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Achatz, Johannes; Selke, Stefan; Wulf, Nele

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Adjusting Reality. The Contingency Dilemma in the Context of Popularised Practices of Digital Self-Tracking of Health Data

*Johannes Achatz, Stefan Selke & Nele Wulf**

Abstract: »Die Realität anpassen. Das Kontingenzdilemma im Kontext der popularisierten Praktiken der digitalen Selbstrackings von Gesundheitsdaten«. The practice of digital self-tracking of health data addresses inter-related contingencies on the micro and macro level: on the micro level, digital self-tracking can be perceived as facilitation of lifeworld contingencies and the expression of the way contingency is dealt with in (socially) exhausted societies. Together, these can be understood as a strategy of the “privatization of contingency.” The attempt to reduce the individual’s contingency of action is accompanied by the increase of lifeworld contingency, resulting in a contingency dilemma in contemporary self-tracking which produces (new) dependencies and vulnerabilities with respect to the technology used. Through a multilevel analysis of digital self-tracking and an empirical study on vulnerable self-trackers, a number of those pathological effects of the contingency dilemma are examined using methods from pragmatism and theory of conventions, while highlighting a possible solution to this dilemma.

Keywords: Pragmatism, digital self-tracking, vulnerability, contingency, conventions, prevention, health data, values.

* Johannes Achatz, Department of Health, Safety, Society, VALID Project, Furtwangen University, Robert-Gerwig Platz 1, 78120 Furtwangen, Germany; achjohannes@gmail.com.
Stefan Selke, Faculty of Health, Safety, Society, Furtwangen University, Robert-Gerwig Platz 1, 78120 Furtwangen, Germany; ses@hs-furtwangen.de.
Nele Wulf, Department of Computer Science, Furtwangen University, Robert-Gerwig Platz 1, 78120 Furtwangen, Germany; wun@hs-furtwangen.de.
This Article has been translated from German by Megan Hanson.

1. Introduction: Contingency and Vulnerability in Practices of Digital Self-Tracking¹

Contingency describes what is neither necessary (the angular sum of a triangle is 180°) nor impossible (squaring the circle). Richard Rorty famously argued for the contingency of language. Overcoming ideas of a rigorous scientific language to describe a determined universe, he argued for a recognition of the contingency of language to describe moral progress in arts, politics, and sciences (Rorty 1989). Questions like “Has the advancement of science led us to a freer society?” can hardly be adequately addressed with the scientific language of mathematics or physics, but instead have to incorporate metaphors and value statements.

This philosophic debate over the use and limits of language to describe our world, our society, and ourselves is reflected in modern technology of measurement. Like a rigorous scientific language, it aims at giving precise and finite information on our world. Questions like “Has the advancement of digital health technology led us to live better lives?” cannot, however, be answered by technology, but instead have to incorporate metaphors and value statements as well.

The use of self-tracking is connected to the wish to lead a healthy life. Self-tracking devices seem to offer us reliable statements about our bodies and to generate actionable knowledge. They thereby offer the facilitation of life-world contingencies on an individual level. This article argues that this strategy of the “*privatization of contingency*” is accompanied by the increase of lifeworld contingency, resulting in a *contingency dilemma* in contemporary self-tracking that produces (new) dependencies and vulnerabilities with respect to the technology used.

There are three basic levels of contingency that overlap in practices of digital self-tracking and that stand in opposition to the hope of “objectified”² (Zillien, Fröhlich, and Dötsch 2015, 88) measurement of human conduct that metric technologies promise: the first level is the *epistemic contingency*, meaning whether or not our world even contains unwavering facts or if all assertions of truth are necessarily contingent (Burke 1994).³

¹ This contribution was written in the framework of the research project “VALID – Ethical aspects of digital self-tracking in the health sector between empowerment and new barriers.” We would like to thank the German Federal Ministry of Health (BMG) for its support and funding.

² All quotes have been translated from German by the authors.

³ Behind the debate about technical contingency in the case of digital self-tracking, there is the philosophical question regarding epistemic contingency, a more detailed discussion of which would go beyond the scope of this publication: can contingencies be controlled to the point that they take on a “humane and social quality” (Dewey 1915, 43), or does every type of con-

On the second level, the question of epistemic contingency is overlapped by the *contingency of social facts* (Searle 1995; 2011, 85). Cocktail parties, the EU, and money as a means of payment are all common elements of the social universe; but they only exist because they have been introduced “as existing” and acknowledged and treated “as existing” by others.

The third level expands on epistemic and social contingencies: scientific and technological advances continually produce new *technological contingencies*. Technology in particular produces contingency in the epistemic as well as in the social sense (Makropoulos 1997, 151) in that new technology-based access to the world is being provided (in the past it was the telescope and sonar; today it is big data). Long standing ideas are being questioned and the increasing mechanization of the world (Jonas 1984, 33) produces new complexities. With that, the need to orientate oneself in dealing with contingency increases, specifically with reference to man-made – *anthropogenic* – contingency of a world that has been reshaped by technology.

