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Can consumers experience ownership for all their personal data? From issues of scope and invisibility to agents handling our digital blueprints

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Abstract

In the age of information everything becomes mined for the nuggets giving rise to it: data. Yet, who these new treasures do and should belong to is still being hotly debated. With individuals often acting as the source of the ore and businesses acting as the miners, both appear to hold a claim. This chapter contributes to this debate by analyzing whether and when personal data may evoke a sense of ownership in those they are about. Juxtaposing insights on the experience and functions of ownership with the essence of data and practices in data markets, we conclude that a very large fraction of personal data defies the logic and mechanisms of psychological possessions. In the canon of reasons for this defeat, issues of data characteristics, obscuring market practices, and data's mere scope are center stage. In response, we propose to condense the boundless collection of data points into the singularized and graspable metaphor of a digital blueprint of the self. This metaphor is suggested to grasp the notion of personal data. To also enable consumers to effectively manage their data, we advocate adopting a practice commonly used with plentiful assets: the establishment of personal data agents and managers.

1 Personal data: an ethereal good, contemporary treasure and psychological possession?

Google's augmented-reality glasses datafy the gaze.

Twitter datafies stray thoughts.

LinkedIn datafies professional networks.

Cukier and Mayer-Schoenberger (2013)

Data, including personal data, have been heralded as the so-called new oil, and if we are in the age of information as many claim, then data would be the fuel of our time. But what are they and who owns these data riches? In essence, data are descriptions of properties of objects and their relations which means that data are always "about" something. One object data are increasingly about is humans, these data are called "personal data" (Rosen 2012).

The most straightforward, static examples of personal data are our names, birthdates and other demographic information of which we have always been aware, think of as personal data, and know that the information they enable can sometimes be sensitive, valuable and may eventually affect us. These data stereotypically come to mind when thinking of personal data. However, these are the tiniest fraction of personal data collected and available.

Even now data available entail our overt behaviors and movements, our social relations and habits, our whereabouts, our preferences and emotions, our genomes, and increasingly more and more things that go on within our very bodies. For example, there are pills that once swallowed send data about what happens in our digestive system; ingeniously powered by our very own stomach acids. There are algorithms that can infer our mood states by tracking how we move the mouse or pointer on our personal computing devices. There are nearly market ready smart floors that will recognize the steps and identity of the person walking across it; plus be able to infer how much in fact he has eaten at the last meal and how tired he already is. And there are devices so small that they can enter the bloodstream and gain unprecedentedly accurate information about the coronary system. Link all of this information to other data about the same person coming from the smartphone, wearables, home thermostat, etc. and you are able to predict how specific actions, people or news in a specific

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environment affect the person physically. Bundling and inferring different data about a person (Haddadi and Brown 2014; King and Forder 2016), or even just about similar people (Sarigol, Garcia, and Schweitzer 2014), enables an increasingly rich reflection of all aspects of the self. While each data point may in itself hold little informative value¹, together, they amount to a powerful and nuanced digital blueprint of a person's every aspect. We use the word blueprint deliberately to denote the architecture or structure around which digital data amasses and is built upon.

Regardless of whether or not consumers appreciate the fact, they are "rich" in data and numerous business models have sprung up around the potential. Fueling them are fast developing means of harvesting and subsequently trading ever more personal data (Acquisti, Taylor, and Wagman 2016; Spiekermann et al. 2015). Something that is essentially "about" a person and her properties has become a global market good in itself, resulting in the market place viewing humans not just as customers, sales potentials or dollars to be captured, but also as a vast collection of potentially valuable data points waiting to be collected. As Eric Siegel, the chairman of Predictive Analytics World put it in an interview with the New York Times Magazine already in 2012 "We're living through a golden age of behavioral research. It's amazing how much we can figure out about how people think now (Duhigg 2012)".

Trading any good at a market place implies that someone transfers or shares her ownership rights over the good. In the context of personal data, a prominent and theoretically and practically question is 'who does and should own a person's data?' The person herself, the entity tracking and capturing, or the company processing and using the data to connect back with consumers? Debates on that question continue (Etzioni 2011; Purtova 2015; Rees 2014) but their ultimate outcome may depend on who appears to hold or can make the stronger ownership claim.

¹ Note that information stems from the interpretation of multiple combined or juxtaposed pieces of data Rowley, Jennifer (1998), "What Is Information?," *Information Services & Use*, 18 (4), 243-54, Zins, Chaim (2007), "Conceptual Approaches for Defining Data, Information, and Knowledge," *Journal of the American Society for Information Science and Technology*, 58 (4), 479-93..

In this chapter, we adopt a psychological view of ownership and discuss whether and when consumers are likely to experience a sense of ownership for their personal data. Observing how freely people provide their data or accept having their data captured (e.g., by downloading an app or joining a social network), one might suspect that people either do not highly value their data (cf. Preibusch, Kübler, and Beresford 2013) or feel little ownership for them. If people feel no ownership for their personal data it is likely that they will do little to protect these data from being collected and (mis)used (Pierce, Kostova, and Dirks 2003).

To address the issue, it is necessary to first understand when people may perceive themselves and others as owners. We systematically contrast enablers of ownership with the properties of personal data, and the way they tend to be collected and transferred. We conclude that a vast amount of personal data eludes psychological appropriation. As a result, we suggest reframing the discourse about personal data into something consumers can grasp and appropriate. Specifically, we suggest using the metaphor of a person's digital blueprint. To address issues arising from the scope of personal data, we further suggest a practice that is frequently used by those holding substantial assets: The use of managers. Finally, we conclude this review by addressing pertinent open questions, fruitful directions for future research and points to be debated by public policy.

2 Why we come to psychologically own targets and what that implies for personal data

Though legal ownership conveys rights to a person (Snare 1972), it is the psychological experience of ownership that determines how strongly she will enact those rights (for reviews see Kamleitner 2014; Pierce and Jussila 2011). To understand whether people will and can protect their personal data, they would need to feel that unauthorized usage of these data infringes their ownership and takes away from something that should be theirs. But is the vast amount of personal data something that consumers are likely to feel ownership for?

Taking the purely psychological notion of ownership (Pierce et al. 2003) that prevails in this book, there is no boundary to what we could psychologically appropriate. We can psychologically own anything

that can be preceded by a possessive pronoun or that we attribute to ourselves or others. From mundane objects like mugs, coats and umbrellas, to special possessions like trophies, picture albums and sport cars, to the workplace, ideas, and the environment, to our very own body and traits that we consider part of us. People may think of all of these as “mine” or “ours” and make them ‘targets’ of psychological ownership.

