We can predict it for you wholesale

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1. Before you even know it

What do others buy after viewing this item?
Well, if you like the sound of that, then you'll love what's coming up next.[1]

US Patent No. 8,615,473 B2 of December 24th, 2013, 'Method and System for Anticipatory Package Shipping', is assigned to Amazon Technologies, Inc., a subsidiary of one of the world's most data- and dollar-wealthy corporations. Using 'forecast analysis of business variables' – the predicted desire for an item based on a customer's prior online behaviour (such as previous orders, searches, wish lists, cart contents, and cursor 'loiter time' over items) – the corporation proposes to 'speculatively ship […] without completely specifying a delivery address' to cut down on fulfilment times: the shipped item is held locally and offered to customers with almost-immediate delivery.

2. Prediction is difficult

Prediction is very difficult, especially if it's about the future.[2]

Predictions are claims about the occurrence of specific, well-defined events in the future whose occurrence can be uncontroversially verified. A prediction ought to be sharp (precise) and accurate (have a significantly greater-than-even chance of being correct).

Of the diverse strategies and approaches to prediction deployed historically, those involving systematic observation of nature have proved more successful than ones based on numerology, the examination of animal entrails or the interpretation of dreams. Ancient astronomers predicted eclipses based on the periodicity observed in past records; foreknowledge of cosmic events endowed them with immense cultural authority. During the Scientific Revolution, natural philosophers formalised observational and experimental procedures and generated theories with formidable predictive power. Mathematics continues to prove 'unreasonably effective'[3] in the natural sciences. (For example, experimentally determined values of a quantity called the electron g-factor agree with theoretical computations to within one part in a trillion.) Despite dramatic epistemological complications arising from 20th century developments (Heisenberg's uncertainty principle, Gödel's incompleteness theorems, chaos theory), mathematics and natural sciences set the standards for both deterministic and probabilistic reasoning, most conspicuously as they quantify the uncertainty of their predictions.

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[1] *Dreams Rewired* dir. Manu Luksch, Martin Reinhart &Thomas Tode. AT/UK: 2015

[2] Niels Bohr (attrib.)

[3] Eugene Wigner. 'The Unreasonable Effectiveness of mathematics in the Natural Sciences'. *Communications in Pure and Applied Mathematics*, Vol. 13, No. I (February 1960)

What has constrained predictive power in the humanities and social sciences – even in the most mathematised of all, economics, where *homo sapiens* has been rationalised beyond recognition into a monomaniacal *homo economicus*? Historically, the obstacles have been located in the very nature of the objects of study. Human and social phenomena arise from the actions of self-interpreting subjects who are susceptible to influence, inclined to rebelliousness and akrasia, resistant to reductionist analysis, and (unlike electrons) heterogeneous. However, the application of machine learning to large data sets appears to have brought about dramatic improvements in the prediction of human behaviour. Does this augur the end of mystery, suspense, romance?

3. Past performance is no guarantee of future results

The computed likelihood of an event may be underwritten by different conceptions of probability, as determined by, for example:
(i) Relative frequency in the statistical record of the past. (Though, as financial service providers typically hedge, 'past performance is no guarantee of future results'.)
(ii) Symmetry. The chance of an event is constrained by logical or physical symmetries of the system, such as those of an unbiased coin. (But a complete model of an unbiased toss would have to include at least the probability of the coin landing on edge, amongst possibly other more exotic outcomes.)
(iii) A causal mechanism or model. (Consider an event as an outcome of a random natural process such as radioactive decay.)
(iv) Degree of belief of an individual that the event will occur (subjective probability).

Prediction in the human sciences is heavily driven by (i), and deeply vulnerable to (iv).

4. Real-world counterfactuals: what could have been

'If, five years after leaving the EU, the UK economy booms, would this refute the prediction of the Remain Camp that Brexit would ravage Britain's economy? If, instead, after five years the UK is in recession, would this confirm the prediction? In both cases, the answer is no; neither observed outcome proves anything. In order to "prove" our predictions, we would need to establish the counterfactual. But there are too many factors that would need to be accounted, and the outcome quantified under the counterfactual. And that is something we simply are unable to do.'[4]

[4] Simon Bishop, RBB Economics. Personal communication.

