Situating Conventions of Health: Transformations, Inaccuracies, and the Limits of Measuring in the Field of Self-Tracking

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Eryk Noji, Karolin Kappler & Uwe Vormbusch *

Abstract: *»Situierung von Gesundheitskonventionen: Transformationen, Unge-nauigkeiten und die Grenzen des Messens auf dem Gebiet des Self-Trackings«.* How is doing health transformed into a measurable entity? Based on empiri-cal research,[1] we will analyze relevant aspects of quantifying health in two distinct fields: diet and mood-tracking. From the perspective of the econom-ics of convention, self-trackers within these fields are investing in new forms and measures of equivalence for how health can be measured and handled. In doing so, they are confronting three main obstacles: the *inaccuracy* of measuring, the cumbersome *materiality* of objects and everyday practice, and the fuzzy *relation* of everyday doings and measuring. On the one hand, self-trackers are striving for practical consent over what an "accurate" meas-uring looks like and in what cases inaccuracy can respectively not be toler-ated. On the other hand, self-trackers draw on varying criteria for *adequate* accuracy depending on how they practically integrate their tracking practices into everyday life. In the economics of convention, objects are granted a vital role, supporting competent everyday actors in their coordination efforts as well as tackling normative and ethical issues. We suggest that technologies such as sensors, mHealth applications, and smartphones are involved in eve-ryday practices as intermediate objects in varying engagements and negoti-ation processes. In both fields of self-tracking, quite a unique configuration of measuring, objects, resistiveness, and engagements (Thévenot 2002, 2014)

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emerges, making present conventions of health evasive and fragmented, and still quite unavailable to health organizations, policy makers, and users alike.

Keywords: Self-tracking, self-quantification, valuation studies, economics of convention, investment in form, materialities.

1.   Introduction

In the last decade, we observe a fulminant advance of quantification, possibly most obviously with the invention of still heterogeneous taxonomies and calculative practices framing the human body, the subject, and his or her everyday routines. Although there have been relevant quantification and tracking efforts in the past (Zillien et al. 2016; Fröhlich 2019), the digitalization of (self-)tracking has expanded its depth and scope dramatically, fueling discussions about the utility, appropriateness, and ethics of the associated numbers and taxonomies (Vormbusch 2020).

Even if the history of modernity is also the history of increasing instrumental knowledge about the human body and its "health status" – Michel Foucault's work is certainly the best-known reference in this context – this knowledge never came close to the living body and subjectively experienced notions of well-being or health. That is because this knowledge in an ideal sense remained a formal body of knowledge (so to speak) linked to the individual only by logical assumptions, formal rules, and scientific procedures, much like what Desrosières and Thévenot (1979) call "logical classifications." They point out that such logical classifications and categories will not become valid descriptions of what is going on until they are rooted in everyday classification practices ordinary actors are engaged in. Diaz-Bone (2016, 52) puts it like this: "No social classification can be built only on logical principles alone and no social classification can be built on empirical data alone." One could argue that for generations modern medicine has done its best to rebut such a notion and that the emerging self-quantification of health is one approach to regain individual autonomy by articulating quantified knowledge, embodied experiences, and everyday practice. To achieve this, new conventions for measuring health must necessarily evolve, addressing the deep trench between bodily enclosed human sensations and calculative knowledge. From a practitioner's perspective, the translation of a cognitively, for-the-most-part inaccessible body is one of the main challenges of self-quantification. This most of all applies to our living body, as the following quote illustrates:

> Most people know what hunger feels like. But do you know what a calorie deficit of 500 calories feels like – compared to a deficit of 750 calories? And

what does a difference in your mood mean if you rate your happiness as 7 vs. 8 on a scale from 1 to 10? (Sophie)[2]

Questions like these typically emerge in the context of self-tracking. They point to a central issue in this field: the emergence and establishment of conventions for assigning numerical values to people's bodies, behavioral patterns, and – not least – emotions. In the following, we shed light on how investment in form is introduced within specific communities of practices of self-quantification. Thereby, we address the problem of how conventions of health are *situated* within the everyday lives of single actors, addressing coordination problems characteristic of contemporary societies. Convention theory in general highlights the practical capabilities of actors enmeshed in conventions (Desrosières 2011; Diaz-Bone and Salais 2011; Diaz-Bone and Didier 2016). Conventions in the meaning of the economics of convention and the sociology of critique (Boltanski and Thévenot 2006) are "logics of coordination." These logics may not be reduced to blunt instruments for given purposes; rather, they have strong normative rootings and implications. Therefore, orders of worth are at least as much moral frames for interpretation and valuation as they are legal and cognitive frames.

In the following, we pursue the thesis that within the field of self-tracking, something new is socially negotiated and, eventually, brought into being: collectively valid orders of worth for individual everyday activities, for competences tied to the body and its history, i.e., immaterial capital tied to the subject, for whose manifold aspects no widely accepted forms of representation and valuation have yet been found. Self-tracking can thus be understood as a gigantic laboratory spread across the globe, in which people integrate, adapt, or develop technical procedures and normative criteria by means of which they categorize and compare their concrete differences. On the one hand, self-tracking practices are based on the emphatic emphasis on one's own distinctiveness ("N=1!"), on the other hand, however, they might finally produce collectively binding taxonomies of the self. Self-tracking therefore implies specific investment in form (Thévenot 1983) which the subjects integrate into their lives or perhaps, more precisely, co-produce in order to connect with one another and contemporary economy and culture in general. Although self-trackers' activities often remain private, they are nonetheless sociologically relevant. In particular, Laurent Thévenot "enlarged the notion of coordinative powers to personal capacities or abilities that imply coordinating with oneself and are a prerequisite for coordination with others" (Thévenot 2014, 11). In order for coordination to be possible, expectations about the behavior of others are required. However, these expectations also relate to how actors coordinate with themselves. According to Thévenot (2002, 69), public

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justification requires *both* emotional involvement and moral infrastructure. Thévenot, in a conceptual move towards differentiating specific regimes of interacting with the world – introduces a "dual view" here: one is focused on justifications in public, drawing on obligatory, albeit subconscious conventions; the other on modes of coordinating with oneself: "Such a dual view is needed if we want to account for the interrelated metamorphoses of modes of government and of selves [...]" (Thévenot 2014, 9). Power and self have to be interlinked, and Thévenot's "regimes of engagement" are understood as unveiling the hidden forms of how the self is being able to interact with itself, which in turn is a prerequisite for engaging in public in the first place. These engagements are "based on a variety of relations to the world" (ibid., 11). Actors can engage in an individual *plan*, in the course of which they see the world functionally in order to achieve a set goal. They can engage in *familiarity*, which means that they value the world in terms of features like simplicity or convenience. Here, actors develop a bond, as in close friendships or in areas of intimacy. Or they can engage in *exploration*, a playful approach to the world that involves excitement and surprise (Thévenot 2014). The emphasis – as with all varieties of conventionalist thinking – remains on the competence of the actors, insofar as they can change their engagement depending on the situation. However, the possibilities of engagement as well as the continuity of the self-depend on specific environments which have been prepared, or in other words, formatted (Thévenot 2014, 12).