And yet, not all that a person could claim or may even be legally entitled to becomes psychologically appropriated (McCracken 1986). For example, there is strong variation in whether people feel as if they own their place of work, though from a legal point of view they may hold equal rights (Pierce and Jussila 2011; Wagner, Parker, and Christiansen 2003). Likewise and though legal ownership is firmly in place, people feel little sense of ownership for many things they legally own (e.g., a tissue feels more like “a” tissue rather than “my” tissue).

To answer the question if personal data are among those possessions that people feel ownership for, it is necessary to understand the mechanisms needed to bring about psychological ownership. We first review characteristics of targets that tend to co-occur with psychological appropriation. Next, we review known key experiences and processes that enable and cause psychological ownership. For each of the factors, we query whether they likely facilitate or inhibit the development of psychological ownership for personal data.

2.1 The characteristics of targets we perceive ownership of

Psychological ownership is a specific form of relationship between a person and a target (Kamleitner 2014; Pierce et al. 2003). In nearly all cases it is a relationship that is wanted and instigated by the person and this informs the key characteristics successfully appropriated targets tend to have.

2.1.1 Claimability

Psychological ownership entails a possessive claim over a target (Baer and Brown 2012; Kamleitner and Feuchtl 2015). Indeed, unless a target can be somehow claimed, psychological appropriation becomes impossible. To claim any target, it is necessary for a person to know that it exists and to at

least roughly understand what it is. Only then it is possible to identify and outline the boundaries separating one object from another (Boulding 1991). Unless some boundaries are in place, a possession eludes the ability of exerting ownership rights over it. A target needs to be sufficiently specified for a person to intellectually and—ideally also physically—“grasp” it. The owner has to have an understanding of where her possessions begin and end. This precondition is perhaps one of the biggest challenges for the appropriation of personal data (Kamleitner, Dickert, and Haddadi 2016). Due to their mere scope and dynamic generation, no person could possibly keep track of every single data point that has been captured. Not only do we not know how many and which data there actually are, we do not even know where they are (Christl and Spiekermann 2016). Thus, claiming them becomes difficult.

An additional consideration for claimability is that of loss. Ownership engenders the possibility of a future loss. Ownership claims are often felt strongest when the loss of a target is feared (Kamleitner 2014), such as when being asked to sell an object (Chatterjee, Irmak, and Rose 2013; Morewedge and Glibin 2015). Personal data are an immaterial good. Even if we permit others to track and use them, we do not feel the pain of separation or loss, and thus may also feel little need to claim them.

2.1.2 Desirability

Since most instances of psychological appropriation are initiated by the prospective psychological owner, it is necessary for a target to be at least somewhat desirable. Here we suggest that desirability may come about through at least one of the following components.

Attractiveness: Unless a target is attractive, people are unlikely to engage with it sufficiently to make it theirs (Peck and Shu 2009; Pierce et al. 2003). While some personal data such as a person’s social media profile (see Spiekermann and Korunovska 2016 for a subsequent sense of ownership for the profile) do hold visual aesthetics and can clearly be considered attractive, this does not hold for other personal data that may only be available in code, such as the way a person moves a computer mouse.

Meaningfulness: Given the strong relationship between our possessions and processes of identity formation, maintenance and signaling, targets that elicit a particularly strong sense of ownership tend to be meaningful for the person, e.g., favorite CDs, cars or pictures. In the extreme case, they become so called special possessions which effectively anchor a person (Grayson and Shulman 2000; Richins 1994), e.g., a house. While some data are clearly meaningful to the data subject such as our birthdate or membership of a political party, and some data may even hold an anchoring function such as the wedding anniversary, many other personal data, such as the level of a specific neurotransmitter, hold little meaning for the data subject.

2.1.3 Non-fungibility

One of the most pervasive findings in the context of ownership is in fact that at least for the owner the owned becomes non-fungible (McEwan, Pesowski, and Friedman 2016). This means that the target in part or wholly cannot be freely replaced or exchanged. For a target to become non-fungible it has to be well-specified and to be either personalizable and/or contaminatable.

Contaminatability: Ownership links a target and a person. One way people tend to realize such a link is through the notions of contamination and contagion, i.e. the perception that an object has been imbued with the essence of a person (Argo, Dahl, and Morales 2006; Nemeroff and Rozin 1994; Rozin and Nemeroff 1990). If people perceive that a target has been contaminated by another person, they consider the product as already owned and tied to another person. Nonetheless appropriating a contaminated target, entails that the new owner is not only tied to the target but also to the other person whose essence is in the target already (Newman, Diesendruck, and Bloom 2011). Depending on who the other is, they could either avoid (Rozin et al. 2015) or desire the product which entails co-ownership. Importantly, theories of contagion suggest that physical contact is necessary to ensure essence transfer (Kim and Kim 2011). Even though personal data are about a person and metaphorically brimming with the person's essence, because they are intangible there is little possibility for contamination. Unless data are somehow tangibilized data subjects are unable to contaminate and thus naturally appropriate their personal data.

Personalizability: Going one step further people may also engage in 'possession work' (Molesworth, Watkins, and Denegri-Knott 2016). Often a strong sense of ownership is expressed or even comes about through specific acts of personalization and territorial demarcation (Avey et al. 2009; Childress 2004; Szlemko et al. 2008). A target that can easily be reshaped so as to reflect its owner and the owner's wishes (Baxter, Aurisicchio, and Childs 2015) allows the owner to claim it in a manner that is visible to the self and to the outside world. Personalization requires the target to become manifest enough for shaping to take place. Territorial markers, for example, only work if they are perceivable through others. However, this is not the case for most personal data. Though some classic pieces of personal data such as names and birth dates, or self-generated collections of personal data such as diaries constitute exceptions to the rule, most data are harvested and then transferred to the so-called cloud where they remain invisible to and out of the data subject's control. Most of the myriad of data points available about a person do not lend themselves to active processes of demarcation and personalization and they bear little surface for the essence of the person to rub off onto the data.

2.2 Experiences with targets which affect perceived ownership

Many of the above-mentioned characteristics affect psychological ownership also in indirect ways by hampering or facilitating experiences and processes that are known to instill psychological ownership. In their seminal paper, Pierce et al. (2003) proposed three processes—or as they called them routes—that lead to the generation of feelings of ownership (see also Sartre 1992). These are: perceived control over, intimate knowledge of, and self-investment into a target. For a target to become psychologically appropriated, it needs to provide 'affordances' that enable at least one of these processes to come into play (Baxter et al. 2015). Affordances are how a person could interact with and use an object given the properties of the object and the capabilities of the person (Greeno 1994) and thus are about the (perceived) possibilities afforded by the relation between an object and an actor (Chemero 2003). Drawing on the routes proposed by Pierce et al. (2003) and the specific affordances identified by Baxter et al. (2015) we discuss whether each of them is likely to facilitate psychological appropriation of personal data.

