could be targeted by attackers.

In current systems, one of the main components that can be targeted by attackers is the data transmission component (Wu et al. 2007). For example, most wearable sports activity tracking devices that are on the market contain sensors to detect motion, but are not designed to track locations. In order to provide a location-tracking functionality, data created by these devices needs to be synchronized with another device or the cloud for further analysis. Many manufacturers rely on Bluetooth Low Energy technology to wirelessly synchronize data (e.g. Omre and Keeping 2010). By capturing this wireless transmission, the lifelogger can be tracked by a potential attacker (Solon et al. 2006).

While some *lifelogging* devices store their data locally, most *lifelogging* services (e.g. Albatal et al. 2013) require users to upload and share the data that is recorded by their apps on central servers, also often referred to as the cloud. Although cloud computing providers are focusing on securing their services, keeping data on external hard disks can be risky and should be carefully considered. Especially since this data does often not only consist of the raw data that is recorded by the *lifelogging* device (e.g. accelerometer data captured from a step counting device), but also of additional personal data that users had to provide in order to take full advantage of the service provided. Users could be required, for example, to provide their age, relationship status, or other sensitive details which are used as mandatory input parameters in the services' algorithms.

One important privacy aspect is the ability to switch off the trackers and devices, hence leaving no record of the current situation. Self-trackers need to have the ability to switch off everything if they feel that it would be inappropriate or if someone might object to what is being recorded. On the other hand, switching off a device is also information that, if analyzed, could reveal information about the user. Devices such as the *SenseCam* come with the feature to temporarily deactivate the device, e.g. to avoid taking pictures when the lifelogger is in the rest room.

Recently, researchers developed a technique called *PlaceAvoider* for owners of first person cameras to 'blacklist' sensitive spaces (like bathrooms and bedrooms). This technique provides a way to identify and prevent the sharing of sensitive images (Templeman et al. 2014).

3.3 Opportunities

In a SWOT analysis, opportunities and threats are identified by analyzing *external* origins. In the case of self-tracking, this means that the society and the companies who produce the self-trackers (or who receive the data) are the focus. In the remainder of this section, we outline various opportunities that arise for these groups, namely business success, adaptive services for the community and research progress.

Business

The main motivation for commercial companies to produce tracking devices is to increase their profit margins. For companies, three main sources of revenue can be identified.

First of all, companies can make a financial profit by selling the hardware devices to their customers. Given that major companies such as *Google*, *Motorola*, *Apple* and *Microsoft* are making significant investments, it is not premature to assume that there is great potentials on the market. Indeed, a recent study by *Berg Insight*[14] shows that sales of smart glasses, smart watches and wearable fitness trackers reached 8.3 million units worldwide in 2012, up from 3.1 million devices in the previous year. Estimating an annual growth rate of 50.6 percent, they estimate that 64 million units will be sold in 2017. With the health and fitness sectors potentially taking the lead, wearables will begin to occupy a growing role in the mobile-health sector, and data analytics and big data will become important services linked to their growth. At the same time, with an increasing number of companies entering the market, we see a variety of rather cheap hardware available for purchase. This indicates that selling hardware can not be considered the main source of revenue.

The second main source of income comes from customer subscriptions, i.e. the hardware is sold relatively cheap, but in order to take full advantage of the self- tracking service, users have to sign up for an additional service. This could

14 http://www.berginsight.com/ReportPDF/ProductSheet/bi-ce3-ps.pdf. Accessed 03 Dec 2015.

include additional data storage, additional means of visualizing the data (e.g. charts) or other features that bind the customer to the company. An example is the subscription model that the company *Narrative*[15] offers to users of their main product, a tiny wearable camera advertised as the Narrative Clip. When buying their relatively cheap device, users currently have to opt for either a three-month, or a 12-month subscription model which allows them to store their photos in the cloud.

Finally, an important source of revenue can come from selling the customers' data for marketing purposes. The analysis of self-tracking data can reveal detailed information about peoples' habits, needs and interests and can therefore be seen as a gold mine for marketers. For example, details about people's running behavior, their age, sex, height, and address can be highly valuable for shoe manufacturers such as *Nike* as it allows them to initiate very specific targeted market campaigns based on these insights (McClusky 2009).

Adaptive Services

While the driving force behind the industrial age was to optimize the industrial process using mechanical tools, today we aim to optimize processes by analyzing data that is created by digital devices. Key techniques for a data-centric optimization of processes are personalization, data mining, machine learning, knowledge discovery and information management approaches. In other words, context-aware algorithms are required to understand, interpret and react upon input data, and adapt their output based on external input parameters. The English physicist Stephen Hawking even argues that the ability to adapt to change is an indicator of intelligence. In line with this argument, algorithms that adapt to change can be seen as computationally intelligent—or smart. Therefore, we refer to systems that rely on such computational intelligence as smart information systems (Hopfgartner 2015). As early as 2008, Marissa Mayer, the current CEO of *Yahoo!* and former vice president of Search Products and User Experience of *Google Inc.*, predicted in an interview held at the *LeWeb* conference in Paris that "in the future personalized search will be one of the traits of leading search engines". This statement reflects the increasing attention that smart information systems draw from both academia and industry. With increasing computational power, smart algorithms enable us to identify patterns, test research hypotheses or create data models, hence shedding light on the potential usage of this data.

15 http://getnarrative.com/. Accessed 03 Dec 2015.

Lifelogs are large repositories that provide a multitude of contextual information. Context is key for the provision of user-centric smart information systems (e.g. Karatzoglou et al. 2010) since it allows understanding the user, and, if comparable data is available, the identification of similar users or items. If the heterogeneous data streams that are capturing aspects of a person's life could be collected into a single stream, that person may be able to benefit from relationships between the different aspects. For example, if you were to regularly listen to The London Philharmonic Orchestra on your portable music player and your mobile telephone sent a GPS location notification to your lifelog, then it would be possible to receive a notification that The Dresden Philharmonic Orchestra was scheduled to perform while you were in Dresden for a meeting. This would not automatically be possible where the different data streams of digital data are separated. An example of middleware architecture for context awareness in lifelogs is presented by Song et al. (Song 2014).

Advances in Research

To date, research on health aspects largely relies on traditional data sources which have been recorded under controlled conditions, e.g. within clinical trials. Given the high financial burden that such trials implicate for the researchers, there is hope that personal health data which is voluntarily provided by self-trackers can be exploited to promote further research in the health domain (Swan 2012). Data collected passively via self-tracking applications could, for example, be used to support users' responses they provided in field trials. So for example, if users have to provide information on how many physical activities they performed within a specific time period, their response—often recalled from memory and thus not always very accurate—could be confirmed (or corrected) using self-tracking data. Besides, by asking for active data collection within a trial, less questionnaires might be needed and hence, the burden of remembering their activities can be lifted from the study participants.

Moreover, self-tracking data from a community of users (e.g. Swan 2012), also referred to as the crowd, can be exploited to better understand the living conditions of specific user groups. For example, an aggregated and averaged view of the data recorded using *Jawbone* devices revealed[16] that citizens of Tokyo (on average) sleep one hour less than citizens of Melbourne, or that citizens in Stockholm take more steps than people in São Paulo. Concluding from this example, it is evident

16 https://jawbone.com/blog/jawbone-up-data-by-city/. Accessed 03 Dec 2015.

that a thorough data analysis of self-tracking data can help us to better understand society in general.

3.4 Threats

The final aspect of a SWOT analysis focuses on the threats that derive from the use of self-tracking techniques. Again, the focus here lies on the threat considering external parties. In this case, we focus on threats for companies that provide self-tracking hardware or services and threats for society in general. In the remainder of this section, we outline the main threats, namely the impact on society and threats for businesses which invest in self-tracking.

Impact on Society

Among individuals, there is growing interest in, as well as a willingness and opportunity to share personal data with others. People use online groups such as *Patients-LikeMe* or *Crohnology* to share medical data with others with similar medical conditions, hoping to learn more about their personal health conditions (Wicks et al. 2010). How the data will be used, who will have access to the data and when, which regulations and legal protections are in place, and the level of compensation or benefit (both personal and public) is still a big issue. Various parties might have an interest in gaining access to this content-rich data.

First of all, service providers such as health insurance companies might have a strong interest in exploiting this data, e.g. by providing cheaper insurance policies to those customers who can prove that they are physically active or have a healthy diet and life-style. In fact, Olson (Olson 2014) reports that health insurance companies are becoming increasingly aware of the potential that wearable technology offers. While this might be an actual motivation for users to actually improve their lifestyle, it might result in a financial disadvantage to those who are not willing to get more active or who are not willing to share their data, e.g. because they consider it a breach of their privacy.

Moreover, there is a big threat that the data might be exploited for the creation of detailed user profiles that can eventually be used against the self-tracker. The revelations of Edward Snowden about the *National Security Agency* (NSA) surveillance on a global scale (Lyon 2014) showed that, nowadays, systems are capable of processing vast amount of personal data in a way that allows for the creation of detailed user profiles. While such surveillance is often advertised as a necessity to protect society from terrorist attacks, it is also considered to be a major threat to

human dignity (Baum 2013). The sensitivity of privacy concerns is also reflected by the perception of self-tracking devices that capture users in proximity to the self-tracker. Caprani et al. (2013) interviewed a visual lifelogger on his experience while wearing a *SenseCam* for seven years. He argued that although people are curious about the recording device, he did not experience any negative effect on his personal life. Early adopter Steve Mann was a little less fortunate, as he got assaulted in a restaurant in Paris for wearing a camera (Biggs 2012). When *Google* released the first version of their optical head-mounted displays (i.e. the *Google Glass*), similar incidents were reported, eventually leading to the ban of the device in some restaurants and bars (Levy 2014), name calling and the development of counter-measures that prevent the device from connecting to WIFI access points (Oliver). These cases illustrate that the use of camera devices is often seen as a breach of peoples' privacy.

A big threat is also posed by hackers who intend to use this data for their personal benefit. Friedland and Sommer (Friedland and Sommer 2010), for example, present an algorithm that can be used to identify potential burglary targets based on the geo-location of videos and pictures that have been shared online by the potential victims. They refer to this as cybercasing, i.e. the method of "using online tools to check out details, make inferences from related data, and speculate about a location in the real world for questionable purposes." Considering that many lifelogs contain GPS data, a leakage of this data can be a serious threat for the lifelogger since it may reveal a lot of personal information which may be used against them.

Business

Various business analysts predict that in the near future, the number of self-trackers will increase significantly and, consequently, many ventures intend to join the market with novel products and services. Although this development can be seen as a big opportunity, the presence of different players on the market also challenges the companies' prospects of success. Competitive markets often result in lower profit margins. Therefore, companies whose initial investment costs are very high face the threat of their investment not being covered by the actual return. At the same time, reducing investment costs, e.g. by using cheaper hardware, or by using fewer resources to develop algorithms or services might backfire and result in an even smaller return of investment. Keeping this in mind, companies are well advised to constantly observe the market and to adjust their product or target group accordingly. An example is the development of Google Glass which was initially developed for a general audience. A constant monitoring of the market eventually

convinced Google that this particular product might be more feasible for business customers rather than individuals. Consequently, they stopped selling the product in early 2015 and are now shifting their business to this market.

Another concern for companies should be the provision of accurate measurement, interpretation and visualization of data. Most self-tracking data is somehow related to users' personal activities. Devices are often advertised as means to monitor one's fitness level. Users might be tempted to completely rely on this data, hence ignoring other (natural and obvious) signals that might suggest otherwise. McKnight et al. (2011) argue that trust is the key aspect for the acceptance of technologies. Therefore, businesses are well advised to pay particular attention to this matter. For example, think of devices such as blood glucose meters where trust in the sensor readings is essential for the users' well-being.