But "forms" and "formats" for coordinating action do not come into effect without altering the world. Actually, their very purpose is to rearrange the entities of the social world in such a way that coordination becomes possible in the first place: "Shaping people and things in conventional forms produces capacities – or powers – to communicate and coordinate, that are needed for living in human communities" (Thévenot 2014, 10). Accordingly, in our cases we will analyze the field-specific investment in form by concentrating on this process of rearrangement. We regard this as a "double transformation" of materialities and doings into numbers and calculations. We are going to analyze two specific practices: diet-tracking and mood-tracking, which differ in regard to the standardization of the corresponding investment in form. By asking how diet- and mood-trackers employ, adapt, and integrate (more or less established and standardized) numerical investment in form into their everyday body and health practices, we address the resistiveness of the involved bodies and objects, specifically the inaccuracy of measuring, the cumbersome materiality of objects and everyday practice, and the fuzzy relation of doing and measuring. Investment in form above all means to invest in the coherence of the entities involved so people and objects may be treated "in homogenous ways across contexts" (Thévenot 2002, 56), thereby essentially transforming them into something different. Getting to grips with

resistiveness means to extend the limits of valuing to immaterial capacities (health) and thereby to shift the existing "margins of accounting" (Miller 1998).

Research in institutional health economics (e.g., Batifoulier et al. 2013; Batifoulier 2018; Da Silva 2018) discusses and highlights the role of values and the quantification of health outcomes, observing, e.g., a shift from welfare state organizational principles to market-economic organizational principles, particularly in French and other European health systems (Da Silva 2018, Batifoulier 2018). The introduction of evidence-based medicine in the 1980s in the form of practitioners' clinical experience, state-of-the-art clinical research, and data collection on current treatments as a factual basis (Staii 2018, 199) was accompanied by continuous standardization efforts (Da Silva 2011), on the basis of statistical distributions against the background of collective data (Staii 2018, 200). This form of data collection to generate medical facts has been continuously expanded and, at the political level, standardization efforts have gradually been extended (Da Silva 2011).

This epistemic change through the datafication of health (Ruckenstein and Schüll 2017) is accompanied by new data infrastructures. The networking of new (individualized) data with old health data particularly promotes individualized, predictive, and preventive medicine. As empowered patients, actors are thus being made increasingly responsible for their health (Staii 2018, 199), but at the same time their orientation towards the common good is not being taken into account (Batifoulier 2011, 153; Ruckenstein and Schüll 2017, 272). Furthermore, economic policy attempts – under the umbrella of patient empowerment or "digitally engaged patients" (Lupton 2013) – to promote active, well-informed patients in order to give them market power and thus make the field of health accessible as a market (Batifoulier 2011). Swan characterizes these patient-driven health care services as "having an increased level of information flow, transparency, customization, collaboration and patient choice and responsibility-taking, as well as quantitative, predictive and preventive aspects" (Swan 2009, 492), while the health outcomes vary between cure, improvement, normalization, prevention, enhancement, and self-expression. The introduction of patient-generated content through self-tracking creates patient-driven health care models, which change not only the role of patients, but also of physicians, health insurances, science, or the concept of health (Swan 2009; Lupton 2013). With the newly emerging data economy in the field of health, the problem of the lack of open negotiation processes on common goals, values, and qualities in the field of health is therefore further intensified (Ajana 2017): On the one hand because of the new actors and infrastructures in the health sector (Staii 2018, 202); and on the other hand because their concerns are even more obscured by the datafication processes and technologies.

Tamar Sharon (2018) has added a new perspective, demonstrating how contemporary health research by major consumer technology corporations is woven into various moral logics and accordingly integrates different notions of the common good. In recent years, a whole series of largely standardized products for alleged improvement in individual health by self-quantification have become popular (e.g., Google Fit, Apple Health, Samsung S-Health, etc.). At the same time, these products support a combination of conventions that Sharon has identified as dominant for health research. On the one hand, in the vitalist repertoire, health is held up as a general good, both for the individual and for social groups and humanity as a whole: "Here, good health, life and vitality are upheld as the highest values, (human) life and its proliferation is understood as having intrinsic value, the pursuit of the good life is framed in terms of the quest for Health" (Sharon 2018, 7). On the other hand, this pursuit of health should now be made possible by quantitative means, thereby transporting industrial logics of efficiency and optimization into the everyday lives of users: "The industrial repertoire is a dominant one in the context of healthcare today, where digital technologies promise to propel medicine forward through early diagnosis, the development of precision treatments and the rendering efficient of inefficient healthcare systems" (Sharon 2018, 6). In the case of self-measurement, there is a new factor that it is not physicians who generate knowledge about patients via measurement methods, but it is the self-trackers who generate knowledge about themselves and thus become experts in themselves.

By asking to what extent this industrial logic finds its way into users' everyday lives through quantification, our perspective is in line with an internalist perspective as a starting point, as proposed by Diaz-Bone and Didier (2016) for a sociology of quantification, which requires categories and quantifications to be interpreted and applied by competent actors, meaning that these entities only emerge in situations. Or as Salais puts it: "Quantification is plural" (Salais 2016, 132), which "means that any quantification process has to be situated, for the choices of what and how to quantify depend of the situation, the activity, the people, and their principles of justice" (ibid.). In practice, this means that while users are directly affected by a vitalist call to individual health, measurement techniques transport notions of accuracy and efficiency, which can be quite troublesome to integrate into daily lives. Accordingly, users must find an adequate balance between the precision of the measurements and the livability of everyday life, or in other words: a balance between conventions conveyed by the objects and their personal ways of being engaged, for example engaging in an individual plan or engaging in familiarity. The concept of adequacy is directly related to normative accounts of how and why tracking should be done. While users of diet-tracking applications can rely on a set of already standardized measures such as calorie and weight, this is not the case for mood-tracking, as different approaches

compete with each other and it is unclear what the best way could be to translate emotions into numbers. Therefore, uncertainties about correct ways of measurement and representation are accompanied by uncertainties about the right measure of mood and well-being in general.

2. Methodological Approach: Transformation Problems and the Limits of Measurement

The methodological design followed the principles of grounded theory (Strauss 1987; Strauss and Corbin 1996) in order to investigate the emerging and changing practices and taxonomies of self-tracking in a flexible and methodologically open procedure. The underlying inductive research logic and the alternating phases of data collection and data analysis allowed for a continuous adjustment of the methodological procedure, the data (saturation) and – within limits – also the underlying research question. In this respect, grounded theory proved to be the appropriate instrument in the context of a sometimes rapidly developing research subject, which is reflected not only in the sometimes rather volatile, short-term and changing surveying practices of self-tracking, but also in the embedding of sensors in everyday objects such as watches or mobile phones. Among other things, the quality criteria of object adequacy and theoretical penetration (Strübing et al. 2018) have repeatedly generated new research questions from the empirical material.

In total, more than 100 data entries were collected, including interviews and group discussions with self-trackers, observations of their self-tracking practices, and expert interviews with stakeholders (such as developers of self-tracking devices) and participatory observations in the QS-community. They cover different fields of self-tracking – such as fitness, performance, sports, mood, and health – and different levels of self-tracking expertise – ranging from casual to professional self-trackers. The following descriptions and findings are mainly based on interviews and a group discussion with strength athletes on diet-tracking and interviews with and Show-and-Tell-talks of the Quantified Self-community about mood-tracking.