2.2.1 Perceived control

Among all the routes proposed control is the perhaps most powerful. It is the essential motivation behind toddlers fascination with the concept of ownership (Furby 1980), it even dominates ownership perceptions in the animal kingdom (Gintis 2007; Ru Han, Shu Li, and Shi 2009), and it is a route that can be more quickly travelled than investing the self or getting to know the target. The ways in which a person can exercise control over a target largely depend on its nature. Baxter et al. (2015) identified five abstract affordances that can convey perceptions of control and thus instill a sense of ownership.

These are:

Spatial control: The first affordance relates to the possibility to physically manipulate the target. Given the intangible nature of personal data, this affordance clearly is not in place unless the data are tangibilized as in the case of a birth or marriage certificate.

Configuration control: This affordance relates to a person's ability to change the settings of a target, such as adjusting the height of a chair or a volume control. In the context of personal data, the perception of control is something consumers deeply value (Spiekermann and Korunovska 2016) though in many cases perceptions of control are an illusion (Brandimarte, Acquisti, and Loewenstein 2013). For example, while consumers may sometimes be able to arrange settings about whether and how much data to volunteer, which gives an illusion of control, the data themselves are hard to arrange. This is because personal data are a byproduct of our being and are not captured by us. Any change to our life adjusts the data we produce. However, it is not the data we exercise control over but rather our lives that these data are about. Nonetheless, it clearly is possible to collect and configure some of the personal data available about us. For example whenever we compile lists of favorite songs, birthday calendars, contact lists or diaries we arrange our data into more meaningful entities.

Evidently, this possibility does not extend to the entire scope of personal data available about us. Even if consumers had any notion of all the data points available about them, as outlined before many of them are inherently meaningless to the person. So while consumers may experience a sense of control

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over more static and meaningful personal data, they are unlikely to do so for the much larger junk of personal data people may not even know about.

Temporal control: This affordance relates to a person's ability to use the target when desired. To the extent to which personal data are turned into personal memories, or stored on devices, such as our photo galleries, people can at least partially determine when to retrieve those data. That, however, again applies to a limited set of personal data. The vast majority of personal data is either not at all perceptible by us (e.g., minute detail about what goes on inside of our bodies), not immediately usable when desired (e.g., our credit scores) or not available to us. It thus defies temporal control.

Transformation control: This control affordance relates to the ability to alter a target and it thus links back to a target's personalizability. Given that data are intangible, they defy conventional ways of transformation. There are two ways consumers can still transform them. One is by similar means as they can configure them, i.e., they can compile multiple data points into bigger units of information which then essentially become a new target for appropriation (e.g., the playlist). The second is to transform data once they have been visualized or even tangibilized. For example, consumers can edit their photos to turn them into a piece of art.

Rate control: this affordance relates to a person's ability to dose or adjust the amount that is being consumed. Since people rarely use their own data themselves, and since those data they use are restricted in scope to the data people can think of, they may experience very little control of rate when it comes to personal data. In fact, people are likely to experience explicit losses of rate control as they find their attempts of control frustrated when unsuccessfully trying to bring to mind specific memories (e.g., what did I eat at that party) or pieces of information (e.g., recalling the passport number or a pin code). One area where they can exert rate control of consumption is in the domain of social networks where they can sometimes decide who can see what data.

Our conclusion then, if we use conventional ways of thinking of control and psychological ownership, is that, although some meaningful and salient pieces of personal information (e.g., demographic data

or memories) may afford consumers some degree of control, the vast majority of data escapes any attempts at control largely because they are intangible and because there are so many (see our later point on the scope of personal data).

There is, however, another aspect in which control and ownership are related. Prelinger (1959) found evidence that it is not only what we control that we feel we own, but also what we are controlled by. Given that personal data are used to steer people's choices (Acquisti et al. 2016; Weston 2016), they doubtlessly enable control over the data subjects. Although Pierce et al. (2003) mentioned this facet of control in their seminal piece, it has barely been addressed in the literature. In the context of data this second facet may hold one of very few keys to how people can experience ownership over their own data.

2.2.2 Intimate knowledge

Something can be one's own if one feels familiar, associated with or intimately knowledgeable about it (Sartre 1992; Van Dijk and Van Knippenberg 2005). At a first glance, this may suggest that people have a very strong sense of ownership for personal data. After all, personal data are about the person herself. They are inherently associated with the person and the person would often hold the most intimate knowledge about her life and by extension about its digital reflection. In fact, for many pieces of personal information, such as memories or personal preferences, people will consider themselves experts equal to none.

Most knowledge-accounts of ownership (e.g., Furby 1978) conceive of intimate knowledge about a target as the result of continued interaction and a joint history. This is also reflected in the knowledge-affordance principles identified by Baxter et al. (2015). Of the six knowledge-related principles, they propose five (ageing, periodic signaling, enabling, simplification, proximity) which directly depend on a person interacting with and getting to know the characteristics and quirks of a target. All of them benefit from a target's tangibility which provides a surface for that interaction and allows for visible traces of a joint history. With regard to personal data, people may become particularly knowledgeable

about those data that they tangibilize when interacting with them. The classic example would be a person's name, it becomes perceived through the senses of vision and audition and it is often interacted with. People will know many ways in which their own name can be pronounced, what other names it may be easily confused with or how to best spell it on the phone. They are thus intimately knowledgeable about a personal data point that they feel a very strong sense of ownership for (Nuttin 1987). Names and other personally-meaningful data points that people interact with are, however, a very special and rare breed of personal data. Most data points are hard to trace or capture by the person herself; their existence is not something people think about and at best they become used once they have been converted into a holistic piece of information and tangibilized (e.g. a medical diagnoses or a selfie).

2.2.3 Investment of the self

The third of the routes towards psychological ownership, Pierce et al. (2003) proposed, is the extent to which a person invests herself into a target. Investment into a target can take many shapes from meaningful monetary investment (Kamleitner and Erki 2013) to psychological effort (Brown, Pierce, and Crossley 2014) and time. Often, exercising control over a target is accompanied by investing effort into the target. Perhaps the strongest act of investment is that of creation. People tend to feel a strong sense of ownership for things that they made themselves (Kanngiesser, Itakura, and Hood 2014). When it comes to data, they clearly are created by people themselves. However, since they are a byproduct of life, they are often not created intentionally or even consciously. In most cases then, people do not feel as if they purposefully created personal data or invested anything into these data. Moreover, while people may have *de facto* created the data, they often do not also create the means needed to capture and trace those data. It is only if they take the time and effort to do so (e.g., when writing a diary, capturing life experiences on social media, or quantifying aspects of the self, such as stepping on a scale) that they actually experience an investment in the data reflecting their life. However, self-capture pertains only to a fraction of the personal data available about us.

