

Theme issue contribution

## Digital Valuation: Lessons in relevance from the prototyping of a recommendation app

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### Abstract

This article describes the use of a prototype recommendation app to explore how users are included and/or excluded in categories of various kinds of ‘People Like You’. In the study, interviews with users of the prototype app indicate that the experience of receiving personalized recommendations is routinely evaluated in terms of relevance, that is, as either of interest to them or as beside the point, as accurate or inaccurate, with accuracy often understood as recognition of their context(s). We build on the interviews to develop an analysis which suggests that the capacity of recommendation systems to make relevant recommendations is a function of the parallel projections – from the app on one side and users on the other – that are made as part of an interaction order. In developing this analysis, we reflect on the implications of the interaction order for the inclusion and exclusion of users in categories or kinds of people. We highlight the importance of the temporal formatting of interaction as a continuous present for the relation between belonging and belongings, and thus for the creation of a dataset (Beauvisage and Mellett 2020).

Keywords: digital valuation; prototype; relevance; recommendation systems; classification

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## Introduction

The instruments and methods deployed in digital economies provide a set of devices that create new opportunities for valuation. One especially important set of such opportunities is associated with recommendation systems, and their capacity for classifying people and things. For example, Marion Fourcade and Kieran Healy say that ‘digital economy’s classificatory architecture allows market institutions to apprehend their clients, customers, or employees through new instruments of knowledge, efficiency and value extraction’ (2017: 10). Such systems are everywhere: in earlier research we (Lury and Day 2019) showed that the dynamic classification of ‘People Like You’ who ‘Like Things Like This’ is central to the now ubiquitous practices of online personalization. As Kris Cohen observes:

We find recommender systems in search engines, in dating sites, in shopping, in social media feeds like Facebook’s, in streaming music services, and, increasingly, at every point of networked interaction. In fact, unless one tries to turn off these personalization engines, which isn’t always possible, it’s now often harder to find a nonpersonalized environment online.<sup>1</sup> (2019: 173)

This article builds on our previous research to describe the ways in which the processes of classification associated with the personalizing practices of recommendation systems provide opportunities for digital valuation by describing a study involving the prototyping of a recommendation app (<https://algorithmicidentities.net/>). In the study, interviews with users of the prototype app indicate that the experience of receiving personalized recommendations is routinely evaluated in terms of relevance, that is, as either of interest to them or as beside the point, as accurate or inaccurate, with accuracy often understood as recognition of their context(s). To explore the significance of this finding for valuation practices we build on the interviews to develop an analysis which suggests that the capacity of recommendation systems to make recommendations is a function of the parallel projections – from the app on one side and users on the other – that are made as part of an interaction order (Goffman 1983). In developing this analysis of our participants’ experience, we draw on Karin Knorr Cetina’s (2009) description of synthetic situations, that is,

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<sup>1</sup> In contrast to the prevalence of recommendation systems in many other countries, Clause 18 of China’s first E-commerce Law (issued on August 31 2018 and effective from January 1 2019) asserts: “When e-commerce operators provide search results of goods/services to consumers based on their consumption interests and habits, options not targeting their personal characteristics should also be provided so as to protect consumers’ legitimate rights and interests” (<http://www.lawinfochina.com/display.aspx?id=e0c468f6d44d5b50bdfb&lib=law>; Han Wen, personal communication, March 2020)

situations in which there is human interaction with on-screen computational projections.

We found her account of such situations helpful not only because it acknowledges human–nonhuman interaction but also because it draws attention to encounters in time, with Knorr Cetina arguing for the importance of time integration formats as a means of coordinating interaction in situations in which participants are not physically co-present. Such formats, she says, need to be ongoing: a synthetic situation’s ‘assemblage and projection is a continuous project’ (2009: 70). In our study, we found that the interaction order of the making and taking of recommendations not only involved complex, ongoing coordination but also opened up opportunities for different kinds of valuation practice. We show that the turn-taking in such situations involves the projection of subject–object and part–whole relations between users and the app, with these relations offering different possibilities for users to experience a sense of belonging and making it difficult for them to translate a sense of belonging into belongings (Cooper 2007), that is, into ownership, (self-)possession or property. In contrast, however, we suggest that the organization of these relations in the time integration format of a continuous present affords the owners of the app the possibility of assetization.

### **Big sister: The relevance of prototyping**

The investigation of recommendation apps on which this article is based was conducted by an interdisciplinary and international team including researchers from sociology, anthropology, design, media studies and computer science in Chile and the UK. Together we developed a recommendation app using a prototyping methodology. The reasons we chose to use prototyping as a methodology included that, as a first or original typing,<sup>2</sup> it is a practice that invites – indeed perhaps requires – reflection on the process of typing or classification, and does so in a way that draws attention to how this process is organized in time.