4 Discussion and Conclusion

With an increasing amount of self-tracking devices and services that enter the market every day, we can also observe an increase in cases where users can benefit from self-tracking. The most popular application of self-tracking is in the area of personal well-being. Self-tracking devices are used to monitor personal fitness levels, thus helping users to make sure that they are benefiting from their workouts, eventually offering them the means to improve their quality of life. Despite these advantages, it is important to remember that self-tracking devices are capable of creating very detailed user profiles. By creating lifelogs, the self-tracker creates a very accurate and possibly even intimate image of their personal life.

In this chapter, we have analyzed the strengths, weaknesses, opportunities and threats of self-tracking, commonly referred to as a SWOT analysis. While strengths and weaknesses are approached from the standpoint of view of the self-tracker, opportunities and threats are analyzed with external parties in mind. We identified the effect of raising self-awareness, total recall, leaving a digital heritage, and creating a collective memory as clear strengths of self-tracking. Over-tracking and erosion of privacy are presented as its weaknesses. The main opportunities of self-tracking for companies and society include business success, the provision of smart adaptive services that simplify our daily lives, and further advances in research. The main threats are a potentially negative impact on society, especially with respect to privacy concerns, as well as threats for business ventures.

To conclude, we argue that there undoubtedly are definitely various advantages (strengths and opportunities) for everyone involved, but also serious disadvantages (weaknesses and threats). Considering that self-tracking is really focused on indi-

vidual's data, it should be up to every individual to decide whether they are willing to accept the disadvantages in exchange for the numerous advantages, or if they prefer to ignore this emerging trend. The critical review presented in this paper should assist users in their decision making process.

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The Emergence of Lifelogging and Thinglogging

Jim Gemmell

Introduction: Enabled by? A reason why?

In 1975, Microsoft crafted a vision statement calling for "a computer on every desk and in every home." That sounds rather unremarkable today, but at the time it was far from obvious that it would actually happen. Virtually all homes and desks were without computers and most people had no desire for one. Looking back, Bill Gates commented:

> "It's very hard to recall how crazy and wild that was, you know, 'on every desk and in every home.' At the time, you have people who are very smart saying, 'Why would somebody need a computer?'" (Academy of Achievement 2010)

Indeed, Ken Olsen, the founder of mini-computer powerhouse Digital Equipment Corporation, would still be saying in 1977 that "there is no reason anyone would want a computer in their home."

Of course, computers did go onto virtually every desk and into more than 80% of homes in the USA (File and Ryan 2014), and Olsen was widely mocked for failing to see any "reason why." But, in fairness, the reason why someone would want a computer in their home was not immediately clear in the 1970s. In 1975, Microsoft only sold the BASIC programming language for the Altair computer, and even Microsoft's official history admits that there was "little you can actually do with the Altair." (Microsoft News Center 2000) In fact, throughout the 1970s, not many people did want a personal computer. Less than six hundred thousand were sold in 1979 (Reimer 2005).

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Fig. 1 1980s ads for personal computers

In the 1980s, that began to change, at least in businesses. And the "reason why" was primarily word processing and spreadsheets. Figure 1 shows an 1983 ad from HP, leading with spreadsheets and word processing as the key features. Even Apple showed a spreadsheet on their screen while boasting that "Apple invents the personal computer. Again." (Also in Figure 1) Spreadsheets and word processors were an excellent "reason why" to business people, in conjunction with a number of other fringe business programs. Consequently, PCs spread onto many desks in businesses just as Microsoft had wanted, but not much into homes. By 1989, 21 million PCs sold every year, yet only 15% of homes had a PC (Reimer 2005; US Census Bureau 2010).

It was in the 1990s that home PCs really took off, with the spread of the Internet, email and the World Wide Web giving people strong reasons to bring PCs into their homes. Mosaic, the first popular Web browser, was released in 1993, and ten years later 62% of American homes had PCs, and 55% had Internet access (US Census Bureau 2010). The Web was also yet another great reason for businesses, and overall PC sales soared after the mid nineties (see Figure 2).

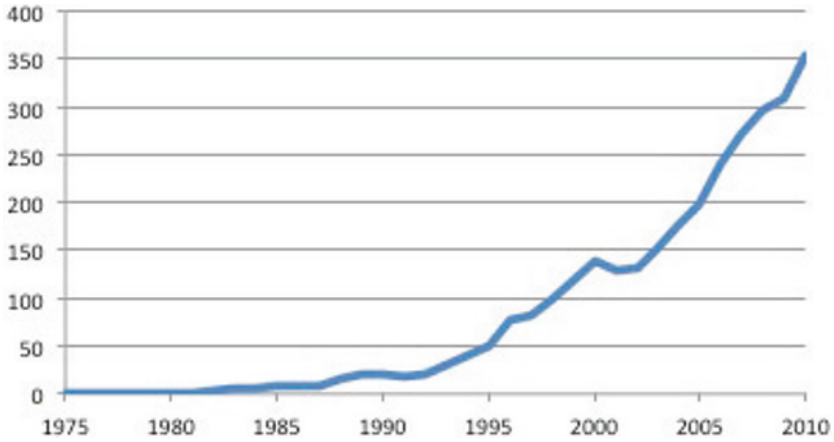

Fig. 2 PC Sales in millions of units

The story of the emergence of ubiquitous personal computers is one of computer class formation. If we look at the new technology that makes these classes possible—if we ask what it enabled by—and if we look at the reasons why for users, it can help us to understand the technical trends we are living through and those we are likely to see coming.

We've looked at the reason why for PCs; next, we will consider the technical side of new computer classes, with insight from Moore's Law and Bell's Law. We can then examine the rising phenomena of *lifelogging* in that context, and see how the budding Internet of Things must intersect with *life*logging to produce *thing*logging.

I believe we should expect thinglogging to become commonplace just like Bill Gates could expect PCs to become commonplace. Thinglogging is just beginning to emerge, and the indications are that it will become a world-wide, ubiquitous trend, just like personal computers have been, and like *lifelogging* is becoming.

Moore's Law, Bell's Law And The Internet Of Things

In the same year that Microsoft published their vision statement, Gordon Moore of Intel updated his 1965 prediction that integrated circuits would double in component density every year for ten years (Moore 1965). That had indeed happened. Now, in 1975, Moore updated his prediction to a doubling every two years (Moore

1975). Moore's Law, as it became known, was really more of a self-fulfilling prophecy; a target that clever engineers have continued to hit until the present day. Most people who have heard of Moore's Law think of it as meaning that their computers will be made ever more powerful at about the same price over the years, which is true enough. However, that also requires that their digital storage also sees similar improvements. Thankfully, digital storage density has increased even more rapidly, and in 2005 the increasing of storage was dubbed Kryder's Law, after Mark Kryder of Seagate.

Moore's Law predicted a doubling of computing power at a relatively constant price and size. Gordon Bell pointed out that one could also expect smaller, cheaper devices to emerge. Bell's Law of Computer Classes predicts that about every ten years a new computer class will form, establishing a new industry (Bell 2008; Bell et al. 1972). Bell himself had designed some of the most popular minicomputers that emerged as a new class after the mainframe era. Bell's 1972 paper speculated as to what might emerge next, including smart terminals, home computers and powerful calculators (Bell et al. 1972).

Some of these classes emerge as a corollary of Moore's law. That is, instead of doubling the compute power at a constant price, one could have constant computing power at decreased price. Imagine you are laying out a new integrated circuit, and Moore's law has made it possible for you to include twice as many transistors in the same space you had used for your last generation IC. You could pack more functionality in that same space—the typical scenario for Moore's Law—or, you could simply print two of your old designs on the die and cut it in half, making two for the price of one in a half-sized footprint: the cheaper, smaller option that helps Bell's Law.

However, Bell's Law is not just a corollary of Moore's Law. After all, the minicomputer class emerged even before there was a Moore's Law—indeed, even before there were any integrated circuits to have their density doubled. (Before increases in IC density, performance gains were achieved by going from tubes to transistors, and from transistors to ICs) Furthermore, to be a new computer class according to Bell's Law it is not enough to just be smaller and cheaper. So, for example, a $500 PC in a smaller case is not a new class compared to the old $1000 PC in a larger case. To truly be a new class requires new ways of being used, creating a new industry with new platforms and applications.

The Bell's Law progression of technology has taken us from mainframes, to minicomputers, workstations and personal computers. After personal computers, there was a new class of home computers; although these are still called "PCs" they are indeed a new class because, being cheaper and connected to the Internet, they were used in new ways, with a new platform (the Internet and World Wide

Web) and new industries (for example, online stores and advertising supported search). Bell's Law then continued to give us tablets, smart phones, and smart watches. It continues today in wearables, home automation, and much more.

Indeed, one way to view computing in the past 40 years is as a quest to put absolutely everything into cyberspace. We've seen local area networks expand to a world wide Internet which is now reaching both up into outer space and also down to on-body and eventually in-body networks. Clearly Bell's Law will enable many scenarios from devices swimming in your bloodstream to smart dirt in your garden. The current buzz over "Internet of Things," tantalizes us with the concept of smart objects—computing and networking in every thing.

There even is a reasonable argument that virtually all these scenarios and more can be enabled by Bell's Law even if Moore's law soon reaches an end: there is already enough small compute power possible to do many of the imagined scenarios in very tiny devices, especially when augmented with networks to access cloud computing assistance. That is, if we hit a limit on how much computing we can put in a small package, we will simply harness compute power in the cloud. Today, our smart phones do this when their voice recognition actually is performed in the cloud.

But is there a reason why for all things to be Internet connected? For instance, will I some day log in to my eyeglasses? Clearly, many things will indeed join the Internet, and indeed many already are. But it won't happen overnight, and we can see a progression for things between them being completely offline to having an IP address. They will go through the stages of being logged, then automatically tracked, then peripheral, and finally Internet-connected.

The first step is simply that the item is known and its information logged and used online. The second step is some automated tracking, for example, have an RFID chip installed in the item so that its location can be automatically tracked. In the third step, a thing is peripheral to some other device that has actual Internet access. For example, it speaks via Bluetooth to a smartphone to reveal its status. Finally, devices can be directly on the Internet.

The progression through these steps will depend on the value of the item and the kind of ongoing information it generates. So, I may log the information about my glasses, and connect online to find someone who can replace a part for that particular model. I may even take the next step and have RFID tagged glasses to help me find them. However, there isn't much value in going any further with my eyeglasses. On the other hand, home automation devices like the Nest thermostat are already being Internet connected because their information and control is so useful. An automobile, being both very valuable and with so many useful control and information points is a great candidate to be directly Internet connected.

But if we consider just the sheer number of things in the world, for the next decade or so, we can expect most of them to enter cyberspace by being logged and tracked, with a relative few (but very important) items being directly or peripherally online. The immediate trend will be towards all items having a digital identity, with more and more items coming into cyberspace every year.

Lifelogging

In 2009, Gordon Bell and I published the book Your Life Uploaded (Bell and Gemmell 2009), with a thesis that life-logging would be cheap, easy and commonplace by 2020. We were not telling people that they ought to life-log, but we were predicting that more and more people would do more and more of it. And we were not advocating life-blogging—the publishing of one's life online—but rather we advocated personal life-logging with extremely selective sharing for purely personal benefit.

Our research in the field had begun around the year 2000 with the question: what would it be like if you could digitize your entire life? We looked at two broad technical trends to make this possible: first, extremely cheap and expansive digital storage (Kryder's Law), and second, an explosion of small and cheap sensor devices due to Bell's Law.