3 Why we struggle to appropriate all personal data

The preceding discussion showed that while it is easy to psychologically appropriate individual pieces of personal data, such as one's name or birthdate, it is hard to appropriate personal data at large. In this section, we distill the main factors emerging from the previous discussion and add insights that are specific to the context of personal data. We condense them into three layers at which fundamental hurdles to the psychological appropriation of a person's entire personal data arise. They arise at the level of (a) the data themselves, (b) their scope, and (c) their transaction practices. Figure 1 illustrates these three layers which jointly impede the psychological appropriation of personal data.

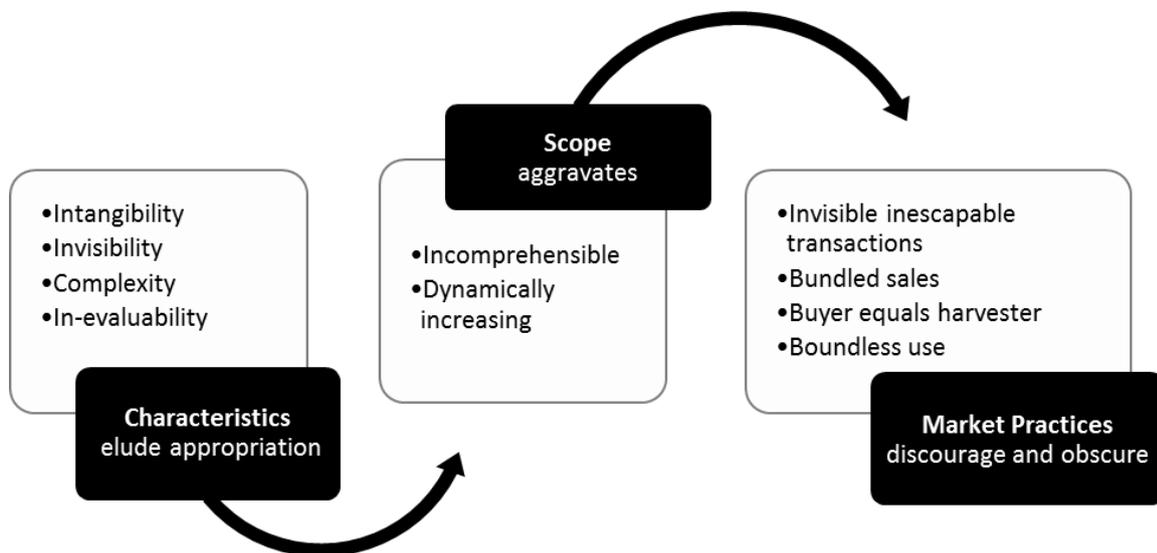


Figure 1. Layers of hurdles to the psychological appropriation of personal data

3.1 Characteristics of personal data

At the first level, the nature of the good itself poses several fundamental challenges for its psychological appropriation.

3.1.1 Intangibility

First, and perhaps most obvious, the fact that consumers cannot physically interact with data poses a challenge to the degree to which they can engage in what has been termed 'possession work' (Molesworth et al. 2016). It is harder to experience control over or intimately know targets that cannot

be quite literally held. Intangibility is not an insurmountable challenge however. Whenever consumers manage to put a layer of materiality on top of their data by talking about, listing or visualizing them--perhaps even on the tangible medium of paper--they break through that hurdle (for the general appropriation advantage of tangible objects see Atasoy and Morewedge 2016). However, given the constant and diverse data streams each consumer produces, tangibilization is only feasible for a small minority of personal data; primarily those static data that stereotypically come to mind when talking about personal data (e.g., basic demographics) and those dynamic data that consumers decide to self-track (for some insights on self-quantification see for example Sjöklint 2014).

3.1.2 Invisibility

In a related vein, but touching on a somewhat deeper challenge, lies the issue of data's invisibility. As an information-like good, data are invisible. While intangibility restricts processes of appropriation, data's invisibility may prevent consumers from forming a wish to engage in such processes in the first place. Because data are invisible, they do not remind consumers of their existence and are thus an unlikely target for psychological ownership.

In addition, invisibility combined with intangibility entails that consumers are in no position to know how or how often others are using their data (Almuhimedi et al. 2015). Since nothing is physically taken away from them, consumers cannot even feel if data are being harvested, regardless of whether they gave permission to do so or not. Personal data are thus a possession that is hard to protect and to exercise ownership rights (Snare 1972) over.

3.1.3 Complexity

Even if data were visible, it is not clear that consumers would feel capable of appropriating them. Remember that psychological ownership mostly entails that a person feels able to control and shape a target (e.g., Baxter et al. 2015; Furby 1980). This requires consumers to believe and perceive that they at least somewhat comprehend the target. Deep understanding of a target facilitates not only the experience of ownership itself, but also fosters ownership attributions. For example, people tend to

attribute more rights of ownership to those that conceptualize a target than those who eventually build it (Levene, Starmans, and Friedman 2015; Li, Shaw, and Olson 2013).

However, data are heterogeneous and increasingly complex (Acquisti et al. 2016). More and more the personal data that stem from sensors on the person or in the environment capture human properties that—for the lay person—are hard to describe and understand. While most will still grasp the concept of their heartrate, many will struggle with concepts such as the meaning of heart rate fluctuations or electrical wave changes within the heart. Even if data were made visible and tangibilized consumers might still not muster the desire or expert knowledge to psychologically appropriate many of them. That said, recall that ownership can also be experienced for those things that we are controlled by. Notwithstanding their level of comprehension, if consumers feel dependent on their data, they may still perceive a submissive form of ownership. To illustrate, consumers may appropriate physical data that they cannot comprehend simply because they realize that these data determine whether they will live or die.

3.1.4 In-evaluability

Consumers not only need to be aware of a target, they also need to be attracted to it (Pierce et al. 2003). Evidence suggests that consumers are fundamentally uncertain as to how attractive and valuable their personal data actually are (Acquisti and Grossklags 2012; Acquisti, John, and Loewenstein 2013; Kamleitner et al. 2013; Preibusch et al. 2013). In fact, despite some notable exceptions, such as one's name or information on allergies, personal data tend to hold less immediate value for the data subject than other ownership targets.

First, as outlined before, we aspire ownership over targets which are attractive and/or meaningful, i.e. which provide symbolic value by informing ourselves and others about who we are and what we can do. Unless data about a target can obtain additional value – such as the social value attached to providing one's name or title – they are unlikely to become coveted psychological possessions themselves. In fact, recent evidence suggests that campaigns aiming to enhance data protection may

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often fail to succeed because they do not manage to make clear to people that data are personally relevant and meaningful (Johnston, Warkentin, and Siponen 2015).

Second, and a fundamental hurdle to the attainment of meaning and value, data are raw material. Most data points, with the by now recurring exceptions, hold in and of themselves little information or signaling value. It is only once they are combined with other data of the same or other people that they accrue value. An example in which consumers themselves make use of this principle is the case of memories. In some sense, memories are nothing else but conglomerated and interpreted points of personal data. What makes memories special is that, unlike names, they also consist of data points that accrue dynamically, such as how we felt in a specific moment.

