Metadating: Exploring the Romance and Future of Personal Data

Chris Elsden, Bettina Nissen, Andrew Garbett, David Chatting, David Kirk, John Vines

Open Lab, Newcastle University
Newcastle upon Tyne, UK
{c.r.elsden; b.s.nissen; a.garbett; david.chatting; david.kirk; john.vines}@ncl.ac.uk

ABSTRACT

We introduce Metadating – a future-focused research and speed-dating event where single participants were invited to '*explore the romance of personal data*'. Participants created 'data profiles' about themselves, and used these to 'date' other participants. In the rich context of dating, we study how personal data is used conversationally to communicate and illustrate identity. We note the manner in which participants carefully curated their profiles, expressing ambiguity before detail, illustration before accuracy. Our findings proposition a set of data services and features, each concerned with representing and curating data in new ways, beyond a focus on purely rational or analytic relationships with a quantified self. Through this, we build on emerging interest in 'lived informatics' and raise questions about the experience and social reality of a 'data-driven life'.

Author Keywords
Personal Data; Quantified Self; Lived Informatics; Dating;

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

INTRODUCTION

Our lives are increasingly suffused with data. Sensing devices embedded in environments, smartphones in pockets and social media are constantly collecting and streaming data, reporting on, and making inferences about our activities. In popular press, a 'data-driven life' is presented as an aspiration and panacea [66]. A 'quantified self' will be fitter, happier and more productive. The 'connected home' will be securer, more energy efficient and easier to maintain. There is undeniable utility to these aspirations; but just as 'big data' has been critiqued [7,61] for simple answers to complex problems, the presumed interactions with such *prosaic* data are frequently idealized, often bearing little resemblance to the lives people lead. While

data may be thought of as the language of machines, movements like the quantified self aim to make data serve human needs (although some argue it makes humans more machine-like [48]). 'Human-Data Interaction' (HDI) [50] has been proposed as its own field of inquiry – to make people's interactions with data infrastructure accountable, and question the social shaping of interaction in HDI [16].

HCI has a history of research to develop and design technologies that collect, analyze and display data (e.g., [19,40,43]); often towards behaviour change (e.g., [14,43]), health monitoring (e.g., [49,56]) or sustainability (e.g., [27,28]). Recently, the HCI community has displayed a more critical conscience about the human experience of data. Rooksby et al. [57] coined 'lived informatics' as a recognition of the way that personal informatics (and as such 'data') becomes necessarily "*enmeshed with everyday life*". In a similar vein, Taylor et al. [61] reflect on engaging communities with data through the notion of 'data-in-place' – "*how, over time, it comes to entangle and settle in a place*". Elsden et al. [23] have also urged consideration for how this data manifests in everyday social encounters, and characterizes the past and future in new ways.

Moves such as these are the departure point for our inquiry, where we seek a deeper understanding of what it might be like to live a data-driven life. In particular, we are curious about the social life of data as it permeates the everyday. Will one's sleep data be a topic of conversation around the dinner table? How would you teach your children about the sensors in the home and their backpacks? How will friends and partners judge each other's curious data habits? What sort of lies might one tell about their data, to whom, and why? What jokes might be made with data? Such questions may initially appear superfluous, and incommensurate with questions around the roles data may play in making us live healthier, longer, and more sustainable lives. But these are relevant questions when we start to take seriously the potential realities of living with ubiquitous data collection and flows on (and within) the body, home and street.

HCI has a history of methodological innovation to speculate about the design of experiences surrounding emerging technologies. These range from creative engagement with scenarios and prototypes [9], to participation in role-playing [52], theatre [63] and improvisation [11] or design fictions [5,45]. Commonly, these methods seek participants to suspend disbelief and engage in critique, ideation or

reflection. Following in this lineage of speculative practice, in this paper we detail Metadating – a speed-dating event where participants were invited to '*explore the romance of personal data*'. The underlying concept of Metadating was that data, collected in the manner of the quantified self, could be used to meet, date, judge and love. Through this conceptualization, we envisaged a future 'data service' where data such as the quality of one's sleep, recent step counts, alcohol consumption and web browsing habits would be presented on a dating profile, a curated window of the 'real' you. Metadating was intentionally in contrast to the 'big data' matching algorithms of dating websites, such as OKCupid [59], and questions the social appropriation of data, and the extent to which it represents one's identity.

We have not designed such a service. Rather, we organised a workshop as a genuine speed-dating event, where single participants 'dated' each other based on 'data profiles' (Figure 1) they created prior to the event. At the event, our participants met each other in a series of speed dates structured around their data profiles, and undertook group reflection on the design of 'metadating' profiles. This provided a rich corpus of data, with insights into the way people position, present and question *data in conversation*. The work presented here only scratches the surface on how two people could achieve intimacy or express love through data. Instead, Metadating draws on the context of dating – meeting, presenting and judging each other as mates – as a concentrated site of identity. Our primary aim is to explore the lived experience of data in this everyday social context.

In this paper we present a thematic analysis of the qualitative data collected through the Metadating event. We focus in particular on the qualities of the data profiles and the dialogue of the dates themselves. We offer three contributions to HCI discourse. Primarily, we extend the concept of 'lived informatics', through an elaboration of the social life of data, which suggest an alternative to idealized interactions and scenarios of a data-driven life. Secondly, we extend these to propose a design space and set of data services that see data as a creative material, to be socialized in everyday interaction. In addition, we extend a tradition of speculative methodologies, emphasizing the value of creating consequential engagements with participants.

BACKGROUND: TOWARDS LIVED INFORMATICS

The emergence of 'Lived Informatics'

Technologies that help people collect data about their lives have been of longstanding interest in HCI, commonly described as 'personal informatics' [40]. There have been six related CHI workshops (see personalinformatics.org) on this topic since 2010, providing a wide-ranging view of related work. Much of this work concerns behaviour change, and identifying the stages and challenges towards goal achievement (e.g., [24,41,42]). However, our work builds on a recent turn within HCI towards 'lived informatics'. Rooksby et al. [57] introduce this notion as a response to a perceived techno-centric, overly cognitive and
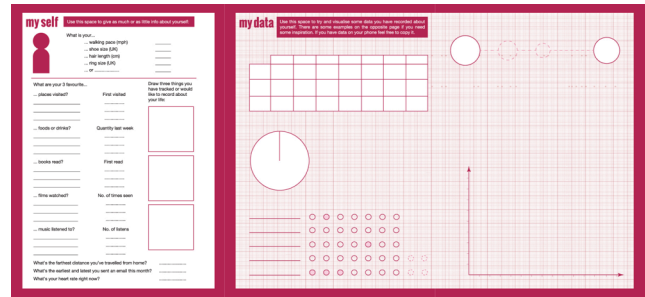

Figure 1: The blank profile, with structured questions on the left page 'my self' and open-ended graphs and tables for 'my data' on the right side.

rational discourse surrounding personal informatics [40]. Experience-centred [67], they describe '*styles*' of use rather than a *'five-stage model'*; they are interested in the stories to which data pertain, as much as the goals they dictate. Lived informatics has informed research about wider experiences of self-tracking; abandonment of self-tracking tools [13]; examinations of how people remember the past with data [18,23]; and the sharing of personal informatics data on social media [25]. All speak of a more holistic and messy view of how people live with and alongside data, a view resonant with third wave HCI [6], anticipating the progression of data into the fabric of everyday life. This perspective has been shared by recent work in sociology. For example, Lupton [46,47] argues self-tracking is an emergent cultural phenomenon, rooted in a more individualist society, with an emphasis on self-understanding and control. This work draws strongly upon the notion of a 'data double' [33,58] to describe the multiple representations of oneself created in data that self-trackers increasingly confront and engage with. HCI has long been aware of how these data doubles can represent the self and afford more 'intimate interactions' [1].

