# Algorithmic personalisation as a mode of individuation

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| Abstract: | Recognising that many of the modern categories with which we think about people and their activities were put in place through the use of numbers, we ask how numbering practices compose contemporary sociality. Focusing on particular forms of algorithmic personalisation, we describe a pathway of a-typical individuation in which repeated and recursive tracking is used to create partial orders in which individuals are always more and less than one. Algorithmic personalisation describes a mode of numbering that involves forms of de- and re- aggregating, in which a variety of contexts are continually included and excluded. This pathway of a-typical individuation is important, we suggest, to a variety of domains and, more broadly, to an understanding of contemporary economies of sharing where the politics of collectivities, ownership and use are being reconfigured as a default social. |
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Algorithmic personalisation as a mode of individuation [1]

> 'The less the determinism, the more the possibilities for constraint.' (Hacking 1991: 194).

**Introduction**

This is the age of personalisation. Personalising practices permeate everyday life in the UK - we are invited to participate in personalised medical, health and care services, to benefit from personalised customer experiences, to find our way with personalised maps, acquire a personalised education, keep up-to-date with personalised news, get a bargain with personalised prices and so on. To give some more concrete examples: in 2007 the UK Government published *Putting People First: A shared vision and commitment to finding new ways to improve social care in England* (http://www.dh.gov.uk/dr_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_081119.pdf). The paper outlined the government's intention to transform adult social care so 'that every person who receives support, whether provided by statutory services or funded by themselves, will have choice and control over the shape of that support in all care settings'. This 'vision' describes itself as a totally different approach to an historic 'one size fits all' system. With an initial focus on transforming social care and support services, the paper proposes that principles of personalisation be embedded in a range of other service areas such as health and education. An example from the field of health and well-being is PatientsLikeMe, a website (http://www.patientslikeme.com) that combines features of traditional qualitative on-line patient communities with quantitative data-collection; the (trade-marked) strap-line is 'Live better, together!'. This website has 300,000 members, who 'share' over 23,000 diseases, and have contributed over 25 million data points about their diseases, resulting in over 50 published research studies. The website says,

> By sharing health data on PatientsLikeMe, people not only help themselves, but help others who can learn from their experiences, and advance research. … Learn from others, connect with people like you, track your health.

The platform is also described as a tool that helps patients find a 'just-in-time', 'someone-like-me' peer who can be relied upon to compare options and aid decision-making. A final example of personalisation is the recommendation service Stitch Fix (https://www.stitchfix.com), a website that describes itself as 'Your partner in style' and which seeks to recommend clothing for women on a personal basis. The business proposition is that the recommendation service - a composite of

algorithmic and human reasoning - knows better than the customer herself what clothes she will like: selected items of clothing are sent directly to her, without a preview, as otherwise her prejudices might prevent her from choosing items that she, unknowingly, will really like.

The question this paper seeks to address is: what kind of individuation (Simondon 1992; Foucault 2001) is personalisation? We ask this question in order to explore the implications of personalisation for how we live together, that is, for forms of sociality. We start from the assumption that personalisation is not only personal: it is never about only one person, just me or just you, but always involves generalisation. Indeed, our argument will be that it is a mode of individuation in which entities are precisely specified by way of recursive inclusion in types or classes as part of the making of what we describe as an *a-typical pathway*. To make this argument, we explore the use of recommendation algorithms to sort or classify people, analysing the way in which individuals are addressed as 'a you', while their membership of types or classes of person is perpetually revised. Our conclusion is that the familiar recognition that personalisation seems to provide – knowing you better than you yourself do - should not be considered as merely a more precise form of individuation. To the contrary, personalisation also constrains who and how we can be.

Recognising that many of the modern categories with which we think about people and their activities were put in place through the use of numbers (Hacking 1991), we develop our analysis of algorithmic personalisation by drawing on an understanding of *number as composition* ([redacted]). This approach starts from the assumption that numbering is everywhere (Hayles 2014), even though numbers may not always be visible. As such, it seeks to situate contemporary analyses of algorithms within the wider context of cultures of numbering. As (even) Badiou (2008) remarks, 'A 'cultural fact' is a numerical fact. And, conversely, whatever produces number can be culturally located; that which has no number shall have no name either' (Badiou 2008: 2-3). In a similar vein, Totaro and Ninno (2014) also comment on the pervasiveness of numbering, but focus specifically on the performativity of the recursive function, which, they argue, provides 'an interpretive key to modern rationality':

> The notion that the 'logic of numbers' operates exclusively on numbers is misleading. In the second half of the last century, the theory of recursive functions has made it clear that the concept of calculation is very general and does not necessarily imply the manipulation of numerical symbols. (2014: 2) (See also Neyland 2014; Totaro and Ninno 2016.)

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More circumspectly, Heinz notes that 'the observation and regulation of performances today has become mutual and reflexive, generalised and anonymous, and it is now increasingly based on observations and comparisons in terms of numbers' (Heinz 2011: 22).

Our compositional approach acknowledges the pervasiveness of numbering in contemporary society by looking at what numbering *does*, rather than what numbering *is*. Adopting a felicitous analogy from Verran, we think of numbers in the same way as anthropologists do kin: numbers both are and have relations just as people are and have relations (Verran 2010: 171; see also Urton 1997; Mackenzie 2014). In other words, we propose that it is as working relations that numbers are able to perform: to travel, to make possible comparison, conversion, and exchange, to be stored, to inform, and to make the same or different. By looking at how numbers are composed or formed in relations, and how social and cultural practices are formed (in part) by number, we aim to show how numbering is a re-presentation - in this case, of persons - that always holds more than one presentation.

To understand how it is that we have become habituated to declaring, measuring and sharing our personal characteristics, behaviours and opinions in the UK in order to carry out mundane activities, we begin by situating our analysis in the context of what has been called a 'like economy' (Gerlitz and Helmond 2013). This context is important, we suggest, insofar as it makes relational value available for computational calculation. Drawing on our compositional approach to numbering, we then develop a set of terms – tracking, bordering, folding and pausing – that lead us to describe forms of personalisation that are performed by recommendation algorithms as the making of a pathway of a-typical individuation. Critically, this pathway creates 'a' person or individual that is always provisional and corresponds only partially with the type or category in which it is included, whether this concerns what a person might buy, like, share or possess. The term pathway is intended to capture this category of person, a 'category' that is never static but always changing and always in motion. While our analytic focus is on the example of algorithmic personalisation, and in particular algorithmic personalisation that involves the use of collaborative filters, we also make references to other examples which share the same logic.

**Liking and likeness**

The rise of a 'like economy' begins, so Gerlitz and Helmond argue (2013), with the arrival of Google in the late 1990s. It is widely known that Google's early success stemmed from its use of a search engine that shifted the value determination of websites from hits alone to hits and links. The

hyperlink analysis algorithm, PageRank, enabled calculation of the relative importance and ranking of a page within a larger set of pages, based on the number of in-links to the page and, recursively, the value of the pages linking to that page and so on. All links do not have equal value in this type of search engine, as links from authoritative sources or links from sources receiving many in-links are weighted in the algorithm.

The use of weighted measures of linking was a first step towards inscribing the capacity to identify and intensify 'relational value' in search engine algorithms (Gerlitz and Helmond, 2013; see also Feuz, Fuller and Stalder 2011). And it is this relational value, we propose, that is central to personalisation insofar as it makes relations between people available for computational calculation. Since this first step, the capacity to make relations of linking – or sharing - has been significantly extended as the determination of 'authority' has changed in line with the participatory features of Web 2.0. More web users now participate in making connections between websites through the creation and exchange of user-generated content (as well as gaming and the purchase of position). In particular, social buttons allow users to share, recommend, like or bookmark content, posts and pages across various social media platforms. In 2006, Facebook launched a share icon as a way for someone to share web content and invite re-sharing and then, in 2009, it introduced the Like button. In 2010, the company extended the capacities of the Like button to link by introducing an external Like button, a plugin that could be implemented by any webmaster, potentially rendering all web content like-able. Significantly, the external 'Like' button does not only capture actual likes, but also aggregates all activities performed on a web object: the number of likes and shares, further likes and comments on stories, and the number of inbox messages containing the object as an attachment. In another important development, Facebook's Open Graph Protocol opened up their social graph – a representation of people and their connections – for external content, allowing for a controlled way of exchanging preformatted data between Facebook and the external web.

It is through the use of these and other techniques, so Gerlitz and Helmond argue, that Facebook has been able to build a 'like economy', that is, an economy that builds on and exploits relational value, mediated by participation. They further suggest that this economy produces what, using Mark Zuckerberg's own phrase, they call 'the default social'. To this analysis we want to add the observation that the relations between the individual and the population that characterize this new social are both participatory and participative in that users may participate knowingly (participatory) or unknowingly (participative). Moreover, participation in the default social is mediated by techniques of exclusive inclusion and inclusive exclusion (Agamben 1998).[2] On the one hand, the Open Graph is able to include non-users of Facebook as the external Like button cookie can trace non-users and add any information gained as anonymous data to the Facebook database and, on the

other hand, a user's explicitly invited activities may be excluded or rendered invisible to other users if they are not sufficiently highly ranked in the dimensions the graph provides. These oscillating dynamics - of being excluded in ways that inform the ordering of those included, and being included but not in ways that allow you to understand the terms of your membership - were intensified further in 2011 when Facebook expanded the possibilities of 'invisible' participation by proliferating custom actions:

> When creating an app, developers are prompted to define verbs that are shown as user actions and to specify the object on which these actions can be performed. Instead of being confined to 'like' external web content, users can now 'read', 'watch', 'discuss' or perform other actions. (Gerlitz and Helmond 2013: 1353)

Gerlitz and Helmond conclude their analysis of the emergence of the like economy by suggesting that Facebook is being developed as an 'infrastructure of decentralised data production and recentralised data processing' (2013: 1357). While they do not discuss the role of recommendation systems within this infrastructure, these have become increasingly important operators of the de- and re-centralising practices of the economy Gerlitz and Helmond describe. Structured by the 'participatory' practices of inclusive exclusion and exclusive inclusion, recommendation algorithms penetrate all corners of the Internet, making personalised recommendations - directly and indirectly - to individuals with interests in a variety of fields, including movies, music, news, books, research publications, restaurants, jokes, financial services, products of all sorts and persons (for example, in online dating). It is to these algorithms that we now turn.