In 2000, we had looked ahead to consumer-grade terabyte hard drives emerging by 2007. One of these drives alone would permit an unprecedented recording of one's life, for example, imagine having everything you have ever read including every book, magazine, web page and email, 10 pictures from each day, and eight hours of audio from each day. A lifetime of this would fit on a terabyte hard drive—and we knew that hard drives would continue to increase in capacity. In fact, we could see that terabyte flash drives were on the horizon, meaning a lifetime of storage could even be kept in a cell phone. By 2009, we were looking ahead to vast cloud storage at ever more affordable prices.

The first sensors to kick off the life-logging recording phenomena were digital cameras and the cameras and microphones in smartphones. It was clear that these would lead to an explosion of photo, audio, and video recording. We also could see that Bell's Law would lead to ever smaller sensors, which, among other things meant we could expect in-home, on-body, and eventually in-body health sensors.

We began an experiment, dubbed *MyLifeBits*, in which Gordon Bell was the guinea pig: we would attempt to digitize as much of his life as possible. This began with scanning all papers, photos and so forth. Soon we were logging all of his activity on his PC, making a copy of every web page he viewed, recording phone

calls to his office, tracking his location via GPS, and much more. He began using one of the earliest wearable health devices. He even began using a SenseCam—a camera worn around ones neck that automatically takes pictures and sensor readings, and uses the sensors to trigger pictures. (Gemmell et al. 2004)

What would be the "reason why" for life-logging—if any? We started out merely asking "what if?"—not really knowing if there was any value to life-logging. But we soon had convincing results from our own experience combined with the results from our academic colleagues (we convinced Microsoft to fund 14 universities and gave them our software and SenseCams, and also held workshops for interested researchers). It became apparent that life-logging would be revolutionary to humankind, with impact across several areas:

MEMORY: human memory is notoriously fallible. Life-logging opened up the tantalizing prospect of true total recall: remembering everything. Indeed more than "everything" one would normally consider in normal human memories but also other details like the exact humidity that one is experiencing. By recording everything together, the few things one did remember could be used to help retrieve other things, for example, finding a web page because you remember you viewed it on the same day as some other memorable event, or finding a photo because you recall it was taken on very hot day and your lifelog includes temperature.

HEALTH: digitizing existing medical records is projected to save billions of dollars and many lives. For instance, think of patients arriving at an emergency room that could benefit from instant access to their condition, allergies, etc. Health life-logging gets even more interesting when various sensors begin to make healthcare quantitative ("here is the chart of my temperature") rather than qualitative ("I think I started feeling feverish on Tuesday"). Instead of only taking measurements in a doctor's office or lab, in-home devices enable more regular status checks. Next come on-body devices, and eventually we will have in-body devices. The explosion of health information due to life-logging will lead to unprecedented era of data-mining to add to our health knowledge.

EDUCATION: dating all the way back to Vannevar Bush's proposed Memex in 1945 (Bush 1945), it has been clear that systems to record, search and annotate the material that one studies would be a winner, whether for a scientist, high school student, or the life-long learner pursuing some hobby. Furthermore, a complete record of the student would enable systems that focus on material the student is weak on, or material that hasn't been reviewed for a long time.

PRODUCTIVITY: life-logging has many applications in the workplace, such as making sure one can refresh an old discussion, find a old colleague with a needed skill, or learn from the history of the person who held a position before you. The traveller has instant search to prove pre-payment of that hotel bill, or the ability

to look up the good hotel you stayed at ten years ago. Businesses can establish a "corporate memory" to spare customers the frustration of bringing a new representative up to speed. Time and motion studies can indicate more productive ways of doing things, or simply warn when low priority tasks are taking up too much time.

STORY-TELLING: *Lifelogging* allows the average person to publish their story to posterity at a level previously only attained by the rich and famous. Even when sharing stories today with family or friends, the life-logger can tell stories with more detail and more ease. Already, there are fitness programs that can share the exact route of your bike-ride or run. Photos know their location and time, allowing them to be automatically placed on timelines or maps. Software to automatically estimate novelty or other "interestingness" metrics will increasingly help you auto-summarize your day or your vacation in order to share the story with friends.

Progress on the 2020 Prediction

With so many "reasons why" identified, we were very confident in our prediction. According to *Your Life Uploaded*, we should be at the mid point of a decade of life-logging emergence. How has the prediction help up so far? Let's take stock:

Wearable fitness devices have absolutely exploded (Figure 3). A number of smart watches also support fitness tracking (Figure 4).

There are a host of other digital health devices for the home (Figure 5), including blood oximeters, blood glucose monitors, blood pressure monitors, scales, sleep trackers (some on your wrist, some under sheets or mattress), and baby heartbeat monitors. There is even the *Hapi Fork*, to help you track your eating habits. In-body sensing is becoming a reality also, for example, the CorTemp ingestible sensor—yes, you actually swallow it (Figure 6).

Fig. 3 Wearable fitness wrist bands

Fig. 4 Smart watches with fitness tracking

Fig. 5 home health monitoring devices

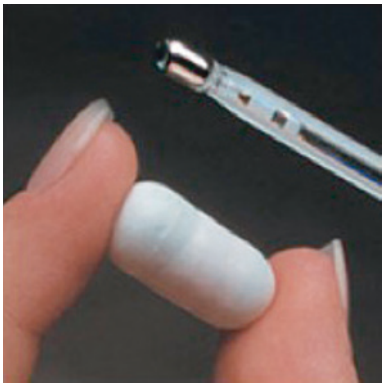

Fig. 6 CorTemp ingestible sensor

Camera devices have also proliferated. There is also the over-ear *Looxcie*, several cameras built into sunglasses (*PivotHead*, *GoVision*), and, of course, the camera in *Google Glass*. *Autographer* is the commercial version of the Microsoft Research *SenseCam* that we used in our research. Another time-lapse camera is the *Narrative Clip*. There are also specialty cameras aimed at the professional market, for instance wearable cameras marketed specifically to Police (VIEVU) or vehicle cameras for professional drivers (like DriveCam).

Meanwhile research labs are preparing even more advanced sensors for us, such as implantable eye pressure monitors, in-artery sensors, in-knee sensors (for after knee replacement), rotten food sensors, infrared sensors, and hand-gesture sensors.

Software for capturing more of one's life has increased in a number of different areas. Phone calls and instant messages can be recorded and searched by products like *Rseve*n and *Calltrunk*. You can automatically have your statement, bills, and so forth fetched and tagged by *FileThis*. *Minerva* and *WebMD* are among the companies offering to help manage and store your health records. The BeWell app measures how healthy your lifestyle is just from smartphone usage while *Mealsnap* helps you keep track of what you eat.

There are many apps to help you create the story of your life, from private journals to release-after-death services and everything in between. For instance, *DayOne*, *Kennedy*, *HeyDay*, *Momento* are journaling apps and 1 Second Every Day is a brief video journal. *DeepVue*, *MemoryMiner* and *LifeBio* help you tell your life story. Your social media is leveraged by apps such as *SocialSafe*, *Timehop*, *Memoir* and *Facebook's* own timeline.

Two applications that are squarely aimed at *lifelogging* are *Evernote* and *Saga*. *Evernote's* motto of "Remember Everything" speaks directly to the memory aspect of *lifelogging*. Appearing just as cloud computing took off and including useful features like OCR, web page capture, and search, Evernote has now reached over 100 million users. Saga is a startup which is noteworthy for attempting to be a broad lifelog including importing your calendar, tracking your location, importing social media, and supporting notes and photos in a way that creates a true 21st century journal with the kind of "make-it-automatic" features that we learned to be crucial from our own experience with life-logging research.

There are other specialized product offerings such as *Evidence.com* to store evidence for police, *Cubesensor* to sense many things in your home like air quality and humidity, soil moisture sensors, and *Kindle's Daily Review* feature to help you remember key ideas from books you have read.

Lifelogging has already impacted mainstream living. Modern smart phones have life-logging sensors such as pedometers, GPS, and even temperature sensing. I can buy a number of life-logging health devices right in my local drugstore. I see tourists using *Gopro POV* cameras on vacation. Fitness wristbands and watches are everywhere. I believe that the major factor in backup products becoming mainstream was the increase in digital photos: people used to say the first thing they would save in a fire would be their family photo albums. Today that means they want to make sure their digital photos are preserved forever. *Google+*, *iLife*, and *OneDrive* features to automatically copy photos to the cloud are key enablers of *lifelogging*.

And lifelog material is not just coming from sensors. An amazing amount of material is being born directly into the digital world, such as bank statements, online purchases, phone bills, medical insurance claims, online restaurant reservations, *Fandango* movie tickets, drinks bought using the *Starbucks* payment app, car rental reservations, and much more. With these, aspects of one's life automatically are digitized with no extra effort required by the user. This is in marked contrast with the enormous scanning effort required in our research to digitize Bell's legacy as part of the *MyLifeBits* project: so much work that he hired a personal assistant who spent over two years scanning.

Furthermore, there is the digital existence of a person: actions that a person takes in cyberspace and that often are automatically being logged. For instance, social media posts, reading eBooks, watching online movies, listening to digital music, and making *Skype* calls. All of these activities, of course, instantly become part of the digital record.

So, half way through what we call the life-logging decade, progress has been impressive, especially all the new devices added to the marketplace. But there is still work remaining to complete the vision.

The first need is to "Keep it together, keep it forever." Too often, data lives in silos and the user is dependent on Silo owner. There are photos in the photo app, call histories in the videoconferencing application, files in the file-sharing site, and so forth. One of the most striking lessons we learned in our *lifelogging* research was the power of "keep it together." Often one has just a small "memory hook" to begin a search with, and you need to bring things together to take advantage of searches like "the web page we viewed while in the conference call" or "the song I was listening to on that very hot day." Furthermore, the individual is at the mercy of each and every silo owner to retain the information. Some may go out of business, or one's account could expire, and that part of your lifelog is then lost. Thankfully, companies like *SocialSafe* are beginning to address "Keep it together, keep it forever" but more in this space can be expected, and probably by some of the major players in computing.

The second need is for more and better software. There is some nice niche software, such as some of the fitness apps. But more niches need to be covered and we need more good general applications such as Evernote and Saga. Indeed, today it is striking that life-logging software is lagging behind the life-logging hardware. We can think of a number of software applications in research labs that should be commercialized, especially those that automatically summarize large quantities of recorded material and help people tell stories.

There is a particular need for better software for scanning legacy material, that is old papers and so forth that were never born digital. It is true that such material is a drop in the bucket compared to the tsunami of "born digital" material that has been and will be lifelogged. However, scanning was an important component that got the early adopters started, and will remain important for years to come as plenty of paper not only exists in old filing cabinets, but also continues to be produced. There are some nice scanners but most scanning software is time-consuming and inflexible. Even if you can get OCR to work, we really need intelligent software that can do things like come up with intelligent titles for files, automatically organize material by date (on the paper, not the date scanned!), and extract the vendor and total from invoices.

Another glaring lack of progress is in the arena of educational software. We sincerely hope that educational *lifelogging* is ubiquitous by the end of the decade, but at present it looks like just getting it into a few cutting-edge schools is as much as we can hope for.

In balance, the progress in the emergence of *lifelogging* has been impressive. If education looks likely to disappoint, health and fitness are exceeding expectations.

There is every reason to be confident that the world of 2020 will be trying hard to absorb all the implications of a fully blown life-logging revolution.

Thinglogging

We can now predict the emergence of thinglogging, just as we were able to predict *lifelogging*. That is, we are predicting that people will increasingly log the "digital lives" of the things they own, based on enabling technology and compelling reasons why.