As it has developed in the discipline of design for example, prototyping describes a process of research and development leading to the production of a product or service that is a specific instance of a type or class of object: this is an iterative process of modification and revision that generally finishes when the object is brought to market as

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<sup>2</sup> The etymology of the term is ‘c. 1600, from French *prototype* (16c.) and directly from Medieval Latin *prototypus* “original, primitive”, from Greek *prōtotypōn* “a first or primitive form”, noun use of neuter singular of *prōtotypos* “original, primitive,” from *prōtos* “first” (see proto-) + *typos* “impression, mould, pattern” ... In English from 1590s as *prototypon*’ (<https://www.etymonline.com/word/prototype>).

a commodity. In recent years, this process has come to be tied to the practices not only of designers and producers but also of consumers or users. The involvement of users typically happens through the representation or projection of their needs or concerns in a variety of intermediary professional practices, as in the development of user personas in market research, branding and User Experience Design (UXD). However, this process is increasingly also associated with the automated collection and analysis of data relating to user preferences, with many recommendation systems employing a combination of these practices.

In some business and software development practices, prototyping has also come to be linked to a principle of ‘perpetual beta’ (O’Reilly 2005), in which an object is seen as never finished or complete, but as consistently open to version-ing, as producers respond to the employment that users make of an object or product, including adaptations and customizations (Nieborg and Poell 2018).<sup>3</sup> Adoption of the principle of perpetual beta is not necessarily about detaching products from markets however but, rather, a way for producers to recognize the dynamism of markets and the extent to which products and services are co-produced with consumers or users. In these practices, prototyping is not understood exclusively in relation to the fixed end or goal of creating a (new) type of object, but in terms of continuously respecifying demand by typing or classifying subjects as particular kinds of users (Woolgar 1990; Clough 2018).

As science and technology studies of human–computer interaction have demonstrated, the practice of specifying or shaping the subject(s) or user(s) has become an increasingly central concern in prototyping practices, particularly through forms of embedded and enacted scripting (Akrich 1992). Indeed, this kind of technical scripting plays a key role in the production of value in relation to the data-intensive forms of ‘controlled consumption’ that apps facilitate (Andersen and Pold 2014). In this use of prototyping, it is no longer only the object that is the product or commodity but also the class or type of user or subject that can be associated with the object. In the case of recommendation apps, classes or types of user – instances of which might be called ‘People Like You’ – can themselves become a product to be brought to the (multi-sided) market, to be sold on to third parties, including advertisers.

There is often a kind of twisted, dynamic looping effect here, so our previous research suggests: more specifically, categories of ‘People Like You’ who ‘Like Things Like This’ are continually projected onto ‘Things Like This’ that ‘Like People Like You’ and vice versa as users respond (or not) to recommendations emerging from automated calculations (Lury and Day 2019). That prototyping may involve the

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<sup>3</sup> In this sense, a prototype is objectual (Knorr Cetina 1997), that is, an object that is never closed, complete or final.

ongoing respecification of mutually informed projections running in parallel made it even more suitable for our methodological purposes, since it amplifies the possibilities that our prototype could be employed as a political device ‘that can make visible (or invisible) certain entities and issues, determining what the experimental entities can do and say’ (Suchman et al. 2002; Tironi 2020).

Big Sister, as we called the app, uses data from a user’s social media accounts to generate a profile of personality traits using a form of machine learning based on natural language processing, as well as providing music recommendations linked to this profile. More specifically, we designed Big Sister to gather posts from a user’s Twitter and Facebook accounts or, in a deliberate diversion from most recommendation apps and specifically to supplement or replace the conventional reliance on social media, from additional texts written or selected by the user. These posts and/or texts are then used to generate a profile of personality characteristics based on the IBM Watson™ Personality Insights service, with the characteristics indicated graphically on the app by positions along a number of ‘bars’ representing continuums of personality traits such as agreeableness, conscientiousness and neuroticism, as well as recommendations for songs in genres deployed by Spotify. To encourage reflection, Big Sister allowed users to compare their results by date and information source on an interactive graphic and see how personality predictions and recommendations change between social media platforms and over time. In later versions we added a further option for users to modify input texts or exclude tweets or posts to see how their results changed. We also incorporated the ability to compare their personality results with those of public figures including the UK’s Queen Elizabeth II and the Chilean poet Gabriela Mistral. In a still later version, we added the option of the user composing Frankenstein-type texts, combining a sequence of fragments from different well-known authors, breaking with Personality Insight’s assumption of the user as a single, unified subject.