Experimental engagements with data

Further alternative perspectives on the dominant discourses of data in people's lives are provided by more experimental and critical arts and design practice. Much of this work has explored the notion of data as a new material to represent the self, examining the implications of drawing out a more human aesthetic to data. An early example is Xiong and Donath's (1999) [68] 'Data Portrait'. Later developed further [17] –*"data portraits depict their subjects' accumulated data rather than their faces."* Designer Nicholas Felton has produced 10 annual 'Feltron Reports' [26] – each representing a year of his life in personally tracked data. Extending to personal communication, the recent Dear Data project (dear-data.com) by Giorgia Lupi and Stefanie Posavec is in deliberate contrast to the digital aesthetics and subject matters of 'big data' and the quantified self. Here, Lupi and Posavec send each other physical postcards of self-portraits of data collected and *visualized by hand* that week. Described as *'exquisitely human'* [54], the drawings cover diverse topics, for example tracking thank yous, wardrobe choices and phone

addiction. These brief examples are instructive. They appeal to data as imbued with human identity, and experiment with representations of data to communicate that identity, rather than only self-analysis or reflection.

Inviting speculation around technology

There is a long history in design of using provocative proposals and objects to promote discussion and dialogue; from Archigram's hypothetical architecture [15], through to Chindogu's [37] and more recently critical and speculative design [20], diegetic prototyping [38] and design fictions [3]. Many of these approaches have been appropriated in or inspired HCI research. For example, Wakkary et al. [64] examine how design fictions are employed in the process of envisioning future sustainable living, while Buttrick et al. [10] use written fictions to scaffold a critique of potential human subservience to machines. Blythe et al. [4] use fictional designs as a means for capturing and communicating alternative design spaces resulting from ethnography. More related to our approach, many HCI researchers have used provocative proposals to engage research participants in processes of speculation around technology and design spaces. Lawson et al. [39] use diegetic prototypes to provoke responses to fictional products, while Vines et al. [62] use purposely questionable technology designs to promote design ideas from participants. These latter approaches are representative of what Lindley et al. [44] term 'anticipatory ethnography'.

There are some overlaps with these approaches and our work on Metadating—through the website, data profiles and our interaction with participants, we aimed to suspend their disbelief and scaffold them to engage with the idea of dating with data. However, crucially, Metadating engaged participants in a very real event. Besides our speculation and framing around the quantified self, at its most simple Metadating recorded two people having a conversation about some hand-written data. In some respects therefore, closer to our approach are 'user enactments' [52] – '*a fieldwork of the future'* to '*investigate radical alterations to technologies' roles'*. As a method with its own roots in speed-dating, in user enactments participants rapidly engage in a set of high fidelity scenarios, often with props, stages and carefully scripted encounters. While Metadating did not engage people with such specific design outcomes, we see similarities in the way that participants were invited to play a role – in this case a real date – and study and

reflect on their encounters. The success of the event turned on the candidness with which participants undertook this – something was really at stake in the context of the date to give a good impression of one's self. Underscoring the authenticity of the dates, one couple who met during the event began a long-term relationship. Metadating sits in a peculiar but productive methodological space – speculative but real; futurist but entirely analogue; a design workshop, research event and genuine speed-dating event.

METHOD

In this section we outline the specifics of our Metadating study, giving particular attention to the ways in which people were invited to participate, how the event was structured and how we analyzed the resulting data.

Invitation and participation

Metadating was advertised as a singles' dating and future-oriented research event. We created a website that described the event, with a link and short survey for people to express an interest in taking part. The event was advertised through paid advertisement on social media and posters around local University campuses for six weeks prior to the event. 26 people expressed an interest in attending. Of these, 17 responded to our follow-ups and indicated they would attend the event. These 17 people were given an invitation pack, one week prior to the event. The invitation pack was printed on high-quality card, was personally addressed, and included a separate information sheet that explained the research. The invitation also folded out as a blank 'data profile', which participants were asked to create before attending the event.

Data profiles

The data profile (Figures 1 and 2) was akin to a cultural probe [29], as it engaged and sensitized participants prior to the event. However, it was also the key artefact at the event. The profiles were intended to help participants familiarize themselves with the notion of self-tracking, collect some personal data, and reflect on what data to share.

Consisting of three A5 pages, the profiles had one 'my self' page of structured biographical details. This page invited responses to a range of questions requesting quantifications of personal details (e.g. walking pace, heart rate, furthest distance travelled from home, number of listens to favorite songs) along with several 'top three' lists (music, films). This structured part of the profile was intended to both
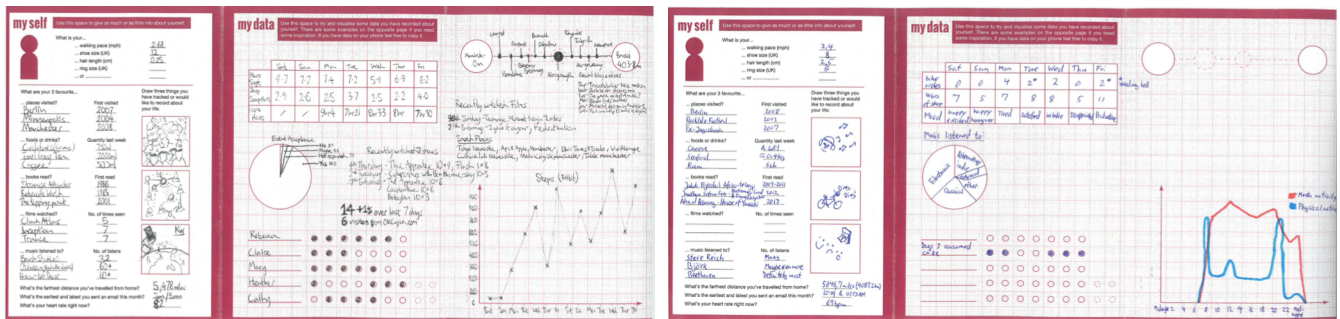

Figure 2: Two examples of participant data profiles: one highly detailed, and one more sparse.

mimic popular questions on conventional dating websites and ease participants into creating their profile. The other two pages were named 'my data', and provided a range of empty graphs, tables and visualisations. Text on the data profile invited participants to complete these empty graphs to represent any aspect of their life they wished to. Overleaf was information about some free tracking tools, and graphical examples of how the empty charts might be used. It was for participants to decide what they recorded, and how accurate or honest they were with what they shared.

The Metadating event
In total 11 participants attended the event, held on a Saturday night, in an atmospheric space on our University campus. There were a number of last minute dropouts. Those who did attend were a mixture of people with a self-stated interest in personal tracking, along with some who were non-trackers and more intrigued in the event itself. All were single, and had indicated when signing up online that they were either 'men seeking women' or 'women seeking men'. Only one participant had experience of speed-dating events before, others had used dating sites and apps, primarily *Tinder* (gotinder.com). Most were connected with the University, either students or researchers, but few had a technical background. Some participants knew each other, attending with friends. The participants aged between 22 and 40 with mean age of 32. Unfortunately, the late dropouts skewed the gender balance such that there were 7 men and 4 women attending. The event itself lasted 3 hours, and consisted of four activities.

Activity 1: First impressions (Figure 3)
Participants were split into two mixed gender groups and invited to inspect and jointly discuss the profiles of the other half of the room. The intent here was to loosely replicate the experience of online dating, judging someone based on their profile without meeting them. For our participants, this was a first look at what other people had done with their profiles. Members of the research team led semi-structured discussion about the profiles; would you like to meet these people? What's missing from these profiles? What's attractive or unattractive in this data?