Everyday practices, like digital self-tracking, are affected by anthropogenic contingency through the increased qualitative and quantitative complexity (Jochum 1998) of technology. Everyday practices become more efficient with technology, but also less transparent in their functions and long-term effects. Even if *individual* contingency of action is successfully reduced with digital self-tracking (e.g., a workout plan based on physical data), lifeworld contingency increases with the use of a technology that is generally not understood by the user. New questions arise: How does the technology work? How reliable are the data and suggestions? Do third parties have access to the data? Is the device aware of the user’s specific health situation? Practices of digital self-tracking that are supposed to supply the user with manageable orientation for one’s personal health behaviour using exact measurements then lead to a contingency dilemma. Behind this contingency dilemma there is the general theory that the use of technology to overcome *individual* contingency of action implies the reproduction of *technological* contingency, and therefore produces (new) dependencies and vulnerabilities with respect to the technology used (Coeckelbergh 2015, 221).

This contribution focuses on the contingencies in practices of digital self-tracking, with a methodological focus on the *situation* of digital self-tracking. Situation is a methodological term in the sociology of conventions (Diaz-Bone 2018, 374) and pragmatism (Dewey 1986, 109-20; Dorstewitz 2011, 215; Welchman 2002). The expression “situation” describes the “organic” constellation of action within an environment characterised by indeterminations within which actors are located and must take decisions on action.

tingency reproduction represent another step “on the road towards a certain kind of madness” (Russell 1947, 856) that must be overcome? This contention led to Richard Rorty’s neo-pragmatic concept of a scientific culture embracing contingency (Rorty 1989).

Therefore, the examination is not limited to individuals (and their motivation) or the level of institutions (and their structures). Instead, this contribution aims to “reconstruct constellations of action from the perspective of actors involved in them” (Diaz-Bone 2018, 377) in which both levels overlap (if a clear division of the levels even seems reasonable). The reconstruction process is borrowed from pragmatic methods (Dewey 1986, 1988). The objective is to *illustrate relevant determinants* of decisions on actions in the “situation” of digital self-tracking and to examine the reproduction or production of vulnerabilities.

The article offers a detailed examination of how vulnerabilities in practices of digital self-tracking develop and to what degree digital self-tracking reduces or reproduces contingencies. First, the facilitating function of automatisms will be described that serve individual contingency reduction, followed by a problematization of the use of digital self-tracking for contingency reduction, illustrating the pathologies of lifeworld contingency. Whether or not – and how – these pathologies are individually experienced will be reviewed based on an empirical study in an ongoing research project. Second, users’ approaches to setting boundaries and utilising conventions to overcome the contingency dilemma will be described, concluding with an outlook on a possible way to overcome the contingency dilemma in digital self-tracking.

2. Social Contingency and Automatisms in Nature and Technology as Facilitation of Contingency

In a world of constant change, anything that appears unvarying, recurrent, and stabilising really stands out. Breathing, heartbeat, and circulation also appear to be untouched by contingency of constant change, just as the luminary course, the tides, or the “stubborn, stereotypical, undivertible habits of the animals” are (Gehlen 1957, 16). Likewise, routine actions and mechanical automatisms seem resonant and produce a *fascination* in the perceptible similarities of internal and external circuits (that is not a “substantial similarity”; Gehlen 1957, 21).

Gehlen uses the term *resonance* (1957, 16) to describe how automatisms produce a fascinating stability and dependability through their recurring loops and inspire concepts of social facts (Searle 1995; 2011, 85). Astrology and horoscopes are social facts that connect the fate of humans to the automatisms of the celestial orbit and with that relieve people of the “paralysis and helplessness in the face of forces of nature” (Gehlen 1957, 18). In the development of social ontologies, just as with habits and routines, automatisms facilitate by “becoming self-evident” (Gehlen 1957, 18) through the

normalization (Makropoulos 1990, 413) of the lifeworld and production of practical effects.

When external automatisms are linked to the lifeworld of humans, humans then “transform” recurring “coordinates of the world” that lie beyond their powers of influence into “human standards” (Gehlen 1957, 18). The constant danger of these strategies of facilitation of contingency lies in the exaggeration of the possibilities of interpretation. Humans perform “magic” (Gehlen 1957, 14) in that they specifically take things that are beyond their reach in order to control contingency, adding social ontologies to the (not fully understood) world. The contingency dilemma becomes apparent in social ontologies when the validity of social facts (e.g., from astrology, flight of birds, etc.) is questioned. If the possibilities of interpretation of a social ontology become too exaggerated, they will constantly be in contradiction to lifeworld experiences and produce new contingencies instead of providing orientation, and in the end will no longer fulfil their facilitating function.

While in the past, as Gehlen described, ritualized natural practices limited contingencies to individual actions and (lifeworld) natural phenomena, with the increasing mechanization of the world, individual technical possibilities for action (hammer, bow, and arrow) are made to be contingent fields of action and contingent horizons of possibilities (tool use, hunting techniques; Makropoulos 1997, 147). Instead of natural automatisms used in a “magical” interpretation to reduce contingency, in current practices, controllable technological automatisms can also take on this function of facilitation. As long as technology is not understood, using (theoretically) controllable technology is a kind of “magical” practice.

The contingency dilemma is especially relevant in dealing with the use of technology on the human body. Digital assistance systems in the field of health and practices of digital self-tracking are individually perceived as the facilitation of lifeworld contingency (Biniok and Lettkemann 2017), but they lead to the continuity of the dualism of contingency *reduction* and contingency *reproduction*, even if it is fed by the fascination with automatisms of human-made devices and no longer by the interpretation of natural cycles.