Mostly, however, it is not the consumers themselves who combine multiple data points into insights but players in the data market. And the data they use to generate insights are often also not those bits of data that consumers would conceive of as valuable in the first place. It may be hard for consumers to strive to appropriate individual data points when failing to understand what insights these data might give rise to (e.g., the speed with which one moves fingers over a touch screen). The struggle may be particularly pronounced for those personal data that dynamically accrue. This is because consumers do not amass all the data points, nor know how to analyze them or how to extract value from the results.

Moreover, because of their intangibility using data does not mean using them up. Though somewhat dependent on a storage device, data themselves are non-perishable. Add the fact that data accrue value by being combined with other data and it becomes clear that the actual value potential of data tends to grow over time. While those harvesting personal data in data markets are very much aware of that fact, it is doubtful whether consumers are truly cognizant of this, too.

3.2 Scope of personal data

As the reader will have noted, the sheer scope of personal data we steadily produce has been resurfacing as a topic. Their scope poses an important challenge to personal data's appropriation because it hampers all of the characteristics and experiences known to foster psychological ownership.

To understand why the scope is such an issue and why humans may underestimate this issue, it is helpful to recall that there are different types of data. Personal data comes from a boundless amount of sources and encompasses progressively more dynamic personal properties that we ourselves may have very little awareness of (e.g., bodily functions). Given the mounting prevalence of sensors in objects and people surrounding us, the scope of personal data that is actually tracked and available keeps rising to unprecedented levels (Haris, Haddadi, and Hui 2014; Wang et al. 2014). It likely already defies the imagination of most people.

First and foremost, this poses a challenge for consumers' comprehension and thus impedes claimability. Second, psychological ownership usually develops for well-specified targets that eventually become non-fungible (e.g., Kamleitner 2014; McEwan et al. 2016). Clearly, millions of dynamically accruing data points are not one what might call well-specified singular targets, nor do most of them evoke any illusion of non-substitutability. Third and related, what comes in high volumes tends to be deemed low in value and attractiveness (Gierl and Huettl 2010; King, Hicks, and Abdelkhalik 2009). Scope, thus, also counteracts the perception of data as a desirable good for appropriation. Fourth, scope acts as a natural barrier to the experience of control (Iyengar and Lepper 2000). Fifth, personal data are about us and we should thus be knowledgeable about them. However, the scope and granularity prevents development of intimate knowledge about personal data in their entirety. Finally, by their very nature we are naturally invested into all of our personal data. Yet given their scope, for the most part this investment is not something we are conscious about.

3.3 Processes of transfer and value creation

While the characteristics of data and their scope relate to the nature of the good traded, the last layer relates to the ways in which this trade and the creation of value occurs. The practices around data trade exhibit substantive differences to the practices consumers engage in when trading other goods.

3.3.1 Invisible transactions and inescapability

A peculiarity of many personal data requests is that they tend to obscure the fact that this is what is being requested. Mobile apps, for instance, do anything but encourage users to think about what it is that they provide in return for using the app at no monetary cost (Kamleitner et al. 2016). The illusion of 'free' digital goods has been carefully nourished by the industry for years and clicking "accept" to grant unreflected permissions has become a standard practice.

In fact, even if consumers wanted to avoid giving away their data, this is often not feasible. Apart from market research studies, such as Amazon's Mechanical Turk, where consumers offer their opinions and data but also their time, there are very few widely known platforms at which consumers could go to trade in their data and be compensated for it. Most transactions containing a transfer of personal data center on another good or service that consumers wish to obtain. In the online sphere, many transactions cannot be completed unless consumers agree to the terms and conditions (Zhao et al. 2016); which—nearly always—include some element of personal data transfer. Online, viable alternative options rarely exist; either consumers permit data tracking and get what they were seeking (e.g., a search on google or an online purchase), or they do not get it at all. This may explain why consumers mostly do not engage with the topic and even fail to read conditions that detail requested permissions. For example, in the context of online social networks, Korunovska, Kamleitner, and Spiekermann (2016) found that even when there is no way to ignore this information, only about 50 percent will properly read and understand the simplest and most transparent privacy notices.

Of course, some online services, such as maps, will in fact need permission to ascertain (though not to track) specific personal data, such as current location, but many ask for much more than is necessary

and consumers will rarely know which of the permissions they are asked to grant are needed purely for the app to work properly, which permissions are needed to harvest data of commercial value, and which permissions may be needed for both (Au et al. 2012). In short, the market mechanisms leading to personal data transfer are intransparent, distract from the transfer of personal data, and make it hard for consumers to ascertain whether they are engaging in a form of coproduction or whether they are selling their data.

3.3.2 Bundled Sales

Another characteristic that is specific for personal data is that increasingly, they are requested in bulk. The classical case are mobile app permissions that simply ask for all data of a kind; be it location, contacts, call logs, or media files. As we have outlined elsewhere this corresponds to a practice of selling ambiguous bundles that consumers may have a hard time comprehending (Kamleitner et al. 2016). This introduces issues related to the processing of scope (Loureiro, Gracia, and Nayga Jr 2013) into the sphere of individual data transactions. For example, when asked to grant permission to their location data, consumers are in no position to know which locations and trajectories that will end up entailing. In fact, as Carrascal et al. (2013) showed, consumers assign similar values to data points as they do to bundles of data of the same kind.

Even if the data are articulated as well-specified pieces of information, it may be hard for consumers to fully appropriate them. In fact, recent work found that consumers only feel a moderate amount of psychological ownership for even well-specified, i.e., real-time contextual information, and that there is a degree of uncertainty about the extent to which these data are actually theirs (Kamleitner et al. 2016).

3.3.3 Buyer equals harvester

This uncertainty about ownership may partly derive from another peculiarity of modern day data harvesting practices. For as long as human kind existed, personal data were free floating bits of information that we ourselves and outside observers could capture by thinking or talking about them

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or even solidify by tangible tools such as diaries, lists, or picture albums. If someone wanted data about us, they could either get them by observing us or they could ask for them directly. Someone would ask me for my name, telephone number or date of birth and I would actively volunteer that information; or not. In a nutshell, the process of data provision required either effort by the observing data gatherer or active involvement of the data subject. With the onset of digital technologies that are able to automatically zoom in, trace and capture ever more granular personal data neither is much needed any more.

Now, all the consumer does is press 'accept' and an entire data harvesting machinery is starting to do its work on the data subject. Because we hold no active part in this process of transfer, we are deprived of an essential possibility to engage with our own data and to go through any of the experiences needed to instill a sense of ownership for what we give. At the same time, we are aware that the data harvesters are making ownership-instilling experiences and invest in the process of claiming the data. By capturing nuanced details they may gain more intimate knowledge about them than the data subjects could have hoped to get themselves. They have excellent control over what to do with those data, and they quite obviously value them.