Similar to *lifelogging*, thinglogging is enabled by storage and capture technology. Secure and plentiful cloud storage means we can create and access information about our things in the situations where we encounter them, whether in the shop during a purchase, while using something during a trip, or in a room in one's home. Information can be captured in a variety of ways, including electronic receipts, searching online databases, barcode/QR-code lookup, point-of-sale integration, or via online human assistance (e.g., from an expert such as an appraiser).

Without thinglogging, people face a clear problem. To date, there has been no easy way for people to collect the information about the things they own and to keep the values of those things up to date. This presents a missed opportunities: information about things that people own is disconnected from the universe of services, products and people that can provide opportunity and unlock value. People also live with an incomplete view of their wealth. According to *Credit Suisse*, approximately half of global personal wealth is made up of property and possessions (Credit Suisse 2013), yet the management tools for tangible assets are paltry in comparison with the tools applied to financial wealth. Finally, people are improperly insured, as insurers can only guess about what people own and how much it is worth.

Once a thing has a digital existence, and given access as it were to the Internet, the opportunities are numerous. Thinglogging opens up connections to sell, insure, share information, value (appraise), obtain maintenance, move, borrow (using an asset as collateral), or donate. In short, you can do things with your things. Like *lifelogging*, thinglogging also offers the prospect of software-generated insights.

Thinglogging will make an enormous improvement to how things are insured. Today, it is unclear or completely unknown what people own and the current value, and insurance is based on averages and crude guesswork. This means that virtually everyone is either underinsured or over-insured. Either you are paying too much for your policy, because your contents are really worth less than the estimate, or

you are paying too little, and could be in for a nasty shock should you have to make a claim only to discover that your coverage is inadequate.

The current insurance claims experience is not a good one. Insurance companies regularly lose customers over frustration with a claims experience. And no wonder! Imagine your house burns now. Now imagine sitting at a table with an insurance adjuster, who slides a legal pad across to you and asks: "please write down everything that you owned that was destroyed in the fire." Anyone who has looked at their credit card bill knows that a lot of seemingly little charges can quickly add up. In the same, way, a lot of seemingly little items in your home can quickly add up to a lot of value, but it is a tough chore to recall them all for an insurance claim. Furthermore, particularly valuable items may come under challenge from the insurer. What model was that exactly? Do you have proof of ownership? (No, I lost it in the fire!)

Thinglogging can change all this. The claims scenario will be click and send, with proof of ownership taken care of long ago. The exact items and their values can be know, making insurance "just-right," instead of having you pay too much or too little. Policyholders will have more peace of mind and better claims experience, and insurers will have happier, more empowered customers.

Having all your things online also allows the usual producer-consumer conversation to be flipped. Today, consumers are typically inundated with offers (ads). Instead, imagine companies being inundated with offers of interest in purchasing their goods and services, in what Doc Searles calls the Intention Economy (Searls 2012). A foretaste of this is found in Zillow's *Make Me Move*, or Priceline's *Name Your Own Price*; in these cases, it is the consumer taking the initiative. A thing-logging system could solicit bids on repair, moving, insurance, and so forth, for certain things one owns. Like Zillow, a "make me sell" notice could be published.

People use products like Mint.com to gain insight into their finances; in a similar manner thing-logging could provide insight into one's tangible assets. The insights that could be gleaned by intelligent software are numerous, including: price trends ("you should consider selling"), recall notices, useful accessories, available maintenance, underinsurance warnings, and depreciation histories.

A catalyst for the emergence of thing logging will be progression to the next generation. In the next 30 years, we will see the greatest intergenerational transfer of wealth in the history of the world. Approximately $30T, or about $2.7B per day, will be inherited. The ones leaving behind this wealth are "the last analog generation"—the last generation to have become well established in their adult lives without personal computers or the Internet—and they are passing it on to a gener-

ation that has known computers all of their adult lives, or sometimes to a younger generation that was born into a digital world with Internet and mobile phones.

The differences between these generations are striking and have implications for thinglogging. Not only will those inheriting the wealth be more comfortable with technology, but they also prefer hands-on action via their technology to being brokered. They trade online rather than visiting a broker and they want apps for wealth management rather than visiting a wealth manager. The older generation is selectively connected to the Internet, while the newer generation can hardly stand to ever be offline. As this massive inheritance takes place, the recipients will be the sort of people to take advantage of thing-logging.

Microsoft had a seemingly audacious mission statement in 1975. Yet they got it right. Today, I believe that if you look at "the reason why" and "enabled by" that thinglogging is just as inevitable as the rise of personal computers. The thinglogging mission statement is: Every thing that everyone owns in a personal cloud

Conclusion

So how did the Microsoft vision of "a computer on every desk and in every home" go from a "crazy and wild idea" to a boring fact of life? Bell's Law led to the creation of the PCs that Microsoft was using at the time, and Moore's Law increased their power until they were genuinely useful enough to belong on every business desk. Another turn of Bell's Law produced the Web-PC that took over the home.

Microsoft's vision statement pre-dated the invention of the spreadsheet in 1979 that would power business adoption, and Microsoft did not foresee the power of the Internet that would drive home adoption. Clearly, this vision was not based on already knowing the "reason why." (Even Bell in 1972 wasn't sure, wondering what functions would make a home computer something more than an "interesting oddity and status symbol.") Rather, they believed in Moore's Law—that clever engineers would make the PC ever more powerful—and they also believed in the PC as a platform for clever software engineers to invent new applications.

Our prediction that life-logging would emerge was somewhat different. We also began from a context where we had seen Bell's Law produce some new classes: smartphones, the first wearable health devices, and other sensors that we had seen demonstrated in research labs. We too trusted Moore's Law and Kryder's Law to continue—at least for a decade. But instead of just supposing some applications would emerge that someone would find useful, we actually began building and using software to discover for ourselves what it was like. And so did our colleagues in the research community. Thus, we had experience with the "reasons why" be-

fore ever making the prediction that life-logging would be cheap, easy, and commonplace by 2020. Progress to date confirms that this is the life-logging decade and that it is emerging right on schedule.

The Internet of Things is a vision very similar to the 1975 vision of a PC in every home. It will be enabled by Bell's Law and Moore's Law. It will be an amazing platform that one can expect clever software people to invent applications on, and that some of these applications will make people want it. But, for most things in the world, the reasons why for connecting them to the Internet are yet to be discovered.

Long before the Internet of Things fully arrives, things will make their way into cyberspace first by being logged and then by being tracked. Many things in the world will enter cyberspace this way while few are yet peripherally or directly Internet-connected. This is thing-logging. While the reasons why for most things to ever be directly Internet connected are yet unknown, the reason for things to be logged are evident—providing knowledge, insight, and the ability to do things with your things. And the coming intergenerational wealth transfer will be a potent catalyst for the more Internet-connected inheriting generation to thing-log.

This is the *lifelogging* decade, and it is emerging on schedule. Every thing that everyone owns will be in a personal cloud.

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Rational Discrimination and Lifelogging: The Expansion of the Combat Zone and the new Taxonomy of the Social

Stefan Selke

1 Introduction: 'Zoomed' thinking and new phenomena

At the M.E.S.H. Camp 2015[1], a meeting in the start-up scene in the area of healthcare, biohacker Tim Cannon presented a possible future. He had sensors implanted under his skin which regulated various systems, for example the heating in his house: "This makes the house part of my body." This example goes far beyond the popularised *lifelogging* uses, such as activity trackers or sleep tracking.[2] At the same time, it clearly shows a possible field of investigation *between* technology and culture. Jim Gemmell, software architect at *Microsoft-Research* and founder of the Thing-Logging platform *Trōv,* has even predicted the coming of a new era, the *Century of Lifelogging*: "You become the librarian, archivist, cartographer, and curator of your life." (Bell and Gemmell 2007, p. 5) Are comments such as this the expression of the familiarisation with technologies that are increasingly suitable for everyday life or a seismographic indication of an anomic trend in society?

1 M.E.S.H stands for Medical Entrepreneur Start-up Hospital. Start-ups meet with insurance companies, doctors and pharmaceutical companies at this event and pitch contest.

2 For a definition and distinction of *Lifelogging* cf. the author's introduction to this anthology.

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It is the task of public sociology to use "dialogic complicity" (Selke 2015) to clearly show the correlation between "public issues" and "private troubles". For this purpose, in the late 1950s, C. Wright Mills suggested an approach he called the "sociological imagination". It can be understood as the intellectual capacity to diagnose one's own epoch, as "zoomed thinking" (as I like to call it) or as the "ability to go from the most impersonal, distant changes to the most intimate characteristics of the human being—and to be able to see the connection between the two. (…) That is why people hope (…) to be able to understand what is going on in the world with the help of sociological thinking." (Mills 1963, p. 44) Few current phenomena are better suited to practise "zoomed thinking" than *lifelogging*. What are the consequences of digital life recordings for individuals and society in general? And reversely: what kind of society is required as a frame of reference for self measurement practises?

In this article I will outline the *lifelogging* phenomenon from the perspective of societal transformation and I maintain that the *cultural matrix* (understood as the set of all the rules of coexistence) will be permanently changed through *lifelogging* (understood as a disruptive technology). Besides the potential of a life with numbers (2) pathologies of quantification (3) are slowly emerging. Therefore, my main thesis is the identification of a new taxonomy of the social which, in principle, affects all aspects of life. I call this principle *rational discrimination* (4). Here, the focus is on the concept of a new organisational principle of society that produces new inequalities. In the end, *lifelogging* can be three different things: an auto-ethnographic research instrument, self-enhancement in scenes, and commercialised everyday practise.

Lifelogging as a Research Instrument

A research community has been established particularly for the gathering of visual data. This community meets up, for example, at *SenseCam* conferences. The *SenseCam*, developed in 2003 by Microsoft Research, was the original wearable *lifelogging* camera. Since its development, an entire market for these cameras has emerged (*Vicon Revue*, *Memoto* etc.).[3] These are used for data collection in auto-ethnographic studies in the areas of tourism, education, museum education and the monitoring of public spaces, or in studies on (dementia) patients or to monitor

3 cf. the article *Capturing the Ordinary: Imagining the User in Designing Automatic Photographic Lifelogging Technologies* by Vaike Fors, Martin Berg and Sarah Pink in this anthology.

diet patients—all areas where the environment should be automatically recorded as best it can. *Lifelogging* therefore allows an extension of classic methods of qualitative (and also quantitative) empirical social research.[4]

Self-enhancement in scenes

Lifelogging uses within specific scenes, such as the Quantified Self (*QS*), have become considerably more prominent than its application as a scientific research instrument. Here, technophile "early adopters" from all over the world meet and share their experiences and ideas. Since technology journalist Gary Wolf got to the heart of it with his 2010 comment "Self Knowledge through numbers", an increasing number of followers of this movement measure themselves in order to improve their performance, health or well-being. Within the *QS* scene, self-tracking and *lifelogging* followers regularly gather at so-called meetups and talk about their personal experiences.[5] One cannot stop at this one description of the field. Although my own perspective on *lifelogging* is rather sceptical, in the following I will introduce a number of *lifelogging*'s capabilities, especially those that are popular in the self-measurement practise.

2 Life with numbers: The capabilities of lifelogging

Lifelogging, which is understood as an encompassing protocol of life, undoubtedly harbours potential. The most important are: the objectification though measurement, optimisation through real-time feedback as well as emancipation and the transfer of knowledge.

4 cf. the article *Built environment, physical activity and social participation of older people* by Daniela Kahlert in this anthology.

5 An analysis of this scene would be interesting considering cultural anthropological aspects (rituals, boundaries). Peripheral areas of *QS* could also be considered part of the biohacking scene. Here, people are striving for new forms of co-evolution of humans and technology and with that the removal of boundaries of the biological body, particularly against the backdrop of transhumanist philosophy. I have kept this section short because multiple articles in this anthology go deeper into the topic of the *QS* scene.