Drawing parallels between natural magic and technology that is not understood should not be pushed to extremes. But in both cases, an *external* instance is granted interpretational sovereignty over one’s own actions. In both natural magic cults and the use of technological devices, this leads to pathologies that will be explained in more detail in the following.

3. Technical Contingency in Practices of Digital Self-Tracking

Even if the reduction of contingency is successful in individual performed actions through the use of technology that is not understood, it is associated with an increase in lifeworld contingency. In this context, Klaus Wiegelerling and Reinhard Heil speak of a “dialectic of *facilitation* and *deprivation* of the right of decision.” The deprivation of the right of decision takes place “when alternatives for action are disregarded through system utilization” (Wiegelerling and Heil 2019, 225). They take as an example the medical expert systems that assist doctors, but also limit their discretionary competence, make treatment methods that diverge from the system’s suggestions risky for the doctor to choose, and increase the lack of transparency of medical diagnoses for patients. The dialectic of facilitation and the deprivation of the right of decision is an individual phenomenon for a doctor in this example. For the affected patient, however, it is perceived as a lifeworld phenomenon of increasing opacity.

This dialectic also applies to the assistance systems for one’s own behaviour, like digital self-tracking with fitness trackers, smart watches, and health apps. On the one hand, the free democratic order applies, which deems of the highest importance the individual right to life and the free development. On the other hand, however, free development also implies the contingency of possible concepts of life and the self, and with that the difficulty of leading one’s “own life.” In order to escape this lifeworld contingency, digital health apps, among other things, offer *facilitation* for people’s own actions, memories, and motivation for activities as well as supposedly “exact” data about one’s own life that are immediately analysed and presented (Selke 2016b, 55).

3.1 Individual Decision-Making Autonomy and Privatization of Contingency

Types of *deprivation of the right of decision* are harder to trace than facilitation functions. First, it must be stated that behind the previously mentioned dependency on digital life assistances, there is not only the individual deprivation of the right of decision. With the *Practice Turn* (Simpson 2009) in the social and cultural sciences and humanities, the idea of basing autonomy on a realm of pure reason made way for locating autonomy within “conventionalised forms of activity in a society” (Geiselhart and Häberer 2019, 113). Departing from Kant and Hegel, the early pragmatists (Peirce, Dewey, James, Mead) formulated action as a transformative social process that is not separate from, but rather is performed in and originates from an envi-

ronment. Decisions on action are then taken based on a specific position of situational rationality (Diaz-Bone 2018, 374). It is the attempt to link theory with practice and put less emphasis on the theoretically *possible* and more emphasis on the practically *necessary* decision-making possibilities and therefore on the question of how practices can become theoretically informed, or as John Dewey would say, “intelligent” (Dewey 1988, 134).

The social and theoretically controllable framework for conditions of action then becomes more important, for it determines the amount of leeway available for situational rationality.

From this perspective, the double contingency of technological action is not only an individual problem. Both the desire for facilitation of contingency as well as the associated deprivation of the right of decision can be seen as effects of a changed framework system, meaning the manifestation of the *privatization of contingency* (Selke 2016a, 314) in (socially) exhausted societies (Lutz 2014). Whether and which contingencies are reproduced or reduced does not solely depend on the individual. Instead, existing social structures are increasingly influenced or even replaced by technological structures of automated digital processes. This change towards a privatization of contingency is expressed, for example, in *mechanisms of responsabilization*, which use technologically mediated (*hard*) *nudges* to suggest how to organise one’s personal freedom and way of life. In short responsabilization is defined as an “obligation for personal responsibility and self-care” (Lutz 2016, 757).

3.2 The Production of Lifeworld Contingency through the Logic of Prevention

The current *prevention discourse* can also be categorised under the *mechanisms of responsabilization*. Against this background, digital data can seem to be both disintegrating and disciplining at the same time. Norms that are applied to health, health behaviour, and health care generally originate from standards that insufficiently take into account the perspective of vulnerable groups. Prevention based on a digital image of a “standard human” very rarely reflects the actual heterogeneity of the population. This distortion can lead to discriminating refusal of access to health care services.

Especially in socially exhausted societies and during times of crises, engineered self-care as a new mobilising strategy for prevention is embraced. Subjects are easier to influence than systems. People are “troublesome” due to their unwillingness or inability to yield to pre-established rules of a system, making direct access to the subject so attractive. Subjects’ willingness to participate as a limited resource has to be repeatedly re-established at all costs; for example, with the use of digital technologies that are user-friendly and “attached” to the user, therefore motivating the user to follow its implemented rules.

A brief archaeology of the concept of prevention, however, shows the ambivalence of the idea of prevention. Here, the canonical understanding is especially informative: prevention was understood as the right of the high clergy to “dictate the conduct of their subordinates” (Brockhaus 1890). With this in mind, prevention can be interpreted as a “sanitary” project, whereby everyday and lifeworld structures slowly become rationalized according to normative stipulations made by an elite orientated toward efficiency. Instead of repressive control from above, a prevention policy established a repressive character from below, from the subject itself (Lengwiler and Madarasz 2010; Wambach 1983).