Based on this empirical research, we contrast two application areas of self-measurement: diet tracking and mood tracking. Both fields have a health impact. However, they differ greatly in many aspects. While diet-trackers can relate to a long history of measuring in the sports and health sectors and can use standardized quantities such as calorie or kilogram largely unquestioned, this is not the case in mood-tracking, as attempts to quantify feelings can be regarded as quite new and unexplored (Vormbusch and Kappler 2014). In other words, diet-trackers can access investment in form that are not (yet)

available for mood-tracking. It follows, that we can observe quite different approaches to transformations of materiality and doings into numbers. On the one hand, a double transformation is to be assumed in diet-tracking, since in most cases it is a question of accounting for both a form of input and a form of output. Accordingly, diet-trackers attempt to account for food intake and activity-consumed calories. Mood trackers, on the other hand, are confronted with a great variety of measurements and units of measurement, as the quantified measurement of mood is not yet standardized. What we characterize in the following as a transformation problem, is from the participant perspective a challenge to deal with various forms of inaccuracy or, as in the case of mood tracking, the question of what it is that can and should be measured. Based on these transformation problems, it can be seen how users in everyday life are confronted with investment in form (Diaz-Bone and Didier 2016; Thévenot 1983; Desrosières 2007), and, depending on the level of standardization as well as the material and practical obstacles, how they handle them, how they stretch or adjust them, or even how they break with them.

3. Diet-Tracking: The Resistiveness of Established Numerical Investment in Form in Everyday Health Practices

Diet-tracking is a practice in which people measure their nutrition in terms of various parameters such as calories and micro- and macronutrients. This can be done to pursue a variety of goals. Some users want to get an overview of their diet. Others want to approximate a healthier lifestyle or an appearance which they consider more attractive or more capable. Such goals are usually linked to the parameter weight as a dependent variable. At the same time, weight serves as a test of the effectiveness of the tracking practices, as it is the weight that should change. A commonly used formula to make weight changes calculable is the accounting of ingested and burnt calories. It is called "calories in, calories out" (CICO). All major apps for diet-tracking work on this principle, e.g., MyFitnessPal or FoodDataBase. However, it is not only the apps that have made this popular. The career of the calorie began at the end of the 19th century, when Wilbur Olin Atwater started to perform nutritional studies using a "calorimeter, a device previously used to measure the combustive efficiency of explosives and engines" (Cullather 2007, 340). As large as a room, this instrument enabled the energetic measurement of food intake and energy consumption through activities. Hundreds of similar experiments followed: "Proceeding from a Taylorist conception of a mechanomorphic body, Atwater led an effort by manufacturers, municipalities, and the federal government to set scientific 'standards of living' that could be used

to contain wage levels while maintaining a healthy, contented workforce" (Cullather 2007, 343). The quantification of food and activities found its correspondent in the measurement of body weight in kilograms (Zillien et al. 2016, 125). Guidebooks like *Diet and Health* by Lulu Hunt Peters took up the concept of calorie and popularized calorie counting as early as 1918. Although never free of criticism, counting calories has become an increasingly recommended way to lose weight. But to make reliable statements about the weight usually requires the bathroom scale, which in turn goes back to a history of domestication starting with the scales in public places in the early 20th century. In order to maintain their normalizing power, however, another supplement was needed, namely charts that normalized body weight in relation to height: "Together, the scale and the height and weight chart became a powerful dual technology for defining normalcy" (Crawford et al. 2015, 483). This indicates that diet-tracker can rely on substantial investment in form, as the apps refer to scientifically engineered classifications and calculations. While the rationale seems simple, difficulties arise in implementation.

One side of – what we call – the double transformation problem in diet tracking is thus to obtain an adequate estimate of the calories ingested. On the one hand, users need to find out how many grams of a particular food they eat, mostly by weighing each ingredient with a kitchen scale. On the other hand, they must have information about caloric density and other relevant ingredients. To provide this information, diet-tracking apps include databases. These databases can be filled by the users themselves (thereby acting as producer and consumer of relevant data alike), so that missing ingredients can be continuously updated, for example by reading the appropriate information from packaging or researching it on the Internet and subsequently feeding the database with this data. Some apps include the possibility to scan barcodes, so that nutritional records are added in a time-saving way. However and as a result, it is not uncommon that there may be differing information for a particular ingredient or a ready meal, indicating some lack of standardization. Most users decide between these options from the gut, unless they are currently holding the package with nutritional charts in their hands. In addition, the databases are usually only available online, so that it cannot be tracked if there is no Internet access available. Users must then enter this later. If they no longer have the nutritional information and quantities, they often estimate it.

The other side of the double transformation lies in the fact that in order to gain/lose weight, this calorie-intake must be higher/lower than the consumption of calories due to daily activities as well as the basal metabolic rate. Consequently, these activities must also be translated into calories in order to relate them with the calories actually ingested. Common diet-tracking-apps try to make the process of accounting as easy as possible. To calculate the basal metabolic rate, users must specify gender, age, and body weight. Depending

on these parameters, steps taken via pedometers are converted into extra calories consumed. To simplify counting steps and because users do not always have their smartphones with them, the apps can be paired with wearables that detect the steps and sometimes the heart rate independently of the smartphone. While pulse measurement increases accuracy, it also reduces battery life, which is why many users turn off pulse measurement. There are also questions about the position of the sensor on the body. Wearables on the wrist or the smartphone in the trouser pocket on the hip, the pulse measurement on the wrist or the chest strap, they all have different advantages and disadvantages in terms of precision and everyday practicality. For example, optical pulse measurements on the wrist often struggle with the problem that they become increasingly inaccurate due to sweat between the sensor and the skin. The interaction of counting the steps and the pulse measurement also shows that these applications were mostly developed for everyday walking and running. Sports that are not essentially based on leg movements cannot be represented in this way. One interviewee told us that his Fitbit had not recorded his bench pressing. He told us that the Fitbit checks the pulse only in longer time intervals, so it does not notice the short load phases, unless they are accompanied by a rapid increase in the pacing rate of steps, which serves as a signal to the device. So basically only running sports can be measured automatically. To track other activities, users must select the type of activity from a list, enter the duration of the activity, and sometimes give an intensity rating. The latter can alternatively also be replaced by the pulse measurement. The app then calculates an estimate based on the metabolic equivalent of task (MET), which is a ratio at which a person is expending energy relative to its mass – one MET is roughly equivalent to sitting quietly (Ainsworth et al. 1993).