Objectification through measurement

First of all, there can be an objectification of self-awareness when humans and machines "merge" with one another, which is how Gary Wolf, co-founder of the self-measurement scene *QS*, sees it. In his manifest *The Data-Driven Life* he criticises subjective distortions and blind spots of our self-awareness. He consequently demands that "[w]e need the help of machines" (Wolf 2010). *Lifelogging* is based on the attempt to eliminate potential self-deception and substitute it with objective and rational measurements. Here, self-trackers implicitely orientate themselves towards prior technologies and instructions of rationalisation. They follow the concept of "intellectual rationalisation" as pragmatically formulated by Max Weber (Weber 1995, p. 18). Weber indicated that rationalisation is based not on knowledge, but on trust in knowledge. Despite—or even due to—scientific advances, we do not know more, but we believe that, in principle, we *could* know more. The rationalisation of the self capitalises on the "organisation and systematisation of reality in order to make it predictable and controllable" (Loo and Reijen 1997, p. 34). Everything that assists methodological, functional procedures and therefore the optimisation of personal gains is welcomed here. The important thing is the belief in the principle of betterment. Or better yet, belief in the will to not only optimise, but even in *optimising the optimisation*.

Optimisation through real-time feedback

This demand for optimisation can be understood as a reaction to sociological diagnoses of exhaustion at the individual (Ehrenberg 2004) and societal levels (i.e. Neckel and Wagner 2013; Grünewald 2013). Consequently, the human body is seen as the object of an "Upgrade culture" (Spreen 2015) whose enhancement is increasingly supported by technical prostheses (Harrasser 2013) along with bio-chemical products.[6] Since we have arrived in an "always-on-society" (Kimpeler 2010; Henning 2015) in which data are awarded unlimited significance and authority, this appears to be unquestionable.

The fascination with self-tracking and the corresponding faith in figures become clear in this euphoric quote: "It is uplifting to see the lines of a graph merge and to see the correspondence of the subjective self-image and the real image"

6 The film SRYBSY (short for: sorry, very busy), shown at the Foresight-Filmfestival 2015, shows this form self enhancement in a telling way, cf. http://foresight-filmfestival.de/portfolio/sry-bsy/. Accessed 08 Nov 2015.

(Pauk 2014, p. 43). Especially from a sociological perspective, one could refer to the Thomas theorem: "If men define situations as real, they are real in their consequences." (Thomas and Swaine 1928, p. 572). He who trusts figures helps to create a new category of reality that results in a new framework of reference for the definition of their situation and therefore for their own behaviour.

Emancipation through collaboration and knowledge transfer

Digital self-tracking and sharing data can be helpful for people with a (rare or chronic) illness for which there is no adequate or suitable medication. The tracking-paradigm finds its expression in Health Social Networks such as *CureTogether* or *PatientsLikeMe*. Here, patients come together to try to aggregate data on the application of medication or types of therapy in order to critically evaluate the pharmaceutical industry's promised effects in a collaborative bottom-up process, to perform as anti-experts, or to contribute to the development of new healing methods through the communal reflection of their personal experiences. They are trying to get away from the dominant informational hegemony and the often criticised powerlessness of the layperson. At the same time, new forms of knowledge transfer between laymen and experts are being created.[7] In many of these applications, patients and doctors work together to use the collected data to derive better therapy methods for illnesses. For example, migraine patients were able to prove that a certain medication increased the cases of dizziness by a factor of four (Betge 2012, p. 124). Empirical research must be done on the corresponding transformation of knowledge, whereby one fundamental question must be asked: How can particularistic knowledge gained through self-tracking become universal or generalisable knowledge?[8]

7 cf. the article *Self-Tracking as Knowledge Production: Quantified Self between Prosumption and Citizen Science* by Nils B. Heyen in this anthology.

8 The project "Knowledge transfer 2.0. The designs and potential of non-certified expertise in life sciences and medicine", funded by the German Federal Ministry of Education and Research, is doing research on this question. cf.: https://www.uni-hamburg.de/fachbereiche-einrichtungen/fg_ta_med/projekte/wisstrans_2_0.html. Accessed 08 Nov 2015.

3 Life in an objectified reality: Pathologies of quantification

In the following I will take an explicitly critical look at *lifelogging*. First, I will look for the reasons for the expansion of *lifelogging*. This will be followed by the question of how norms of self-observation are shifted to become permanent self-observation (of one's own health, physical well-being, performance levels etc.) and evaluation of these categories between peer-to-peer reference groups—and which societal transformations can be tied to this process.

Privatised contingency reduction

The pleasures of booming digital self-tracking primarily correspond with the fear of losing control that we see in modern societies. Dangers are broken down into (calculable) risks and (expected) security in order to suggest the controllability of the world. In the space between vague expectations and withheld fulfilment, new attempts at minimising the omnipresent insecurities of the world are being established. This *desire for control* is based on a generalised trend of fear, commonly irrational fear or an ostentatiously presented "sorrow of the world" (*German Angst*). *Lifelogging* can therefore be comprehensively understood as digital crafting of the senses. The data work as a "dike" of digital society: They protect one from the sudden intrusion of the unknown and unpredictable.

The demand for *protection through predictability* is one of the four reactions to the "liquid modernity" (Baumann 2012) in which individuals must constantly accept *exogenous* changes and insecurities they cannot control. The result of the resignation to the perceived loss of control in societies of risk and consequences is an orientation towards fields that seem to be *endogenously* manageable. The loss of confidence in (political) institutions and the lacking ability of self-organisation in modern societies enhance the desire for positive experiences of self-efficacy and direct feedback. The philosopher Giorgio Agamben points out that this originates from the replacement of political thinking with economic thinking: "For want of historical tasks, the biological life has been declared the last political task of the Western World" (Agamben 2015, p. 39). Therefore, it goes to show that the domination of the economic paradigm accompanies what has commonly been called *biopolitics* (Michel Foucault): The procurement of life as an eminent political task, which is simultaneously a private task.

This demand for a privatised contingency reduction results in the level of the controllable—and that is mainly one's own body that is taken under the loupe of

the "caring eye" through monitoring measures. *Lifelogging* is not therefore digital narcissism, as some columnists are quick to call it. *Lifelogging* is more about the search for a life management strategy. Contingency—the perception of "it-could-always-be-very-different" forces one to constantly deal with open possibilities. While the world is being examined in increasing detail at the level of the controllable, an internalisation ('endogenisation') of the world's risk management occurs that no longer works in the "outside world". The effect of this *privatised contingency reduction* (Kraus 2005) is the increased belief that one can tame the chaos with numbers and the recovery of the illusion of controllability. The illusion of the measurability (of nearly everything) might be the last measure against a "transcendental homelessness" (as Georg Lukács called it in 1916) in a century in which meaning is the primary scarce good (Selke 2012). Self-trackers counter the loss of political utopia and metaphysical security with formulas of ideas according to which self-awareness can be enhanced through data collection.

Commensuration

The belief in the basic measurability of nearly everything is an intelligent idea "which gains its power from the omnipresent appearance of objectivity" (Distelhorst 2014, p. 19). In the end, quantification itself always includes an element of control. It is nothing other than the proof of usefulness with a feedback feature in real time. Here, the significant aspect is the disassembly of personal conditions and social facts into statistics, whereby meaningful relationships and everyday ways of understanding can go missing.

Lifelogging is additionally based on the faith in figures and confusing the entirety with its individual elements. The problem with the commensuration—the mistake of transforming *qualitative characteristics* into *quantitative value* to make them measurable and comparable—forces completely heterogeneous data to form an overall picture which often stands in contradiction to practical connections to everyday life.

Digital self-tracking is also vulnerable for this category mistake when an increasing number of individual aspects are tracked. It is then that the tracking itself comes to the foreground, which means nothing more than that the real goals are dominated by the media of data collection. This *dysfunctional balance between ends and means* is one of *lifelogging*'s most obvious pathologies. However, the thing that often fades into the background is the fact that average values and reality

often have little to do with each other.[9] Thus the system of knowledge is changed in the direction of an overemphasis of *know-how* with a simultaneous loss of *know-why*. The technically possible categorisation of external and even internal conditions (i.e. through "mood tracking") makes it clear that, in principle, all biological conditions can be arranged hierarchically, taken out of context and therefore be made socially comparable. Every form of digital forensics proves itself to be a form of practical contact with the body. The more often one's own data are made accessible for comparison on eHealth platforms and decentralised, self-registrative data practises are mixed with administrative social, health and consumer statistics, the less interpretive knowledge and alternative readings are taken into consideration. The lack of interpretation abilities results in normalising self-tracking and the homogenisation of societal practices that lack comprehensive purposefulness.

Bodily capital

Through the retreat to the level of the controllable, one's own body almost automatically gains a different status. It becomes a "construction site" and the health that is connected to it becomes a type of substitute religion. The realised transformation of the body to a lifestyle product and temple can be understood with the concept of *bodily capital* (Schröter 2009). Therefore, an additional differentiated form of capital is added to those elaborated on by Pierre Bourdieu (economic, social, cultural).

In a society that is (at least partly) running out of gainful employment, the preservation of health has been declared and transfigured to a form of work. Individuals are made into managers of their own health just as they have already been made into entrepreneurs of the self (Bröckling 2007) in the area of gainful employment. With that the body gains the status of an object of investment. Sociologist Nina Degele calls these 'beauty dealings' and assigns these activities an instrumental character: If you want to be beautiful, you have to proceed in a success-oriented and competent manner: "Beauty dealings (...) is a medium for communication and serves the production of one's own public image for the purpose of attaining attention and the protection of one's own identity" (Degele 2004, p. 10). On the one hand, beauty is therefore individual because it helps one express their individuality, autonomy and authenticity. On the other hand, it is also social

9 This can be symbolised in a rather literary example: When an aged Goethe was asked if he had led a happy life, the poet answered: "Yes, I have had a very happy life. But I cannot remember one single happy week." (as quoted in Baumann 2014, p. 66)

because it is about effects of recognition and the ascription of competence. These mutually strengthen each other: "private beauty dealings become ideological when appearing autonomous and self confident belongs to the 'impression management' necessary in society" (Degele 2004, p. 13). The effect of this practise is registered with glances and through data. The expressive body and demonstrative health are symbols that can be assessed by society. Health and fitness are deemed "a symbol of physical discipline and attractiveness" (Schröter 2014, p. 32) and therefore as components that lead to status and power. Life becomes comprehensible as a project that one must regularly invest in to prevent one's own *substitutionality* and to be seen as useful. Sociologist Siegfried Kracauer took note of this in 1929 in his observations of the many beauty parlours in Berlin. He summarised the causes of the boom in his classic work *Die Angestellten* (Kracauer 2013, p. 25; emphasis added by the author) and put forth an explanation that is still fascinating today:

> "The rush to the beauty parlours stems from the existential fear that the use of cosmetic products is not always a luxury. *For fear they might be taken off the shelves*, men and women dye their hair and people in their forties work out to stay thin."

People are worried about maintaining their marketability and employability. The natural body has become workable material that people handle with an attitude of maintenance. In fact, in the *lifelogging* scene, there are many mechanist and functionalist pictures of the body that can be broken down into its individual parts which, in the case of a defect, can repair itself or can be brought to the right repair shop. Thus, every form of digital forensics proves itself to be a "window to the body", whereby naturalisation causes the transformation of the human from a subject to an object and one's own life receives the status of a project.