Figure 3: Participants first impression of anonymous profiles.

Activity 2: Speed-dating (Figure 4)
The gender balance on the night dictated that women would enjoy seven dates each while men would enjoy four – everyone dated each other once. These took place in two rounds of four, with a break in-between; four dates took place simultaneously. Data profiles were laid out on each table for the first date. Men rotated, with their profile. Each date lasted 4 minutes. There were 28 dates in total. The dates were entirely unstructured, besides an encouragement to swap their 'data' profiles as the first dates began.

Figure 4: Two couples 'Metadating', with data profiles.

Activity 3: Clustering data
After dating, participants took part in 2 more workshop activities (Activity 3 and 4) in two groups. We provided each group with cut outs (individual charts, graphs lists, etc.) of all the data people had drawn, and asked them to cluster them in response to: what different categories and types of data did people collect?; and what type of data does and does not belong in a profile? Groups were asked to explain and discuss why they grouped data together.

Activity 4: Ideal profiles
For the final activity we provided participants two descriptions of personas, and asked them to think about what type of data might fit each profile. They created and presented both an ideal and a flawed profile for them.

Follow-up interviews
Finally, several months following the event we conducted eight follow-up interviews (4M, 4F) with those participants who responded to the request. Six of these were people who participated in the Metadating event. Two were people who had expressed interest but dropped out. We contacted these individuals, as we were interested in finding out why they pulled out of the event, and also to discuss their perceptions of the data profiles, without attending the event.

Ethics of Metadating
As an unorthodox method, we wish to briefly highlight our ethical approach. All participants were clearly informed about, and consented to, the nature of Metadating as both a research and dating event – we had sustained email contact with participants beforehand, and met most participants in

person prior to the event to deliver their profiles. Contact details of participants were not shared with other attendees. Importantly, it was entirely up to participants how they chose to represent themselves with data. There was no obligation that the data they shared was 'true', nor were they forced to share things they chose not to. We held the event in a safe space on our campus, with four researchers of mixed gender on hand throughout.

Analysis

Each of the group activities, dates and interviews were audio recorded. Each of the 24 recorded dates was fully transcribed. This in itself created a large corpus of data, based on 8 hours of audio recordings. We proceeded to conduct an inductive thematic analysis [8] of our research data. As our primary interest was in what people chose to put on their profiles, why they put them on there, and how they talked about it, we proceeded by closely coding the data from the speed-dating exercise followed by the data profiles completed by participants. We then more deductively sought to focus on the specific talk during dates. This talk, combined with the content of the profiles themselves, forms the core of our thematic analysis, to which the field notes and follow-up interviews offered further reflection. We finally selected excerpts of our data as a means of illustrating these themes presented below, as they relate to the data represented, the qualities of data-driven conversations, and general reflections on the event.
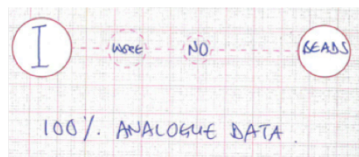
FINDINGS

With the data profiles we were interested in what people chose to record, and how they would represent this within the constraints of the profile. Excerpts of data profiles that we refer to throughout this section are shown in Figure 5.

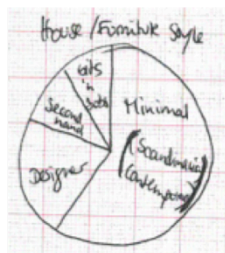### Approaches to constructing a data profile

While participants varied in how much time they spent working on their profiles, there were two distinct interpretations of how to complete them. Some explicitly sought unusual and interesting data to record. They were seen to be more *"creative"* and artistic by others, and produced data that was illustrative rather than accurate *(Fig, 5h)*. These profiles sometimes oriented towards representing an ideal week (e.g. one's intended exercise regime or social activities), and these participants appeared to be comfortable with guessing or even making up data *(Fig, 5d)*. Typically they used their data to express a point they wished to make or subject they were interested in. Contrasting with these approaches, others saw the profile as simply something to be completed, and sought to be honest, neat and accurate. If they had tracked lots of data, their profiles were very detailed; if not their profiles tended to have gaps. However, in at least one case, their profile was deliberately ambiguous – *"to make it something which would hopefully provoke questions." (P11)*. Another described herself as a *"perfectionist"* and felt she just could not be as creative as others (P3). Most participants collected data over the prior week especially for the event. Some transposed tracked data from a device (e.g., *(Fig. 5g)* Fitbit data); others used data easily recorded by hand (e.g., *(Fig. 5f)*) and drew diagrams or graphs that were more illustrative

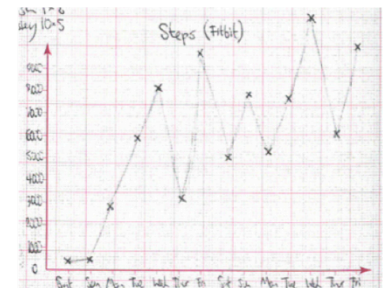### Choosing and representing the data

We identified 88 separate examples of data in the 'my data' part of the profile. 10 of these were pie charts; 14 were graphs; 6 were maps or travel *(e.g. Fig. 5c)*; 50 used the charts or dots *(Fig. 5b and 5f)*, largely to record daily events. In many cases, the subject was as or more important than the data itself. The profile was a very limited space,

a) A playful and expressive use of an ambiguous space on the profile. Others left this space blank.
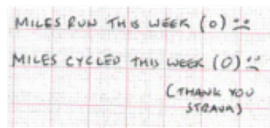
b) A table of repetitive meals throughout the week.

c) A representation of major travel over a year.

d) A pie chart of 'house furniture style'. Categories include 'Minimal (Scandinavian Contemporary)' and 'Second Hand'.

e) An amusing example displaying exercise not achieved that week.
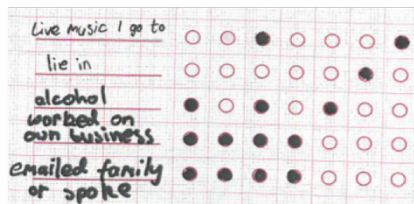
f) Recorded activities throughout the week.

g) An accurate graph of steps transposed from a Fitbit step-tracker.
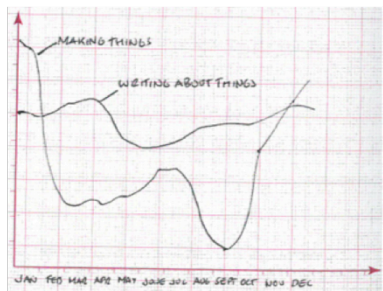
h) A graph depicting 'making things' and 'writing things' over the course of a year.

Figure 5: A snapshot of data from the 'My Data' section of seven different profiles.

which demanded unusual *selectivity*. In discussion prior to the dates, one participant suggested that the *choice* of data and its *presentation* was of most interest to him. He felt the pressure creating a profile was that "*it would have to be something you would talk more about, and something that would maybe make people a bit curious" (P10).*

Routine and Activities
The vast majority of data on profiles related to daily routines and activities. Some of these were common to aims of quantified self: recording sleep, consumption of food and drink, exercise, cycling and steps. Others though were more unusual: calls to mum over the week; eating specific food like muesli; 'cooking days'; a graph of mental vs. physical activity; sex (charted over the year) and the ability to concentrate through the week, correlated with coffee. Routines can be mundane, but arguably give a sense of who someone is, through how they live their daily life. This would be an unusual part of a dating profile. However, data, which is frequently revealing of our routines, was clearly perceived as a means to express identity in this context.