In this context, material resistance to measuring is ubiquitous in our data. Users clearly differ in how they practically deal with these difficulties that is, how they deal with inaccuracies, with resisting materialities, and with the process of measuring. To demonstrate this, we focus on a group of strength athletes whose goal is to build muscle and, in that sense, gain weight. Their motivation is very sports-oriented or performance-oriented. However, they have started for health-related reasons – from latent underweight to heavy overweight. We further contrast their statements with the diet-tracking practices of health-oriented self-trackers, by caring for their nutrition, monitoring a dietary change or addressing health problems through weight reduction and control. Throughout our interviews, very different assessments of measurement inaccuracies – culminating in contradictory constructions such as "approximately accurate" (Alex) – emerge. On the one hand, for some interviewees and in some periods of diet-tracking it seems to be important that, for example, calorie measurements are carried out as accurately as possible, since they are the basis for the dietary intake under changing conditions (e.g.,

days on which one trained hard for the strength athletes). On the other hand, there are several statements in the interviews, referring to – what could be called – "acceptable inaccuracy of measurement." Alex, for example, states that "broccoli has only 20 calories, anyway" (Alex) and represents in fact a negligible amount of calories. Nevertheless, broccoli is "weighed quickly" (Alex) and therefore included in the tracking. The same strength athlete accepts a rough estimate of 500 burnt calories for his strength training. While strength training cannot be tracked automatically, it nonetheless appears as an unusual imbalance in accuracy in contrast of what could and should be expected according to an industrial logic, which requires that all relevant parameters are recorded with the utmost precision. If this was not possible, you could expect that the legitimacy of the practice was questioned. In fact, one of our health-oriented self-trackers justified the abandonment of self-tracking in line with this thought, among other reasons:

> You had to weigh everything before and then think about it, yes, I add a little bit now and then you have thought: Oh, fuck it, that's just 10 calories probably and that's why it was not precise. That has lost meaning. (Barbara)

While Barbara was unable to reconcile self-tracking with her claim to adequate accuracy and her notion of a healthy diet, the group of strength athletes does not doubt the usefulness of self-tracking despite obvious inaccuracies. So how do the athletes justify such imbalances in terms of accuracy of measurements on the one hand versus rough estimates on the other? First of all, it should be noted that the group of strength athletes evaluates digital diet-tracking as an enormous facilitation and time saving in so far as they have for a long time conducted nutritional balances with paper and pencil and drawn up training and nutrition plans to be adhered to in excel-sheets. Through their many years of involvement with the topics of sports, nutrition, muscle building, and fat loss, they have accumulated a great deal of expert knowledge. Against this backdrop, they initially justify their self-tracking practices as facilitating their work:

> I: And you say you've been engaged with this before. How do you describe your previous knowledge?

> B: For example, I just calculated with a calculator in table form. How much I have eaten and then made comparisons [...]. And that's just, of course, much easier with the app, because it calculates everything automatically. So you just type that in, what you have eaten, and then it gets directly converted and then it shows you your daily requirement. And that's just a calculation work of, I do not know, a quarter of an hour or something more, which is just saved every day or every evening. (Max)

It should be noted, that other users who have little experience with CICO accounting can find the practice of tracking every meal quite tedious, like in Barbara's case. The strength athletes, however, value mobility and the flexibility that diet-tracking offers on the smartphone. In this regard, particular

emphasis is placed on real-time feedback, which, compared to a diet plan and handwritten notation of meals, enables the individual daily routine to be flexibly adapted to the calorie balance:

> Otherwise, otherwise you just stick to the pre-calculated amount that someone writes down for you. Yes, you can eat 100 grams of rice, two pieces of turkey, a curd, and then you can cry yourself to sleep. You know? And if, if you do that flexibly, with a tracking app, you can, if you monitor it yourself, you can choose it. You can go and eat a piece of cake with people, you know it still fits, and then you can adjust the rest of the day with more activity. That's much, much, much better. (Alex)

How exactly the balance must turn out depends on the specific phase, the strength athletes are currently in. They alter phases of muscle gain – which is impossible without weight and fat gain – with phases of fat loss. Hence, they are periodically switching between a calorie surplus in which they build muscle, but inevitably also fat, and a calorie deficit, in which they get rid of the fat again. In surplus phases, both sides of the transformation problem are inaccurately measured, because, according to them, only the existence of a balance surplus is important:

> So in surplus I do not care. In surplus, I certainly do not track vegetables, because that makes 300 calories and if I gain one kilo after a week, or one point five kilos, after all I don't care. (Alex)

In deficit phases, however, "everything above the calorie density of an onion" (Alex) is measured. So much stricter accuracy requirements are applied – at least as far as the conscientiousness of the measurement of food is concerned, since the estimates of their workouts remain unaffected. Additionally, it is the body itself that brings inaccuracies into play on both sides of the transformation problem, which is why inaccuracies cannot be avoided anyway. On the one hand, the calorie consumption of activities depends on the general fitness of the self-tracker, which can only roughly be estimated. On the other hand, the absorption of calories depends on the metabolism. In this sense, one of our strength athletes sums up:

> One has anyway, food has a fluctuation anyway, training has a slight fluctuation, everything is subject to fluctuations. That's why you cannot do it 100%. You also have to decide for yourself how much effort you want to put in it, right? (Alex)

Even for the strength athletes, the claim for accuracy is subordinated to what they consider reasonable or acceptable of being integrated into their everyday lives. So while engaging in an individual plan (accurate tracking to achieve weight goals) is important, it still has to be weighed against engaging in familiarity. Accordingly, the highest possible degree of precision – following the logic of the industrial convention (Boltanski and Thévenot 2006) – would require too much effort. Hence, the practice of diet-tracking implies a continuous weighing of effort – put into the calculation – and precision of the

self-tracking practices. The test, guiding the above mentioned process of accounting, simply consists of the fact, that the self-tracking "simply works" or that despite all inaccuracies the outcome fits the targeted outcome, according to Alex:

> Well, where I was on maintenance calories, I definitely did not gain weight, so I guess, first of all, I've done that meticulously enough and second, the app works quite well with the estimates. (Alex)

This "good enough" also shows that the strength athletes depend on the result, not so much on the numerical values themselves. Corresponding to this, in the group discussion, the strength-athletes present their tracking practices and the relationship to inaccuracies of the measurement as a trial-and-error procedure:

> If you take that and then say okay with that value I've lost a bit of weight, but not what I want, I want to lose weight faster, then I'll increase that a bit. You can use it well, above all, you can take it, not necessarily to see the exact calorie requirements, but for example to compare your activity. At least if you know how they work. For example, they are susceptible to gestures of your hand. And if I watch out that I do not cheat, then I have feedback on how active I am. That is, if I do not lose weight anymore, I may have been less active. But I believe only very, very few use it like that. (Peter)

The strength athletes therefore use self-tracking to make comparisons with themselves via a kind of trial-and-error procedure and in this way gain experience about their calorie balance, with which they gain control over weight gain and weight loss as unerringly as possible. The test for CICO-formula consists in being "accurate enough" to achieve the goal. This is the minimum requirement and any inaccuracies beyond this seem to be tolerated. In this sense, the numerical investment in form of the corresponding industrial convention is attenuated by a permanent loop between testing and readjustments.

In these continuous feedback-loops, diet-trackers deal with resistances and associated inaccuracies on both sides of the transformation problem, often by developing counter-practices. For example, the strength athletes avoid places of public consumption of food, since it is sometimes difficult to obtain the correct calorie information. Another practice is the consumption of more ready meals, as the scanning of the corresponding barcodes reduces inaccuracies and saves time in tracking, as they directly refer to the caloric content. Similarly, other diet-trackers tend to eat whole packages of food, e.g., a whole bag of frozen broccoli, and prefer packaged vegetables to fresh vegetables. In the extreme, this leads to a standardization of food products, as known from system gastronomy. In this respect, the measurement (or tracking) methods can intervene intrusively in everyday life. This is in line with Thévenot's note that "an environment has to be prepared or shaped within proper 'formats' to support a particular regime of engaging with it" (Thévenot 2014, 12). But

processes of negotiation usually show up, in which a balance is made between the requirements of measuring methods and the requirements of one's own lifestyle, between engaging in an individual plan and engaging in familiarity or in exploration.