Physical capital can only be socially assessed through *demonstrative* health and fitness: "bodies are trained and treated, rehabilitated and repaired, socially disciplined and aesthetically moulded" (Schröter 2009, p. 252). One's own symbolic value is continually improved upon in a dynamic process. Within an increasingly broad logic of prevention (Kühn 1993; Lengwiler 2010), the investment in physical capital becomes an everyday, individual and autonomous task, the non-fulfilment of which implies sanctions.

Argued from a psychoanalytical perspective, the appeal of digital self control through *lifelogging* arises from the imperative of the renunciation of instincts. In a society in which the leading values are thinness, athleticism, health, productivity and effectiveness, the renunciation of instincts truly is rational. For only then can one's own social position be secured or marked. This creates the breeding grounds for the exclusive life forms of *asceticism of prosperity*: sacrifice no longer stems from deprivation, but rather from the knowledge of the validity of data.

Specific economy and commodification of the human being

This day in age, career and success require performance and praise, whereby collecting knowledge about one's own "I" has become a compulsory exercise. Kevin Kelly, one of the founders of *QS*, is also a prominent idea provider of the neo-liberal economy. In his book *New Rules for the New Economy*, he determined certain principles that are now proving to be successful within the big data idea. Here, the exceptional first sentence in the book is: "No one can escape the transforming fire of machines. Technology, which one progressed at the periphery of culture, now engulfs our minds as well as our lives. Is it any wonder that technology triggers such intense fascination, fear, and rage?" (Kelly 1999, p. 1) In this case, the machine is the market. *Lifelogging* forces people to organise their lives in a market fundamentalist manner. Kelly, who established the new self-tracking cult along with Gary Wolf, claims that the human being "itself [becomes] a workpiece which gains its value through processing and trade." (quoted in Schirrmacher 2013, p. 227) The maxim of self rationalisation especially develops its effectiveness in areas involved with one's own health. Instead of following an orientation of the senses, self-tracking projects follow latent economic logics. Strategies such as increased efficiency and self optimisation are perverted into the doping agent of the competitive edge. In meritocratic societies that (still) follow the myth of equal opportunity and performance (Distelhorst 2014), people constantly act in line with the market and try to praise and prove themselves to be a "living application" ("Lebendbewerbung). Since almost everything has been organised in line with the market (labour markets, relationship markets, education markets etc.), we have learned to navigate through these markets according to figures. The rationality myth of number-based objectivity nurtures the belief in scores and ranking, which seems to have no alternative. According to the common sense that has been trained in management theory, only that which can be measured can be improved upon. Wherever incentives are offered, self-trackers even deliver their data "voluntarily". Here are just two examples: Since the beginning of 2014, *SparkassenDirektVersicherung,* the bank-owned insurance company out of Düsseldorf, has been testing a scoring system where cars are installed with telematic boxes which automatically deliver driving data to a central office. Based on a calculated index, the user can receive a five percent discount on their annual insurance policy (Leipold 2015). For customers under 26 years of age that have had their driving recorded, the *AXAWinterthur* (Switzerland) rewards "safe driving" with a discount of up to 25 percent.[10]

10 https://www.axa-winterthur.ch/de/privatpersonen/angebote/drive-recorder. Accessed 18 Aug 2015.

The advertisement reads: "That way, you can always go online to see and evaluate your driving style."

Living has increasingly come to mean (re)configuring oneself under competitive conditions as if one were a machine that needs to work optimally—*using data to counteract affluent neglect* ("Wohlstandsverwahrlosung"). Utilitarian thinking, cost-benefit analyses and efficiency calculations are present in every imaginable area of life. One looks for marketable performance regarding everything that can be quantified: "Jogging becomes an achievement, just as sightseeing or one's repertoire on sex positions." (Distelhorst 2014, p. 13). Calculability is classified as an ideal-typical expression of a performance-focused lifestyle. It is in that way that the guiding formula of the *QS* movement ("self-knowledge through numbers") has declared itself as the triumph of neo-liberal thinking in day-to-day life (Stark 2014). Although the philosopher Martin Seel has warned that the measurable world is only that—the *measurable* world—and not the *real* world, we now live in the age of an *economy of the concrete*.

4 Life with rational discrimination: The new taxonomy of the social

If the authoritative power of data increases, a new form of discrimination will develop, namely *rational discrimination*. The first part of the term emphasises the *method* of discrimination, the second part emphasises the *consequences*. This form of discrimination is deemed *rational* because it assumes that, in principle, everything is comprehensible and explainable. By means of scientific (or at least proto-scientific) self-experimentation, apparently objective, reliable and valid data are deduced according to transparent methods of measurement, whereby, superficially, no irrational or destructive reason for humiliation are the guiding basis for action.

Lifestyles increasingly orientate themselves between two different 'poles': On the one hand, the *ceiling of perfection* is continuously being raised: digital *lifelogging* is transfigured to a means with which symbolic inflated lifestyle goals become reachable. On the other hand, the lowest *limit of social respectability* is constantly being lowered while complete sectors of society are stigmatised and excluded through precariousness (meaning social isolation and insecurity). This can be seen in the example of the numerical depiction of social stratification (e.g. Hartz-IV benefits[11]). An intervention in the living of one's life results from the

11 The lowest level of German unemployment compensation and social benefits that were introduced in 2005 as part of the German government's *Agenda 2010 series of reforms*.

increasing convergence of tracking possibilities within the *corridor of the rateability of the human*. We have to "prove" our lives everywhere and at all times: Rateability based on usability.

The devout consumer

Once again, the health care system can be seen as a crucial driving force for this development. *Generali*'s[12] announcement that it wants to apply an incentive programme led to criticism from consumer advocates.[13] The insurance company announced it would offer a discount programme to customers who were willing to provide self-tracked health information. The point to criticise here is that there is also a price included, which is paid by the data supplier. The *devout consumer* is the social figure that expresses a twofold reverence. Self-trackers are reverential with their own data, but also with regards to the institution that promises them rewards if their data corresponds to specific norms. Nevertheless, this balancing act is, in reality, unbalanced. The price of a life as a (potentially) accident-prone person and at the same time a person looking for a good deal is paid by allowing the concept of what is (still) normal to be delegated to software and the cognitive suppression of the social consequences of this shift. Here there is a certain homology to privacy paradoxes, the fact that privacy is verbally (ostentatiously) seen as highly relevant for most people but they (performatively) act to the contrary and disclose their private data. The increase of the phenomena of insecurity does not only lead to the omnipresent demand for security, but rather it also legitimises an increasing peer-to-peer *inclination to compare*. With that, *lifelogging* creates a *horizontal regime of control* that is based on the deviation from "set values" and in which deviations from the norm are sanctioned.

Data as metasocial tracers

The functional principle of *rational discrimination* can be explained as follows: Data primarily serve the purpose of "translating" existing social expectations. The intervention in the living of one's life results from the fact that data do not serve the description of facts alone. In reality, tracking can only work through the social

12 *Generali* is one of the biggest primary insurance companies in Germany.

13 cf. http://www.versicherungsbote.de/id/4824749/Generali-Vitality-Fitness-App/. Accessed 14 Sept 2015.

contextualisation of the data. More generally put, descriptive data become normative data through contextualisation. The use of a black box with digital traces of life changes 'neutral-descriptive' data into 'social tracing' data. In other words, the *why*-questions of life are increasingly being transformed into *how*-questions. Normative data are those which translate social expectations of "correct" behaviour, "correct" appearance, "correct" performance etcetera into figures and virtually demand a certain, socially desirable behaviour.

A historic example is the secret diary of Samuel Pepys. In the mid 17th century, Pepys wrote meticulous journal entries about every aspect of his life, about his physical condition[14] and his deviation from the moral norm of his time.[15] The entries reflect not only on his respective health status, but they mirror Pepys' *social position*. They are ultimately *metasocial commentaries*.

The example of the Balinese cock fight offers a cultural anthropological foundation of the hypothesis of rational discrimination. During the traditional (and also illegal) cock fights on Bali, two roosters fight in an arena, the owners and the audience bet on the (deadly) outcome of the fight. Anthropologist Clifford Geertz (Geertz 1987, p. 252) suggests that the amount of the wager and the odds (which are the essence of the social situation of the cock fights) are a metasocial commentary on the social "rank hierarchy" of the village dwellers that bet against each other.

This example is a clear indication that the individual existence of humans always takes place within a hierarchy of status. The omnipresence of metasocial commentaries is increasingly being tied to data on one's own social position as a consumer, employee and romantic partner. In our culture, we do not attend cock fights, we have *QS*.

Classification of rational discrimination

Rational discrimination deals with a form of discrimination that can be typologically classified between social and statistical discrimination. *Social* discrimination

14 An example of such a journal entry: "31.10.1663—I got up this morning feeling very well, only I pushed too much while shitting. I still felt well over the course of the morning and in the afternoon, I had a normal, light and solid stool (…) bless God for that. (…) In the future I (…) will directly be more cautious with my health …" (Pepys 1980, p. 220f.)

15 Here is a further example: "24.9.1663—I told my wife I was going to Deptford and went to Westminster Hall and there I found Mrs. Lane and took her over to Lambeth (...) and had my way with her (....) then I went home for dinner (...) It saddens my heart that I cheat on my wife..." (Pepys 1980, p. 220).

is understood as the categorical rejection or dismissal of people according to their (real or ascribed) group-specific characteristics (e.g. ethnicity, sex, age) as well as political, religious or sexual orientation. The aspect of discrimination can range from verbal and symbolic depreciation to exclusion from social zones, group-focused enmity (cf. Heitmeyer 2012) as well as manifest violence. Statistical discrimination is understood as the sweeping judgement and condemnation of people (employees, consumers etc.) according to probabilistic approaches.[16] The aspect of discrimination results from the fact that individual characteristics, i.e. real job performance or real buying power, do not play a significant role. Statistical discrimination defies duties of equal treatment in the areas of insurance coverage[17], the labour market[18] or pension schemes (e.g. Balsa 2001; Eriksson 2001).

16 The basic assumption of the theory or statistical discrimination is lacking or incomplete information (e.g. about a person). It is clear that digital self-tracking cannot be about statistical discrimination. There is incomplete information, for example, when a job or university place applicant is to be evaluated without being able to draw on experience with this person (which is in the very nature of the thing). Furthermore, the theory assumes that decision makers try to gain information on the person by considering them on a group level. Thus an *assessment of productivity indicators and potential* follows. Statistical discrimination excludes prejudices and individual motives and instead assumes that people's characteristics can be determined based on group membership and therefore on the basis of representative characteristics. "Statistical discrimination takes place when an individual is assessed on the basis of the average abilities of a group that it belongs to and not solely on the basis of their individual characteristics." (Büsch 2000, p. 8) In the long term, statistical discrimination can lead to systematic preference-oriented discrimination.

17 A study done by Richter (Richter 2011, p. 287f.; emphasis by the author) came to the conclusion that there is often statistical unequal treatment in the area of private insurance services. "In the different classes of insurance, various representative characteristics are used more or less, depending on the type of insurance. The results are the differentiation in insurance premiums or the rejection of contracts. This is how private health insurance companies differentiate between age, sex, disability and sexual orientation. (…) From an insurance economic perspective, this procedure (…) is comprehensible, *rational* and efficient. If they were to renounce statistically valid characteristics, they would run the risk that other insurance companies could steal their good risks (anti-selection)."