Tastes, Hobbies and Travel
Other data was revealing of people's tastes. This included specifically detailed foods (e.g. a list of biscuits), and was similar to the Top Three's of film, food, music on the 'my self' part of the profile. Pie charts were commonly used to represent taste in music, internet browsing, or even clothing colors and the furniture style of one's house *(Fig. 5d)*. Hobbies, a stalwart of traditional dating profiles, were also well represented in weekly activities; for example reading a paper, attending live music, a feeling of optimism for bike building, and different exercise classes. The data here refers to what we say we like doing – a common means to introduce oneself and express identity.

Two participants drew maps, while three used the timeline graphic to depict either a particular trip or significant destinations *(Fig. 3c)*, though only one included precise distances. Representing travel highlighted important places rather than exact details – and was a means to talk about exciting times or adventures in ones' life.

Sharing Vices
A number of participants recorded their vices. These included alcohol, coffee, and chocolate, cake and biscuits. By contrast, one participant *(P3)* represented what she called a *"boring"* and honest representation of her week, where all she had eaten were oats, quinoa salad and soup *(Fig. 5b)*. This diet is objectively 'good' or healthy food, but less provocative than a "*diet coke habit" (P5)* or eating cake daily. These vices were humorously contrary to health-conscious aspirations of quantified selfers and a great point of commonality and self-deprecation between participants. Rather than sharing data to brag, they sometimes chose data that was less flattering, but humble.

The presentation of data
Even if some data was typical of self-tracking culture (e.g. steps and sleep), this often presented and curated on the profiles in unusual ways. With multiple scales and values juxtaposed; colorful annotations (e.g., 'ringing the bell' next to a graph of cycling or smiley emoticons); or using ambiguous phrases like 'a lot' or 'enough'. However, many of the most interesting data and discussions came from things that were not easily tracked, or involved people guessing and fabricating representative data:

Most of the things that people recorded were often not things you would conventionally record with life-tracking apps…that's probably to do with the fact that you're trying to present yourself in an unusual way, or things you think are unique about yourself, which I would have probably struggled to support doing this in a digital way. (P7)

This participant felt that the rather simple graph he drew *(Fig. 3h)* of his productivity in terms of writing and making things said something about who he was and what he did with his time. But this could only be represented by hand – there's little data he had for this besides looking through deadlines in his calendar. For many, to represent themselves solely with graphics or outputs from apps would have limited how they expressed themselves.

Conversing around and with data
We now focus on how participants conversed with each other around and with the data during dates. The conversations highlight how data and the data profiles acted as a 'ticket for talk' [60] – it helped individuals initiate conversation and structured encounters. In our analysis we observed a number of common conversational strategies. It was common across dates to **read data out loud**, to draw attention to this data and comment on it, or invite their date to explain or respond to it. Participants **asked questions** of each other's data, encouraging their date to **explain the context** surrounding their data and what it meant to them. Some dates involved one participant asking many more questions than the other, though most involved **turn-taking** and **comparisons** of data in common. Attention often roved around the profiles, introducing several subjects, for example, travel, music, exercise, food etc. until a mutually interesting topic was found and a longer follow-up conversation continued. Those with less complete profiles tended to focus on just one or two subjects. There were also many **compliments of data.** This we might expect on a date, but in this case they were directed to the data and often acknowledging effort and the successful creation of an interesting profile. Such strategies are interesting in themselves, but could arguably have occurred had we asked participants to bring five important personal objects along to the event. However, that this was 'normal' behaviour in itself is notable. Despite the potential strangeness of this event, participants clearly had no difficulty having conversations about data; for the most part discussed in a prosaic fashion. We now highlight points where the data played a unique role in interaction between participants.

Participants introduced their Data Profiles in a number of ways. Some spoke of *"exposing the data" (P2)* – raising anticipation or joking about what the data might reveal.

(P10): *So do you wanna reveal your…*
(P2): *Oh, go on, go on, let's do this. Dive in!*

(P8) *Wow, get a real insight into you now!*
(P1) *Well, who knows right!*

Everyone was initially curious of each other's data, with some expectation that the data might give a *"real insight"*. The response to this is a little defensive. Conscious of being judged based on charts and graphs, and at the same time questioning whether data does say much about someone.

Curiosity rather than analysis or presentation
Rather than initiating talk about their own profiles, participants overwhelmingly questioned and remarked on their date's profiles. There was little time to analyze or carefully inspect each other's data. It was much more polite to ask, and there was a pressure to maintain a good conversation. Partly as a consequence, much of the data served to be symbolic – illustrative rather than demonstrative – signifying interests, tastes and points in common. On other occasions, participants prompted their dates to explain further through a suggestion or judgment.

"So you're doing volleyball once a week?"(P4)

"My god, what were you doing… did you just wake up… that's a really low heart rate!" (P9)

Once again though, any story or narrative was made through the author, rather than the data itself. But as conversation developed, participants might refer back to the data, to make it fit with the conversation.

(P10): *I was in Germany last weekend, end of November.*
(P1): *Is that here in Aachen you went?*
(P10): *Yeh yeh! We went to the Christmas markets!*

The data here acts to add extra detail to the original story, but also to encourage a further anecdote about the visit.

Exploiting ambiguity and explaining the context
Answers and explanations to questions were work to contextualise the data, making it relevant and of interest in the current conversation. Through this contextualization, participants expressed themselves, telling their own stories. In this way, particularly where follow up questions and anecdotes were pursued, data was a conversation starter.

(P6): *So where is 11,732 miles. That seems very specific.*
(P2): *Dunedin, in the South of the South Island of New Zealand.*
(P6): *Really?*
(P2): *I figured that's probably the furthest I've been. I tried Sydney, and then I tried that, and that was furthest, so I thought that was probably the furthest.*
(P6): *Yeh. Wow. And what did you do there? How long?*

In this case, a specific but ambiguous 'distance from home' invites a question. With some prompt, P2 explains further why she included that data and how, while a follow up question allows her to tell a longer anecdote about time spent travelling in New Zealand. There are many such examples, explaining a high step count as an evening spent clubbing, defending drinking on a Sunday as part of a roast dinner, or justifying odd music listening choices as resulting from a car share to work. We note how the ambiguity of the data both invites question and gives room for both participants to respond with wide-ranging answers.

(P1): Yeh, but it's kind of interesting because it doesn't actually have any kind of measurement. This could be anything, this could be like getting up from your desk, or actually running 5 miles."
(P10): *I think this is actually getting up to go to a talk.*
(P1): Is this getting up from the sofa to go to bed?
(P10): *It's actually cooking; because I'm quite active in the kitchen I would say.*

In this case, the ambiguity, lack of measurement or scales on a graph encourages both participants to speculate about what a graph of 'physical vs mental activity' represents.

Comparison inherent to data (and dating)
Comparison was a common practice. Particularly for topics such as movie or music preferences, there was often an exchange of responses, with explicit invitations such as *"What about yours?"*. Some people sought and emphasised similarity, offering their own data to say 'me too'.

"You've put rum as well. We've both got rum." (P3)

"Oh you win on shoe size. I win on hair length." (P5)

"That's Vancouver. I couldn't decide between South Africa and Vancouver. I didn't know which was further. Where's yours?" (P1)

"…number of steps. yeh you do fewer steps than me – (Laughter) – but you cycle." (p11)

Comparison was another mechanism to establish or invite dialogue with the data profile itself as a point of commonality. Such comparisons were far more common on the shared parts of a profile such as 'top three' places or films. Comparison was also often for comparison's sake. One couple feigned a game of 'Top Trumps' – comparing their heights, hair lengths and shoe sizes. Comparison is somewhat inherent to metrics, as it reduces different qualities to make them commensurate and thus comparable. A walk to commute and a walk in the park are quite different, yet comparable with a step-tracker. Indeed, comparison becomes a means to interrogate data, and establish norms and boundaries as to what is expected and what is unusual. This somewhat arbitrary comparison was clearest with the comparison of heart rates, part of the pre-defined 'my self' section. Even though one's heart rate is not especially telling, as a shared element of many profiles, it was a conversational resource, to joke or compare with.