4. Mood-Tracking: The Resistiveness of Establishing Numerical Investment in Form in Everyday Health Practices

Mood-tracking is a practice in which people measure their mood, either by proactively entering their current subjective sensation of mood or by the automatic recognition of physiological parameters which are taken as an approximation of the emotional state. The motivation to track one's mood and to find more adequate forms to do so emerges either from medical and clinical needs, such as assessing and controlling emotional disorders, or from an interest in the pursuit of happiness.

Historically, the way people refer to themselves and their mood(s) has taken a variety of forms, particularly before numbers and calculations have been applied to measuring the self (Noji and Vormbusch 2018). For example, one of the first institutions of self-inspection has been established within the framework of confessing one's guilt (Hahn 1982). In this context, there were two further steps in the evolution of confession, understood as an early social institution of self-thematization: first, the focus of sin analysis shifted from looking at external actions to internal intentions and motives in the 12th century, thereby socializing emotions (Hahn 2000) and increasing the sense of one's own subjectivity; second, and since the time of the European Reformation, life observation and life confession have been systematized and integrated into everyday life, mostly in the form of diaries and reflected in the genre of novel writing since the 18th century. Consequently, the practice of confession and self-thematization has been institutionalized for quite a long time already, drawing attention to the exploration of one's own inner life, one's own emotions, feelings, and moods. This connection between self-inquiry and self-control can also be found in mood-tracking (Pritz 2016,131). Yet, despite this history of self-thematization and mood description and recording and while strength athletes refer to standardized measured variables with calories and weight (both as body weight and weight in terms of performance, e.g., when pressing a bench), mood-tracking contains a range of profound uncertainties. Since feelings were mostly treated in the form of language, it is unclear what the adequate measurables may be and in which procedures and representation formats those measures can be handled.

In this sense, a large number of different forms of measuring, recording, and reflecting of mood can be observed (Pritz 2016). On the one hand, there is a wide range of apps that require the active input of their users. These apps ask – sometimes proactively – the self-trackers to answer a couple of questions about their current state of mood. Depending on the app, the mood can be described by selecting the fitting term from a range of predetermined words, by choosing a value from an ordinal scale (ranging from 1 to 8, 1 to 10, or even 1 to 100 as in the case of the app "trackyourhappiness,"[3] or by picking the corresponding "smiley" or emoticon (see Pritz 2016, 132; Vormbusch and Kappler 2014). As a rule of thumb, the low values are associated with "unhappy" and the high values with "happy." More sophisticated services and apps allow a more complex mapping of the state of happiness, using, e.g., cross tables combining two dimensions: "arousal" (ranging from "angry" to "relaxed) and "feeling" (ranging from "sad" to "happy"; cf. interview with Steve). Depending on where the self-trackers ablate their feelings on this xy axis system, the colour of the entire square changes and the state of happiness is assigned to adjectives such as "frustrated."

On the other hand, there are first approaches that try to measure mood automatically, recording body information by sensors and deriving a mood from the measured body-value (see Oh and Lee 2015, 54). Wearables enable immediate recording of physiological data such as neuronal activities, heart rate variability (HRV), or skin conductance (cf. Malhi et al. 2017, 104). Using these automated measurement techniques, changes are determined which then analytically are associated with emotions (cf. Vormbusch and Kappler 2018, 220). Other approaches use activity data recorded by smartphones – such as number of visited places, patterns of communication or movement, telephone usage activities, number of phone calls, degree of physical activity – to derive the users' mood and specifically the existence and severity of a depressive period (Servia-Rodríguez et al. 2017; Malhi et al. 2017).

The aim of this variety of approaches is a multi-coloured statistical overview of one's own emotional world and sensitivities in the form of word clouds, progression curves or frequency distributions, named and documented by means of special software on the computer, tablet, or smartphone (see Pritz 2016, 133). But there is no consensus or standard on the adequate measurables, procedures, and representation formats, such as seen in our interview data and observations of the Quantified-Self community. One of our interviewees describes how emoticons are used to measure mood, as it is apparently uncertain which point on a scale to choose:

> [...] and then I have this slider, which goes from zero to... I think it is actually divided in the middle, so you get five points to the left and then that is the best mood, for example, and to the right, and it is a good mood. And I

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[3] www.trackyourhappiness.org.

also have this little smiley feedback. So, I put the slider and then I can see the smiley and it helps me to adjust, I think "No, not that happy, or...", you know, so that gives me kind of feedback to see, if I scored right on the scale. [...] it is just on the continuum happy versus not happy. (Sandra)

Another indicator for the lacking consensus in mood-tracking are the controversial debates among mood-trackers on the respective advantages of a numerical or text-based representation of their mood:

> [...] I also feel very reductionist if I would do it by numbers, so if I would score it. I am just curious if other people have experiences with things that are a bit more elaborated than a number, but not as free flow as words or things. [...] The structure does not help you with emotions, because it is a structure, you do not need a structure but a flow. (Deborah)

What is being discussed here in public is the question of how to capture feelings adequately. The previously established narrative formats like diaries seem too free and unstructured for Deborah. Numbers, on the other hand, seem to give too much structure and are accordingly too reductive. Instead, she is looking for a format that allows a "flow," so emotions are not suppressed and yet structured in some way. Obviously, her previously established formats do not seem appropriate for her, so she is looking for new forms.

Beyond the assignment of a value to a perceived "state of happiness," most apps allow further information about the social context, e.g., where you are, what you are doing, who you are with, etc. These are then linked together for further analysis. Additionally, it is common to correlate the perceived state of mood with other measured data in order to find out which factors have an effect on the perceived happiness. John relates his mood-tracking data to psychological theories in order to obtain information about factors that influence the emotional state:

> So what I am trying to do is to derive my personal formula that includes all the different variables and factors in my life that kind of influence and define happiness. Last December, I started tracking data points in my everyday life in order to test some psychological and behavioural theories of happiness. (John)

Using psychological theories, John has tried to relate his daily routine to a measure of his state of health. His attempt to find a kind of happiness formula can be read as an equivalent for the production of the CICO formula, but this seems to be reaching its limits:

> So, my theory was, I will see how the way I live my life, by everyday activities, is related to my happiness. I put together a list of activities that I usually do during the day, about fourteen or fifteen, and at the end of each day, I took a look on how much time I spend on these activities in minutes. And then I also computed an average happiness level for that day. And then I just ran the correlations, [...] The problem with this model is, it is kind of difficult, even for me, [...] it is kind of hard to say, sometimes, what variable

> is the cause and which is the effect. Did I feel unhappy because I worked hard/too much or did I have to work much because I was not happy. [...] So, based on this formula, based on these results I kind of derived a partial formula. It was inconclusive. [...] So, at this point, what I know is there is no solid conclusion yet, there is no final product, there is no data, there is no formula of happiness. But I did learn that happiness can be quantified and so can be the factors that influence the happiness. (John)

John explains that even for him it was difficult which variable actually causes which effect. Interestingly, these failures do not seem to lead John to give up belief in the possibility of measuring happiness. On the contrary, John thinks he has learned that one can quantify happiness, only he has failed to provide the necessary investment in form. Nevertheless, the question of whether experiences of happiness could be calculated with the help of an integrated "world happiness formula" (John) – analogous to the CICO-formula in diet-tracking – is doubted by many self-trackers. Even the goal of a consistent quantification of emotional experience is highly controversial.