18 Büsch (2000) examines statistical age discrimination regarding the employment of job applicants on the labour market. It has been observed that in Germany, employment seekers already have difficulties finding a job at 40. "One can speak of discrimination against older versus younger applicants when it is assumed that both applicants are equally qualified for the open position but one of the applicants receives preferential treatment due to their membership to a certain group." In comparison to younger applicants, older people are said to have numerous disadvantages (being worn out due to illness and work, lacking abilities, less willing to accept change, lacking flexibility,

The phenomenon of rational discrimination can be placed between statistical and social discrimination because, on the one hand, single values are compared with group values, averages or ideal values (an aspect of statistical discrimination) and, on the other hand, due to the above-mentioned corridor of the rateability of the human. This brings the concept of normalism to mind, which is understood as theoretical discourses and practical procedures with which societal "normalities" are created which are then held as a given so that they are perceived to be objective fact (Link 2013).[19] Self-tracking is based on meta-suppositions on normality and therefore forces one to conformity. Especially health has become its own field in which both system integration and social exclusion take place.

Hence, deficit-oriented and primarily quantifying organisational principles of the social prevail: the omnipresence of self-tacking technologies results in a *constant search for mistakes, declining tolerance for mistakes and increased sensitivity to deviations* with regards to ourselves as well as to others. Large areas of life that can be illustrated in qualitative dimensions and could simultaneously be the foundation for positive social awareness are forgotten. One loses perspective of the whole person and his dignity. In general, people are being degraded to the status of numerical objects.[20]

What happens next can be summarised as: *We are a number.* The rational perspective is an achievement of abstraction that leads to the de-individualisation of humans. This can be understood as a form of violence or aggression. An active subject becomes a passive object. In the statistical world, there are neither active nor leading personalities. Individual histories are translated into the language of statistics and probability. Ultimately, our understanding of life itself is transformed. Capitalism only recognises something as an achievement if it is—or seems to be—measurable and calculable. At the present, the emphasis on the quantifiable is excessive. *We start to see ourself differently when we observe each other.* I would now like to present four different examples in order to illustrate the spectrum of *rational discrimination*.

learning difficulties or higher training costs, as well as increased wage rates and risk of illness and less remaining time on the labour market).

19 cf. the article *Lifelogging and Vital Normalism* by Lars Gertenbach and Sarah Mönkeberg in this anthology.

20 This already begins before starting school: One tries to illustrate educational success based on a scale of 1 to 6 (1 being the highest, 6 being the lowest mark). Teachers call successful pupils *Einserkandidaten*, meaning a candidate to become a straight "A" student.

Examples of rational discrimination

The first example is *Freeletics*, a tracking-app that is supposed to facilitate training and working on one's own body ("Get in the best shape of your life"). The "athletes" record their training sessions, create statistics and put themselves in the limelight with motivational videos. Every training success is turned into points and entered into the user's profile. The goal is to reach a higher level.[21] The description of the app is: "Keep in touch with the *Freeletics* community around the globe. Compete and compare times with friends and inspiring athletes. Track your progress and share results on the *Freeletics* leaderboard."[22] The athletes are therefore socially perceived through (negative) deviations from ideals and ideal values and motivated at the same time.

The second example refers to rational discrimination in the working environment. "Are you still asleep, or are you already working?" The employees of the supermarket chain *Tesco* have to ask themselves this question. Surveillance *at the workplace* is increasingly associated with discrimination. Currently, forms of rationalisation are even being rationalised. In post-Taylorism, not only every hand movement of the employee working on the assembly line is being timed, the entire person is being tracked. In this context, the economic expert James Wilson talks of "physiolytics". Workers should be tracked in every area "in which performance can be increased" (Wilson 2013, p. 9). The difference to Taylor is that now, employees are tracking themselves as well. Supermarket chains such as *Tesco* or the internet giant *Amazon* are examples of companies that track the walking distance of their employees with great detail. Monitored people are stressed out because they are constantly in fear that a mistake will be found and they will be disciplined.[23] *Lifelogging* at the workplace also takes place with the involuntary consent of the employees because it occurs within a relationship of dependency on the employer. The social geographer Jerome Dobson (Dobson and Fisher 2003) even speaks of "geoslavery", and with that he means the practise of (secretly) monitoring the location and performance of other people. "Part of this term shows that the master is in a position to verify every move of the slave according to time, place, speed and direction."[24]

21 cf. https://www.freeletics.com/de. Accessed 13 Sept 2015.

22 cf. https://www.freeletics.com/en. Accessed 13 Sept 2015.

23 At *Amazon* they have implemented a principle based on the baseball idiom "Three strikes, and you're out" (Vanessa 2013).

24 Here we must remember that we as consumers implicitly endorse these practises, for example when we order a book over *Amazon*.

The third example is the promise of security that can result from rational discrimination. Technical assistance systems are increasingly being used in geriatric nursing.[25] This is accompanied by the collection of data of the person in need of care. An example of this is the *Safewander*[26], a sock with an integrated sensor that registers if a dementia patient has left their "protected" living area or not. However, the measured spectrum is being expanded to the monitoring of complete living spaces.[27] Besides emergency calling systems that also allow "silent search queries", private living environments, including personal habits, are visible from the outside. The "smart meter" documents consumption in "intelligent" homes right down to the use of individual household devices. Hence, it can be determined how long it has been since a person has taken a shower, when they went to bed and got up or when they usually make coffee. Daily life is divided into "events" and made visible for digital measuring instruments. Deviations from that which has been defined as standard in the person's profile set off alarms.[28] Providers such as *JustChecking*[29] in Great Britain or *RWE Smarthome*[30] in Germany check on demand in which room a person is and if necessary sets off a software-aided alarm—assistive colonialism is in full swing. It is still unclear what this development will lead to. It is clear, however, that the structure of responsibility is being shifted towards a socio-technical system. Human care and social interaction are being outsourced to the field of technology. This form of life-tracking can even lead to the *avoidance of others* and causes a form of technically supported alienation.

For the care of another person can only be delegated to technology to a certain point before it endangers the immediacy of human interaction. In this context, Zygmunt Baumann speaks of "adiaphorization" (Baumann and Lyon 2013,

25 The development of technical assistance systems to aid elderly people with impaired cognitive, motor or sensory abilities in everyday situations to help them lead an independent life is known as *Ambient Assisted Living (AAL)*.

26 cf. http://www.safewander.com. Accessed 14 Sept 2015.

27 The integration of technical assistance systems in existing nursing and assisted living homes allows the businesses in this sector to profit from the demographic change (Georgieff 2008).

28 For example, when the coffee machine has not been used for a long time and it is assumed that "something is not okay". Touch-sensitive bathmats or rugs register if someone is (still) standing or has (already) fallen down and costly video monitoring systems use software to recognise falls and can react to them with the assistance of software.

29 cf. http://www.justchecking.co.uk. Accessed 14 Sept 2015.

30 cf. https://www.rwe-smarthome.de/web/cms/de/2768534/home/. Accessed 14 Sept 2015.

p. 165) with which he means the disconnection of one's own actions from moral concerns. In the end, more technology will lead to increasing indifference and laziness, which is the opposite of what Emmanuel Levinas meant with his "caring gaze" which stemmed from the holistic understanding of the human (quoted in Schnabl 2005). An equally high risk lies in technologies' disciplining effect. Assistive systems can also turn into mechanisms of degradation in which human dignity has been interwoven in functionalities. Surveillance turns into a form of disciplining that paradoxically stands in opposition to the actual goal of promoting a self-determined life in old age. These days, sensors make decisions for people where other people used to.

The fourth and last example illustrates that *horizontal controls* resulting from self-tracking contributes to the erosion of solidarity and simultaneously shifts the boundaries between voluntariness and coercion. Rational discrimination also takes place where company health management passes off pressure of the entire staff to individual employees because individual behavioural deviations from the norm harms the collective "health score". This is the basis for the *dacadoo* business model, which provided the service of calculating individual employees' fitness values into a collective "health score" for the company. This "health score" then forms the basis for the calculation of the insurance premiums for the company's health insurance programme.[31] Wherever services are only offered in connection with previously calculated probabilities or verifiable preventative activities, where "data for deeds" are collected (Kuhn 2014), a new form of biopolitics will slowly emerge that has a discriminating character for those who do not (wish to) correspond to the ideal. "Data produces opportunity for action and the compulsion to act at the same time" (Kuhn 2014, p. 51). In the end, the normativity of the data leads to the decay of the solidarity, or the concept of solidarity in general. With this in mind, one can refer to the philosopher Michael Sandel (2012) and say that elementary societal values are being corrupted.

Consequences of rational discrimination

Tracking technology providers create completely *new categories* to describe and standardise people. Generalisable assertions can be made on one's fitness level based on *NikeFuel*'s measuring unit. With their product *Vitality-Age*, the insurance company *Generali* has created a new category for gauging the age and health of their customers. Those who define social categories have power and change the

31 https://www.dacadoo.com/?lang=de. Accessed 08 Nov 2015.

cultural matrix. The intervention of disruptive technologies (Coupette 2014) in the value structure not only creates the powerful and the powerless and digital winners and losers. What is more, fundamentally new *structural* conditions for social devaluation are being created and are rapidly being institutionalised in diverse areas of practise.

Rational discrimination may be based on supposedly objective and rational tracking procedures. Nevertheless, the tracking methods produce digital winners and losers, which is how top performers are separated from those unwilling to perform, those who generate costs from those who save costs, "health-on-people" (healthy) from "health-off-people" (sick) as well as the useful from the unnecessary people.[32] Above all, it has come to a renaissance of pre-modern appeals of "culpability" in the guise of talk about "personal responsibility". Against this background, *lifelogging* can also be understood as *shame punishment*. This works especially well when the aspect of discrimination is hidden behind the façade of playful competition (gamification) or a reward system (incentivisation). The interlocking processes of norming (standardisation) and normalisation (control) are limiting the range of the normal and human and run the risk of creating a "completely disciplined social structure" (Mills 1959) on the basis of rational consistency where instead of the *pheno*type of human, the *geno*type has taken centre stage.

Data translate social expectations and transform people into abstract numerical objects which can be dealt with in a far more inconsiderate and indifferent way. In the long run, the implication of the disappearance of personal aspects through quantification will be the elimination of differentiated personalities and the establishment of a one dimensional concept of the human being. The result of this de-personalisation is ultimately the reification of the social: The question regarding the "correct measurement of life" increasingly shifts towards the question regarding the "value of a person". The final point in this series of self-tracking principles[33] is the commodification of the human, meaning the transformation of the human into a fictitious commodity (cf. Polanyi 2014). For we are not only goods consumers, we repeatedly tout ourselves commercially as "living applications" ("Lebendbewerbung"). Those who must continuously put themselves on the market strive to be in good shape. Self-trackers are advertisers and the advertised product all at once. It is an investment that is implicitly felt to bring an increase in value for one's social status and self-respect. The main test one has to take is configuring oneself as a good and thus investing in one's social affiliation and

32 Literarily, this topic has been dealt with in an extraordinary way by the Swedish author Ninni Holmquist (Holmquist 2011).

33 cf. the article *Lifelogging* by Peter Schulz in this anthology.

"marketability". Self-tracking looks at the characteristics which are assumed to be on demand on the markets or tries to commercialise existing characteristics. Those who are completely responsible for being "ready to use" of course welcome any and all aids and tools that contribute to keeping one's business up and running. That is how the performance-fixated economy directly or indirectly procures the appropriate "human material" (Lutz 2014, p. 11). Something paradox about this procurement process is that the de-individualisation involved with this commodification simultaneously forms the basis of what is felt to be one's own feature of individuality.