The name Big Sister was chosen with a nod towards George Orwell’s Big Brother as well as IBM’s nickname – Big Blue, while recognizing that, as Armand Mattelart and André Vitalis (2015) observe, it is the multitude of ‘little sisters’ (or little analytics, Amoores and Piotukh 2015) that collectively work together to produce recommendations. We hoped the name would indicate membership of a family of digital devices while signalling aspects of both surveillance and companionship associated with apps (Woods 2018).<sup>4</sup> We also created a visual identity to give the app a persona, including a stylized representation of an eye (see Figure 1).

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<sup>4</sup> One UK interviewee remarked, ‘of course there’s a lot of connotation with ... the name ... but I kind of ... it’s kind of funny. So it’s kind of like a ... [laughs] kind of like a joke’ (UK Participant 7).

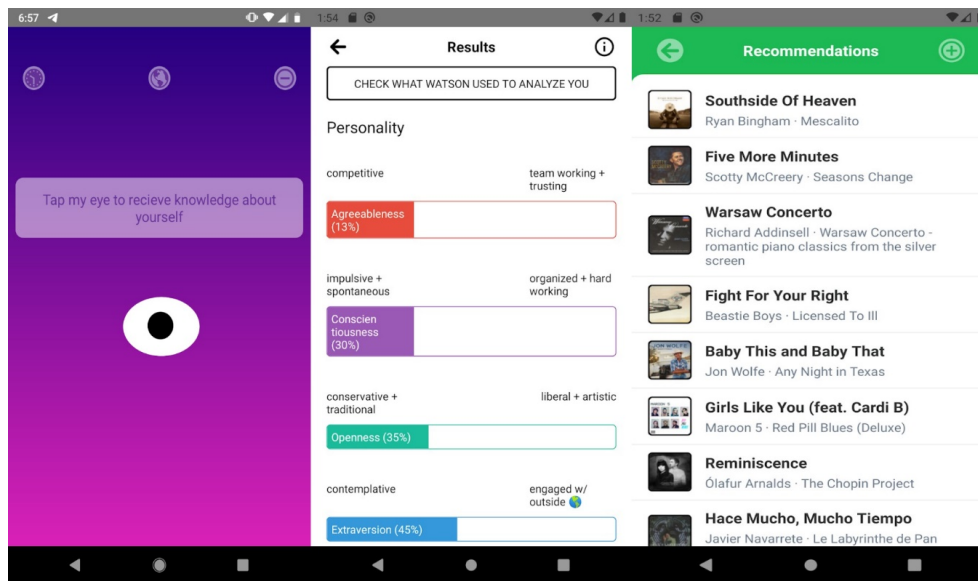


Figure 1: Screen shots from the first beta version of the Big Sister app  
Source: Photo by author Matías Valderrama

Another element of the prototyping methodology was a Big Sister ‘kit’ (see Figure 2), which enabled users or participants to create three dimensional visualizations of the profiles and recommendations provided by the app. The kit included a board, with an abstract representation of a person at the centre, radiating outwards. In the trace interviews (Dubois and Ford 2015) we conducted following a period of 2–4 weeks use of the app, we asked participants to position post-its nearer or closer to the central figure during the interview to indicate perceived accuracy of recommendations and their personality profile.<sup>5</sup> Our questions were open-ended, and invited participants to reflect on their use and experience with the app. The aim was to enable a form of co-analysis of the results of the use of the app by us as the researchers and the participants (Latzko-Toth et al. 2017: 203). The preliminary analysis of a first round of interviews fed back into the design of later versions of the app, with additional features designed not only to ease its use but also to expand the possibilities of users testing the app itself.

<sup>5</sup> Dubois and Ford argue that the use of visual materials in interviews is ‘useful for enhancing recall, validating trace data-generated results, addressing data joining problems, and responding to ethical concerns that have surfaced in the current era of surveillance and big data’ (2015: 2067).



Figure 2: The Big Sister kit

Source: Photo by author Matías Valderrama

## Prototyping relevance

While as to be expected, the experience of participants with the app was very varied (see Tironi and Valderrama 2021 for a discussion of Big Sister as a problematizing and decolonial prototype); the experiment seemed to lead some of them to reflect more deeply on the role of algorithms in their everyday life than they usually did:

So, did you get a sense of how the app generated these inferences do you think from playing with it? (Interviewer).