Health insurance companies are now offering programmes that award customers with bonuses for achieving health goals and sharing certain fitness data (e.g., AOK-Bonusprogram with a tracking app).⁴ Preventative measures infiltrate the realm of possibilities that is theoretically (according to the free democratic order) available to everyone for their personal development by shifting institutional health care measures from the institutionally offered “treatment of illness” to the individually demanded “prevention and promotion of health” (Gugutzer and Duttweiler 2012, 8). The health care service is no longer provided by the health care system, but rather demanded from every individual’s health behaviour.

If like this the corresponding practices of self-tracking and prevention are enforced without question, long-term effects and problems will have to be compensated for. For example, the flexible adaptability of the subjects to the logic and goals of prevention is being overstrained. The pressure on the subjects is an increasing necessity to live up to the demands of preventative thinking because the prevention imperatives are presented as based on scientific rationality. The appellative nature of the renunciation of personal interests (“affluent asceticism”) is increasing while at the same time decision architectures (“big nudging”) based on algorithms are increasingly interfering with everyday routines and instrumentalise people based on particular interests. The logic of prevention then represents a type of responsabilization as a “transition from public to personal safety, from collective to individual risk management, from state care to self care, from social security to personal responsibility” (Lessenich 2010, 564).

⁴ Cf. The AOK PLUS-Bonusprogram: <https://www.aok.de/pk/plus/inhalt/bonusprogramm/> (last accessed on 05.09.2019).

4. Vulnerabilities and Conventions in the Situation of Digital Self-Trackers

With reference to the contingency dilemma, the situation of digital self-trackers can be described as conflicting. The basic conflict of a *privatization of contingency* stems from a desire for orientation, stability, and reliable effects of personal health practices, which come with detrimental opportunity costs. Digital tracking-technology offers orientation by presenting “precise” numbers and recommended practices for improving health. The offered suggestions, however, are norms based on arithmetic means and an ideal of an average healthy human, which hardly match any individuals health. Vulnerable persons in particular, with chronic diseases, disabilities, or in ongoing medical treatment, do not and sometimes never match health norms of an idealized average. Stability is offered by fascinating automatisms of data measurement, processing and presentation that seem to facilitate from uncertain ideas of personal health, but deprive from evaluating one’s health status on their own. The data measured has to be accorded with the private perception of health and brings feelings of personal well-being in conflict with data points. Reliable effects of personal health practices, promised by presenting personal workout plans based on individual fitness data, are, in turn, demanded by the logic of prevention and serve as an instrument of external control or responsabilization.

Unlike services from state funded health institutions, individual health behaviour is not accompanied by a body of laws regulating and guiding the tasks and boundaries of health improvement. To put it pointedly, with the “health revolution” (Gugutzer and Duttweiler 2012, 8) from provision of health care to prevention and personal responsibility, the desired health care service of state institutions are being outsourced to citizens. In this indeterminate situation of individual health practices where institutionalized frameworks (laws, regulations, minimal standards) are missing or still in development, conventions still serve as a baseline for orientation and coordination of individual behaviour (Boltanski and Thévenot 2006; Diaz-Bone 2018, 3). As culturally established solutions to coordination problems, conventions offer justification and a baseline of coordinated action that can be expected from others. *Market* convention aiming at generation of profit, thereby balancing supply and demand, *civic* society aiming at a certain level of well-being for all, or *domestic* convention aiming at protecting a personal realm of recreational activity and creativity that can serve as a “home” – are typical repertoires of (moral) justifications that form the basis of institutionalized frameworks (Boltanski and Thévenot 2006). As such, conventions are present, even if institutionalized (democratic) guidelines are not and supply an orientational framework that digital self-trackers can fall back on.

Health and well-being are values of a civic and a vitality repertoire of justification (Sharon 2018). Healthy employees increase effectivity and profit and are valued according to market and industrial repertoires of justification (Cappel and Kappler 2019). How individuals are to go about this prevention cannot, however, be stipulated and therefore cannot offer a facilitation of contingency through orientation toward laws, norms, and a set of official (democratic) rules. First of all, preventive behaviour is always performed *ex ante*, whether the person will have health issues in the long-term or not; prevention therefore knows no end nor fixed boundaries to the amount of preventive behaviour required to stay healthy. Second of all, mandatory preventative measures create conflicts between civic and vitality repertoires of justification (Sharon 2018): some health insurance companies promote PAYL (pay-as-you-live) services and grant bonuses for sharing private fitness data. Other health insurance companies dismiss it, arguing from the repertoire of civic convention: as long as not everyone can participate, it must not be used as a comprehensive service offered by health insurance companies (Kramer and Jahberg 2016).

Missing institutionalized frameworks for health apps can also be attributed to the dynamic state of (industrial) app development. Conventions support institutionalization, but in the case of digital health apps, the industrial convention (Boltanski and Thévenot 2006) has not yet developed into official “minimum standards” (Bierbaum and Bierbaum 2017, 257). Many health apps are developed *without* input from health experts (Trojan and Kofahl 2015, 85) and initiatives to create a certification authority for apps (Gießelmann 2017; Kramer 2017) are not yet well established.