**Recommendation Algorithms**

While very many different kinds of algorithms are used in recommendation systems, two main kinds are distinguished, collaborative filtering algorithms and content sharing algorithms. Sometimes, as in Netflix, they are combined. The former group of algorithms is based on large amounts of digital data on users' behavior, activities or preferences and leads to predictions of what users will like based on their similarity to others (see further below). An example is Last.fm (http://www.last.fm), a music 'station' or streaming service that personalises the music it transmits by observing the music an individual has listened to on a regular basis and comparing those tracks with the listening behaviour of other individuals. The calculative process involved in this group of algorithms is sometimes described as 'leveraging' the behavior of users[3] since it requires the participation of many users to produce personalised recommendations for one person.[4] Content-based filtering methods, in

contrast, are based on a description of an item in terms of discrete characteristics; the algorithm is then designed to produce recommendations for individual users of items that have similar properties to those that the individual liked in the past (or is examining in the present). Pandora Internet Radio (currently restricted to listeners in the USA, Australia and New Zealand because of licensing restrictions) is an example: it makes use of an algorithm that uses properties of a song or artists (a subset of the 450 attributes provided by the Music Genome Project) in order to seed a station to transmit personalised music.

We focus on collaborative filtering algorithms, partly because their ability to make successful predictions across fields is held to be stronger than that of content based algorithms, but also because they require and exploit 'participatory' methods to develop novel classificatory techniques. As such, they allow us to identify distinctive aspects of personalisation as a mode of individuation. Crucially for the use of such algorithms, information relating to 'pre-existing' or demographic qualities of the person or entity concerned is not required to produce personalised recommendations. Instead the information required is produced through the aggregation of the ongoing participation of both the individual to whom the recommendations are made and other users of social media. Rather than allocating users to a pre-existing class, group or type (typically a socio-demographic stratum), the properties of which are presumed to be known in advance, the operations of collaborative filtering start from the premise that (individual) customers who share (that is, have in common) some preferences will also share others. This single but powerful assumption is of value for those developing algorithms in that 'the only information [they need] to work is a set of numerical ratings — specific information about users or items to be recommended is not necessary' (Seaver 2012).

It is worth exploring how these numerical ratings are turned into personalised recommendations in some detail. A helpful analysis is provided by Seaver (2012), who describes the 'signature action' of collaborative filtering algorithms in terms of the operation of a grid, with items along one side, users along the other, and numerical ratings at their intersections (see also Bowker 2014; http;//personalisedcommunication.net/the-project/). Significantly, this grid is a matrix, that is, a grid with the formatted capacity to map (or perform) network transformations:

> This matrix is mostly empty (or "sparse"), since most users will have not rated most items. The work of the collaborative filtering algorithm … is to predict what values will show up in the empty spaces of the matrix. These predictions are then provided in some form to the user as recommendations. (Seaver 2012)

Seaver continues, 'at any given time, the matrix is in an anticipatory flux: new ratings from users arrive constantly, displacing their predicted values and shifting the others. The calculative operations involved in this in-filling process is the signature action within the matrix — blank values are replaced by predictions, which are then replaced by actual ratings'.[5] In the next stage described by Seaver, the numbers from the matrix are statistically analysed and their variance is mapped to a number of dimensions or axes. Users who are 'near' each other on this multi-dimensional coordinate system are held to be similar (like each other), and a user will be recommended items from the neighbourhood around them. It is this calculative activity that leads to the paradigmatic claim of such algorithms to specify the individual in the complex conjugated personalised address: 'People like you like things like this'.

But how, if at all, does this description of the calculative logic in recommendation algorithms help us understand what is distinctive about personalisation as a mode of individuation? Seaver concludes that preference and similarity are collapsed in this calculative system since "liking" and "being like" are equated. We consider that an understanding of the composition of these relations will help us see how numbers are rendered consequential for the making up of persons (Hacking 1991). How is this equation accomplished or, in our terms, composed? If we are to address the specificity of personalisation as a mode of individuation we need to see the particular ways in which numbers both are and have relations.

**Pathways of a-typical individuation**

Seaver's claim about the equivalence between liking and likeness in recommendation algorithms is less critical to our argument than his observation that this calculative matrix is in a constant state of anticipatory flux. Indeed, we propose that the emphasis on perpetual renewal means that the equation of 'liking' and 'being like' that is accomplished by these recommendation algorithms is *not* about establishing relations of absolute equivalence. Instead, we suggest, the calculative activity that produces the anticipatory flux of the matrix involves an ongoing series of approximations in which 'being like' and 'liking' are continually made more and less like each other in a variety of ways. Such approximations, we would emphasise, are designed to be subject to constant testing.

As Seaver points out, such approximations vary hugely depending on the calculative space in which they are produced (3 or 9 axes or dimensions, for example). Their value - that is, their ability to produce personalised recommendations in terms of criteria of accuracy, diversity (of recommendations), privacy protection, and trust - is realised as they are tested repeatedly in

relation to data collected via a whole variety of participatory methods and metrics including those outlined above. In other words, the personalised address to 'a you' is not achieved through the *collapse* of liking and likeness, preference and similarity, but through a carefully calibrated sequencing of their possible inter-relationship. Crucially, this process does not only involve the statistical making of proximity or nearness but also the turning of near-ness into next-ness, a process of *bordering* or adjoining. We conclude therefore that personalisation is not the collapse of liking and likeness but the making of *a pathway*, a dynamic series of approximations of similarity and preference that makes persons.

Indeed, this pathway can be described as a mode of a-typical individuation. What do we mean, though, in our use of a-typical? Certainly it might seem counter-intuitive to use the term at all if it is understood to mean 'not typical' or 'not of a type', since we have argued throughout that personalisation is a mode of individuation that involves generalisation through the (repeated or recursive) inclusion of an entity in a type or class. While we propose that personalisation is a mode of inclusion that is *not* that of inclusion in a class or type defined by inherent or pre-given properties (using a-typical in a negative sense), we also want to use the term to describe a mode of recursive inclusion, in which both the individual and the type are repeatedly specified anew. To do so, we draw on multiple – etymologically unrelated – meanings of 'a'.

The first set of meanings are associated with the use of 'a' as the indefinite article, since this use directly indicates membership in a type or class of people, things or events ('this is a cat', 'this is a friend of mine'). The indefiniteness of this inclusion, while appearing to indicate a lack of determination, has its own logic: for example, as well as meaning 'one single' or 'any', 'a' is also commonly used to introduce someone or something for the first time. It allows for a mode of inclusion in a type or category on the basis of criteria that are not pre-given but rather open to further (indefinite) specification ('If that is what you think, then you are not a friend of mine because a friend of mine would not think that'). As the indefinite article, 'a' is also used to specify both someone or something as being like someone or something else ('you are a star') and to express rates or ratios, as in 'for each' or 'per'. Our use of the term a-typical thus calls up the operation of the two analytically distinct, but historically intertwined, understandings of analogy identified by Stafford (2001): participation (similitude, mimesis, likeness) and proportion (ratio).[6] These are combined to produce principles of inclusion that are subject – recursively – to further revision: their combination is the means by which the you that is '*a* you' becomes a recursive shifter (Chun 2011, 2016).

To these meanings of 'a' as the indefinite article, we wish to add a further meaning, that is, 'a' as a variant spelling of 'ad-', denoting motion or direction, a reduction or change into, an addition, increase or intensification, as in 'adjoin' or 'adjacent'. The etymology of these terms relates to the Latin *adjacentem*, *adjacens*; from *adjacere*, 'to lie at, to border upon, to lie near'; from *ad-*, "to" + *jacere*, "to lie, to rest"; literally, "to throw". Our use of the term a-typical to describe pathways of individuation is thus intended to describe the ways in which collaborative filtering algorithms are designed to allow for the ongoing re-definition of principles of inclusion and exclusion via the recursive activity of adjoining or the work of adjacency: what we describe as the compositional practice of bordering or framing.[7] In this practice, the aim is to create, not equivalence, but a topological invariance: that is, the aim is to achieve a continuity of a recursive function[8] such that likeness ('People like you') is iteratively produced as a pathway through a massively aggregated de- and re-contexting of liking.