Moreover, we may not interpret ourselves as the person that brought the data into being through our labor nor as those that were the first ones' to truly hold and claim them. Both are important signals in processes of ownership attribution and legitimization (Kanngiesser et al. 2014; Malcolm, Defeyter, and Friedman 2012; Palamar, Le, and Friedman 2012).

In short, the digital spheres entail data transfers in the form of harvesting and mining that deprive consumers of experiences that confirm their role as owners whilst sending signals that may consumers make feel as if theirs was a lesser claim.

3.3.4 Boundless co-ownership and –usage

Some of the personal data we hold are in fact imbued with joint ownership from the outset. The classic example are transaction data, e.g., purchasing online with your credit card or logging into a website,

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which per definition involve two transaction partners who both may be entitled to claim that data.

Providers hold a right to those types of data that are about the data subject's relationship with them.

Similar constellations arise in the private sphere. We all hold information about others which we also share (Kamleitner and Mitchell 2016; Pu and Grossklags 2016). For example, any time an app asks us for our contact list, we in fact share other persons' personal data². Some have, therefore, suggested that personal data markets ought to be viewed from the perspective of social interdependence (Sarigol et al. 2014). As this highlights, boundaries of ownership may not always be clear because some data are about our relations.

Boundaries are, however, also unclear due to data's previously discussed invisibility and immateriality. With tangible goods joint ownership involves the necessity of alternate use. The physical restrictions of the target entail that different people cannot simultaneously use the target in the same way. It also entails that over time usage by the multiple parties leaves traces on the physical matter of the target; thus engraving joint entitlements into the very substance of the target and affecting feelings of ownership (Kamleitner and Rabinovich 2010). With personal data, joint usage leaves no traces. What we give away are invisible, identical copies that can be sold on or stolen without disturbing the original version. In his blog post "Beyond Data Ownership" Joe Andrieu a project member of Harvard's VRMPProject even called the entire Internet a "copy machine".

While the copies of the data themselves are identical, there is, however, barely any limit to what they can be turned into. As they are raw material, data are inherently malleable. The data subject thus passes on a potentially powerful ingredient without knowing what it may be used to build. In the best case, it may be used to identify a new way to combat human problems; in the worst case, it may be used to exploit or harm the data subject (Acquisti et al. 2016; Conitzer, Taylor, and Wagman 2012;

² Given the ease with which most people appear to do this, perceptions or considerations of ownership appear not only to lack for people's own data but also for those of other people.

Kostkova et al. 2016). The data subjects themselves are unlikely to fully realize what their data are or may be used for.

Together, all of the discussed practices and processes impede consumer's ability to experience ownership for the good they hold and data markets seek to harvest and capitalize. Not only are there processes putting a veil over the nature of this good and its uses, there are also processes that heighten the experienced legitimacy of claims made by data harvesters.

4 How could people be made to claim their data?

Evidence suggests that people hunger for privacy control and ownership over their personal data (Bélanger and Crossler 2011). Given all the challenges to appropriation discussed, the result is a control paradox. Merely signaling the possibility of control over some data makes consumers responsive to market nudges (Tucker 2014) and tempts them into giving away even more data (Acquisti, Adjerid, and Brandimarte 2013; Acquisti, Brandimarte, and Loewenstein 2015; Brandimarte et al. 2013). The desire for control makes people so keen to believe in the promise of control that they may end up sacrificing that which they hoped to obtain: control as a gateway to a sense of ownership. For example, the practice of self-quantification demonstrates that consumers even themselves use their personal data to better understand or modify themselves (Nafus and Sherman 2014; Rivera-Pelayo et al. 2012). In doing so they paradoxically end up providing data to app providers that can then also use these data to influence the person (Haddadi and Brown 2014). It follows then that practices that aim to help consumers with the appropriation of specific pieces of personal data may be of limited use. In the worst case scenario they could even make them more vulnerable by providing an illusion of safety. Here, we focus on two radically different potential solutions that complement each other namely; personal data gestalts and personal data asset managers.

4.1 The metaphor of a digital blueprint

A possible solution to the conundrum of a lack of psychological ownership for data could aim for a mechanism that instills a sense of ownership for every individual type and piece of personal data. Given the ever increasing and already incomprehensible scope of personal data, such a solution would appear not viable. However, if we are able to condense and reduce a range of personal data, so that consumers appropriate fewer chunks of data, such a process appears more feasible. This would also be in keeping with human mechanisms of thinking that tend to condense, simplify, abstract and categorize inputs (Kardes et al. 2008; Loken 2006; e.g., Waldmann and Hagmayer 2006). Specifically, we suggest going for the extreme case of condensing all personal data into a metaphorical gestalt. A gestalt can take on a meaning of its own and makes graspable what otherwise cannot be grasped in its entirety (Hamlyn 1957; Roth 1985; Wertheimer and Riezler 1944). In particular, when there are many individual pieces, as is the case with personal data, a gestalt can help reduce initial complexity and instill a sense of meaning. To illustrate, take the example of a machine. In essence, it is a vast collection of screws, bolts, steel, cables, pipes and maybe even tinders; all of which become properties of the machine. Taken separately each of these pieces holds little meaning and value. Once all the materials have been crafted together and transformed into the gestalt of a machine we are capable of thinking of all of these pieces jointly. The sum becomes more than its parts and we see a holistic machine, an aesthetically pleasing and functional structure that provides us with assistance or entertainment. Once we grasp the gestalt, its meaning trickles down to the components which become recognized as necessary and interconnected building blocks. Viewing objects and people in terms of their gestalt comes natural to us.