Similar to the industrial convention, the market convention (Boltanski and Thévenot 2006) has not yet been transformed into institutionalized standards. Over 200,000 health apps are currently on the market. According to a 2016 analysis, app developers are unsatisfied with profit margins, pointing at a lack of reliable criteria for market control in this sector. Forty-four percent of health apps are offered without payment (Albrecht, Höhn, and von Jan 2016, 75-6) and create an unstable market situation in which “the prognosis for the market development of wearables” are considered “diverse and partially contradictory” (Meidert et al. 2018, 157). The market for health apps has not been consolidated to the point of effecting the establishment of frameworks for orientation and contingency reduction for the individual user (laws, declarations of self-regulation, official certificates, etc.), rather the conventions behind the market situation are in active negotiation.

With a lacking establishment of (industry) quality standards for health apps, effectivity that has not yet been proven in long-term studies, the diverse and unassisted use of self-tracking apps in the leisure sector, missing institutionalization of coordinating norms from market conventions, and a

lack of legislature framework, there is little that can hinder mechanisms of prevention from delegating demands for health practices to the user.

4.1 Privatization of Contingency

Strategies of coping with contingencies become conflicting when the desired positive effects of digital self-tracking have not yet been scientifically established (Trojan and Kofahl 2015, 85; Seto et al. 2012), but a “probabilistic predictable event” is nonetheless interpreted as a “consciously taken risk.” Predictable risks can therefore

be pushed to the area of responsibility of the decision-maker, even when the risk prognosis has nothing to do with the individual, but only with aggregated collectives. Situations in which decisions are made that are defined by probabilistic risks therefore take an event that someone may possibly experience in the future and turn it into an event that can be attributed to the situation as a consequence of the decision. (Samerski and Henkel 2015, 91)

The expectation of a possible event becomes radically individualised.

Digital self-tracking technologies do not only produce trivial contingencies, although – just as with any new technology – it inevitably results in new possibilities for action and therefore uncertainty and contingencies. In fact, digital self-tracking allows *specific contingency production of possible futures based on measured data that adds the pressure to conform* to the ideas and considerations about the possibilities of one’s own life.

By presenting supposed “exact data” of one’s own body via digital self-tracking devices and deriving feedback about one’s health condition and suggestions about what to do from this data, possible futures appear to be more likely than they realistically are. The zenith of this development are great promises that are made by apps such as Life Clock (thelife-clockapp.com), which offers “calculations” of the user’s life expectancy down to the second. Preventative activities, such as jogging, are then meticulously added to the amount of lifetime left. The metric life expectancy provides supposed stability, putting an exact date on the user’s own death, which is something existentially unfathomable. The Life Clock technology makes a promise of the future, it is a “prophetic technology” (Achatz 2019) that lessens fears of the future, exaggerates the actual possibilities to control one’s own life expectancy, and meets the latent pressure of prevention logic with concrete numbers (Selke 2016a, 314-5).

Because the predictions are based on “exact data” from the sphere of life-world contingencies, it is precisely the prophetic aspect of technology that allows the creation of popularised responsabilising strategies. Users can liberate themselves from their individual contingency of their health behaviour through the tangible stability of automatically generated health data, thereby making a pact with machines that produce contingencies: unlike

medical treatment, there is generally no end to prevention, resulting in a continual obligation to perform preventive health activities, justified by pointing towards “objective” health data.

How do users then regulate their use of digital self-tracking? Are the life-world effects of contingency that result from a prophetic technology perceived as destabilizing, or is the joy in experiencing the stabilizing automatism of the generation of health data more predominant?

4.2 User Perspectives on the Contingency Dilemma in Digital Self-Tracking

In an empirical study we examine the gradual transformation of vulnerabilities and new possibilities of literacy.⁵ A user survey from April 2018 to April 2019 aimed to find out how contingencies in user behaviour affected the sharing of user’s health data.

The goal was to examine contingencies in the use of digital self-tracking beyond the self-tracking scenes that are already well researched, such as the Quantified Self Movement (Ajana 2018; Lupton 2016). The sociology of conventions allows identifying modes of orientation and options for overcoming the contingency dilemma in digital self-tracking even when institutionalized frameworks are absent. A theory of convention presupposes existing moral capabilities of solving coordination problems. It is in line with evolutionary biologists who argue human morality developed exactly for solving problems of cooperation and coordination among humans, allowing for shared intentionality and social coordination (Tomasello 2015, 2019). *To what extent and how digital self-trackers make use of value frameworks to change their indeterminate situation and counter privatization of contingency* are examined in close detail. The “reconstruction of the *empirically* available moral systems that underlie economic coordination” (Diaz-Bone 2018, 145), but likewise sustain civic, industrial, and vitality convention (Cappel and Kappler 2019), are the social-theoretical pillars of convention theory that will be referred to in the following.

The contingency dilemma will be reconstructed based on “constellations from the point of view of involved agents” (Diaz-Bone 2018, 377). How do users regulate and justify their digital self-tracking practices? Which conventions are available for users, vulnerable persons in particular, for orientation? Are available conventions experienced in a mode of conflict or do they offer empowerment? In qualitative interviews, mainly classically vulnerable people (chronically ill people, people with disabilities) and for com-

⁵ “VALID – Ethical aspects of digital self-tracking in the health sector between empowerment and new barriers,” funded by the German Federal Ministry of Health (BMG). See: <https://www.hs-furtwangen.de/en/research/forschungsprojekte/valid/>.

parison a number of resilient people (athletes, people who self-track in their leisure time) were asked about their experience with health-related digital self-tracking, confirming some aspects that (according to Gehlen) can be classified as a facilitating function through automatisms, or the reduction of contingency.