Playing around with data
Many dates were filled with humor, with much laughter and joking around the data. Some participants teased about 'boring' or mundane data, often in self-mockery, or as a means to downplay their data's significance. However, most frequently, humor came from the deliberate over or misinterpretation of the data that was there.

(P2): *Ability to walk correlated to –*
(P5): *No wake! That's wake! Not walking! My ability to wake! I can walk!*"

Participants clearly found it amusing to speculate about what strange things you could track (e.g. number of crows seen) in contrast with the more prosaic topics of most consumer tracking (e.g. steps, diet). Some also mocked and anthropomorphized nagging tracking tools.

"Strava's like a cycling running app, that tells you when you've not done any running or cycling. And goes 'you should really go out'. And then you have to say – I don't wanna go out, I've got a fucking cold, and it's cold outside." (P7)

What's telling is that data is an acceptable subject to make light of and to be mocked. Humor is an integral part of daily life and communication, especially on a date, even for seemingly dry and serious things like data.

Avoiding, defending and downplaying data
On occasion, the data profiles were quite contrary to the impression participants sought to portray, or they had to defend or explain the data they had chosen to record and include. As noted, a small number of participants regretted how they had created their profile, downplaying them as "*empty*" or "*boring*". Others apologized for their profile, to preempt any criticism or bad impression it gave. One participant appeared embarrassed by some of the data written on their profile, purposely steering discussion away from it whenever it was brought up. However, more often than not, when defending their data many appealed to what was typical or usual, rather than what was displayed on the profile. This served to highlight their honesty, but sought to explain that this data is not representative.

"I didn't play volleyball then, this one I played volleyball, it's usually up here. So yeh, you get kinda, Wednesday, Saturday, Sunday it's like usually really high." (P8)

In discussing his step–count, a participant appealed to his *usual* routine of playing volleyball and a high step-count, not shown in this data. In other examples, while justifying things that are difficult to measure, another defense was to convey that the data was made up, badly drawn or hurriedly created. Again, they appealed to representativeness – this is more or less right, imprecise rather than dishonest.

"I completely made it all up. I think the only thing I actually recorded, because my phone was so crap and so old, that I could only install one sleep app for a few hours, on Thursday and Friday of my sleep time." (P5)

These negotiations with the data, even where it was chosen and hand-drawn bespoke for this event, makes clear the need for data to be contextualized to fit a social situation.

REFLECTIONS ON METADATING
The above analysis gives an overview of the conversations participants engaged in. Many of these show well-understood rhetorical strategies and self-presentation; however, we have also highlighted more unusual aspects of conversations about data. We now consider some wider reflections about how Metadating worked.

Ambiguity as a resource for contextualization
It was very evident that many conversations concerned resolving ambiguity in the data, which was necessarily reductive and only a partial representation of an individual's identity. There was a strong sense that the data could not, and should not, tell everything: "*You don't want someone's complete autobiography before you meet them." (P2),* especially as time was limited to fully take in and understand another's data. This inclined people to pose questions where it seemed interesting but unclear: "*if there was anything on here you were interested in, you had to ask me." (P11)* Ambiguity, a well known resource for design [30], allowed a person to tell their own story of what the data means – to incorporate that data appropriately in a given situation or conversation. This is especially so where someone seeks to avoid or defend their data – ambiguity gave them a means to downplay or suggest an alternative meaning. It was also a resource for humor. Much of the playful misrepresentation of data relied on ambiguity affording an alternative interpretation.

A common example of ambiguity was the 'furthest distance from home'. Interestingly, an answer like 11,372 km refers to a specific place and expresses a level of careful detail. It's not simply ambiguous through abstraction (i.e. Australia) but through its specificity. This detail acted as a hook – attention in the profiles was often directed to odd details suggestive of a wider context. At the same time, further ambiguity arose from the messy and hand-written quality of profiles, or unusual qualities juxtaposed.

Honesty vs. representation
Dating literature, drawing particularly on Goffman [31], reports a common tension between presenting an authentic version of oneself and creating a good impression [21,22]. One proposed means of negotiating this tension is through presenting an 'ideal self' – the person you hope or intend to be. Part of the premise of using data to represent oneself was that it might objectively show the 'real' you. This presented a dilemma, when participants were constrained by time and technology in what they could record. Much of the data they could be honest and accurate about – e.g. a sleeping pattern – is not necessarily how people would choose to represent themselves. Alternatively, the 'real' data of the last week might be atypical, or contrary to their self-perception. As such, participants felt that fabricating data as a means to better represent who they *really* were

was justified. Some depicted an ideal week (e.g., of exercise or social activities), guessed at data (e.g. walking pace or the scale of a graph) or fabricated it entirely. People did not feel obliged to show all of their data – just enough that was illustrative, as an expression of their personality, and to invite curiosity.

However, honesty was carefully managed to preserve the authenticity of their profile. Dating literature describes the profile as a promise [21] – *"that the person here won't be fundamentally different from the person you meet"*. Nearly all participants were very frank about the inaccuracies or fabrications of their profile. Yet despite these admissions, they were all insistent that this data still represented them or was *"kind of true"(P10)* and they had not lied on their profile. Such flexibility was in part granted by the hand – drawn nature of the profiles – it was to be expected that not everyone would track or transpose data accurately. Though, even if this were a digital exercise, some noted they would still curate and choose data that showed their best side.

Those who were more 'honest' in their data were left in a challenging position if their data did not represent them. On occasion they apologized for a lack of representativeness in their profile: *"I don't have that much on my profile, so I just did it, and I apologize I didn't feel like I could cheat much." (P9)*. One participant who was honest and a keen tracker by contrast had a much more detailed profile than most *(Fig. 2)*, but much of this data was harder for people to interpret and understand rapidly during the date than more representative and higher-level data.

Analyzing vs. performing data
Metadating forced the live performance, articulation and negotiation of data. It is apparent that the personal analysis of data and the performance of that data are very different things. In their extensive study of public 'Show & Tell' presentations by quantified-selfers, Choe et al. [12] report more about what people said and did, rather than *how* they said it. Nevertheless, they demonstrate that analysis of data involves scientific rigor, lots of data, and particular insights. Meanwhile, in performing a dialogue about data, our participants exchanged accuracy and rigor for authenticity, and simple and specific pieces of data – 'tickets for talk' – representative of a wider phenomenon or interest.

Returning to the everyday-ness of this talk, it is worth recalling Bartlett [2] who, in his argument for a more reconstructive memory, claimed that *"literal recall is extraordinarily unimportant" (p204)* in everyday life and conversation. Likewise, while precise facts are vital for analysis, they are rarely needed to make an impression on a date. In this respect, the story and conversations that could be reconstructed around data proved more important to the act of dating than the data itself. More generally, we think this demonstrates how the logical analysis and understanding of data is quite distinct to the sort of conversations performed with data.

DATA DESIGNED FOR LIVING
We conducted Metadating as an exploration into the everyday and lived relationships with and through data. The heightened role data is anticipated to play in our lives, with a quantified self and Connected Home raises questions about how we will *socialize* all this data. That is – how do we make data and devices that are good company? What will be the norms around their use? What are the multitude of relationships we can have with data, and on what terms?