Yeah, I think so, like gathering the kind of frequencies of like word use and that kind of thing, I guess. So, yeah, so if you discount some of your posts and things, it changes it because you're kind of ... alongside work ones I do post quite a lot of pictures of my guinea pigs, so, if they're taken out, it changes it. (UK, Participant 6).

I just realized that I use a lot of things with algorithms and probably in the triple I am not aware [...] Maybe if you had asked me on the street – with those quick surveys – I would have told you three things [about algorithms and data], but I have twelve and probably there are more. So that was like “Wow, let's not forget that”. (Chile, Participant 1)<sup>6</sup>.

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<sup>6</sup> Matías Valderrama translated the interviews with Chilean participants included here from Spanish to English.

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In some cases, the (in)adequacy of recommendations was understood to be a consequence of the (lack of) capacity of Big Sister and other apps to consider how recommendations may be of value or not depending on awareness of context, including whether an app is able to acknowledge the significance of time and place and the absence or presence of others. This was sometimes experienced by participants as a failure of recognition or understanding:

For example, [Spotify] recommends me Reggaeton or Trap [music genres] from Chile, but I didn't listen to them or maybe I listened one time, because typically there is a birthday and someone connects your Spotify account and others put music on my account, then someone put Trap on at a party and it is there forever on my record and Spotify thinks I like Trap now. So it's out of context, there's a bias in that too [...] Also, there are apps that can be used by third actors: I go to my mom's house and she loves Inti Illimani, so she takes my phone and puts on Inti Illimani. Then Spotify doesn't understand that she's my mom and doesn't know that I'm not at home for the weekend or maybe it does, but it's not so precise about that yet. (Chile, Participant 1).

It always came out on the last [personality dimension] bar ... that I was very anxious or very stressed. I said, 'Yeah, it could be because of everything that's going on. I'm probably giving a lot of likes to news about cops hitting people'. So I think, I made that connection, that I'm really giving a lot of likes to that kind of news, as well as the fires in Australia, things a little bit chaotic, there might be a connection with the anxiety of my profile. (Chile, Participant 1).

In other cases still, the lack of relevance was linked to the app's perceived inability to recognize the participant's membership of – and sense of belonging to – an already existing collective:

[Big Sister] was saying that it was not probable that I like Latin music and I like Latin music. I mean I'm Latin. [Laughs.] I guess apps consider the same variables in all geographical contexts and there's still an important context factor. (Chile, Participant 3).

While these remarks can be seen as criticisms of our and other recommendation apps for being inaccurate, they can also be seen as the articulation of a desire for such apps to be more or differently relevant. That is, they articulate the value for users of the identification of relevance in a way that is more nuanced than a response to pre-existing interactions or expressions of interest, independent of context, and as wanting more than can come from a series of apparently



disconnected recommendations.<sup>7</sup> Indeed, in their criticisms of the app, many of our participants appear to value an understanding of relevance similar to that outlined by Noortje Marres (2012), who argues for an appreciation of relevance not only as a constantly ongoing activity – that is, for relevanc-ing, but also as an activity that requires a sensitive and highly dynamic recognition of context. Indeed, our participants appear to reject the idea that relevance involves a one-off projection of concerns, interests or aspects of identity onto a context or spatio-temporal background (domestic or geographic), independent of their ongoing (and sometimes changing) concerns, interests or collective or social identity. In suggesting that relevance should be more context-aware, or put differently, that the app recognize the ongoing complexity of the situatedness of interaction, the participants thus problematize the terms of their inclusion by the app in a category of ‘People Like You’ who ‘Like Things Like This’.

### **Inclusion, exclusion and belonging**

To explore this issue further consider the distinction drawn by one of our participants between the experience of receiving a recommendation from an app and receiving a recommendation from a friend. The former is described as a solitary experience while the latter is described as ‘more about sharing’:

When someone else recommends it to you ... I don't know how to explain it ... but I feel that ... I'm sharing a part of my tastes and I feel that it generates other things afterwards: it generates conversations, it generates “Hey, I didn't like it”, “But why didn't you like it?” I feel that it invites you to connect with another person from something that has become common [...] the experience of these digital recommendations is more solitary, like they are for you and almost from yourself, because it's your own data that is generating these things, and the other is more about sharing. (Chile, Participant 4).

Receiving a recommendation from an app is understood negatively by this participant in comparison to receiving a recommendation from a friend because it is seen to be without the possibilities of a continuing connection to others, the lack of something held in common. However, the solitary nature of such recommendations is not always understood in negative ways as the participant above suggests

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<sup>7</sup> Recommendation apps typically make use of behavioural classification and/or contextual classification algorithms. While there has recently been what has been called a ‘contextual turn’ (Prey 2017), in which apps use data relating to place, time, activity and emotional state our participants’ experience suggests that contextual classification is as yet too crude – too behavioural – to be able to incorporate their understanding of context adequately.

when they say about the app that ‘it reflects me like, there's nothing in it that's presenting me in a way that I wouldn't want to be presented. So, yeah, so, yeah, I guess, I found that quite comforting or supportive, I suppose’.