4.2.1 Facilitation of Contingency

Self-tracking provides the feeling of security through automated and therefore stable and seemingly exact data that stand out from the contingency of the individual and inconsistent health situation. Users can get “numbers that say [...] I was really lazy today” (D1_2).

The increased feeling of security is also an effect of a chain of processes: the security of automatic data collection, analysis, and presentation and the resulting suggestions for health behaviour *facilitates* the contingency of uncertain health conditions. The user wants to know if the way their “body feels corresponds with what [...] the watch actually measured” (B1_4).

Just like rituals, reliably repeated automatisms are all the more *meaningful* when they can be compared to the provided health standards (e.g., walking 10,000 steps a day) or other users’ data, therefore creating a recurring data cycle. These automatisms also have an effect on the user’s self-perception because they offer them points of reference with regards “to which extent [...] one’s own perception is skewed or not” (B1_6).

Now I’m going out with my devices again because I always go jogging with my dog in the morning. And I take what feels like a trip around the world. I was really astonished to find out how short the jog really was, although it feels so long. I need to adjust my perspective of reality a little with numbers and measurements. (B1_1)

Digital self-tracking applications *communicate* standards to their users and allow silent or visible (through data entry) participation in health rituals. This results in scalable comparisons for the users, both on the peer group level and “on an international level [...]: And then you see how you’re ranked” (B1_6).

The validity of these standards, however, have not been unequivocally certified, and the users are instead “not really aware of how the (tracking device) actually gets the numbers” (C1_10). This ignorance is partially compensated for with speculation: the fitness tracker must “somehow do it according to my pulse. Then probably, I guess, using a movement sensor” (C1_10).

Automatisms of personal data analysis produce a resonance (Gehlen 1957, 16) that, beyond the specific benefit, additionally produces a *fascination* (Gehlen 1957; Lee et al. 2018, 8), as illustrated by the following interview excerpt:

Well I am fascinated for example by this: when I swim for a while with it on, it's completely waterproof. And for example at the end it says which swimming stroke I used and how long I swam. How many calories I burned. That kind of fascinates me. That's why I used it a lot in the beginning. (C1_10)

4.2.2 Reproduction of Contingency

Opposite the *individual* reduction of contingency are the *lifeworld* contingencies that arise, for example because the communicated standards do not always correspond with the health situation of the user and then lead to the *exclusion* from practices of comparison with other users. For example, limitations such as an “injured knee” are not taken into consideration because “healthy people” are the standard (C1_16). This leads to the reality that “physically [...] limited” people cannot “compare (themselves) with a healthy person” (A1_3_1). This pre-standardization then appears to be a criterion for exclusion for vulnerable groups:

And the app doesn't know that I am still on medication. That means that I have to exercise differently, or that I have to be in a different heart rate zone than someone who isn't taking medication. And all of that isn't included in an app. Especially for people who aren't yet that fit. These apps might be a little too hard and too standardised. (D1_2)

The uncertainty about both the data collection as well as its storage and the further use (“black box”) were key issues in the interviews: an app's evaluation of the individual sensitivities, such as the restfulness of sleep, was questioned. A discrepancy arises between self-perception: “Because I thought I slept well”; and the measured results: “Why is it telling me that I slept poorly?” (C1_7). The tracked data therefore serves as a “good indicator” that can give orientation, but users would not “fully rely” on them (B1_6).

Concerning the users' lack of knowledge with regards to data collection and use it was said: “That the data is saved on some servers that I don't have any control over. And yeah, I actually have no idea what happens with the data” (C1_8). They make assumptions to compensate for this lack of knowledge: “I heard that the data is collected and then actual profiles are created” (C1_7).

The *measurements* are often *opaque* and do not help the user to better understand digital self-tracking technology. Quality criteria, such as those that serve as a foundation for empirical research, rarely come into play. Some users criticise the reliability of the measurements because they have “little faith” in the “exact measurements” apps present, an example of which are “calories burned,” which is calculated based on different factors, such as “muscle mass” (D1_2). Users question both the technical generation and the usefulness of the calculated values because the devices' “black boxing” prevent the user from knowing how they are calculated: “Regarding the actual

interplay of factors, that (the app) really knows how I am sleeping based on my heart rate or movement. I don't really know much about the technical aspects" (C1_10). For some users the "display of some measurements" has no added value on its own: "I might as well not have them (the measurements), I would still just be standing alone in the forest" (P2).

The feeling of being observed or evaluated with digital *self*-tracking makes users feel *insecure* because it shows the contradiction between self-efficacy and heteronomy. Users differentiate between the desired effects, such as support and motivation for exercising, and the undesired effects, such as control and surveillance through the apps:

I want the device to help me somehow, or motivate me, or do something for me. But I don't want to be tracked around the clock. (D1_2)

This aversion to control and surveillance is explicated in the "fear of data storage," which for some users outweighs the advantages of the applications (P6).