How this is accomplished in the multi-dimensional calculative space of recommendation algorithms can be illustrated by way of a consideration of 'the next adjacent possible', a term developed by the theoretical biologist Stuart Kauffman (2000).[9] Put briefly, Kauffman understands life in terms of autonomous agents[10], by which he means 'something that can act on its own behalf in an environment'. This living entity is 'something that can both reproduce itself and do at least one thermodynamic work cycle' (2000: 64). Kauffman says,

> That bacterium, sculling up the glucose gradient, flagellum flailing in work cycles, is busy as hell doing 'it', reproducing and carrying out one or more work cycles. So too are all free-living cells and organisms. We do, in blunt fact, link spontaneous and nonspontaneous processes in richly webbed pathways of interaction that achieve reproduction and the persistent work cycles by which we act on the world. Beavers do build dams; yet beavers are 'just' physical systems. (2000: 64)

In making this argument, Kauffman points to the importance of the role of adjoining or bordering. He points to the constitutive role of the particular material constraints (or context) in which any entity individuates. He also identifies the work of adjacency as the activity of 'constructing constraints that can manipulate constraints', thus drawing attention to the role of the border as the operator of the relation of the inside of an entity to its outside. Drawing on this analysis, we return to our observation on testing. Personalised recommendations are based on the making of nearness or adjacency in a multi-dimensional space but the implementation of collaborative filtering algorithms requires that they be subject to repeated testing in the specific kinds of relations to context that are commonly called participation. It is only insofar as a population's relations to

multiple contexts (including data relating to liking, sensing and sharing as well as to time and space) are registered by the algorithm that the mode of individuation we are describing can happen at all. In other words, the (numerical-cultural) process of *folding* a whole into, across or within itself to make parts, of de- and re-contexting what Zuckerburg describes as the default social, is fundamental to the making of pathways of a-typical individuation. As Seaver (2015) observes, while it is sometimes claimed that big data has no context, 'context is everything' for recommendation algorithms. [11]

It has been widely observed that algorithms do not operate in isolation from context-aware techniques of data capture and collection as they are organized in particular calculative infrastructures (Hayles 2002; Verran 2011). Dourish, for example, notes,

> If the database is malleable, extensible, or revisable, it is so not simply because it is represented as electrical signals in a computer or magnetic traces on a disk; malleability, extensibility, and revisability depend too on the maintenance of constraints that make *this specific collection* of electrical signals or magnetic traces work as a database; and within these constraints, new materialities need to be acknowledged. (2014)

Similarly, Amoore and Piotukh highlight the changing role of indexing practices in data collection activities:

> while structured data is territorially indexable, in the sense that it can be queried on the horizontal and vertical axes of spreadsheets within databases, so-called unstructured data demands new forms of indexing that allow for analysis to be deterritorialized (conducted across jurisdictions, or via distributed or cloud computing, for example) and to be conducted across diverse data forms – images, video, text in chat rooms, audio files and so on. (2015: 345)

As they also observe, the activity of '(ad-)joining' is of particular importance in the deployment of these new forms of indexing. They give the example of IBM's predictive policing:

> The linking of the data elements is performed through joins across data from different data sets, either on the basis of direct intersections with already indexed data (e.g. via a phone, credit card or social security number ingested from a database), or probabilistically, through correlations among data-points from different sources (e.g. text scraped from a Twitter account correlated with facial biometrically tagged images drawn from Facebook). (2015: 345)

It is not just that there is more than one relevant context for recommendation algorithms. Different contexts are deliberately made to appear or disappear in different practices of context-*ing*. Indeed, this emphasis on context – what is sometimes called context-awareness - provides another compelling reason to describe personalisation as a *pathway* of a-typical individuation. A trajectory is not established in advance – as when we travel with the aim of moving from A to B, already knowing where B is – but in response to contexts that emerge in the making of a path.

**Becoming normal by being better than you**

We turn now to a discussion of the consequences of personalisation for the making of the default social, by considering the practice of normalization (Foucault 1991: Canguilhem 1991; Agamben 1998; Hacking 1991).[12] In his discussion of modes of governance linked to earlier forms of statistical normalisation, Hacking (1991) argues that debates concerning the setting of boundary conditions were fundamental to the way in which a population was governed by statistical laws. Updating this argument, we suggest that the work of adjoining in the personalisation practices described above involves an ongoing reorganization of boundary conditions (operating the relation between inside and outside, inclusion and exclusion through techniques of contexting) that transforms conditions of governmentality. This is especially clear in relation to the way in which practices of normalization now require the achievement of transitivity.[13] On the one hand, the verbs of the vocabulary of participation – liking, sharing, linking – describe activities in which objects are repeatedly attached to persons; that is, they promote an algorithmic kind of linguistic transitivity (as in 'things like this like people like you'). On the other hand, the data collected through the tracking of participation are then ordered transitively - in a mathematical sense - in an n-dimensional space of likeness or similitude. In these practices, the 'new normal' of individuation appears as a function of the ideal of transitive closure, an internal limit, in relation to which every possible relation (between verb and object) is partially ordered in such a way that the you that is a you emerges is similar to other 'yous', nearly but not quite the same as other 'yous', and never quite able to be consolidated as an 'us'.

While this limit can never be reached since it involves a never-ending in-filling in relation to a constantly changing population,[14] we are nonetheless witnessing a proliferation of models of optimization across the fields of medicine, marketing, project management, and operational research (the last of which is sometimes described as 'the science of better', the significance of which will be made apparent below). In such models, optimal pathways of a-typical individuation are commonly identified in relation to specific objectives, often through software that merges data with parameters (as in the case of the parametric algorithms discussed by Parisi 2013) or employs

evolutionary modelling. As described above, one of the novel aspects of such techniques is the calculative deployment of recursion such that the aim of the action of ad-joining is not set in relation to a pre-defined target; rather pathway and target emerge together.

Indeed, the term precision medicine is sometimes preferred to the synonyms personalised or stratified medicine because it acknowledges the significance of the necessarily dynamic fit between, for example, a cancer, drug target, resistance and side effects through repeated monitoring and the operationalization of the feedback loop between evaluation and intervention.[15] In some cases, the methods of operational research are applied in conjunction with computational biology with the aim of identifying a pathway that has a 'biologically meaningful objective': a network is 'designed (or revised) optimally' to find 'the natural circumstances that trigger one particular pathway but not others' (http://ercim-news.ercim.eu/en82/special/pathway-signatures). An example of findings based upon pathways defined in molecular terms rather than by anatomy or traditional disease classification is the recently reported study (Mateo, Carreira, Sandhu et al. 2015) of the efficacy of the drug Olaparib, approved for treating ovarian cancers with *BRCA1/2* mutations. This study built upon the finding that cancers are significantly heterogeneous at the molecular level and discovered that the variation within one, such as ovarian cancer, can be more marked than between cancers, such as ovarian and prostate, when tracked in terms of their differential sensitivity to particular treatments.

More broadly, we can see the operation of principles of optimization modelling in the now ubiquitous ordinal tropes of ranking, which ensure that what counts as best is not given in advance, but rather emerges in a participative fashion with the (continually changing) requirement to do and be better (Esposito 2013, [redacted], Guyer 2010). In these practices the you that is addressed is *both* specific *and* a you 'that is like everyone else' (Chun 2011), only more or less so. The exhortation to 'Believe in Better'[16] pervades contemporary culture and might be seen as an appropriation of 'optimism of the will', recursively calibrating relations between individuals and populations to establish new forms of stratification (Fourcade and Healey 2013). In the requirement to be like but better than each other established in relation to such optimizing practices, you and I are not just different to each other but different-er: our differences are such that we are always both more and less different to each other. As the Optimizely commercial platform informs us, 'Being personal is no longer optional' (https://www.optimizely.com), or, as the name of a British financial services comparison website says, GoCompare (http://www.gocompare.com/ps/homepage/2.aspx/?Media=GG001&PST=1&device=c&PST=1&gclid=Cj0KEQjwwYK8BRC0ta6LhOPC0v0BEiQApv6jYX5FTYS1gIsxfMkzlNlsaIMdTDT1Y7KLjtZwIIP8Y0MaAvB

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Y8P8HAQ.) Indeed, it is not just persons that are invited – or obliged - to participate in bettering themselves in the compositional practices of personalisation: universities, hospitals, museums, police forces, hotels, holidays, restaurants, brands and schools are also now frequently placed in dynamic relations of competitive comparison with each other by often mandatory or non-voluntary inclusion in the recursive partial orderings of ranking systems. While normalisation techniques sometimes provide a statistical snap-shot, a one-off cross-section of a population fixed in relation to a single environment (the nation, for example), personalisation is noteworthy for the way that it establishes (constantly shifting) grounds for dynamic stratification in relation to multiple norms in multiple environments.

**Signature pathways**

We consider one further aspect of the making of a pathway of a-typical individuation by exploring the use of 'you' as a shifter. In linguistic terms, shifters such as 'this' and 'that' as well as 'I' and 'you' can only be understood by reference to the context in which they are uttered. In other words, a shifter, sometimes also called a place-holder, is an indexical term whose meaning cannot be determined without referring to the message that is being communicated. The 'you' in a pathway of personalisation designates both the person to whom a message is directed and the 'you' that is contained in the message that is sent. In relation to our description of algorithmic personalisation, it is the suturing of this doubling in the shifter that makes a personalised address to the individual possible and also organises the activity of shifting as adjoining, creating constraints that can manipulate constraints in the making of a pathway.

For Jakobson (1957), enunciation is encoded in a shifter in the statement itself. While Jakobson defines the shifter as an indexical *symbol*, Lacan defines it as an indexical *signifier* in order to problematize the distinction between enunciation and statement. As a signifier, the shifter 'I' is normally part of a statement. As an index, it is also normally part of the enunciation. For Lacan (1977), this division or distribution of the 'I' or 'you' does not merely illustrate the splitting of a subject; it *is* that split. Drawing on these understandings of shifters, it seems that the indexical signifier is not stopped or 'arrested' by (representatives of) the symbolic order (Fenves 2002) in the anticipatory flux of personalising practices.[17] In the context of (algorithmic) personalisation, it seems that the shifter is rather *paused*. Temporary halting incites participation or the folding of a context into the pathway. Indeed, it is this pausing, the marking of an interval, a stopping and starting that

repetitively gathers a collectivity. In assembling observers and observed, pausing allows for both observation and the observation of the observing (Kaldrack and Rohle 2014).