The feeling of ‘for you and almost from yourself’ is captured in the title of a book by Kris Cohen: *Never Alone Except For Now*. He explains the phrase as a way to describe the political atomization he believes to be characteristic of participation in digital media: ‘felt by some as abandonment or impoverishment and by others, mostly in principle it seems, as freedom to go it alone, to vote and shop as one likes’ (2017: 23). A number of the participants in our study appeared to deliberately adopt this solitary way of engaging with recommendation apps, describing their interaction operationally, saying they tried to train apps to better recognize them, or at least recognize some selected aspects of themselves, sometimes expressing their interaction in strategic terms:

... What is interesting with actually in thinking about the Twitter feed is how I create closure about myself on this type of platform, so in this context I know that the algorithm doesn't know that I like certain things because I never share those things on purpose on this platform. (UK, Participant 8).

The attempt to create ‘closure about myself’ by taking specific actions was understood by some participants to be recognized by the app as they perceived recommendations to be becoming more precise as they interacted with it:

There are other exceptions like Rdio [a defunct music platform], which was more precise, but I'm thinking that it's because I probably interacted more, as I'm the one who's constantly educating it. There's a kind of computer-human interaction that tells you, “Is this ok?”, “No”, “Ah, let's go on the next one, is this ok?”, “Yes”, “Check” and it's fed by something I'm doing explicitly. (Chile, Participant 1).

In these examples, participants appear to adopt an understanding of interaction in terms of subject–object relations, in which they, as independent subjects, have the ability to direct the app, which is seen as a discrete object, relatively independent of its infrastructure or a wider context, including the interactions of other users. However, other participants brought forward alternative – part-whole – understandings, in which they presented their experience of use of the app as happening in a wider set of arrangements or circumstances. Consider in this regard not only the participant who said ‘I am Latin’ but also the participant who, while not disputing the high levels of anxiety attributed to them by the app, ascribed it not to their identity or their personality as an individual subject, but rather to ‘everything

that is going on’, including ‘news about cops hitting people’ and ‘fires in Australia’.<sup>8</sup> This is a strong statement of the participant’s understanding of themselves (and the app) as being part of a whole, an ensemble of relations that extend beyond the immediate situation of interaction with the app. Nevertheless that this participant did not make any connection between Big Sister and the ways in which the protests happening at the time of the interview were being visualized by protestors through a public iconology of eyes (Fig 3; see also [https://en.wikipedia.org/wiki/Eye\\_injury\\_in\\_the\\_2019%E2%80%9320-Chilean\\_protests](https://en.wikipedia.org/wiki/Eye_injury_in_the_2019%E2%80%9320-Chilean_protests)) suggests that the potential multiplicity of part-whole relationships is not easily recognized by users, and that wholes are themselves always partial.



Figure 3: Signs of public protest using eye imagery, Santiago, Chile, November 2019  
Source: Photo by author Celia Lury

To explore these relations of inclusion, exclusion and belonging still further, consider the framework of folding introduced by Francis Lee and co-authors in their discussion of algorithms (2019: 2). They suggest that ‘it is through multiple operations of folding – of relating things – that [algorithms] work: It is in the many practices of relating, constructing, tinkering and applying that algorithms gain their power to reshape things’. Crucially however, they stress that it is not algorithms alone that loop, capture or fold, but that there is a kind of

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<sup>8</sup> In fact, the app’s report of excessive neuroticism as a characteristic of the user was likely due to an error in the configuration of the app that was subsequently corrected.

turn-taking, producing parallel lines of (inter)action: ‘Sometimes humans fold things into the algorithm, and sometimes algorithms fold things into something else. Hence, agency is not fixed with the algorithms or with the humans’. Certainly our prototyping experiment, in its various iterations, provides support for this analysis. Across the range of responses we have described there is a kind of anamorphic (mis)recognition at play in which interaction or turn-taking involves a series of parallax projections as what is recommended by the algorithm changes in relation to what users do, creating a series of loops or foldings in which space and time are creased and concertinaded, leading to a variety of projections and displacements by users and the app. To understand what is involved here consider the following description of video art, which also creates a synthetic situation that has a relational dynamic. As the art critic Barry Schwabsky writes, ‘Video technology and the mirror have this in common: that in reduplicating some fragment of the world, they introduce at least a very small spatial or temporal division into reality’. However, as he points out, while the reflection may be ‘at a greater or lesser distance’: ‘if I try to take what I see in the mirror as a guide for my movements, I will always be in the paradoxical situation of trying to follow something that is following me’ (2018: 35).