4.3 Vulnerability and Digital Self-Tracking

The contingency dilemma of the reduction of individual contingencies of action and the (re)production of lifeworld contingencies can therefore be found in self-tracking applications for activities in everyday life and specific actions. This can be observed in statements regarding users' fascination with technology, on the one hand, and the opacity of the same technology, on the other hand, which extend to users' feelings of insecurity. Considering the above mentioned opacity regarding the values that are produced "in the app" and the "black box" of the technical processing of one's own health data, digital self-tracking applications themselves produce new lifeworld contingencies and insert themselves into everyday life not without friction, but as a disruptive technology (Selke 2016a, 310; Swan 2013).

Motivated by the fascination with technical automatisms and demands to optimise one's own health behaviour based on the logic of prevention, digital self-tracking apps contribute to the reduction of individual contingency. Adopting calls to action given by a technological device that is opaque in its functionalities and the use of personal and health data tends to lead to the deprivation of the user's right of decision. An area of lifeworld contingency is produced within which the logics of prevention undisputedly reign. People who are vulnerable due to illness, injury, or handicap are particularly excluded from the image of a "healthy standard person" and indicate that *devices' data and their own physical condition are incompatible*. However, they paradoxically continue using digital self-tracking apps.

4.4 Digital Self-Tracking and Regimes of Engagement

Due to the lack of reasonable guidelines, however, convention theory is valid here because users *themselves* set boundaries (Plessner 2003) and, especially on the moral level and with respect to the user's individual situation (situational rationality), develop their own solutions to the coordination problem of contingency in individual health practices that do not, however, approach the stabilising degree of coordinated and cooperative action that extend beyond a local regime of engagement (Thévenot 2010, 11).

In terms of *facilitation* and the *deprivation of the right of decision*, the range of individual coping mechanisms can be observed through which individuals try to protect and secure personal values and which approaches there are to establish frameworks from conventions through a cooperative and coordinated change to the situation of digital self-trackers.

The users' quotes that serve to illustrate this issue thereby follow a systematic according to the type of dependency (device, group, network technology), or setting of boundaries to avoid it, and show types of (moral) judgement about how to deal with one's own data (self-reference, group-reference, general social reference).

4.4.1 External Boundaries

In the leisure sector, apps serve to guide action. The *app's demands* are adopted particularly in cases where the user's own health expertise is not sufficient enough to determine for themselves what healthy behaviour is. Answering the question of how important the demands of the app are, one user stated: "It really is important, because, like, I don't know what I should do to lose weight" (C1_11). Some users internalise this action orientation to the point that it becomes a type of compulsion, and a "sense of obligation" results from the use:

It almost feels like an obligation. Like at that moment I have to swim two more laps. Otherwise, and this is exaggerated, I would disappoint the watch. (C1_10)

Athletes, however, take orders from coaches or trainers who design workout plans. They do not regulate how data are used; rather they rely on the *demands of the trainer*. Digital self-tracking apps serve the purpose of a coaching instrument in that they manage training schedules, delegate tasks to the athlete, document and analyse performance, and provide feedback for the trainer:

The heart rate zone was set by the coach and performance tests. And training plans were designed based on that. And those are the workouts you do. So it was really mandatory to have a chest strap! (A1_1)

With regards to data protection and sharing personal information, some users stand out because they do not set any boundaries and think the protection of their data is irrelevant. They assign very little value to their personal health data. Interestingly, this type of user generally presents arguments for this degree of indifference. They do state concerns, but also that they have not personally had negative experiences. These users are often uncritical of the commercialization of their data (e.g., personalised ads), with opinions of it ranging from “not troubling” to “often quite practical” (A1_1). Sometimes this indifference towards data protection is very directly expressed: “And with my health data, for me that is almost less important [...] it even doesn't matter. If someone wants to use it, they should do whatever they want with it” (A1_1); or simple yet concise: “data protection: well, I don't really care about it!” (C1_16).

4.4.2 Self-Limitation

The adoption of external demands is faced with measures of self-limitation, and users establish boundaries when they find an app to be *invasive* and, therefore, when it causes them to feel *insecure*. An example of this is the constant control and evaluation of apps:

You can get kind of too obsessive about it, sometimes! And then it was getting on my nerves. Always looking at it. You are constantly looking to see how [many calories] you have burned, what am I still allowed to eat? What do I still have to eat? You put a lot of pressure on yourself. (C1_18)

Some only use digital self-tracking “for themselves” and do not let the data of others influence them. These users choose to opt out of the comparative function that is often a key element of digital self-tracking. For these users, it's about competition:

I don't necessarily want to compare myself to others. I have my own aspirations for myself. Whether or not someone shares these aspirations is their own business. Because when you start comparing yourself, then it starts to become a competition and then you say: Oh, now I have to get in 5,000 more steps today. (A1_3_1)

Besides the mere personal use of the data, other users share their data in exercise *groups* or among their friends and family, but they draw the line at sharing their data on Facebook or elsewhere. Whether or not users in the group are strangers or not is also a criterion: “Well if there is a stranger in the group, [then] I don't like to [share] the information” (B1_3).