Much personal informatics research concerns people recording and capturing data about their daily activities. Creating data *of* people and their lives, towards evaluating, optimizing and reflecting on those lives. Here, we have speculated about what people might *do with* that data, as it becomes commonplace. Crabtree and Mortier describe this challenge – to move from the status quo which boyd and Crawford describe [7] of *"data about you"* to *"my data"* [16]. Though limited to personally recorded data, Metadating supposes 'my data' could form part of one's identity, a means to judge each other, and perhaps even meet romantic partners. While some might see this as fanciful, we point to the remarkably prosaic manner in which participants engaged with data on their dates. The notion of representing life, and talking about life, through data, was conceptually clear to our participants. As such, these interactions and the choices in crafting data profiles reveal much about the qualities that are important for data to be socialized, and 'designed for living'. It should be **ambiguous,** but intriguing [30]. It requires a human elucidation and interrogation of the context, body and place [58] that surrounds it. Data will misrepresent people, frequently. Therefore it should **invite questions** and discussion, rather than definite, final and judgmental answers. It should be more **illustrative** than exact, more suggestive than cold and precise. Such detail is rarely required or called for in everyday talk. There is a time and a place for analysis, another for performance. It should be data to make conversation – **a ticket for talk** that should also be **playful**. It should be open to mischievous interpretation and misinterpretation – not so serious and soulless. And data for living should indulge us in speculative sense making, and should support **unusual correlations** and ambitious hunches. These characteristics can serve to help us unpick and question often-idealized future scenarios and fictions of a data-driven life. But we can also reconsider these characteristics as values, central to the design of new data services with a human aesthetic.

Data services for living
We propose a space for alternative engagements with data that act in contrast to the rational and analytic engagement expected and demanded by traditional devices and visualization. Services are emerging to combine, store, or visualize existing data to deliver new 'insights' (e.g. Exist (exist.io), Gyroscope (gyrosco.pe). However, an approach to diversify the roles of these sorts of tools could create new opportunities to engage with data on a more human scale

[36] and widen their appeal. Yet, if we treat data as a material, then there is, at present, strikingly little that end-users can do with it. Especially in comparison to, say, the multiple cultural practices, services and transformations enacted around other media like photographs. This has been recognized in InfoVis literature that considers alternative visualization methods, and a democratization of visualization tools. Pousman et al. [55] define 'Casual InfoVis' which supports the depiction of *"personally meaningful information in visual ways."* Huron et al. propose a new paradigm of 'Constructive Visualization' [34] – providing people with building blocks to create their own. But while research has considered how different 'visual cuts' of data might be received [24] and aid sense-making or new insights, the ambitions remain rooted in self-tracker goals rather than a more playful, or creative, interaction. We therefore conclude with a set of alternatives, which intend to open up this design space for future practical exploration.

Curation and selectivity – The hand-written data profile gave our participants unprecedented freedom in curating their data. There are few existing tools that support such a level of selectivity in the presentation of one's data, which is often fragmented. Indeed, many systems will be personalized based on 'data profiles' of their users, which will rarely be seen or understood. Curatorial services could serve to address the agency in data-driven systems to support a human voice, and the negotiation, downplaying or defense of data that we saw participants engage in during their dates. Literature on digital possessions and legacy frequently highlights the value and need for curation [32,53,65] towards preservation of, and meaning-making with, digital content. Clearly while some data may well be cherishable, much is ephemeral. Furthermore, while Zhao et al. have shown how social media is curated-through-use [69], due to the high bar for posting content, always-on data devices are rarely so select and curated. Consider the many representations of photographs on display in private albums, online, surrounded by comments, on calendars and even mugs. How these media coherently come together is important, selective, and expressive. Curatorial data services could provide tools to manipulate and achieve this coherence, across diverse services and temporalities.

Bricolage – Following on from curation, there could be the opportunity to blend data from different sources, in interesting ways. More than a 'mash-up' or search for insightful correlations, this should be about the ability to flexibly link data to support personal narratives and meaning. Again, photo album and collage practices are instructive here – and we can imagine how personal data might be a meaningful metadata [23] to other media. Our findings suggest value in the potential playfulness and incongruity in this bricolage – which might be quite curious or questionable, but invite an author's voice. More broadly, this concerns how data is framed for performance and presentation, rather than analyzed back stage.

Transformation and translation – Drawing on the digital qualities of data, there are opportunities to transform and translate data. Once again, the manipulation of other media provides food for thought. Instagram has popularized filters, which can be used to give photographs a different tone, or character. What would an equivalent action or *filter* be for sharing or displaying data? Perhaps one that removed the numbers? Or let you annotate the axes? Or set two graphs or visuals side by side? The flexibility of drawing or translating data by hand – creating what one participant called *"analogue data"* appealed to many other participants and supported a freedom of personal expression. Other manipulations might play with the scales, temporality or granularity of the data. Nissen et al. [51] highlight how the direct involvement in fabricating and translating data into three-dimensional *"data-things"* as mementos invests personal meaning in them. While this provides an opportunity to support greater control and ownership of data through such manipulations, we can also speculate transformations that allow for degrees of ambiguity or 'blurrings' of data. Of course such creative actions could be a challenge to the very objectivity for which it is valued. As Jacobs et al. [36] note, 'performing data' treads a fine line between *"artistic license and strict accuracy"*. However, in presenting data, we recall how participants often sought to be illustrative, rather than precisely honest.

CONCLUSIONS
Researchers in HCI increasingly identify with design for human values and experience [35,67]. Metadating should help us seriously question what this means in an age of data. Building on the emerging topic of 'lived informatics', Metadating invited participants to question how they would represent themselves and talk about data in the context of a date – a rich site for identity-work. Although somewhat speculative and future-focused, the prime strength of the Metadating approach was that the event and activity had genuine consequence for the participants and, in many respects, was experienced as an authentic social event. Our findings address the sort of data people chose and how they presented it. Ultimately, Metadating unveils, albeit briefly, a range of possible human relationships to data. More than a dry, mechanical force, personal data became temporarily a 'ticket for talk', a conduit of personal expression, humorously ambiguous and creative. As this data permeates the fabric of everyday life, our bodies and homes, we must attend to these qualities, and pursue opportunities for people to socialize, and live well with their dear data.

REFERENCES

1. Jeffrey Bardzell and Shaowen Bardzell. 2008. Intimate Interactions: Online Representation and Software of the Self. *interactions* 15, 5: 11–15. http://doi.org/10.1145/1390085.1400111

2. Frederic C. Bartlett. 1932. *Remembering: An experimental and social study*. Cambridge University Press.

3. Julian Bleecker. 2009. Design Fiction: A short essay on design, science, fact and fiction. *Near Future Laboratory* 29.

4. Mark Blythe, Jamie Steane, Jenny Roe, and Caroline Oliver. 2015. Solutionism, the Game: Design Fictions for Positive Aging. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (CHI '15). ACM, New York, NY, USA, 3849-3858. http://doi.acm.org/10.1145/2702123.2702491

5. Mark Blythe. 2014. Research through design fiction: narrative in real and imaginary abstracts. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '14). ACM, New York, NY, USA, 703-712. http://doi.acm.org/10.1145/2556288.2557098

6. Susanne Bødker. 2006. When Second Wave HCI Meets Third Wave Challenges. In *Proceedings of the 4th Nordic Conference on Human-computer Interaction: Changing Roles*, ACM, New York, NY, USA, 1–8. http://doi.org/10.1145/1182475.1182476

7. danah boyd and Kate Crawford. 2012. Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication & Society* 15, 5: 662–679.

8. Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative research in psychology* 3, 2: 77–101.