This paradox is deliberately brought into existence in one of the artist Bruce Nauman’s works: *Live-Taped Video Corridor* which features

two stacked television monitors at its far end, both linked to a camera mounted at the corridor’s entrance: the top monitor plays live feed from the camera, while the bottom monitor plays pretaped footage of the empty passageway from the identical angle. Walking down the corridor, one views oneself from behind in the top monitor, diminishing in size as one gets closer to it. The camera’s wide-angle lens heightens one’s disorientation by making the rate of one’s movement appear somewhat sped up. Meanwhile, the participant is entirely, and uncannily, absent from the lower monitor. The overall result is an unsettling self-conscious experience of doubling and displacement. (<https://www.guggenheim.org/artwork/3153>).

In our study, nearly all participants reported experiencing the situation in which interaction with recommendation apps takes place to be a ‘cramped and disorienting space ... a space [requiring] habitation, adaptation and negotiation’ (Cohen 2017: 6). They all tried to engage with, manipulate or opt out of the app while the app continued to provide recommendations, continually folding or looping them in or out, co-opting them into its ongoingness whether they followed particular recommendations or not.

More specifically, the parallelism of this relational dynamic appears to create ‘a space of prophylaxis between [an algorithmic] logic [of

classification] and more familiar logics of representation, identification, subjectivity and relation' (Cohen 2017: 126) as subject–object and part–whole understandings coexist, complicating the relations between inclusion, exclusion and belonging.<sup>9</sup> As we have noted, some participants disputed the relevance of the recommendations they received: disowning some of the personality characteristics they were ascribed and identifying with others, drawing lines between their selves as individual subjects and others – 'Spotify doesn't understand that she's my mom'. Other participants asserted their membership of a group form and an associated sense of belonging that they believed should automatically lead to inclusion – 'I am Latin'. Indeed, while some participants did not attach much significance to the recommendations at all in terms of identity or a sense of belonging to a category, in this latter case the participant asserts the overriding importance of socio-political grounds for identity that exist outside their individual interaction with the app. They insist upon a sense of belonging to a social group that is not recognized by the app. Others still were prompted by their use of the app to engage in a reflexive consideration of their identity, and even of the relevance of self-possession to the concept of individual identity itself:

Because there's the whole debate about, okay, algorithms, the way they take information about you, do they take too much, but there's a whole other problem which is more like the problem of what is identity and, and I think what is good with Big Sister app is that it pushes you to think about, okay, how do I stage myself and this just shows that okay, even though there's a sort of fantasy or authenticity and being true to yourself, actually, we spend most of our social life in staging our self in different ways. And also, there's even like a sort of internalization of being true to some rules of social roles. All those things are super naturalized. So, I think something good with recommendation is like, yeah, it makes you think about how you could appear. (UK, Participant 8).

In sum, our participants' articulation of relevance in terms of both subject–object and part–whole relations exposed that some of them perceived an excess of belonging that was not captured by inclusion in the categories or classifications generated by the app. Correspondingly, however, as we have already seen, the app's recommendations create an excess of inclusion that does not correspond to a sense of belonging by the user when they question its relevance to themselves. The excesses informed by turn-taking run in parallel but are not the same.

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<sup>9</sup> In this respect, recommendation apps appear to share the Möbius form of organization identified by David Stark and Ivana Pais (2020) in relation to platforms. They describe this form as having neither an inside nor an outside but animated by an organizing principle of co-option.

In the next section, we consider the implications of these parallel but alternate excesses (of belonging over inclusion and inclusion over belonging) for the relations between belonging and belongings (Cooper 2007), that is, for possibilities of ownership, possession and property. Our suggestion is that opportunities for valuation – for both the user and the owner of the app – are to be found in the organization of the interdependence of these excesses. To support this claim, in the next section we explore the temporality of this interdependence, the making and taking of recommendations.

### **The entitlements of turn-taking: Belonging and belongings**

In her discussion of the synthetic situation of currency traders Knorr Cetina (2009) emphasizes the importance of time transactions to the interaction order. With this term she draws attention to interaction with on-screen projections in which a future outcome becomes linked to a present commitment. She suggests that such transactions may be coordinated via temporal integration formats. In what follows we suggest that the temporal integration format typical of recommendation apps is a continuous present (Day et al. 2023), and that this format opens up the possibility for such apps to become assets for their owners while foreclosing possibilities for users to assert or recognize relations between belonging and belongings.