A clear connection to moral values is found in the attempt to reduce one's own opacity (a key term here: transparent citizen) by entering false information and therefore creating a more or less fake user profile and, if not protecting, at least obscuring *privacy*. Measures such as choosing pseudo-

nonyms with “nicknames” (B1_2) or “fake names” (C1_15), or entering false personal information are commonly used by different users:

The Google account has already been set up with age and name anyway.
The age is wrong anyway. (D1_1)

Boundaries are sometimes set (e.g., not using a certain app) due to specific concerns about equal treatment and privacy. These reflected concerns are less informed by moral assessments (intuitive feelings, rule of thumb), but rather by *ethical principles* (fairness, equality). One example is the previously mentioned PAYL health insurance programme that calculates insurance rates based on digitally gathered health data:

For example, it's also possible to use the apps by the health insurance companies. I wouldn't do that either because then I would always be afraid that there would be rewards! If you walk 10,000 steps a day then you get this or that reward, and then have to pay less money. And those are things where I think, yeah, maybe one person cannot do that but another person can! So yeah I am actually afraid that my health insurance company will start using that someday (A1_3_1).

So, there are different decision-making strategies and degrees of setting boundaries to avoid the contingencies of the indeterminate situation of digital self-tracking that make users feel insecure. Some users even find the use of self-tracking devices to be an obligation. Others find the motivational character of devices alone to be a compulsion that makes them feel insecure. At the group level, either collective practices of an exercise group are adopted or users try to avoid the competitive character of a data-sharing group. On the general societal level are the general impacts of self-tracking, such as profiling, calculating health insurance rates, and the trading of health data. Here, there are two user fractions: one that is generous with their data, and one that is restrictive with their data and rejects the use of self-tracking due to ethical concerns regarding fairness or equality.

This division illustrates that moral values are being negotiated, defended, or discarded, but that there are almost no initiatives beyond the use or non-use of apps to change the situation of digital self-trackers; in fact, boundaries are set more through *self-restriction* and less, if at all possible, through control of the technology (“black box”). A particularity here is the common practice of entering false names and contact information, which has the same effect as rule-oriented, *coordinated* action (less transparency of personal data, hindering profile building) but do not become cooperative action (networking with others, developing norms, and establishing formalised conventions). This is a practice on the margins of political action as it has a collective effect and therefore helps shape the face of the polis and coexistence, but is closed to any contribution to *politics* in its *non-collectivization* and *non-publicness* (Marchart 2010; Braun 2018).

Especially in cases of the comprehensive use of digital self-tracking, such as by health insurance companies, there are not only the dangers of a breakdown of solidarity through the unequal advantages and disadvantages regarding demands of prevention as discussed in the literature, but there is also a lack of politization. Problems such as the unequal access and use of digital self-tracking, opacity of the applications and their values (“black box”), uncertainty through opaque “fitness data,” and opaque use of personal data from self-trackers remain in an unregulated sphere that will remain closed to discourse and regulation as long as there is no explicit public cooperation and cannot, therefore, enter in democratic processes of decision making. While users are to a minor degree trying to change the social framework of the use of digital self-tracking (e.g., by entering false personal information), they are not trying to change the technology, but are taking personal steps to set boundaries.

5. Conclusion

Individual contingency of action can be reduced through digital self-tracking; however, this produces or reproduces lifeworld contingencies. The less the technology used is understood in its functioning, the greater increase in contingency. Criteria that can be applied for this increase are the *technical literacy*, analogue to health literacy, meaning the ability to find, understand, assess, and successfully use information on technical systems. The “black box,” however, particularly prevents the *understanding* of the technology. Users’ *assessments* of the applications of digital self-trackers are also extremely varying and range from dependencies (“I don’t know what I should do to lose weight.” (C1_11)) to self-limitation (“I started taking it off because sometimes it just became too much with all the data.” (C1_7)) and complete non-use of applications for ethical reasons. Instead of increasing their own personal control over the digital self-tracking application (e.g., by demanding app developers provide more comprehensive options and settings), users limit their own actions. Problematic “profile creation” is made more difficult by users entering false personal information. However, beyond that, this action achieves neither a coordination among users that establishes regulations and transforms conventions into official frameworks (or laws), nor a public within which the problems and interests of the users can become visible and politically effective. As a consequence, the pathological effects of digital self-tracking remain invisible, ranging from *silent workings of the logic of prevention*, *responsibilization strategies*, and *dependencies* to the *exclusion of vulnerable users*.

Exact digital information processing technologies do not offer the “stubborn” facts (Russell 1947, 853) that Russell was hoping for. As long as num-

bers are generated by a “black box,” they can only reduce individual contingencies of action, but they cannot contribute to the transparency of the world. Dewey’s hope that a “humane and social quality” (1915, 43) can be gained from contingency also cannot be realised as long as the use of digital self-tracking remains *pre-collectivized*, just as the health app market is still *lacking established frameworks for contingency reduction*, therefore keeping closed the sphere of public democratic mechanisms of cooperation and coordination as well as participative negotiation of values.

Our proposed solution is to overcome *pre-collectivization* and open channels for the expression of user needs in order for them to partake in shaping the technology without having the same technical expertise as the developers, thereby diminishing the hierarchical relations in which the effects of the logic of prevention can dominate. Vulnerabilities created by the unwanted use of data by third-parties, dependency on developer’s requirements regarding the control of one’s own data, the exclusion of users beyond the “healthy standards” (chronically ill, people with physical disabilities, etc.), the invasive insecurity through opacity of the produced data, and the further processing of that data could at least be reduced and in the long-term lead to more control over one’s own data, increased expertise, the freedom of personal development, and, last but not least, experiencing self-efficacy through democratic participation.

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