Consequently, and despite many efforts and intents, there are currently no uniform models in the form of metrics, forms of practice, and rules for making mood or happiness accessible, assessable, and optimizable (cf. Vormbusch and Kappler 2018, 208). Hence, the current form of "writing mood" is highly volatile, unstable, and little standardized, with ongoing quite different investment in form. These difficulties in finding the right "formula" and appropriate forms in general also indicate that the immaterial object of the measurement appears to be much less clear-cut than is the case in diet-tracking with calories. This includes the far-reaching uncertainty about the object of mood-tracking itself. For the interviewees, it is not self-evident what is to be measured and what can be made visible by it:

> What I measured was happiness and I sort of wondered, is it really happiness or should I be measuring satisfaction, or accomplishments or, you know. (Deven)

> To me, that is more like looking at the level of frustration or some sort of... like the level of how liberated I am every day. (Marc)

Satisfaction, the achievement of goals, frustration, and freedom, all these feelings are associated with the concept of "happiness." So the self-trackers do not seem to be sure what they should measure: happiness, satisfaction, frustration, among many other possibilities. This may have something to do with the fact that, as the next interview extract shows, happiness cannot apparently be measured without influencing the state of happiness itself: "What I learnt – I can't measure happiness without affecting it" (Deven).

No suitable "conventional forms" seem to have yet been found that enable self-coordination with regard to mood. Nevertheless, the attempt to measure mood has performative effects – at least on the mood itself that is to be measured. In contrast to diet tracking, in which some actors change their practices

more or less consciously, for example by not visiting restaurants, this seems to be far less controllable in mood tracking due to the uncertain form.

5. Discussion

Comparing diet- and mood-tracking, we come across two fields that fall back on established investment in form to varying degrees. While diet-trackers can rely on largely standardized measures such as calorie or weight in relation to body height, it is still unclear in the field of mood-tracking which form of quantifying makes sense, with which variables it should be related, and which representative formats should be used for this. This is one of the reasons why in the Quantified Self-community, diet-tracking is considered relatively unspectacular and many discussions turn rather to not yet established methods such as mood-tracking. Since the unit and procedure of measurement are not yet standardized, questions on the integration in everyday life and thus about resistances and (in)accuracies – as they are discussed in diet-tracking – are less obvious here, because first of all it has to be figured out what should be measured at all – and how. While the limits of measuring in diet-tracking are mostly about convenience and a resistant materiality that cannot be measured as desired and is sometimes adapted performatively, mood-tracking still deals with questions like whether happiness can be measured at all because of its immateriality and volatility (Vormbusch and Kappler 2014). Nonetheless, there is a constant effort in particular to make feelings accessible to quantification – to the point of trying to create a kind of happiness formula, as we have seen by the example of John. We expect that with increasing standardization, these questions could shift towards issues of an adequate implementation in everyday life, as is the case in diet tracking.

Accordingly, what is considered adequate in the respective fields of diet and mood tracking varies. However, we do not consider the considerations involved in this regard as a private matter alone. Thévenot (2014, 13) argues that the established distinctions between public and private, as well as between individual and collective, make it difficult to fully grasp a person's composition and engagement. Referring to the concept of engagements and pushing it further, we suggest that even in private individuals will consider public valuation. For the regime of the individual plan this means, for example, to gauge which goals appear worth choosing, and which means are allowed or reputable for them. For the regime of familiarity, this means asking yourself which people and objects can or may be integrated into intimate relationships and what forms of appreciation this may possibly violate. Self-trackers are also concerned about public discourses that accompany their doings and achievements. Many self-trackers routinely anticipate possible criticism and are actively downplaying the rigidity of their activities or, conversely,

presenting self-tracking as the right solution to problems that others fail to address. For example, the self-trackers in our group discussion opposed invasive forms of medical intervention (gastric reduction). If you stick to self-tracking and do not deceive yourself, the argument goes, you will achieve a lot with small changes in your lifestyle, even without a rigid nutritional plan that exceeds the will of many.

Indeed, self-tracking apps are flexible technologies. We understand them as intermediate objects, i.e., objects that connect separate situations of coordination, thereby "supporting the spatiotemporal scope and coherence of the coordination" (Diaz-Bone 2019, 81; our translation). Intermediaries mediate between different assessment logics. We think of this not only as a mediation in situations of justification, but also as a mediation underneath orders of justification. When the strength athletes distance themselves from rigid nutrition plans and instead emphasize that self-tracking allows them to pursue their plan while maintaining flexibility to follow familiar or spontaneous everyday occurrences, it shows how these technologies can mediate between their commitment to the plan and their desire not to subordinate everything else to this plan, but to leave space for simplicity and spontaneity. At the same time, they could be classified as those kinds of empowered actors, who achieve their future goals with the help of technology and the standards integrated into it. In the area of health in particular, institutional requirements for empowering patients overlap with ambitions for self-empowerment of users of corresponding apps and in this sense, collective logic of coordination overlaps with individual logic of coordination. In the quest to be healthy, public demands for taking responsibility for one's own health mingle with individual efforts to pursue goals as well as with everyday life, in which familiarity plays a major role. Our interpretation emphasizes in what ways technologies are intermediaries in this process, which on the one hand carry registered logics and standards into the actors' everyday life, while on the other hand they support these actors in their various engagements. However, these logics must be situated. This in turn depends on the capabilities of the actors and their willingness to integrate the technologies into their everyday lives. This became clear, for example, with Barbara, who justified her tracking with a healthy lifestyle. For her, tracking was a measure to monitor a change in diet, which should help her to improve her health and energy. But, in her opinion, the app required such high precision of measurement, which clashed strongly with what she found to be pleasant and actionable, that she finally even stopped tracking entirely. The technology would have meant a great performative adaptation of her everyday habits and what she perceived as a pleasant everyday routine. The strength athletes, in contrast, resigned themselves to not doing their tracking as precisely as possible. In a trial and error process, they found out for themselves how much precision was required to at least move in the general direction of their goals. For each

measurement process, the strength athletes were able to give evaluative arguments about how much precision is necessary or why it is just enough not to be as precise here or there and when to be satisfied with an estimate, for example, because everything else would be too complex and too annoying. In the end, what was most important was not that it worked perfectly well, but that it worked "well enough." For many self-trackers, engagement in familiarity was a legitimate reason to limit their tracking efforts. In this case, the focus is on engaging in familiarity (living everyday life with ease). But we also find exploration in self-tracking (try it out playfully) and justification in public (strength athletes talk to/argue with others to show them the right way; Kappler et al. 2018). Consequently, self-trackers regularly deal with conflicting moral demands, like self-evident concerns for one's own health, various demands for performance, industrial logics of efficiency, accuracy, and planning as well as the negotiation with the various demands of everyday life.