It is certainly evident that the temporalities of turn-taking in digital media are viewed by app owners as highly significant for processes of digital valuation, as indicated by the ongoing attempts on a variety of platforms and apps to create what Tania Bucher (2020) calls ‘right-time’. The examples she gives include Facebook’s stated ambition that the News Feed function ‘show everyone the right content at the right time so they don’t miss the stories that are important to them’ and the replacement of Twitter’s one real-time feed with a ‘While you were away’ section at the beginning of the timeline, an algorithmically generated ‘recap of some of the top Tweets you might have missed from accounts you follow’ (2020: 1699). In these temporal orderings, relations are, as Alberto Corsín Jiménez puts it, ‘always turning themselves “into” other relations, moving in and out of different social forms, in a “flow of analogies”’ (2013: 389). Knorr Cetina describes this flow in the case of currency traders as

like a carpet whose small sections are both being woven and rolled out at the same time in front of us. The carpet grounds experience; we can step on it and change our positioning on it. But the carpet composes itself only as it is rolled out; the spatial illusions it affords hide the intrinsic temporality of the fact that its threads (the lines of text appearing on-screen) are woven into the carpet only as we step on it and unravel again behind our backs (the

lines are updated and disappear). As the carpet is woven it assumes different patterns; the weave provides specific response slots to which traders react, taking the patterns in different directions. In sum, the screen reality is a process, but it is not simply like a river flowing from one location to another as an identical mass of water. Rather, it is processual in the sense of an infinite succession of nonidentical matter projecting itself forward as a changing situation. (2009: 72).

In the case of recommendation algorithms, the processual flow of recommendations ('People Like You Like Things Like This' and 'Things Like This Like People Like You') may be understood as 'obviational'. This is the term that Roy Wagner (1978) deploys to make 'obvious' the supplementary and substitutive flow of social relations, while acknowledging that some relations – between people and things – are always being 'obviated' or (temporarily) disposed of in favour of others. Wagner suggests that if obviation is successful, 'awareness of time and its passing become one and the same thing' (2019: 12). How this is achieved, he says, depends on the medium of recollection in which obviation occurs. In the case of recommendation apps, we suggest, it is the organization of turn-taking in the digital medium – the ways in which user reaction is folded into prediction – that is key to the making of categories of 'People Like You'. That is, while the parallelism of interaction proceeds in turn-taking – as the participant quoted above describes their use of the app: "Ah, let's go on to the next one, is this ok?" – since the time units are able to be systematically varied by the app in the digital medium to produce recommendations in sequenced but also overlapping ways, the outcome is always that 'Many times are in "People Like You"', and 'Many "People Like You" are in each time now present'. We give this temporal integration order the description 'continuous present', an ongoingness that is continually punctuated for users as recommendations are called up and replaced, as they are simultaneously included in the categories recommended for them and excluded from categories recommended for others.

One participant thought that algorithmic recommendations are more accurate if the user is able to indicate at least some preliminary choices: 'If you are using it for the first time, I think Spotify would let you choose what type of music you like to listen to, like you could choose pop music or you could choose which specific singers. So, I think that's the most direct way' (UK, Participant 5). But our analysis suggests that such choices are never 'first' in any absolute sense since, as the parallelism of turn-taking proceeds, time units are always being varied such that an individual user is always included and excluded in many categories at any one time, even what they perceive to be 'the first time'. This means that, rather than the rule of first possession that characterizes the property relations of the queue (Strathern 2011), the

algorithmic rule of a continuous present is what organizes relevancing, opening up and closing excesses of inclusion over belonging and belonging over inclusion in a variety of continuously ongoing ways. And in doing so this temporal format opens up the possibility (or not) of establishing a potential relation of ownership or property.<sup>10</sup>

On the one hand, since users are never simply inside or outside the categories created by the app at any single point in time, not only are they likely to find it difficult to assert a sense of belonging on a continuous basis, they will find it even harder to identify ways in which they can translate a sense of belonging into belongings (Cooper 2007), or exert any kind of ownership of the category in which they are (temporarily) included.<sup>11</sup> At the same time, they may also feel a sense of belonging which is not recognized by inclusion in the app's categories. On the other hand, and also at the same time (!), the implementation of the continuous present as a temporal integration format, the 'permanently snarled and bewildering temporality' of 'never but always' (Cohen 2017: 5), makes the creation of categories of 'People like you' realizable by the app owner as an asset. Announcing the beta launch of Branded Moments for example, Spotify

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<sup>10</sup> Consider some of the complexities of ownership in relation to the prototype Big Sister. To start with, it piggy-backs on the terms and conditions of the social media platforms already collecting/extracting/sharing data from their/our participants, allowing us to collect/extract/share data relevant to our concerns. Whether and to what effect such piggy-backing will be enabled by calls for interoperability has become a key regulatory issue (<https://www.adalovelaceinstitute.org/blog/walled-gardens-open-meadows/>). However our prototypical experiment, conducted in an academic environment, required its own contractual forms between us as researchers and participants (including consent forms), between the app and a commercial platform, and between our institutions, including an extremely complex data-sharing agreement.