Given that a pathway is a process of stopping and starting that repetitively gathers a collectivity, it is not surprising that the ability to identify some pathways but not others – the signature action Seaver describes - is currently the source of considerable interest. Frow's discussion of signature and brand (2002) is illuminating in this respect. He describes the signature as a shifter that sets up 'a tension between representation and the represented' and observes that the signature is not only an index of the act of framing (of adjoining or bordering), but also designates a naming right. Specifically, Frow argues that the power of the signature stems from the elision of the difference between the signature as an index and the taxonomic function of the proper name. This elision is effected in a particular way by the brand, he asserts, since 'the "Name", when one abstracts it from the signature it indicates, loses its 'index' character and becomes a 'trademark'. Like the trademark, the name is of a symbolic order' (Gandelman, quoted in Frow 2002: 63).

As Frow observes, the brand's economic significance as a 'nexus between high-speed, continuous flow manufacturing and the reshaping of people's habits and lives' (Ohmann, 1996: 61 in Frow 2002: 64) is growing. The detachment from indexicality is what provides the basis for using the signature as a claim to ownership. Importantly, however, Frow argues that the brand is in principle reducible to neither a product nor a corporation. As a quasi-signature or signature-effect, a brand name is routinely attached to a product range, and even to generations of product ranges, rather than to singular objects. It is precisely the divisibility of brand from product (in practices of bordering or framing) that makes possible the transfer of brand loyalty from one generation of a product to another. With Frow's insights, we propose that recommendation algorithms create pathways of a-typical individuation that are always distinct (divisible and detachable) from both object and person. In consequence, the ways in which such pathways acquire autonomy or not, and how that autonomy is recognized,[18] constitute the heart of current debates on the sharing economy. It is here that the politics of collectivity, ownership and use are being reconfigured.

**Conclusion**

We have argued that personalisation is a mode of a-typical individuation that is produced in techniques of recursive divisibility (the drawing of lines of inclusive exclusion and exclusive inclusion). As such, it provides an entry point into the constitution of what, following Mark

Zuckerburg, we have called the 'default social'. Crucially, as a numbering practice, personalisation does not involve zooming ([redacted]), a performative gesture that operates the dynamism of moving from big to small, that is, a slide from one to many and back again, as if the only difference to be registered was that of an increase in a uniform quantity (as in what Badiou calls the count of one). Instead, this is a mode of numbering that constitutes a default social through forms of de- and re-aggregating, in which a variety of contexts are included and excluded, such that one is always more and less than one. In a recursive process that involves tracking bordering, folding, and pausing, the individual is precisely and momentarily specified as 'a you' (Chun 2016), that is, as a dividual (Raunig 2015; Strathern 1998). At the same time, pausing allows for the composition of heterogeneous (numerical-cultural) quantities, in which qualitative differences of mass are recognised at different levels of observation as matters of dimension and scale. Put somewhat differently, the person that is addressed as a you is refracted in multiple partial orderings that allow for specific forms of comparison and competition (of better-ing) while the folding of contexts into the pathway creates new ways of configuring relations between participation and proportion, sharing, ownership and use in the identification of signature pathways.

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Importantly, our argument does not suggest that personalisation is replacing other modes of individuation. Rather it introduces new techniques that combine in a variety of ways to transform and intensify contemporary forms of individualism.[19] As such, it merely confirms Hacking's observation in relation to the history of the making up of people, 'The less the determinism, the more the possibilities for constraint' (1991: 194).

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[2] These are practices that Agamben associates with sovereignty: bare life, he argues, has always been the object and the aim of state action, and it has always been subjected to elaborate mechanisms of both inclusion and exclusion.

[3] Arvidsson argues that it is through personalisation that platforms such as Facebook will – on their own and in conjunction with third parties – benefit from the financialization of everyday life (Arvidsson forthcoming).

[4]One of the most famous examples of this group is item-to-item collaborative filtering, an algorithm developed by Amazon.

[5] He continues, 'The collaborative filtering matrix intermeshes the identities of users and items. It is both possible and typical for a collaborative filter to take no special account of either, organizing all entities strictly in terms of ratings: users are known as a [ranked] collection of relations to items and items are known as a [ranked] collection of relations to users. Persons and things enjoy no separate modes of existence in the matrix, which is indeed a function for translating one into the other' (2012). In other words, collaborative filtering algorithms do not just determine that 'Users like you liked items like this'; they also establish that 'Items like this liked users like you'. This 'collaboration' is very different from that of the taste-bearing individuals explored by Bourdieu in *Distinction* (1987) where the relations are those of class and the exercise of taste, and involve symbolic violence. How pathways of 'a-typical individuation' will coincide with, transform or supersede such 'demographic' stratification remains to be seen.

[6] For Stafford, analogy is an associative method, a demonstrative and evidentiary practice. She says, 'Analogy correlates originality with continuity, what comes after with what went before…This transport of predicates involves a mutual sharing in, or partaking of, certain determinable quantitative and qualitative attributes through a mediating image' (2001: 9).

[7] Bateson describes set theory diagrams as 'a topological approach to the logic of classification' (1999: 186). In such diagrams a frame is a mode of referring by ordering. As Tkacz observes in a commentary on Bateson, 'A frame always sorts things as either belonging or not belonging and this process is mediated by axioms or principles – indeed, the axioms are what define the frame; they are the conditions of its possibility' (2014: 71).

[8] Totaro and Ninno (2014) argue that what is fundamental to the recursive function is that repetition becomes *the aim of action*.

[9] Rabinow's understanding of adjacency (2009) provides another, related set of terms. For Rabinow, the concept of adjacency is both analytic in that sets of relations must be decomposed and specified, and synthetic in that these relations must be recomposed and given new form. In this process, a neighbourhood emerges as the figure of what moves in tandem, together, the outcome of the interlinked processes of analysis and synthesis.

[10] Kauffman observes in relation to autonomous agents that 'At the end of the cycle the system is poised to cycle again' (2000: 68).

[11] The Optimizely platforms says that it can 'Connect that browsing behavior, demographic information, contextual clues, and 1st- and 3rd-party data into a complete picture of your customer that you can use to power personalised experiences'.

[12] Hacking (1991) argues that 'normalcy' is one of the most socially significant statistical meta-concepts. We are pointing to the significance of normalization without, we hope, imputing any consensus to the very different concepts and trajectories implicated in this meta-concept across a range of disciplines.

[13] Transitivity has a range of meanings in different disciplines. In linguistics, for example, transitivity is a property of verbs that relates to whether a verb can take direct objects and how many such objects a verb can take. In mathematics, a binary relation over a set is transitive if, whenever an element a is related to an element b, and b in turn is related to an element c, a is also related to c. The partial ordering produced by the algorithms discussed above organise liking in relations that are transitive in both senses.

[14] Parisi offers another view of the limits of reason, specifically in relation to computation. She suggests that while parametric quantities are discrete entities that not only select data, as part of the software into which they are scripted, they may also be infected by data that they are not able to compute: "Instead of being a continuous flow of data, such as a topological binding of many actualities into one stream of ceaseless variation, the incomputable … is an infinite series of discrete yet incomplete data that immanently ingresses and becomes uniquely arranged into algorithmic sets, in which these data acquire togetherness and continuity' (2013: 170).

[15] In precision medicine (or its synonyms), reference is commonly made to the *4Ps* which are predictive, personalised, preventive and participatory. Some of the advocates of this approach describe current developments as a revolution, 'fueled by several factors: first, an appreciation that medicine is an information science; second, systems or holistic approaches to studying the enormous complexities of disease; third, emerging technologies that will let us explore new dimensions of patient data space; and fourth, powerful new analytical technologies—both mathematical and computational—that will let us decipher the billions of data points associated with each individual' (Hood and Friend 2011).

[16] This is the strap-line employed by Skye, Rupert Murdoch's telecommunications company, which encourages us all, no matter what, to 'Believe in Better'. Elsewhere in the UK there is a chain of leisure centres that are called 'Better', a national insurance company that is called 'More Than' and Eurostar, the company that runs trains through the tunnel connecting the UK to continental Europe, deploys a campaign that employs the hashtag, 'bettercloser'. There is a Canadian pharmaceutical company that has a range of products called Be.better; Nike's current range of products includes a T-shirt with the slogan 'bettering' written across the front; the shoe and clothing company Timberland use the advertising strap-line, 'Best then. Better now'; the TSB (a UK bank) claims 'Our TSB Classic Plus account, just got plusser'; the Wellcome Museum in London invites us in with the slogan 'More than ever'; the i-Phone 6 is described as 'bigger than bigger'; a recent advertisement for an electric car (an Audi) insists, 'Like a car, but better'.

[17] It is hard to avoid drawing a parallel with Althusser's discussion of interpellation: the policeman who calls out 'Hey, you there'. Althusser's approach draws on Lacan's various discussions of the mirror stage, a form of pausing in which infants encounter an external sense of coherence, producing a sense of 'I' and 'you', that comes to represent a permanent structure of alienation for Lacan.

[18] A paradigmatic example is the recent successful filing of a patent by Amazon for a method of speculative or anticipatory shipping. See Coleman (forthcoming).

[19] In marketing and many policy fields, for example, the design of optimal pathways is informed by behavioural economics, in which doing is deployed as a measure of being. In the terms of our analysis, 'nudging' is the identification and operation of constraints that can manipulate constraints, and the current investment by business and government in a 'context aware' computational infrastructure seems designed to support the rise of personalisation as a mode of individuation that will afford the possibility of dynamic stratification.

Algorithmic personalisation as a mode of individuation [1]

> 'The less the determinism, the more the possibilities for constraint.' (Hacking 1991: 194).