9. Marion Buchenau and Jane Fulton Suri. 2000. Experience Prototyping. In *Proceedings of the 3rd Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, ACM, New York, NY, USA 424–433. http://doi.org/10.1145/347642.347802

10. Laura Buttrick, Conor Linehan, Ben Kirman, and Dan O'Hara. 2014. Fifty shades of CHI: the perverse and humiliating human-computer relationship. In *CHI '14 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '14). ACM, New York, NY, USA, 825-834. http://doi.acm.org/10.1145/2559206.2578874

11. David Chatting. 2014. Speculation by Improvisation. In *Workshop on Human-Computer Improvisation at Designing Interactive Systems* (DIS '14). http://openlab.ncl.ac.uk/hcimprovisation/files/2014/06/chatting-improv-v2.pdf

12. Eun Kyoung Choe, Nicole B. Lee, Bongshin Lee, Wanda Pratt, and Julie A. Kientz. 2014. Understanding quantified-selfers' practices in collecting and exploring personal data. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems* (CHI '14). ACM, New York, NY, USA, 1143-1152. http://doi.acm.org/10.1145/2556288.2557372

13. James Clawson, Jessica A. Pater, Andrew D. Miller, Elizabeth D. Mynatt, and Lena Mamykina. 2015. No longer wearing: investigating the abandonment of personal health-tracking technologies on craigslist. In *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing* (UbiComp '15). ACM, New York, NY, USA, 647-658. http://doi.acm.org/10.1145/2750858.2807554

14. Sunny Consolvo, Katherine Everitt, Ian Smith, and James A. Landay. 2006. Design requirements for technologies that encourage physical activity. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '06). ACM, New York, NY, USA, 457-466. http://doi.acm.org/10.1145/1124772.1124840

15. Peter Cook. 1999. *Archigram*. Princeton Architectural Press.

16. Andy Crabtree and Richard Mortier. 2015. Human data interaction: Historical lessons from social studies and cscw. In *ECSCW 2015: Proceedings of the 14th European Conference on Computer Supported Cooperative Work, 19-23 September 2015, Oslo, Norway*, Springer, 3.

17. Judith Donath, Alex Dragulescu, Aaron Zinman, Fernanda Viégas, and Rebecca Xiong. 2010. Data portraits. In *ACM SIGGRAPH 2010 Art Gallery* (SIGGRAPH '10). ACM, New York, NY, USA, 375-383. http://doi.acm.org/10.1145/1836786.1836793

18. Tao Dong, Mark S. Ackerman, and Mark W. Newman. 2014. "If these walls could talk": designing with memories of places. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (DIS '14). ACM, New York, NY, USA, 63-72. http://doi.acm.org/10.1145/2598510.2598605

19. Paul Dourish and Sara Bly. 1992. Portholes: supporting awareness in a distributed work group. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '92), ACM, New York, NY, USA, 541-547. http://doi.acm.org/10.1145/142750.142982

20. Anthony Dunne and Fiona Raby. 2013. *Speculative Everything: design, fiction, and social dreaming*. MIT Press.

21. Nicole B. Ellison, Jeffrey T. Hancock, and Catalina L. Toma. 2012. Profile as promise: A framework for conceptualizing veracity in online dating self-

presentations. *New Media & Society* 14, 1: 45–62. http://doi.org/10.1177/1461444811410395

22. Nicole Ellison, Rebecca Heino, and Jennifer Gibbs. 2006. Managing Impressions Online: Self-Presentation Processes in the Online Dating Environment. *Journal of Computer-Mediated Communication* 11, 2: 415–441. http://doi.org/10.1111/j.1083-6101.2006.00020.x

23. Chris Elsden, David S. Kirk, and Abigail C. Durrant. 2015. A Quantified Past: Towards Design for Remembering with Personal Informatics. *Human-Computer Interaction* 6: 1-40.

24. Daniel Epstein, Felicia Cordeiro, Elizabeth Bales, James Fogarty, and Sean Munson. 2014. Taming data complexity in lifelogs: exploring visual cuts of personal informatics data. In *Proceedings of the 2014 conference on Designing interactive systems* (DIS '14). ACM, New York, NY, USA, 667-676. http://doi.acm.org/10.1145/2598510.2598558

25. Daniel A. Epstein, Bradley H. Jacobson, Elizabeth Bales, David W. McDonald, and Sean A. Munson. 2015. From "Nobody Cares" to "Way to Go!": A Design Framework for Social Sharing in Personal Informatics. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*, ACM, 1622–1636. http://doi.org/10.1145/2675133.2675135

26. Nicholas Felton. 2005. Nicholas Felton | Feltron.com. Retrieved September 21, 2015 from http://feltron.com.

27. Jon E. Froehlich, Eric Larson, Tim Campbell, Conor Haggerty, James Fogarty, and Shwetak N. Patel. 2009. HydroSense: infrastructure-mediated single-point sensing of whole-home water activity. In *Proceedings of the 11th international conference on Ubiquitous computing* (UbiComp '09). ACM, New York, NY, USA, 235-244. http://doi.acm.org/10.1145/1620545.1620581

28. Jon Froehlich, Leah Findlater, and James Landay. 2010. The design of eco-feedback technology. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '10). ACM, New York, NY, USA, 1999-2008. http://doi.acm.org/10.1145/1753326.1753629

29. Bill Gaver, Tony Dunne, and Elena Pacenti. 1999. Design: cultural probes. *interactions* 6, 1: 21–29. http://dx.doi.org/10.1145/291224.291235

30. William W. Gaver, Jacob Beaver, and Steve Benford. 2003. Ambiguity as a resource for design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '03). ACM, New York, NY, USA, 233-240. http://doi.acm.org/10.1145/642611.642653

31. Erving Goffman. 1959. *The presentation of self in everyday life.* Random House.

32. Rebecca Gulotta, William Odom, Haakon Faste, and Jodi Forlizzi. 2014. Legacy in the age of the internet: reflections on how interactive systems shape how we are remembered. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (DIS '14). ACM, New York, NY, USA, 975-984. http://doi.acm.org/10.1145/2598510.2598579

33. Kevin D. Haggerty and Richard V. Ericson. 2000. The surveillant assemblage. *The British journal of sociology* 51, 4: 605–622.

34. Samuel Huron, Sheelagh Carpendale, Alice Thudt, Anthony Tang, and Michael Mauerer. 2014. Constructive visualization. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (DIS '14). ACM, New York, NY, USA, 433-442. http://doi.acm.org/10.1145/2598510.2598566

35. Ole Sejer Iversen and Tuck W. Leong. 2012. Values-led participatory design: mediating the emergence of values. In *Proceedings of the 7th Nordic Conference on Human-Computer Interaction: Making Sense Through Design* (NordiCHI '12). ACM, New York, NY, USA, 468-477. http://doi.org/10.1145/2399016.2399087

36. Rachel Jacobs, Steve Benford, Mark Selby, Michael Golembewski, Dominic Price, and Gabriella Giannachi. 2013. A conversation between trees: what data feels like in the forest. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '13). ACM, New York, NY, USA, 129-138. http://doi.acm.org/10.1145/2470654.2470673

37. Kenji Kawakami. 1995. *101 unuseless Japanese inventions: the art of Chindogu.* WW Norton & Company.

38. David Kirby. 2009. The Future is now: Diegetic Prototypes and the Role of Popular Films in Generating Real-World Technological Development. *Social Studies of Science.* http://doi.org/10.1177/0306312709338325

39. Shaun Lawson, Ben Kirman, Conor Linehan, Tom Feltwell, and Lisa Hopkins. 2015. Problematising Upstream Technology through Speculative Design: The Case of Quantified Cats and Dogs. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (CHI '15). ACM, New York, NY, USA, 2663-2672. http://doi.acm.org/10.1145/2702123.2702260

40. Ian Li, Anind Dey, and Jodi Forlizzi. 2010. A stage-based model of personal informatics systems. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '10). ACM, New York, NY, USA, 557-566. http://doi.acm.org/10.1145/1753326.1753409

41. Ian Li, Anind K. Dey, and Jodi Forlizzi. 2011. Understanding my data, myself: supporting self-reflection with ubicomp technologies. In *Proceedings*

of the 13th international conference on Ubiquitous computing (UbiComp '11). ACM, New York, NY, USA, 405-414.
http://doi.acm.org/10.1145/2030112.2030166

42. Ian Li, Jon Froehlich, Jakob E. Larsen, Catherine Grevet, and Ernesto Ramirez. 2013. Personal informatics in the wild: hacking habits for health & happiness. In *CHI '13 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '13). ACM, New York, NY, USA, 3179-3182.
http://doi.acm.org/10.1145/2468356.2479641

43. James J. Lin, Lena Mamykina, Silvia Lindtner, Gregory Delajoux, and Henry B. Strub. 2006. Fish'n'Steps: Encouraging physical activity with an interactive computer game. In *UbiComp 2006: Ubiquitous Computing*. Springer, 261–278.