Further legal, financial and institutional complexities required (or at least made it seem impossible to argue otherwise) that the UK institution involved be described as the lead institution in a memorandum of agreement, even though, among researchers it was acknowledged that it was the team at the university in Chile who had initiated and were leading the project. Issues of ownership continue in the naming of authors of this and other academic papers relating to the project, an issue that is linked to the ways in which the storage (or banking) of journal articles reorganizes recommendation through the operation of metrics in digital media (Biagioli and Lippman 2020). It is possible, though unlikely, that our prototype app will be commercialized. Possible other sources of revenue of Big Sister include (slight!) increased probability of securing further research grant funding, with other benefits being largely reputational. While we aimed for the co-production of knowledge, our participants are only partially recognized in this account; at the same time, many of them appeared to value their experience of this experiment in ways that are not fully recuperated or recollected here.

<sup>11</sup> Warner asserts that, 'All the verbs for public agency are verbs for private reading, transposed upward to the aggregate of readers. Readers may scrutinize, ask, reject, opine, decide, judge, and so on. Publics can do exactly these things. And nothing else' (2002: 123).



promised to leverage ‘our unique data and insights’ in order to ‘identify – in real-time – what a listener is doing, and give brands an opportunity to own that moment’ (Spotify for Brands, 2016, emphasis added, cited in Prey 2017: 9).

Of course, the maintenance of a continuous present is not easy to achieve, and users may choose to drop out altogether:

There is a sort of cheating thing in the measurements that can be, or maybe exists but I don't know, that finally they read your past, then they are reading the things that you have done. But there is something in particular with music, especially for my profile that I like to get into music a lot, that I discover new things. So, precisely, discovering new things has to do with not repeating the past, like sometimes I've left behind styles [of music] that I don't want to go back to. If this algorithm gets into my past and says, “Oh, look, listen to Backstreet Boys again”, I don't want to listen to that, I passed that stage. Then there's also a thing about discovering something new that's antagonistic to the previous pattern. (Chile, Participant 1)

Nevertheless, we suggest that it is the creation of a continuous present that offers the app’s owner the opportunity to operate an open-ended and expanded ground for digital valuation, providing as it does the possibility for the app to be a ‘resource controlled by [an] entity as a result of past events and from which future economic benefits are expected to flow to the entity’ (Birch and Muniesa 2020: 2, 3).

## **Conclusion**

To sum up, use of the method of prototyping in a study of recommendation apps enabled us to see the significance of the temporality of the activity of relevanc-ing for forms of digital valuation. This significance is tied to the finding that in the activity of relevanc-ing conducted by recommendation apps there is an excess of inclusion over belonging for users, and that this excess is more than can be owned either for themselves or as their selves by participants as individual subjects. At the same time, it is difficult for individual participants to recognize or make durable their sense that they are part of, or belong to, a whole that exists outside the app in their interaction with the app. Instead, so our experiment in prototyping suggests, the excess of inclusion over belonging is continuously re-collected in the medium of algorithmic calculation as a continuous present. In this process there is potential for the recommendation app to create a dataset (Beauvisage and Mellett 2020).

By pointing to the importance of both subject–object and part–whole relations, our experiment suggests that while the valuation opportunities afforded by relevanc-ing make possible ‘stealing’, that is,

data extraction, they may also include a taking part in, belonging to, being part of, maybe even ‘sharing’ in something else (Strathern 2011). Our analysis suggests however that there are very significant differences in the possibilities of realizing such opportunities associated with different projected positions in the turn-taking parallelism by which recommendation systems proceed. We conclude that in making this visible, there is a role for the experimental use of prototyping to change the terms and conditions of valuation not only by highlighting the ways in which the activity of making relevant establishes multiple relations between inclusion, belonging and belongings, but also by ‘designing for belonging rather than individuating’ (Tafasee 2021), by encouraging different kinds of context awareness and by drawing attention to the temporality of turn-taking as a kind of class(ification) action.

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