**Introduction**

This is the age of personalisation. Personalising practices permeate everyday life in the UK - we are invited to participate in personalised medical, health and care services, to benefit from personalised customer experiences, to find our way with personalised maps, acquire a personalised education, keep up-to-date with personalised news, get a bargain with personalised prices and so on. To give some more concrete examples: in 2007 the UK Government published *Putting People First: A shared vision and commitment to finding new ways to improve social care in England* (http://www.dh.gov.uk/dr_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_081119.pdf). The paper outlined the government's intention to transform adult social care so 'that every person who receives support, whether provided by statutory services or funded by themselves, will have choice and control over the shape of that support in all care settings'. This 'vision' describes itself as a totally different approach to an historic 'one size fits all' system. With an initial focus on transforming social care and support services, the paper proposes that principles of personalisation be embedded in a range of other service areas such as health and education. An example from the field of health and well-being is PatientsLikeMe, a website (http://www.patientslikeme.com) that combines features of traditional qualitative on-line patient communities with quantitative data-collection; the (trade-marked) strap-line is 'Live better, together!'. This website has 300,000 members, who 'share' over 23,000 diseases, and have contributed over 25 million data points about their diseases, resulting in over 50 published research studies. The website says,

> By sharing health data on PatientsLikeMe, people not only help themselves, but help others who can learn from their experiences, and advance research. … Learn from others, connect with people like you, track your health.

The platform is also described as a tool that helps patients find a 'just-in-time', 'someone-like-me' peer who can be relied upon to compare options and aid decision-making. A final example of personalisation is the recommendation service Stitch Fix (https://www.stitchfix.com), a website that describes itself as 'Your partner in style' and which seeks to recommend clothing for women on a personal basis. The business proposition is that the recommendation service - a composite of

algorithmic and human reasoning - knows better than the customer herself what clothes she will like: selected items of clothing are sent directly to her, without a preview, as otherwise her prejudices might prevent her from choosing items that she, unknowingly, will really like.

The question this paper seeks to address is: what kind of individuation (Simondon 1992; Foucault 2001) is personalisation? We ask this question in order to explore the implications of personalisation for how we live together, that is, for forms of sociality. We draw on Simondon's refusal to start from the pre-constituted individual and instead focus on a *process* of individuation. For Simondon, the individual – or person in our case – is neither given in advance nor ever final; rather, it is always coming into being. To this fundamental insight, we add the assumption that personalisation is not only personal: it is never about only one person, just me or just you, but always involves other individuation, in our case, the individuation of a type of person. Indeed, our argument will be that personalisation is a mode of individuation in which entities are precisely specified by way of a process of recursive inclusion in types or classes as part of the making of what we describe as an *a-typical pathway*. To make this argument, we explore the use of recommendation algorithms to sort or classify people, analysing the way in which individuals are addressed as 'a you', while their membership of types or classes of person is perpetually revised. The you of personalisation is simultaneously singular and plural. Our conclusion is that the familiar recognition that personalisation seems to provide – knowing you better than you yourself do - should not be considered as merely a more precise form of individuation. To the contrary, personalisation also constrains who and how we can be.

Recognising that many of the modern categories with which we think about people and their activities were put in place through the use of numbers (Hacking 1991), we develop our analysis of algorithmic personalisation by drawing on an understanding of *number as composition* (Day, Lury and Wakeford, 2014). This approach starts from the assumption that numbering is everywhere (Hayles 2014), even though numbers may not always be visible. As such, it seeks to situate contemporary analyses of algorithms within the wider context of cultures of numbering. As (even) Badiou (2008) remarks, 'A 'cultural fact' is a numerical fact. And, conversely, whatever produces number can be culturally located; that which has no number shall have no name either' (Badiou 2008: 2-3). In a similar vein, Totaro and Ninno (2014) also comment on the pervasiveness of numbering, but focus specifically on the performativity of the recursive function, which, they argue, provides 'an interpretive key to modern rationality':

> The notion that the 'logic of numbers' operates exclusively on numbers is misleading. In the second half of the last century, the theory of recursive functions has made it clear that the concept of calculation is very general and does not necessarily imply the manipulation of numerical symbols. (2014: 2) (See also Neyland 2014; Totaro and Ninno 2016.)

More circumspectly, Heinz notes that 'the observation and regulation of performances today has become mutual and reflexive, generalised and anonymous, and it is now increasingly based on observations and comparisons in terms of numbers' (Heinz 2011: 22).

Our compositional approach acknowledges the pervasiveness of numbering in contemporary society by looking at what numbering *does*, rather than what numbering *is*. Adopting a felicitous analogy from Verran, we think of numbers in the same way as anthropologists do kin: numbers both are and have relations just as people are and have relations (Verran 2010: 171; see also Urton 1997; Mackenzie 2014). In other words, we propose that it is as working relations that numbers are able to perform: to travel, to make possible comparison, conversion, and exchange, to be stored, to inform, and to make the same or different. By looking at how numbers are composed or formed in relations, and how social and cultural practices are formed (in part) by number, we aim to show how numbering is a re-presentation - in this case, of persons - that always holds more than one presentation.

To understand how it is that we have become habituated to declaring, measuring and sharing our personal characteristics, behaviours and opinions in the UK in order to carry out mundane activities, we begin by situating our analysis in the context of what has been called a 'like economy' (Gerlitz and Helmond 2013). This context is important, we suggest, insofar as it makes relational value available for computational calculation. Drawing on our compositional approach to numbering, we then develop a set of terms – tracking, bordering, folding and pausing – that lead us to describe forms of personalisation that are performed by recommendation algorithms as the making of a pathway of a-typical individuation. Critically, this pathway creates 'a' person or individual that is always provisional and corresponds only partially with the type or category in which it is included, whether this concerns what a person might buy, like, share or possess. The term pathway is intended to capture this category of person, a 'category' that is never static but always changing and always in motion. While our analytic focus is on the example of algorithmic personalisation, and in particular algorithmic personalisation that involves the use of collaborative filters, we also make references to other examples which share the same logic.

**Liking and likeness**

The rise of a 'like economy' begins, so Gerlitz and Helmond argue (2013), with the arrival of Google in the late 1990s. It is widely known that Google's early success stemmed from its use of a search engine that shifted the value determination of websites from hits alone to hits and links. The hyperlink analysis algorithm, PageRank, enabled calculation of the relative importance and ranking of a page within a larger set of pages, based on the number of in-links to the page and, recursively, the value of the pages linking to that page and so on. All links do not have equal value in this type of search engine, as links from authoritative sources or links from sources receiving many in-links are weighted in the algorithm.

The use of weighted measures of linking was a first step towards inscribing the capacity to identify and intensify 'relational value' in search engine algorithms (Gerlitz and Helmond, 2013; see also Feuz, Fuller and Stalder 2011). And it is this relational value, we propose, that is central to personalisation insofar as it makes relations between people available for computational calculation. Since this first step, the capacity to make relations of linking – or sharing - has been significantly extended as the determination of 'authority' has changed in line with the participatory features of Web 2.0. More web users now participate in making connections between websites through the creation and exchange of user-generated content (as well as gaming and the purchase of position). In particular, social buttons allow users to share, recommend, like or bookmark content, posts and pages across various social media platforms. In 2006, Facebook launched a share icon as a way for someone to share web content and invite re-sharing and then, in 2009, it introduced the Like button. In 2010, the company extended the capacities of the Like button to link by introducing an external Like button, a plugin that could be implemented by any webmaster, potentially rendering all web content like-able. Significantly, the external 'Like' button does not only capture actual likes, but also aggregates all activities performed on a web object: the number of likes and shares, further likes and comments on stories, and the number of inbox messages containing the object as an attachment. In another important development, Facebook's Open Graph Protocol opened up their social graph – a representation of people and their connections – for external content, allowing for a controlled way of exchanging preformatted data between Facebook and the external web.

It is through the use of these and other techniques, so Gerlitz and Helmond argue, that Facebook has been able to build a 'like economy', that is, an economy that builds on and exploits relational value, mediated by participation. They further suggest that this economy produces what, using Mark Zuckerberg's own phrase, they call 'the default social'. To this analysis we want to add the observation that the relations between the individual and the population that characterize this new

social are both participatory and participative in that users may participate knowingly (participatory) or unknowingly (participative). Moreover, participation in the default social is mediated by techniques of exclusive inclusion and inclusive exclusion (Agamben 1998).[2] On the one hand, the Open Graph is able to include non-users of Facebook as the external Like button cookie can trace non-users and add any information gained as anonymous data to the Facebook database and, on the other hand, a user's explicitly invited activities may be excluded or rendered invisible to other users if they are not sufficiently highly ranked in the dimensions the graph provides. These oscillating dynamics - of being excluded in ways that inform the ordering of those included, and being included but not in ways that allow you to understand the terms of your membership - were intensified further in 2011 when Facebook expanded the possibilities of 'invisible' participation by proliferating custom actions:

> When creating an app, developers are prompted to define verbs that are shown as user actions and to specify the object on which these actions can be performed. Instead of being confined to 'like' external web content, users can now 'read', 'watch', 'discuss' or perform other actions. (Gerlitz and Helmond 2013: 1353)

Gerlitz and Helmond conclude their analysis of the emergence of the like economy by suggesting that Facebook is being developed as an 'infrastructure of decentralised data production and recentralised data processing' (2013: 1357). While they do not discuss the role of recommendation systems within this infrastructure, these have become increasingly important operators of the de- and re-centralising practices of the economy Gerlitz and Helmond describe. Structured by the 'participatory' practices of inclusive exclusion and exclusive inclusion, recommendation algorithms penetrate all corners of the Internet, making personalised recommendations - directly and indirectly - to individuals with interests in a variety of fields, including movies, music, news, books, research publications, restaurants, jokes, financial services, products of all sorts and persons (for example, in online dating). It is to these algorithms that we now turn.