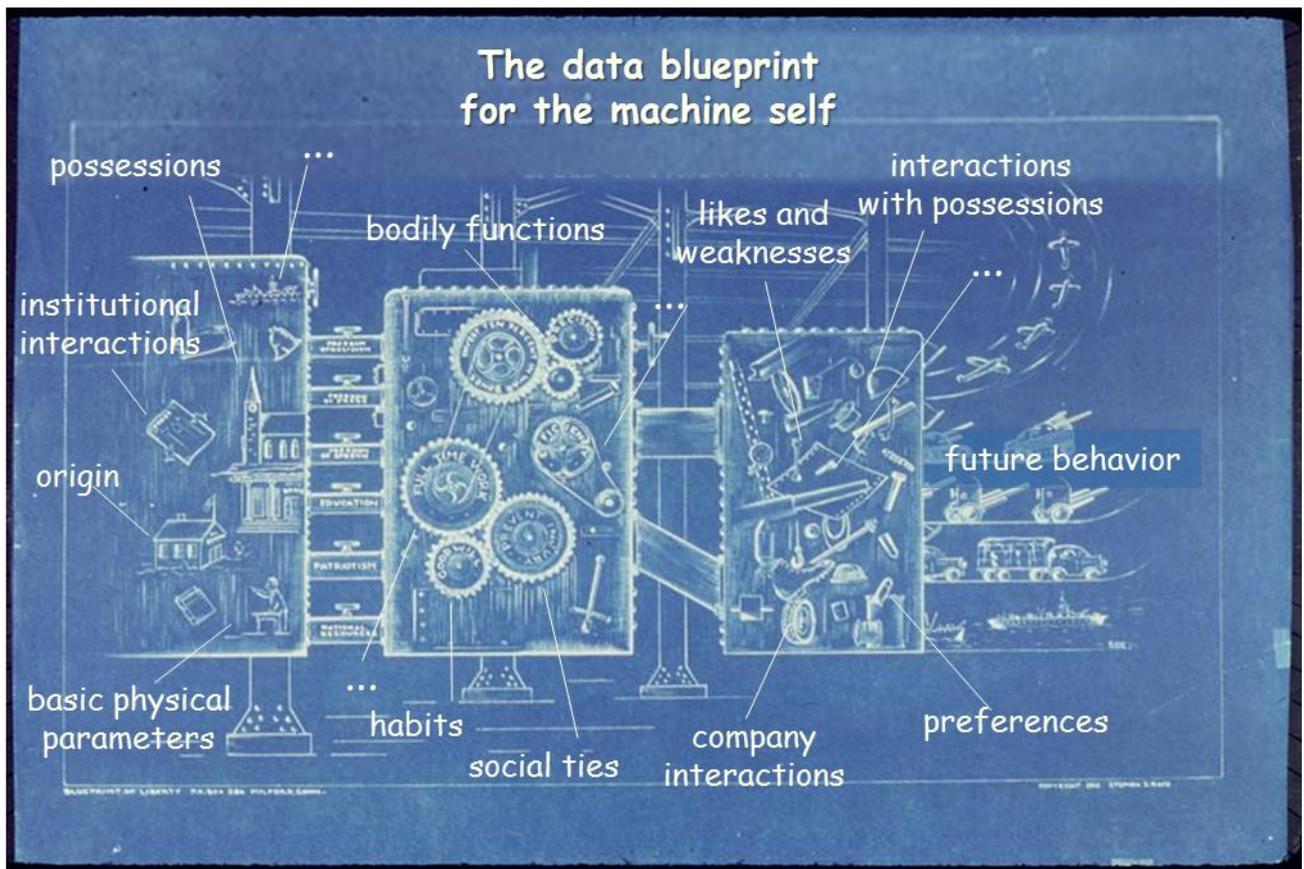
Going back to the example of a machine, in its constructors' mind, the machine already exists prior to its creation. A blueprint or construction plan helps to inform where each of the many parts going into the machine ought to be put to bring about a functioning gestalt. This blueprint can provide nuanced information about how exactly the machine is going to work. To the skilled eye, a look at the blueprint reveals what would happen if the screws in one section were removed or where in the machine is likely

to need the most oiling. We suggest that personal data are in many ways like a blueprint of the person those data are about (see Figure 2 for a schematic illustration).

Personal data describe the properties of the entire gestalt of a person. For example, the blueprint elements of personal data might include minute details about her basic physical parameters and body functions, e.g., the genome, height, shoe size, medical records and fitness app records. It includes details about her sources and origins e.g., birth dates, ancestry and life trajectories in the form of biographic information such as employment histories, schooling records but also simple location data. It comprises numerous hints on the person's properties and preferences, e.g., past activities, declared and observed interests, opinions. It also includes information about a person's possessions, e.g., the car, the house and all acquisitions made online. The smarter these possessions become, the more the blueprint elements entail information about the role of those possessions in a person's life and about the activities a person engages in with those possessions, e.g., her driving patterns, the preferred contents of the fridge and the frequency with which they are taken out of the fridge, and the temperature preferences and patterns in one's house. Obviously, the digital blueprint also comprises nuanced sketches of a person's social ties, e.g., call logs, social media data or information about co-habitation. By the same token, it includes details about a person's company interactions, such as purchase histories, insurance policies or web browsing patterns, and about her institutional interactions, e.g., tax returns or criminal record. So the digital blueprint potentially describes multiple nuances that make us into who we are and it includes information of how we function in our very specific surroundings. The notion of a blueprint may hence serve as a useful metaphor for the value of all data points in their entirety. Personal data, we argue, are like a digital blueprint of the machine self. Using this metaphorically-rich gestalt allows encapsulating the complex and massive bundle of data points.

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Based on blueprint of victory by U.S. National Archives and Records Administration

Figure 2. A schematic illustration of personal data amounting to a digital blueprint of a machine self

Importantly, and referring back to the example of a machine, there are vital comprehension consequences of using the blueprint metaphor. First, we know that we can influence and understand a gestalt without physically interacting with it. Information about the components going into the machine and the way they have been combined yields potentially powerful insights such as how to power it. Second, since many essential points of data about a machine are reflected in its blueprint, we know that everyone who is privy to the blueprint could copy the machine or find out where the structure may be weakest or how best to corrupt or exploit the machine. Third, we also know that as long as someone has the blueprint, i.e. a collection of personal data of the machine, they can exert influence on the machine - potentially even from far away. Finally, it highlights that personal data eventually can function as an instruction manual to the self. Because consumers are familiar with the

notion of blueprints, and can be made to understand their power, we suggest and hope that altering the discourse to speak of digital blueprints of the self rather than of personal data helps consumers to appropriate personal data in their entirety.

Mapping the suggestion of a discourse about digital blueprints rather than about personal data along the characteristics of ownership discussed in section 2 yields a picture with promise for the development of psychological ownership. This gestalt imbues data with an essence that makes them at the same time graspable, desirable and thus able of being claimed through any of the routes instilling psychological ownership. A nuanced blueprint of the machine self is very much like the self and like other parts of the self that we are aware of, such as our limbs (Belk 1988), we should be able to appropriate it. And by highlighting that blueprints can function like instruction manuals, it helps consumers understand the implications that sharing or leaking these data may have. However, even if consumers are able to grasp the gestalt of personal data, there remains the vexed question of what they do with it.

4.2 Need for help: data asset managers

Claiming this gestalt is like claiming a portfolio of myriads of assets. We concede that even if consumers claim ownership over the portfolio they may be ill equipped to handle and aspire control over all individual data assets contained (cf. Baruh and Popescu 2015; Garg et al. 2013; Matzner et al. 2016). The before-mentioned control paradox (Brandimarte et al. 2013) in which people may end up losing the control they set out to protect highlights how challenging the task of navigating the execution of ownership over personal data may be. Given the sheer scope of data and the ever increasing amount of sources aiming to track and capture these data, it is obvious that to demand that consumers should stand up and claim all aspects of their digital blueprints is an enterprise destined to fail.