As a community of practice, self-trackers shift the common ways of dealing with themselves and thus to make themselves accessible to others. Since "different objects [...] support distinct modes of coordination" (Thévenot 2002, 60), it can be expected that techniques of self-tracking enable specific and new forms of coordination with oneself and others. Numbers and calculations as a means of observing oneself allow different approaches to oneself and others than it is the case with narrations (Noji and Vormbusch 2018). This brings us to the dual view suggested by Thévenot (2014). As intermediate objects, self-tracking technologies draw the users' attention to certain facts – while hiding others. Intermediate objects unfold their own representative formats, their own language of how to think and communicate about bodies, feelings, intentions et cetera, in other words: how to relate to oneself. They enable people to coordinate in specific ways. As Sophie indicated in the introductory quote, it makes a difference whether you know the feeling for hunger or whether you can grasp hunger in quantitative form, for example 500 calories or 750 calories, because Sophie obviously learned how 500 calories hunger feels like. The taxonomies of self-measurement define what is considered a relevant difference. And simultaneously they manifest coordinating powers with all their potential empowering or suppressing effects. From the perspective of governing, self-tracking as an emerging form of measuring the self might well be interpreted as a kind of "writing the body" (Vormbusch 2020).

This new form of writing value is not just falling from the sky. Rather it materializes the historic ambitions to measure and "write" the world in new ways. In this context, it might be productive to recall that the social form of writing value has undergone fundamental transformations since the beginning of the 12th century (cf. Hoskin and Macve 1986). It began with innovations in the field of spatial structuring of texts. These were increasingly structured by the subdivision into chapters and sections, by chapter headings and accentuations as well as by the establishment of appendices, tables of

contents, and indexes. As a result, the social flexibility in the interpretation of these texts was shrinking (cf. Vormbusch 2012, 110). Particularly in economy and finance, double-entry bookkeeping represents the climax of this development, which is regulated to a high degree by legal norms. One could argue that the representation of emotions, bodily sensations, and everyday doing in the field of self-tracking can be understood analogously as a practice of representation "in the making." In contrast to long established conventions of writing *economic* value, the representation of mood, for example, is currently still highly experimental in terms of knowledge object, cognitive interest, metrics, and institutionalization; self-trackers often "assemble" corresponding representations from different sign systems. It is literally experimented in small social groups with new "spellings" of happiness. Consequently, on the level of an analysis of contemporary societies, self-tracking can be described as an emerging practice in which actors are reacting to fundamental, economic and cultural uncertainties (Vormbusch 2016). Against the background of a growing incertitude, they are trying to reach an agreement on the norms and criteria by which they themselves and their life practices could be collectively judged and altered.

Our analysis demonstrates how people are making up this instrumentation in order to cope with a growing social incertitude. What is innovative about self-quantification is how new forms of coordinating dispersed action are brought into being: still gravitating towards established notions of selfhood, individualism, authenticity, and optimization, but simultaneously transforming these notions by doing a form of quantified identity politics. It is not only that technology and calculation is inscribed into how self-quantifiers deal with themselves and the world. Since selfhood is dependent on how it is addressed and "written," we would argue that self-quantifiers are rescribing the meaning of identity, selfhood, and health by transforming meaning into numeric values – which is not to replace it, but rather to mingle these two in innovative ways. In this context, we must take the freedom into account people have when responding to action problems of today's modern societies by choosing specific ways of coordinating their actions. In this sense, they are not just executing a clear-cut program or unconsciously reproducing a specific discourse. What they are doing is answering specific calls (the call for freedom, the call for optimization, or, important in our context here, the call to treat themselves in a healthy and sustainable way) by drawing on conventions and – particularly – their engagements with the world.

6.   References

Ainsworth Barbara, William Haskell, Arthur Leon, David Jacobs, Henry Montoye, James Sallis, and Ralph Paffenbarger. 1993. Compendium of

physical activities: classification of energy costs of human physical activities. *Medicine & Science in Sports & Exercise* 25 (1): 71-80.

Ajana, Btihaj. 2017. Digital health and the biopolitics of the Quantified Self. *Digital Health* 3: 1-18.

Batifoulier, Philippe, Louise Braddock, and John Latsis. 2013. Priority setting in health care: from arbitrariness to societal values. *Journal of Institutional Economics* 9 (1): 61-80.

Batifoulier, Philippe. 2018. Réformes de la santé: une diversité de privatisations. *L'Économie politique* 80 (4): 50-61.

Boltanski, Luc, and Laurent Thévenot. 2006. *On justification: Economies of worth*. Princeton: Princeton University Press.

Callon, Michel. 1998. Introduction: The embeddedness of economic markets in economics. In: *The Laws of the Markets*, ed. Michel Callon, 1-57. Oxford: Blackwell Publishers.

Crawford, Kate, Jessa Lingel, and Tero Karppi. 2015. Our metrics, ourselves: A hundred years of selftracking from the weight scale to the wrist wearable device. *European Journal of Cultural Studies* 18 (4-5): 479-496.

Cullather, Nick. 2007. The foreign policy of the calorie. *American Historical Review* 112 (2): 337-364.

Da Silva, Nicolas. 2018 L`Industrialisation de la médicine libérale. Une approche par l'économie des conventiones. *Management & Avenir Santé. L'industrialisation de la santé* 1 (3): 13-30.

Desrosières, Alain. 2007. Surveys versus administrative records: Reflections on the duality of statistical sources. *Courrier des statistiques. English series* 13: 7-19.

Desrosieres, Alain. 2011. The economics of convention and statistics: the paradox of origins. *Historical Social Research* 36 (4): 64-81. doi: 10.12759/hsr.36.2011.4.64-81.

Diaz-Bone, Rainer. 2016. Convention theory, classification and quantification. *Historical Social Research* 41 (2): 48-71. doi: 10.12759/hsr.41.2016.2.48-71.

Diaz-Bone, Rainer. 2019. Valuation an den Grenzen von Datenwelten: Konventionentheoretische Perspektiven auf Quantifizierung und Big Data. In *Digitale Bewertungspraktiken: Für eine Bewertungssoziologie des Digitalen*, ed. Jonathan Kropf and Stefan Laser, 71-96. Wiesbaden: Springer VS.

Diaz-Bone, Rainer, and Robert Salais. 2011. Economics of convention and the history of economies: Towards a transdisciplinary approach in economic history. *Historical Social Research*, 36 (4): 7-39. doi: 10.12759/hsr.36.2011.4.7-39.

Diaz-Bone, Rainer, and Emmanuel Didier. 2016. The sociology of quantification – Perspectives on an emerging field in the social sciences. *Historical Social Research* 41 (2): 7-26. doi: 10.12759/hsr.41.2016.2.7-26.

Foucault, Michel. 1993. Technologien des Selbst. In *Technologien des Selbst*, ed. Luther H. Martin, Huck Gutman, and Patrick H. Hutton, 24-62. Frankfurt am Main: S. Fischer.

Fröhlich, Gerrit. 2019. *Medienbasierte Selbsttechnologien 1800, 1900, 2000. Vom narrativen Tagebuch zur digitalen Selbstvermessung*. Bielefeld: transcript.