**Recommendation Algorithms**

While very many different kinds of algorithms are used in recommendation systems, two main kinds are distinguished, collaborative filtering algorithms and content sharing algorithms. Sometimes, as in Netflix, they are combined. The former group of algorithms is based on large amounts of digital data on users' behavior, activities or preferences and leads to predictions of what users will like based on their similarity to others (see further below). An example is Last.fm (http://www.last.fm), a music

'station' or streaming service that personalises the music it transmits by observing the music an individual has listened to on a regular basis and comparing those tracks with the listening behaviour of other individuals. The calculative process involved in this group of algorithms is sometimes described as 'leveraging' the behavior of users[3] since it requires the participation of many users to produce personalised recommendations for one person.[4] Content-based filtering methods, in contrast, are based on a description of an item in terms of discrete characteristics; the algorithm is then designed to produce recommendations for individual users of items that have similar properties to those that the individual liked in the past (or is examining in the present). Pandora Internet Radio (currently restricted to listeners in the USA, Australia and New Zealand because of licensing restrictions) is an example: it makes use of an algorithm that uses properties of a song or artists (a subset of the 450 attributes provided by the Music Genome Project) in order to seed a station to transmit personalised music.

We focus on collaborative filtering algorithms, partly because their ability to make successful predictions across fields is held to be stronger than that of content based algorithms, but also because they require and exploit 'participatory' methods to develop novel classificatory techniques. As such, they allow us to identify distinctive aspects of personalisation as a mode of individuation. Crucially for the use of such algorithms, information relating to 'pre-existing' or demographic qualities of the person or entity concerned is not required to produce personalised recommendations. Instead the information required is produced through the aggregation of the ongoing participation of both the individual to whom the recommendations are made and other users of social media. Rather than allocating users to a pre-existing class, group or type (typically a socio-demographic stratum), the properties of which are presumed to be known in advance, the operations of collaborative filtering start from the premise that (individual) customers who share (that is, have in common) some preferences will also share others. This single but powerful assumption is of value for those developing algorithms in that 'the only information [they need] to work is a set of numerical ratings — specific information about users or items to be recommended is not necessary' (Seaver 2012).

It is worth exploring how these numerical ratings are turned into personalised recommendations in some detail. A helpful analysis is provided by Seaver (2012), who describes the 'signature action' of collaborative filtering algorithms in terms of the operation of a grid, with items along one side, users along the other, and numerical ratings at their intersections (see also Bowker 2014; http;//personalisedcommunication.net/the-project/). Significantly, this grid is a matrix, that is, a grid with the formatted capacity to map (or perform) network transformations:

> This matrix is mostly empty (or "sparse"), since most users will have not rated most items. The work of the collaborative filtering algorithm … is to predict what values will show up in the empty spaces of the matrix. These predictions are then provided in some form to the user as recommendations. (Seaver 2012)

Seaver continues, 'at any given time, the matrix is in an anticipatory flux: new ratings from users arrive constantly, displacing their predicted values and shifting the others. The calculative operations involved in this in-filling process is the signature action within the matrix — blank values are replaced by predictions, which are then replaced by actual ratings'.[5] In the next stage described by Seaver, the numbers from the matrix are statistically analysed and their variance is mapped to a number of dimensions or axes. Users who are 'near' each other on this multi-dimensional coordinate system are held to be similar (like each other), and a user will be recommended items from the neighbourhood around them. It is this calculative activity that leads to the paradigmatic claim of such algorithms to specify the individual in the complex conjugated personalised address: 'People like you like things like this'.

But how, if at all, does this description of the calculative logic in recommendation algorithms help us understand what is distinctive about personalisation as a mode of individuation? Seaver concludes that preference and similarity are collapsed in this calculative system since "liking" and "being like" are equated. We consider that an understanding of the composition of these relations will help us see how numbers are rendered consequential for the making up of persons (Hacking 1991). How is this equation accomplished or, in our terms, composed? If we are to address the specificity of personalisation as a mode of individuation we need to see the particular ways in which numbers both are and have relations.

**Pathways of a-typical individuation**

Seaver's claim about the equivalence between liking and likeness in recommendation algorithms is less critical to our argument than his observation that this calculative matrix is in a constant state of anticipatory flux. Indeed, we propose that the emphasis on perpetual renewal means that the equation of 'liking' and 'being like' that is accomplished by these recommendation algorithms is *not* about establishing relations of absolute equivalence. Instead, we suggest, the calculative activity that produces the anticipatory flux of the matrix involves an ongoing series of approximations in which 'being like' and 'liking' are continually made more and less like each other in a variety of ways. Such approximations, we would emphasise, are designed to be subject to constant testing.

As Seaver points out, such approximations vary hugely depending on the calculative space in which they are produced (3 or 9 axes or dimensions, for example). Their value - that is, their ability to produce personalised recommendations in terms of criteria of accuracy, diversity (of recommendations), privacy protection, and trust - is realised as they are tested repeatedly in relation to data collected via a whole variety of participatory methods and metrics including those outlined above. In other words, the personalised address to 'a you' is not achieved through the *collapse* of liking and likeness, preference and similarity, but through a carefully calibrated sequencing of their possible inter-relationship. Crucially, this process does not only involve the statistical making of proximity or nearness but also the turning of near-ness into next-ness, a process of *bordering* or adjoining. We conclude therefore that personalisation is not the collapse of liking and likeness but the making of *a pathway*, a dynamic series of approximations of similarity and preference that makes persons.

Indeed, this pathway can be described as a mode of a-typical individuation. What do we mean, though, in our use of a-typical? Certainly it might seem counter-intuitive to use the term at all if it is understood to mean 'not typical' or 'not of a type', since we have argued throughout that personalisation is a mode of individuation that involves generalisation through the (repeated or recursive) inclusion of an entity in a type or class. While we propose that personalisation is a mode of inclusion that is *not* that of inclusion in a class or type defined by inherent or pre-given properties (using a-typical in a negative sense), we also want to use the term to describe a mode of recursive inclusion, in which both the individual and the type are repeatedly specified anew. To do so, we draw on multiple – etymologically unrelated – meanings of 'a'.

The first set of meanings are associated with the use of 'a' as the indefinite article, since this use directly indicates membership in a type or class of people, things or events ('this is a cat', 'this is a friend of mine'). The indefiniteness of this inclusion, while appearing to indicate a lack of determination, has its own logic: for example, as well as meaning 'one single' or 'any', 'a' is also commonly used to introduce someone or something for the first time. It allows for a mode of inclusion in a type or category on the basis of criteria that are not pre-given but rather open to further (indefinite) specification ('If that is what you think, then you are not a friend of mine because a friend of mine would not think that'). As the indefinite article, 'a' is also used to specify both someone or something as being like someone or something else ('you are a star') and to express rates or ratios, as in 'for each' or 'per'. Our use of the term a-typical thus calls up the operation of the two analytically distinct, but historically intertwined, understandings of analogy identified by Stafford (2001): participation (similitude, mimesis, likeness) and proportion (ratio).[6] These are combined to produce principles of inclusion that are subject – recursively – to further revision: their

combination is the means by which the you that is '*a* you' becomes a recursive shifter (Chun 2011, 2016).

To these meanings of 'a' as the indefinite article, we wish to add a further meaning, that is, 'a' as a variant spelling of 'ad-', denoting motion or direction, a reduction or change into, an addition, increase or intensification, as in 'adjoin' or 'adjacent'. The etymology of these terms relates to the Latin *adjacentem*, *adjacens*; from *adjacere*, 'to lie at, to border upon, to lie near'; from *ad-*, "to" + *jacere*, "to lie, to rest"; literally, "to throw". Our use of the term a-typical to describe pathways of individuation is thus intended to describe the ways in which collaborative filtering algorithms are designed to allow for the ongoing re-definition of principles of inclusion and exclusion via the recursive activity of adjoining or the work of adjacency: what we describe as the compositional practice of bordering or framing.[7] In this practice, the aim is to create, not equivalence, but a topological invariance: that is, the aim is to achieve a continuity of a recursive function[8] such that likeness ('People like you') is iteratively produced as a pathway through a massively aggregated de- and re-contexting of liking.