44. Joseph Lindley, Dhruv Sharma, and Robert Potts. 2015. Anticipatory Ethnography: Design Fiction as an Input to Design Ethnography. In *Proceesings of the 2015 Conference on Ethnographic Praxis in Industry (EPIC '15)*. 237–253.
doi:10.1111/1559-8918.01030

45. Conor Linehan, Ben J. Kirman, Stuart Reeves, Mark A. Blythe, Joshua G. Tanenbaum, Audrey Desjardins, and Ron Wakkary. 2014. Alternate endings: using fiction to explore design futures. In *CHI '14 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '14). ACM, New York, NY, USA, 45-48.
http://doi.acm.org/10.1145/2559206.2560472

46. Deborah Lupton. 2014. Self-tracking cultures: towards a sociology of personal informatics. In *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures: the Future of Design* (OzCHI '14). ACM, New York, NY, USA, 77-86.
http://doi.acm.org/10.1145/2686612.2686623

47. Deborah Lupton. 2014. *Self-Tracking Modes: Reflexive Self-Monitoring and Data Practices*. Social Science Research Network, Rochester, NY.
http://papers.ssrn.com/abstract=2483549

48. Deborah Lupton. 2013. Understanding the Human Machine [Commentary]. *Technology and Society Magazine, IEEE* 32, 4: 25–30.

49. Lena Mamykina, Elizabeth D. Mynatt, and David R. Kaufman. 2006. Investigating health management practices of individuals with diabetes. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '06), ACM, New York, NY, USA, 927-936.
http://doi.acm.org/10.1145/1124772.1124910

50. Richard Mortier, Hamed Haddadi, Tristan Henderson, Derek McAuley, and Jon Crowcroft. 2014. *Human-Data Interaction: The Human Face of the Data-Driven Society*. Social Science Research Network, Rochester, NY. http://papers.ssrn.com/abstract=2508051

51. Bettina Nissen and John Bowers. 2015. Data-Things: Digital Fabrication Situated within Participatory Data Translation Activities. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (CHI '15). ACM, New York, NY, USA, 2467-2476.
http://doi.acm.org/10.1145/2702123.2702245

52. William Odom, John Zimmerman, Scott Davidoff, Jodi Forlizzi, Anind K. Dey, and Min Kyung Lee. 2012. A fieldwork of the future with user enactments. In *Proceedings of the Designing Interactive Systems Conference* (DIS '12). ACM, New York, NY, USA, 338-347. http://doi.acm.org/10.1145/2317956.2318008

53. Daniela Petrelli, Elise van den Hoven, and Steve Whittaker. 2009. Making history: intentional capture of future memories. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '09). ACM, New York, NY, USA, 1723-1732.
http://doi.acm.org/10.1145/1518701.1518966

54. Maria Popova. 2015. Dear Data: Two Designers Visualize the Mundane Details of Daily Life in Magical Illustrated Postcards Mailed Across the Atlantic. *Brain Pickings*. 2015. Retrieved Sept 23rd 2015 from
https://www.brainpickings.org/2015/03/19/dear-data-giorgia-lupi-stefanie-posavec/

55. Z. Pousman, J.T. Stasko, and M. Mateas. 2007. Casual Information Visualization: Depictions of Data in Everyday Life. *IEEE Transactions on Visualization and Computer Graphics* 13, 6: 1145–1152.
http://doi.org/10.1109/TVCG.2007.70541

56. Stephen Purpura, Victoria Schwanda, Kaiton Williams, William Stubler, and Phoebe Sengers. 2011. Fit4life: the design of a persuasive technology promoting healthy behavior and ideal weight. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '11). ACM, New York, NY, USA, 423-432.
http://doi.acm.org/10.1145/1978942.1979003

57. John Rooksby, Mattias Rost, Alistair Morrison, and Matthew Chalmers Chalmers. 2014. Personal tracking as lived informatics. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems* (CHI '14). ACM, New York, NY, USA, 1163-1172.
http://doi.acm.org/10.1145/2556288.2557039

58. Minna Ruckenstein. 2014. Visualized and Interacted Life: Personal Analytics and Engagements with Data Doubles. *Societies* 4, 1: 68–84.
http://doi.org/10.3390/soc4010068

59. Christian Rudder. 2014. *Dataclysm: Who We Are (When We Think No One's Looking)*. Random House Incorporated.

60. Harvey Sacks. 1995. *Lectures on conversation*. Blackwell Publishing.

61. Alex S. Taylor, Siân Lindley, Tim Regan, David Sweeney, Vasillis Vlachokyriakos, Lillie Grainger, and Jessica Lingel. 2015. Data-in-Place: Thinking through the Relations Between Data and Community. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (CHI '15). ACM, New York, NY, USA, 2863-2872. http://doi.acm.org/10.1145/2702123.2702558

62. John Vines, Mark Blythe, Stephen Lindsay, Paul Dunphy, Andrew Monk, and Patrick Olivier. 2012. Questionable concepts: critique as resource for designing with eighty somethings. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '12). ACM, New York, NY, USA, 1169-1178. http://doi.acm.org/10.1145/2207676.2208567

63. John Vines, Tess Denman-Cleaver, Paul Dunphy, Peter Wright, and Patrick Olivier. 2014. Experience design theatre: exploring the role of live theatre in scaffolding design dialogues. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '14). ACM, New York, NY, USA, 683-692. http://doi.acm.org/10.1145/2556288.2556960

64. Ron Wakkary, Audrey Desjardins, Sabrina Hauser, and Leah Maestri. 2008. A Sustainable Design Fiction: Green Practices. *ACM Trans. Comput.-Hum. Interact.* 20, 4: 23:1–23:34. http://doi.org/10.1145/2494265

65. Rebecca D. Watkins, Abigail Sellen, and Siân E. Lindley. 2015. Digital Collections and Digital Collecting Practices. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (CHI '15). ACM, New York, NY, USA, 3423-3432. http://doi.acm.org/10.1145/2702123.2702380

66. Gary Wolf. 2010. The data-driven life. *The New York Times* 28. Retrieved Sept 23rd, 2015 from http://www.nytimes.com/2010/05/02/magazine/02self-measurement-t.html

67. Peter Wright and John McCarthy. 2004. *Technology as experience*. MIT Press.

68. Rebecca Xiong and Judith Donath. 1999. PeopleGarden: creating data portraits for users. In *Proceedings of the 12th annual ACM symposium on User interface software and technology* (UIST '99). ACM, New York, NY, USA, 37-44. http://doi.acm.org/10.1145/320719.322581

69. Xuan Zhao and Siân E. Lindley. 2014. Curation through use: understanding the personal value of social media. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems* (CHI '14). ACM, New York, NY, USA, 2431-2440. http://doi.acm.org/10.1145/2556288.2557291