In a way, we are too data-rich to cope. However, richness in data is not the first kind of richness humans have been facing. In response to holding more assets than people themselves can handle, they have always employed agents, managers and stewards. On behalf of the owner, entrusted and accountable

third parties have been looking after and exerting control over assets. In principal such a practice should also be possible for personal data. This would therefore involve a new industry of intermediaries between consumers and data harvesters and analyzers comprised of data management experts or software who could protect, exploit and control personal data on behalf of and accountable to consumers.

5 A summary and outlook

More and more the sum of a person's personal data amounts to a holistic digital reflection, to a deep well of knowledge about that person. If personal data are the goods, then we are about to become goods ourselves. We argue that, consumers are likely to claim and feel little ownership for a good that is being increasingly harvested from them and traded in markets that barely involve consumers (Kamleitner et al. 2013). The more complex, encompassing and unobservable personal data become, the harder it becomes to perceive them as a target for psychological ownership. Even for easily identifiable pieces of personal information, the emergence of psychological ownership may necessitate acts of materialization or repeated engagement that are infeasible given the scope of personal data. Together, a range of obscuring market practices, the thorough invisibility of data, the often limited value they provide to those they are about, and their sheer incomprehensible scope are likely to lie at the heart of why people feel and exert little ownership over a good that is becoming increasingly precious to the market, and whose trade directly affects consumers themselves.

We want to stress that this conclusion pertains to the range of personal data at large. There are numerous individual pieces of data such as their names (as evidenced by the name letter effect Jones et al. 2002) and dates of birth that consumers feel doubtlessly very strong ownership for. Increasingly these self-descriptive and meaningful data points are, however, a minority among the personal data that are being harvested and traded. The likely consequence is that consumers do not feel, and thus also not strongly claim and protect ownership over the majority of their personal data. Rather, they may easily confuse exerting control over small bits of information such as their email address or date of birth with the appropriation of their personal data at large.

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This conclusion is important because, the information deducible from personal data can be used to influence the person (Acquisti et al. 2016; Weston 2016), those similar to her (Sarigol et al. 2014), and those around her (Chen et al. 2015; Kamleitner and Mitchell 2016). High levels of privacy concern suggest that consumers have at least an inkling of these possibilities (Zhao et al. 2016) which can end in the eventual loss of all privacy (Haris et al. 2014) and in discriminatory practices that influence the choices available to consumers based on their data (Weston 2016). As if we were a non-sentient mountain, incapable of passing things out voluntarily, data are being mined out of us.

The way people deal with their data may hold the key to whether privacy will really soon be dead as some—and most famously Facebook founder, Mark Zuckerberg—claim it is already or, whether it is under duress, but has a chance to survive. Ownership is a precondition for privacy, as is autonomy (Weston 2016) and if consumers fail to claim their personal data and effectively hand over instruction manuals to their selves, then both are under threat (cf. Cohen 2000).

Asking consumers to claim their data is not an easy feat and may not even always be desirable (e.g., detailed personal data can help governments combat social issues and health researchers identify new treatments for diseases). Providing consumers with the possibility to make informed decisions as to whether or not to share their data does however seem desirable.

In response, in section 5 we sketched a mechanism that may help consumers feel and claim ownership over personal data. The solution we suggest is to evoke the gestalt and metaphor of a digital blueprint of the self rather than to talk about the data points. The idea of a digital blueprint helps consumers to understand and figuratively grasp their entire personal data; thus making them claimable. It helps them understand that together these data are deeply personal and unique to themselves; thus making them desirable and non-fungible. It helps ensuring consumers that they have experiences of investment, control and knowledge with these data; thus enabling processes formative of psychological ownership.

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We further suggest that digital data managers will be a necessary institution for consumers to have any chance to factually behave like they own their data. Obviously this suggestion comes with several legal, commercial, technical and societal implications and more interdisciplinary research devoted to questions around the notion of digital data managers is imminently needed. Given recent attempts to include users in personal data markets (Chaudhry et al. 2015), this call is certainly not too far off from several existing research agendas (e.g., thehubofallthings.com, www.datatransparencylab.org, www.databoxproject.uk). All of these endeavors aim to give more control over their data to consumers. None of those we know of does, however, also help the user deal with her data richness through the idea of an entrusted and accountable agent.

Viewing the phenomenon of personal data through the lens of psychological ownership can inspire several future research agendas. We highlight some that we consider of particular importance.

To begin with, it allows a fresh look on the question of what can and cannot be psychologically owned. Apart from considerations of attractiveness, prior research has tended to focus on what people are unwilling to attribute ownership rights for, such as things people deem sacred (Belk 1991) and entities which are perceived to be autonomous (Starmans and Friedman 2016). What our analyses suggests is that people may also struggle to ascribe ownership to anything that escapes their mental grasp, either due to its scope or its ethereal nature. The need for some specification of boundaries as a pre-condition for claiming ownership has barely been addressed in the literature. Future research that aligns insights on what cannot be owned seems well suited to propel a deeper understanding of how humans navigate and appropriate the world.

A related and very crucial agenda arises from the fact that we are in the end social beings. Even without gadgets observing our interactions, many of the data tracked at the level of the individual arise from social interactions in which more than one individual is being involved. Beyond thus being the source of data that could be rightfully claimed by more than one user, consumers also hold numerous bits of information and personal data that are essentially the data of others (e.g., friends' phone numbers and

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birth dates, pictures of them, their preferences). An increasing body of research is coming to recognize the role friends and acquaintances may play in the data ecosystem (Chen et al. 2015; Kamleitner et al. 2016; Kamleitner and Mitchell 2016; Sarigol et al. 2014). Several digital business models already prosper on the very fact that gaining access to one person means getting information about many others. Academically and legally, the implications of the fact that we are all carriers of information about others and that we are interconnected has, however, largely gone unnoticed. This practice may not only entail an additional threat of data leakage, but also the key to motivate enhanced data protection. It could be that consumers are more easily aroused to protect their family or friends data than their own. One project which looked at whether people are capable of evaluating real-time personal information points in that direction. It found that people have less uncertainty about the value and ownership of data arising from social settings than from settings in which they are by themselves (Kamleitner et al. 2016).

In preparation for this chapter we have engaged in discussions with scholars from a range of disciplines. Wherever we went and whoever we spoke to, from policy makers to scholars in human development one question kept popping up and it certainly is a question that can also be tackled from the viewpoint of psychological ownership. The final direction we aim to open up is perhaps the most challenging one and arises as a direct result of the increasing view of human actors as a compilation of interconnected data points that are harvested and traded in markets that are devoted to influencing those providing these data. It is the question as to what it means to be human.

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