How this is accomplished in the multi-dimensional calculative space of recommendation algorithms can be illustrated by way of a consideration of 'the next adjacent possible', a term developed by the theoretical biologist Stuart Kauffman (2000).[9] Put briefly, Kauffman understands life in terms of autonomous agents[10], by which he means 'something that can act on its own behalf in an environment'. This living entity is 'something that can both reproduce itself and do at least one thermodynamic work cycle' (2000: 64). Kauffman says,

> That bacterium, sculling up the glucose gradient, flagellum flailing in work cycles, is busy as hell doing 'it', reproducing and carrying out one or more work cycles. So too are all free-living cells and organisms. We do, in blunt fact, link spontaneous and nonspontaneous processes in richly webbed pathways of interaction that achieve reproduction and the persistent work cycles by which we act on the world. Beavers do build dams; yet beavers are 'just' physical systems. (2000: 64)

In making this argument, Kauffman points to the importance of the role of adjoining or bordering. He points to the constitutive role of the particular material constraints (or context) in which any entity individuates. He also identifies the work of adjacency as the activity of 'constructing constraints that can manipulate constraints', thus drawing attention to the role of the border as the operator of the relation of the inside of an entity to its outside. Drawing on this analysis, we return to our observation on testing. Personalised recommendations are based on the making of nearness or adjacency in a multi-dimensional space but the implementation of collaborative filtering

algorithms requires that they be subject to repeated testing in the specific kinds of relations to context that are commonly called participation. It is only insofar as a population's relations to multiple contexts (including data relating to liking, sensing and sharing as well as to time and space) are registered by the algorithm that the mode of individuation we are describing can happen at all. In other words, the (numerical-cultural) process of *folding* a whole into, across or within itself to make parts, of de- and re-contexting what Zuckerburg describes as the default social, is fundamental to the making of pathways of a-typical individuation. As Seaver (2015) observes, while it is sometimes claimed that big data has no context, 'context is everything' for recommendation algorithms. [11]

It has been widely observed that algorithms do not operate in isolation from context-aware techniques of data capture and collection as they are organized in particular calculative infrastructures (Hayles 2002; Verran 2011). Dourish, for example, notes,

> If the database is malleable, extensible, or revisable, it is so not simply because it is represented as electrical signals in a computer or magnetic traces on a disk; malleability, extensibility, and revisability depend too on the maintenance of constraints that make *this specific collection* of electrical signals or magnetic traces work as a database; and within these constraints, new materialities need to be acknowledged. (2014)

Similarly, Amoore and Piotukh highlight the changing role of indexing practices in data collection activities:

> while structured data is territorially indexable, in the sense that it can be queried on the horizontal and vertical axes of spreadsheets within databases, so-called unstructured data demands new forms of indexing that allow for analysis to be deterritorialized (conducted across jurisdictions, or via distributed or cloud computing, for example) and to be conducted across diverse data forms – images, video, text in chat rooms, audio files and so on. (2015: 345)

As they also observe, the activity of '(ad-)joining' is of particular importance in the deployment of these new forms of indexing. They give the example of IBM's predictive policing:

> The linking of the data elements is performed through joins across data from different data sets, either on the basis of direct intersections with already indexed data (e.g. via a phone, credit card or social security number ingested from a database), or probabilistically, through correlations among data-points from different sources (e.g. text scraped from a Twitter

> account correlated with facial biometrically tagged images drawn from Facebook). (2015: 345)

It is not just that there is more than one relevant context for recommendation algorithms. Different contexts are deliberately made to appear or disappear in different practices of context-*ing*. Indeed, this emphasis on context – what is sometimes called context-awareness - provides another compelling reason to describe personalisation as a *pathway* of a-typical individuation. A trajectory is not established in advance – as when we travel with the aim of moving from A to B, already knowing where B is – but in response to contexts that emerge in the making of a path.

**Becoming normal by being better than you**

We turn now to a discussion of the consequences of personalisation for the making of the default social, by considering the practice of normalization (Foucault 1991: Canguilhem 1991; Agamben 1998; Hacking 1991).[12] In his discussion of modes of governance linked to earlier forms of statistical normalisation, Hacking (1991) argues that debates concerning the setting of boundary conditions were fundamental to the way in which a population was governed by statistical laws. Updating this argument, we suggest that the work of adjoining in the personalisation practices described above involves an ongoing reorganization of boundary conditions (operating the relation between inside and outside, inclusion and exclusion through techniques of contexting) that transforms conditions of governmentality. This is especially clear in relation to the way in which practices of normalization now require the achievement of transitivity.[13] On the one hand, the verbs of the vocabulary of participation – liking, sharing, linking – describe activities in which objects are repeatedly attached to persons; that is, they promote an algorithmic kind of linguistic transitivity (as in 'things like this like people like you'). On the other hand, the data collected through the tracking of participation are then ordered transitively - in a mathematical sense - in an n-dimensional space of likeness or similitude. In these practices, the 'new normal' of individuation appears as a function of the ideal of transitive closure, an internal limit, in relation to which every possible relation (between verb and object) is partially ordered in such a way that the you that is a you emerges is similar to other 'yous', nearly but not quite the same as other 'yous', and never quite able to be consolidated as an 'us'.

While this limit can never be reached since it involves a never-ending in-filling in relation to a constantly changing population,[14] we are nonetheless witnessing a proliferation of models of optimization across the fields of medicine, marketing, project management, and operational research (the last of which is sometimes described as 'the science of better', the significance of

which will be made apparent below). In such models, optimal pathways of a-typical individuation are commonly identified in relation to specific objectives, often through software that merges data with parameters (as in the case of the parametric algorithms discussed by Parisi 2013) or employs evolutionary modelling. As described above, one of the novel aspects of such techniques is the calculative deployment of recursion such that the aim of the action of ad-joining is not set in relation to a pre-defined target; rather pathway and target emerge together.

Indeed, the term precision medicine is sometimes preferred to the synonyms personalised or stratified medicine because it acknowledges the significance of the necessarily dynamic fit between, for example, a cancer, drug target, resistance and side effects through repeated monitoring and the operationalization of the feedback loop between evaluation and intervention.[15] In some cases, the methods of operational research are applied in conjunction with computational biology with the aim of identifying a pathway that has a 'biologically meaningful objective': a network is 'designed (or revised) optimally' to find 'the natural circumstances that trigger one particular pathway but not others' (http://ercim-news.ercim.eu/en82/special/pathway-signatures). An example of findings based upon pathways defined in molecular terms rather than by anatomy or traditional disease classification is the recently reported study (Mateo, Carreira, Sandhu et al. 2015) of the efficacy of the drug Olaparib, approved for treating ovarian cancers with *BRCA1/2* mutations. This study built upon the finding that cancers are significantly heterogeneous at the molecular level and discovered that the variation within one, such as ovarian cancer, can be more marked than between cancers, such as ovarian and prostate, when tracked in terms of their differential sensitivity to particular treatments.

More broadly, we can see the operation of principles of optimization modelling in the now ubiquitous ordinal tropes of ranking, which ensure that what counts as best is not given in advance, but rather emerges in a participative fashion with the (continually changing) requirement to do and be better (Esposito 2013, Gerlitz and Lury 2014, Guyer 2010). In these practices the you that is addressed is *both* specific *and* a you 'that is like everyone else' (Chun 2011), only more or less so. The exhortation to 'Believe in Better'[16] pervades contemporary culture and might be seen as an appropriation of 'optimism of the will', recursively calibrating relations between individuals and populations to establish new forms of stratification (Fourcade and Healey 2013). In the requirement to be like but better than each other established in relation to such optimizing practices, you and I are not just different to each other but different-er: our differences are such that we are always both more and less different to each other. As the Optimizely commercial platform informs us, 'Being personal is no longer optional' (https://www.optimizely.com), or, as the name of a British financial

services comparison website says, GoCompare (http://www.gocompare.com/ps/homepage/2.aspx/?Media=GG001&PST=1&device=c&PST=1&gclid=Cj0KEQjwwYK8BRC0ta6LhOPC0v0BEiQApv6jYX5FTYS1gIsxfMkzlNIsaIMdTDT1Y7KLjtZwIIP8Y0MaAvBY8P8HAQ.) Indeed, it is not just persons that are invited – or obliged - to participate in bettering themselves in the compositional practices of personalisation: universities, hospitals, museums, police forces, hotels, holidays, restaurants, brands and schools are also now frequently placed in dynamic relations of competitive comparison with each other by often mandatory or non-voluntary inclusion in the recursive partial orderings of ranking systems. While normalisation techniques sometimes provide a statistical snap-shot, a one-off cross-section of a population fixed in relation to a single environment (the nation, for example), personalisation is noteworthy for the way that it establishes (constantly shifting) grounds for dynamic stratification in relation to multiple norms in multiple environments.

**Signature pathways**

We consider one further aspect of the making of a pathway of a-typical individuation by exploring the use of 'you' as a shifter. In linguistic terms, shifters such as 'this' and 'that' as well as 'I' and 'you' can only be understood by reference to the context in which they are uttered. In other words, a shifter, sometimes also called a place-holder, is an indexical term whose meaning cannot be determined without referring to the message that is being communicated. The 'you' in a pathway of personalisation designates both the person to whom a message is directed and the 'you' that is contained in the message that is sent. In relation to our description of algorithmic personalisation, it is the suturing of this doubling in the shifter that makes a personalised address to the individual possible and also organises the activity of shifting as adjoining, creating constraints that can manipulate constraints in the making of a pathway.

For Jakobson (1957), enunciation is encoded in a shifter in the statement itself. While Jakobson defines the shifter as an indexical *symbol*, Lacan defines it as an indexical *signifier* in order to problematize the distinction between enunciation and statement. As a signifier, the shifter 'I' is normally part of a statement. As an index, it is also normally part of the enunciation. For Lacan (1977), this division or distribution of the 'I' or 'you' does not merely illustrate the splitting of a subject; it *is* that split. Drawing on these understandings of shifters, it seems that the indexical signifier is not stopped or 'arrested' by (representatives of) the symbolic order (Fenves 2002) in the anticipatory flux of personalising practices.[17] In the context of (algorithmic) personalisation, it seems

that the shifter is rather *paused*. Temporary halting incites participation or the folding of a context into the pathway. Indeed, it is this pausing, the marking of an interval, a stopping and starting that repetitively gathers a collectivity. In assembling observers and observed, pausing allows for both observation and the observation of the observing (Kaldrack and Rohle 2014).