5 Life with decision engines: The new social contract

There seems to be no limits to the possibilities of self-tracking, at least on the technical side. The tracking zone is constantly being expanded. An innumerable amount of providers offer *lifelogging* technologies. Sensors can now be found hidden in "intelligent" textiles with which the human heart can be monitored, for example the t-shirt *Ambiotex* (originally a development of the Fraunhofer Institute for Integrated Circuits IIS). The shirt continually measures bodily signals and transfers the data to a smartphone or tablet via radio waves to be analysed and saved. There are conductive textile electrodes in the shirt fabric that can pick up the heart's activity as well as the rate and depth of the person's breaths. Furthermore, the t-shirt has features such as fall recognition and an alarm with an automatic assistance notification with which the geodata of the person wearing the shirt can be transmitted.[34] A further "smart textile" are the hightech socks from the New Zealand company *Footfalls and Heartbeats*. These socks give diabetics early warnings of diabetic foot ulcers for which a "smart" wool was developed with interwoven synthetic optical fibres. That way, the foot of the person wearing the socks can be analysed according to its blood circulation and the possible risk of getting an ulcer.[35] There is hardly a body part or bodily function that has been left out. Many applications focus on chronic illnesses, such as *Dexcom G4,* a system that continually measures glucose levels in subcutaneous fat tissue to automatically adjust the tissue sugar to the blood sugar levels. The external receiving device saves the data on a computer for later analysis and warns the user if their levels differ too greatly from the expected levels.[36] The sensor *Scanadu Scout,* is merely

34 cf. http://www.ambiotex.com/de/. Accessed 14 Sept 2015.

35 cf. http://www.ambiotex.com/de/. Accessed 14 Sept 2015.

36 cf. http://www.nintamed.eu/produkte/dexcom-g4.html. Accessed 14 Sept 2015.

held up to the forehead and can measure body temperature, pulse, the blood's oxygen saturation and blood pressure and produces an electrocardiogram with data forwarding.[37] The *lifelogging* spectrum is very extensive and goes from sleep-, mood-, baby-, senior-, sex- and work-logging to death-logging[38] (cf. Leipold 2015; Selke 2014). In practise, the possible converges with the conceivable.

Those who express doubt are (too) quickly decried as cultural pessimists and a person who denies modernisation. The following anecdote shows how extensive human tracking has become: There was a typing error in an article that I wrote for a journal: Instead of writing *Thing*logging ("Internet of Things") I wrote *Think*logging. Neither I nor the editor found the mistake. A shorter version of the article was later published in a newspaper. This goes to show that we believe many things are possible—even reading and filing away thoughts. The hope of salvation has run ahead of the technical realisation.

The longing for decision engines

Rational discrimination is the foundation for the construction of new social categories and the establishment of new social orders that focus on deviations, suspicions, risks, deficits and cost factors. Ultimately, a generalised ideology of inequality emerges. If rational discrimination goes unquestioned and becomes an element of society, it can even mutate into a legitimate element of prosecution in the future. In the final stages of this development there would be the necessity of a reversal of the burden of proof—that would then be the dystopia "*lifelogging* as a civil duty". The default situation would be "suspicion", hence people would primarily be perceived as a risk, mistake, failure. With this in mind, people would have to prove their utility, harmlessness etc., in an increasing amount of spheres of life. The basis of this is formed by a development that does not focus on *realworld questions*, but rather on *data-driven processes* (Krcmar 2014, p. 10). It is therefore not about what people need, but rather what can be lucratively combined with data.

Data collection and *lifelogging* are not an end in itself. Ultimately, it will always be about the question of who is actually *making the decisions*. Are lifeloggers becoming blind to the possibilities of their own thinking? Are they losing their decision-making autonomy? Against this background, the example of *lifelogging* pioneer Gordon Bell leaving the decision on whether or not he should eat some ice

37 cf. https://www.scanadu.com/scout/. Accessed 14 Sept 2015.

38 cf. the article *Deathlogging. Social Life Beyond the Grave* by Hèléne Bourdeloie and Martin Julier-Costes in this anthology.

cream to his digital 'black box' seems almost harmless. It lets him know if he has exceeded a certain number of calories and gives him a green light to consume ice cream (or not). The zest for life then takes place within a mathematical corridor of pre-programmed appropriateness. This leads to the unlearning (de-skilling) of elementary capabilities that also effect one's own decision-making. A similar example can be found with the app *Ampelini*[39] that helps kids make the right decision when crossing the street. With regards to baby-logging, parents count on the monitoring software *Owlet*[40] ("monitor you baby from your smartphone"). In these and many other cases, one is primarily promised increased safety. Thus one must ask the question of what would happen if engines (or algorithms) not only influenced simple, but also complex decisions. Increasingly refined "smart" helpers are being developed for life in the "colony of perfection". With that, one must ask when engines will begin taking over ethical life or death decisions, for example (Rauner and Schröder 2015).

In the end, self-tracing and self-monitoring are only precursors of a development that will end in an *era of decision engines*. Apparently rational and informed decisions will be made regarding enemies and "welfare scroungers", lazy people, slackers, dumb people, people unable to work or reluctant consumers. However, rational discrimination is not a characteristic of technology per se. Machines are programmed by people: technology does not monitor people, people monitor people. To be more exact, the decision on what is normal has been delegated to a (new) elite (so-called symbol analysts) that are unmistakeably oriented towards Californian *solutionism* that assumes that there is a technical, pragmatic solution for everything (Mozorov 2013, p. 19ff.). *Lifelogging* perfectly suits this attitude.

The new social contract

In China they have established a *Social Credit System* (SCS) that assigns each citizen a type of "loyalty index" indicating a person's loyalty to the government. What began as a type of credit score for loans expanded so greatly that, according to Rogier Creemers (University of Oxford) "[i]t isn't just about financial creditworthiness (...) The aim is to collect nearly every aspect about citizens' lives and share it between public bodies."[41] Are we witnessing the emergence of the decision

39 *Ampelini* is a play on the German word *Ampel*, which means traffic light.

40 cf. https://www.owletcare.com. Accessed 14 Sept 2015.

41 https://www.newscientist.com/article/mg22830432-100-inside-chinas-plan-to-give-every-citizen-a-character-s. Accessed 08 Nov 2015.

engines of the future? Either way, it is becoming clear what the centralisation of personal data can lead to.

The desire for decision engines began long before the digital era. The Dominican monk Father Dubarle published an enthusiastic outline in 1948, the goal of which was "the rational arrangement of human concerns, especially those which affect the community and show a certain statistical regularity". (as quoted in Wiener 1958, p. 174ff.). Dubarle wanted an apparatus of state, a *machine à gouverner* that could make better decisions based on extensive data collection. He was in no way naive to think that human actions could be entirely represented in data. Thus he demanded a machine that did not act purely deterministic, but rather a machine that strived for "the style of probabilistic logic". The important thing here is, however, that the power over the decision engine was transferred to the *state*. The state was supposed to become "the most well-informed player" and ultimate coordinator of all partial decisions. For Dubarle, the task of the decision engine was making fundamental life or death decisions: "direct extermination or organised cooperation." In his euphoria of progress he added "This is probably good news for those who dream of the best of all possible worlds!"

This "good news" becomes dangerous in its updated neo-positivist form. On the last pages of their manifest *The New Digital Age, Google*'s Eric Schmidt and Jared Cohen request nothing other than the voluntary submission to the world's bests known decision engine: "As in a social contract, users will voluntarily relinquish things they value in the physical world—privacy, security, personal data—in order to gain the benefits that come with being connected to the virtual world. In turn, should they feel that these benefits are being withheld, they'll use the tools at their disposal to demand accountability and drive change in the physical world." (Schmidt and Cohen 2013, p. 257). Their reasoning sounds almost exactly the same as Dubarle's exuberant belief in progress; with two important differences. First of all, today, decision engines actually exist. Second of all: It is companies and not the state that are "the most well-informed players" and ultimate coordinators of all partial decisions.[42] If *Google* claims that, worldwide, networking and technologies are the way to a better life, then one must remember the crucial question regarding who actually decides what is normal. Decision engines, programmed by humans, decide how far one can deviate from the "norm" and still be "normal".

42 There is a very controversial literary realisation of this motif in the novel *The Circle* by Dave Eggers (Eggers 2013).

Or are the new "Cogs" (cognitive computers) the decision engines of the future? Computers such as IBM's *Watson*[43] are fed with "world knowledge" and soak it up like a curious child. Companies that purchase such computers from IBM want to remain anonymous, probably because they are afraid that it would then become clear that many of the decisions in banks, hospitals or insurance companies are not being made by human beings. With its programme *Chef Watson*, IBM is trying to gain wide acceptance for cognitive computing—on the basis of 10,000 documents, the programme can create 10^{18} cooking recipes. Of course depending on the contents of the smart refrigerator. The first tests have been praised by the media (Fleschner 2015), even if some of the recipes might need some getting used to ("beer-tacos"). From the consumer's perspective, the question is rather whether or not *Chef Watson*'s three recipes are an autonomous decision, or which other status this type of filter has. Taking it a step further, the question arises whether or not cognitive computers will "one day replace ethics commissions or will shoot suspected terrorists as autonomous drone pilots." (Rauner and Schröder 2015, p. 65)[44]

6 Conclusion: Praise to unpredictability and zones of opacity

It is still possible to set other priorities. Counter movements such as *Digital Detox* or *Mindfullness* encourage people to reduce their dependency on technologies and to win back their decision-making autonomy. The biggest challenge here is to dispel the myth of the TINA-syndrom (TINA: there is no alternative). The important abilities citizens need in order to confront the challenges of the future is the will to (once again) make one's own decisions—as well as the ability to take responsibility for these decisions. Besides informing people on data protection (along with other important initiatives), there is a need to gain back awareness of the fact that zones of non-transparency are important in the development of one's own personality and that life is not about being perfect.

Those who do not arrange their own zones of non-transparency might do so in the future. After the introduction of the above-mentioned *Social Credit Sys-*

43 *Watson* became world famous after it won *Jeopardy* in 2011. Similarly, another IBM computer *Deep Blue* beat the world chess champion Garri Kasparow in 1997.

44 The open letter written by Stephen Hawkings, Nick Bostrom, Eloin Musk and others demanding that artificial intelligence should only be used for good causes and should obey human beings will not change anything. "If computers should one day develop a sense of humour, they will find the letter in the archives and read it out loud to each other and have a good laugh." (Rauner and Schröder 2015, p. 67)

tem (SCS) in China, there was a rapid development on the black market for data profile "adaptation"—digital retouching instead of complete objectivity.[45] On the one hand, compulsive perfection is the imperative that is being written into the cultural matrix by self-tracking technologies. On the other hand, there will be an emergence of whole new professional fields and markets for dealing with data in a "humane" way. Self-tracking implies going through highly specified training sessions to learn and acquire culturally rewarded, visible and market-compatible characteristics and the sheer limitless self-rationalisation of one's own life. However, in order to live in the new objectified reality, there is a need for a broader spectrum of expertise that also includes "bilingualism". *Narrating instead of counting, assessing instead of measuring*. For that which is deemed as appropriate cannot be measured. This is exactly what philosopher Hans-Georg Gadamer points out in his book "Die Verborgenheit der Gesundheit" (*Enigma of Health)* where he criticises the contemporary term *measurement* with a classic platonic dialogue: "There is talk of a measurement which is not used to approach something, but which possesses something inherent to itself. (…) There is not only a realm of measurement, there is also a realm of appropriateness. (…) The true meaning of this appropriateness is that it contains something that cannot be defined." (Gadamer 2003, p. 167) It is precisely this which is missing from the self-tracking training sessions: the learning and acquisition of ways to deal with surprises, secrets, intuition and contingency and therefore, ultimately, how to deal with oneself. Here, what has been established should be re-discovered. Not only the person as data savvy, but also as sovereign over their own life.

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45 And with that, there was a repeat of the development of retouching, which quickly cropped up after the late 19th century invention of photography. After the intoxication of the "objectivity" of photographs had worn off, people quickly discovered that certain picture elements (e.g. one's face) needed a self-serving form of reworking or soft focussing.

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