Hahn, Alois. 1982. Zur Soziologie der Beichte und anderer Formen institutionalisierter Bekenntnisse: Selbstthematisierung und Zivilisationsprozess. *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 34 (3): 407-434.

Hahn, Alois. 2000. *Konstruktionen des Selbst, der Welt und der Geschichte. Aufsätze zur Kultursoziologie*. Frankfurt am Main: Suhrkamp.

Hoskin, Keith W., and Richard H. Macve. 1986. Accounting and the examination: A genealogy of disciplinary power. *Accounting, Organizations and Society* 11 (2): 105-136.

Kappler, Karolin, Krzeminska, Agnieszka and Eryk Noji. 2018. Resonating self-tracking practices? Empirical insights into theoretical reflections on a "sociology of resonance". In *Metric Culture: Ontologies of Self-Tracking Practices*, ed. Ajana Btihaj, 77-96. Bingley: Emerald Publishing.

King, Vera, Benigna Gerisch, and Hartmut Rosa (Eds.). 2019. *Lost in perfection. Impacts of optimisation on culture and psyche.* London: Routledge.

Lupton, Deborah. 2013. The digitally engaged patient: Self-monitoring and self-care in the digital health era. *Social Theory & Health* 11 (3): 256–270.

Lupton, Deborah. 2016. *The quantified self*. Cambridge: Polity Press.

Malhi, Gin S., Amber Hamilton, Grace Morris, Zola Mannie, Pritha Das, and Tim Outhred. 2017. The promise of digital mood tracking technologies: are we heading on the right track? *Evidence-based mental health* 20 (4): 102-107.

Miller, Peter. 1998. The margins of accounting. In *The laws of the markets*, ed. Michel Callon, 174-193. Oxford: Blackwell Publishers.

Neckel. Sighard. 2005. Die Marktgesellschaft als kultureller Kapitalismus. Zum neuen Synkretismus von Ökonomie und Lebensform. In *Triumph und Elend des Neoliberalismus*, eds. Kurt Imhof and Thomas Eberle, 198-211. Zürich: Seismo.

Noji, Eryk, and Uwe Vormbusch. 2018. Kalkulative Formen der Selbst-thematisierung und das epistemische Selbst. *psychosozial* 41 (2): 16-34.

Oh, Jeungmin and Uichin Lee. 2015. Exploring UX issues in quantified self technologies. *Eighth International Conference on Mobile Computing and Ubiquitous Networking (ICMU)*: 53-59.

Pritz, Sarah M. 2016. Mood Tracking. Zur digitalen Vermessung der Gefühle. In *Lifelogging. Digitale Selbstvermessung und Lebensprotokollierung zwischen disruptiver Technologie und kulturellem Wandel*, ed. Stefan Selke, 127-150. Wiesbaden: Springer.

Ruckenstein, Minna and Natasha Dow Schüll. 2018. The datafication of health. *Annual Review of Anthropology* 46: 261-78.

Salais, Robert. 2016. Quantification and objectivity: From statistical conventions to social conventions. *Historical Social Research* 41 (2): 118-134. doi: 10.12759/hsr.41.2016.2.118-134.

Servia-Rodríguez, Sandra, Kiran K. Rachuri, Cecilia Mascolo, Peter J. Rentfrow; Neal Lathia, and Gillian M. Sandstrom. 2017. Mobile sensing at the service of mental well-being. In *Proceedings of the 26th International Conference on World Wide Web – WWW '17. The 26th International Conference. Perth, Australia, 03.04.2017 – 07.04.2017*. eds. Rick Barrett, Rick Cummings, Eugene Agichtein und Evgeniy Gabrilovich, 103-112. New York: ACM Press.

Sharon, Tamar. 2018. When digital health meets digital capitalism, how many common goods are at stake? *Big Data & Society* 5 (2): 1–12.

Staii, Adrian. 2018. Connected health: Between common aspirations and specific interests. In *Confidence and Legitimacy in Health Information and Communication*, ed. Céline Paganelli, 177-193. New Jersey: John Wiley & Sons.

Strauss, Anselm. 1987. *Qualitative analysis for social scientists*, Cambridge: Cambridge University Press.

Strauss, Anselm, and Juliet Corbin. 1996. *Grounded Theory: Grundlagen Qualitativer Sozialforschung*. Weinheim: Psychologie Verlags Union.

Strübing, Jörg, Stefan Hirschauer, Ruth Ayaß, Uwe Krähnke and Thomas Scheffer. 2018. Gütekriterien qualitativer Sozialforschung. Ein Diskussionsanstoß. *Zeitschrift für Soziologie* 47 (2): 83-100.

Swan, Melanie. 2009. Emerging patient-driven health care models: An examination of health social networks, consumer personalized medicine and quantified self-tracking. *International Journal of Environmental Research and Public Health* 6 (2): 492-525.

Thévenot, Laurent. 1983. L'économie du codage social. *Critiques de l'économie politique* 23/24: 188-222.

Thévenot, Laurent. 2002. Which road to follow? The moral complexity of an "equipped" humanity. In *Complexities. Social studies of knowledge practices*, ed. John Law and Annemarie Mol, 53-87. Durham/London: Duke University Press.

Thévenot, Laurent. 2014. Voicing concern and difference: from public spaces to common-places. *European Journal of Cultural and Political Sociology* 1 (1): 7-34.

Vormbusch, Uwe. 2012. *Die Herrschaft der Zahlen. Zur Kalkulation des Sozialen in der kapitalistischen Moderne*. Frankfurt a.M./New York: Campus.

Vormbusch, Uwe. 2016. Taxonomien des Selbst. Zur Hervorbringung subjektbezogener Bewertungsordnungen im Kontext ökonomischer und kultureller Unsicherheit. In *Leben nach Zahlen: Self-Tracking als Optimierungsprojekt?*, eds. Stefanie Duttweiler, Robert Gugutzer, Jan-Hendrik Passoth, and Jörg Strübing, 41-58. Bielefeld: transcript.

Vormbusch, Uwe. (to be published in 2021). Accounting for who we are and could be. Inventing taxonomies of the self in an age of social unrest. In *The new politics of numbers. Quantification, administrative capacity and democracy*, eds. Andrea Mennicken and Robert Salais. London: Palgrave Macmillan.

Vormbusch, Uwe, and Karolin Kappler. 2014. „Froh zu sein bedarf es wenig ...? Quantifizierung und der Wert des Glücks". *Sozialwissenschaften und Berufspraxis* 37 (2): 267-281.

Whitson, Jennifer R. 2013. Gaming the quantified self. *Surveillance & Society* 11 (1/2): 163-176.

Zillien, Nicole, Gerrit Fröhlich, and Daniel Kofahl. 2016. Ernährungsbezogene Selbstvermessung. Von der Diätetik bis zum Diet Tracking. In *Leben nach Zahlen: Self-Tracking als Optimierungsprojekt?*, eds. Stefanie Duttweiler, Robert Gugutzer, Jan-Hendrik Passoth, and Jörg Strübing, 119-136. Bielefeld: transcript.

Historical Social Research

All articles published in HSR Special Issue 46 (2021) 1: Conventions, Health and Society.