Given that a pathway is a process of stopping and starting that repetitively gathers a collectivity, it is not surprising that the ability to identify some pathways but not others – the signature action Seaver describes - is currently the source of considerable interest. Frow's discussion of signature and brand (2002) is illuminating in this respect. He describes the signature as a shifter that sets up 'a tension between representation and the represented' and observes that the signature is not only an index of the act of framing (of adjoining or bordering), but also designates a naming right. Specifically, Frow argues that the power of the signature stems from the elision of the difference between the signature as an index and the taxonomic function of the proper name. This elision is effected in a particular way by the brand, he asserts, since 'the "Name", when one abstracts it from the signature it indicates, loses its 'index' character and becomes a 'trademark'. Like the trademark, the name is of a symbolic order' (Gandelman, quoted in Frow 2002: 63).

As Frow observes, the brand's economic significance as a 'nexus between high-speed, continuous flow manufacturing and the reshaping of people's habits and lives' (Ohmann, 1996: 61 in Frow 2002: 64) is growing. The detachment from indexicality is what provides the basis for using the signature as a claim to ownership. Importantly, however, Frow argues that the brand is in principle reducible to neither a product nor a corporation. As a quasi-signature or signature-effect, a brand name is routinely attached to a product range, and even to generations of product ranges, rather than to singular objects. It is precisely the divisibility of brand from product (in practices of bordering or framing) that makes possible the transfer of brand loyalty from one generation of a product to another. With Frow's insights, we propose that recommendation algorithms create pathways of a-typical individuation that are always distinct (divisible and detachable) from both object and person. In consequence, the ways in which such pathways acquire autonomy or not, and how that autonomy is recognized,[18] constitute the heart of current debates on the sharing economy. It is here that the politics of collectivity, ownership and use are being reconfigured.

**Conclusion**

We have argued that personalisation is a mode of a-typical individuation that is produced in techniques of recursive divisibility (the drawing of lines of inclusive exclusion and exclusive inclusion). As such, it provides an entry point into the constitution of what, following Mark Zuckerburg, we have called the 'default social'. Crucially, as a numbering practice, personalisation does not involve zooming (Day, Lury and Wakeford 2014), a performative gesture that operates the dynamism of moving from big to small, that is, a slide from one to many and back again, as if the only difference to be registered was that of an increase in a uniform quantity (as in what Badiou calls the count of one). Instead, this is a mode of numbering that constitutes a default social through forms of de- and re-aggregating, in which a variety of contexts are included and excluded, such that one is always more and less than one. In a recursive process that involves tracking bordering, folding, and pausing, the individual is precisely and momentarily specified as 'a you' (Chun 2016), that is, as a dividual (Raunig 2015; Strathern 1998). At the same time, pausing allows for the composition of heterogeneous (numerical-cultural) quantities, in which qualitative differences of mass are recognised at different levels of observation as matters of dimension and scale. Put somewhat differently, the person that is addressed as a you is refracted in multiple partial orderings that allow for specific forms of comparison and competition (of better-ing) while the folding of contexts into the pathway creates new ways of configuring relations between participation and proportion, sharing, ownership and use in the identification of signature pathways.

Importantly, our argument does not suggest that personalisation is replacing other modes of individuation. Rather it introduces new techniques that combine in a variety of ways to transform and intensify contemporary forms of individualism.[19] As such, it merely confirms Hacking's observation in relation to the history of the making up of people, 'The less the determinism, the more the possibilities for constraint' (1991: 194).

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[2] These are practices that Agamben associates with sovereignty: bare life, he argues, has always been the object and the aim of state action, and it has always been subjected to elaborate mechanisms of both inclusion and exclusion.

[3] Arvidsson argues that it is through personalisation that platforms such as Facebook will – on their own and in conjunction with third parties – benefit from the financialization of everyday life (Arvidsson forthcoming).

[4]One of the most famous examples of this group is item-to-item collaborative filtering, an algorithm developed by Amazon.

[5] He continues, 'The collaborative filtering matrix intermeshes the identities of users and items. It is both possible and typical for a collaborative filter to take no special account of either, organizing all entities strictly in terms of ratings: users are known as a [ranked] collection of relations to items and items are known as a [ranked] collection of relations to users. Persons and things enjoy no separate modes of existence in the matrix, which is indeed a function for translating one into the other' (2012). In other words, collaborative filtering algorithms do not just determine that 'Users like you liked items like this'; they also establish that 'Items like this liked users like you'. This 'collaboration' is very different from that of the taste-bearing individuals explored by Bourdieu in *Distinction* (1987) where the relations are those of class and the exercise of taste, and involve symbolic violence. How pathways of 'a-typical individuation' will coincide with, transform or supersede such 'demographic' stratification remains to be seen.

[6] For Stafford, analogy is an associative method, a demonstrative and evidentiary practice. She says, 'Analogy correlates originality with continuity, what comes after with what went before…This transport of predicates involves a mutual sharing in, or partaking of, certain determinable quantitative and qualitative attributes through a mediating image' (2001: 9).

[7] Bateson describes set theory diagrams as 'a topological approach to the logic of classification' (1999: 186). In such diagrams a frame is a mode of referring by ordering. As Tkacz observes in a commentary on Bateson, 'A frame always sorts things as either belonging or not belonging and this process is mediated by axioms or principles – indeed, the axioms are what define the frame; they are the conditions of its possibility' (2014: 71).

[8] We see our understanding of the work of adjacency as an example of what Simondon describes as transduction, that is 'a process — be it physical, biological, mental or social — in which an activity gradually sets itself in motion, propagating within a given domain, by basing this propagation on a structuration carried out in different zones of the domain: each region of the constituted structure serves as a constituting principle for the following one, so much so that a modification progressively extends itself at the same time as this structuring operation.' He continues, 'The transductive operation is an individuation in progress; it can physically occur most simply in the form of progressive iteration' (Simondon 1992: 313). Totaro and Ninno (2014) argue that what is fundamental to the recursive function is that repetition becomes *the aim of action*.

[9] Rabinow's understanding of adjacency (2009) provides another, related set of terms. For Rabinow, the concept of adjacency is both analytic in that sets of relations must be decomposed and specified, and synthetic in that these relations must be recomposed and given new form. In this process, a neighbourhood emerges as the figure of what moves in tandem, together, the outcome of the interlinked processes of analysis and synthesis.

[10] Kauffman observes in relation to autonomous agents that 'At the end of the cycle the system is poised to cycle again' (2000: 68).

[11] The Optimizely platforms says that it can 'Connect that browsing behavior, demographic information, contextual clues, and 1st- and 3rd-party data into a complete picture of your customer that you can use to power personalised experiences'.

[12] Hacking (1991) argues that 'normalcy' is one of the most socially significant statistical meta-concepts. We are pointing to the significance of normalization without, we hope, imputing any consensus to the very different concepts and trajectories implicated in this meta-concept across a range of disciplines.

[13] Transitivity has a range of meanings in different disciplines. In linguistics, for example, transitivity is a property of verbs that relates to whether a verb can take direct objects and how many such objects a verb can take. In mathematics, a binary relation over a set is transitive if, whenever an element a is related to an element b, and b in turn is related to an element c, a is also related to c. The partial ordering produced by the algorithms discussed above organise liking in relations that are transitive in both senses.

[14] Parisi offers another view of the limits of reason, specifically in relation to computation. She suggests that while parametric quantities are discrete entities that not only select data, as part of the software into which they are scripted, they may also be infected by data that they are not able to compute: "Instead of being a continuous flow of data, such as a topological binding of many actualities into one stream of ceaseless variation, the incomputable … is an infinite series of discrete yet incomplete data that immanently ingresses and becomes uniquely arranged into algorithmic sets, in which these data acquire togetherness and continuity' (2013: 170).

[15] In precision medicine (or its synonyms), reference is commonly made to the *4Ps* which are predictive, personalised, preventive and participatory. Some of the advocates of this approach describe current developments as a revolution, 'fueled by several factors: first, an appreciation that medicine is an information science; second, systems or holistic approaches to studying the enormous complexities of disease; third, emerging technologies that will let us explore new dimensions of patient data space; and fourth, powerful new analytical technologies—both mathematical and computational—that will let us decipher the billions of data points associated with each individual' (Hood and Friend 2011).

[16] This is the strap-line employed by Skye, Rupert Murdoch's telecommunications company, which encourages us all, no matter what, to 'Believe in Better'. Elsewhere in the UK there is a chain of leisure centres that are called 'Better', a national insurance company that is called 'More Than' and Eurostar, the company that runs trains through the tunnel connecting the UK to continental Europe, deploys a campaign that employs the hashtag, 'bettercloser'. There is a Canadian pharmaceutical company that has a range of products called Be.better; Nike's current range of products includes a T-shirt with the slogan 'bettering' written across the front; the shoe and clothing company Timberland use the advertising strap-line, 'Best then. Better now'; the TSB (a UK bank) claims 'Our TSB Classic Plus account, just got plusser'; the Wellcome Museum in London invites us in with the slogan 'More than ever'; the i-Phone 6 is described as 'bigger than bigger'; a recent advertisement for an electric car (an Audi) insists, 'Like a car, but better'.

[17] It is hard to avoid drawing a parallel with Althusser's discussion of interpellation: the policeman who calls out 'Hey, you there'. Althusser's approach draws on Lacan's various discussions of the mirror stage, a form of pausing in which infants encounter an external sense of coherence,

producing a sense of 'I' and 'you', that comes to represent a permanent structure of alienation for Lacan.

[18] A paradigmatic example is the recent successful filing of a patent by Amazon for a method of speculative or anticipatory shipping. See Coleman (forthcoming).

[19] In marketing and many policy fields, for example, the design of optimal pathways is informed by behavioural economics, in which doing is deployed as a measure of being. In the terms of our analysis, 'nudging' is the identification and operation of constraints that can manipulate constraints, and the current investment by business and government in a 'context aware' computational infrastructure seems designed to support the rise of personalisation as a mode of individuation that will afford the possibility of dynamic stratification.