The impossibility of the counterfactual arises in another way too. The decision to grant a defendant bail can be assessed ex post based on compliance – but not the decision to deny bail. You can't run a controlled experiment on society[5] – nor on an ecosystem.[6]

5. The long and short of I.T.

The proliferation of networked sensors and ubiquitous processing makes possible a fully embedded urban information infrastructure – an operating system for 'Smart Cities'. Trends gleaned through data correlation can be extrapolated into future patterns. Anticipatory algorithmic management for a resilient, ecologically balanced future free from uncertainty – as you remember it from techno-utopian fictions.[7]

As Joe Chip discovers in a face-off with his 'smart' door in *Ubik*[8], even everyday infrastructure is not above suspicion. CCTV manufacturer Hikvision (40% owned by the Chinese Communist Party) has supplied over a million cameras compatible with facial recognition technology to the UK – including to the parliamentary estate and the police. These contracts were awarded with full knowledge of Hikvision's association with 'Skynet' (China's nationwide surveillance network), and its development of a centralised facial recognition database, for which it is amassing data.[9]

In its full expression, the corporate-governed 'Smart City' epitomises a *new new enclosure movement.* Using network surveillance, it builds private databases that fuel prediction products. These products are traded in a behavioural futures market, which Shoshana Zuboff has identified as the mainspring of surveillance capitalism.[10]

6. Self-fulfilling prophecies (I): classification and profiling

'Behind every customer is an individual', claims consumer credit reporting agency Experian, advertising its Mosaic tool that enables corporations to 'personalise customer

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[5] See for example the discussion on algorithms predicting for recidivism in Hannah Fry. *Hello Word.* W. E. Norton: New York, 2018 pp. 49–78 and also the paper discussed therein: Jon Kleinberg, Himabindu Lakkaraju, Jure Leskovec, Jens Ludwig, and Sendhil Mullainathan. 'Human Decisions and Machine Predictions'. NBER Working Paper No. 23180. February 2017

[6] Temporal factors predominate – when will unintended consequences become apparent? and how will we recognise them as consequences?

[7] Philip K. Dick. 'We Can Remember It For You Wholesale'. *The Magazine of Fantasy & Science Fiction*. April 1966.

[8] Philip K. Dick. *Ubik* (Doubleday: 1969). Chip is held up by his own front door – a door that is aware of its contractual rights.

[9] Ryan Gallagher. 'Cameras Linked to Chinese Government Stir Alarm in U.K. Parliament'. *The Intercept.* 9 April 2019. Accessed 01/08/19 at https://theintercept.com/2019/04/09/hikvision-cameras-uk-parliament

[10] Shoshana Zuboff. *The Age of Surveillance Capitalism.* PublicAffairs. 2019.

experience and increase share of wallet.'[11] For useful patterns to emerge from this data, categories must be created. Mosaic classifies consumers into 66 types across 15 groups, using criteria such as home ownership and location, career stage and ethnicity.

The classification system is riddled with arbitrariness and value judgements – affordable but pleasant', 'bright young singles', 'time-honoured elders' – that propagate through decision algorithms that run on the database. Experian markets the tool across the retail and service sectors, including human resources and financial agencies that can have life-changing impact. 'Through denying credit or screening career opportunities, negative profiles can haunt an individual across various domains. A person's data shadow does more than follow them; it precedes them'.[12]

7. Better than you: false consciousness, true intentions

Network intelligence corporations declare, with no sense of hubris, that their extensively correlated datasets 'know' you better than you know yourself.[13] Facebook infers an individual's creditworthiness, voting intentions and sexual preferences through a combination of first-order data (what are your neighbours like?) and second-order metadata (the topology of your network). Credit card company Visa claims to predict divorce one year ahead through analysis of spending habits. It is very specifically you, with all your peculiarities, and not just as a member of some category, that these corporations want to know. Deep personal knowledge yields valuable information on how you might behave (what you might buy, when you might die). And data anonymisation provides little protection against a motivated, mathematically sophisticated agent.[14]

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[11] *Mosaic. The consumer classification solution for consistent cross-channel marketing*. Experian Ltd 2016. Accessed 15/07/2019 at https://www.experian.co.uk/assets/marketing-services/brochures/mosaic_uk_brochure.pdf

[12] Rob Kitchin. 'Continuous Geosurveillance in the "Smart City"'. *dis magazine* 2015. Accessed 15/07/2019 at http://dismagazine.com/dystopia/73066/rob-kitchin-spatial-big-data-and-geosurveillance

[13] In 2002, statistician Andrew Pole worked for US store Target to discover newly pregnant customers. Shopping habits change on major life-events, opening a window for brand-switching. The store was diversifying its stock and wanted to secure new custom through targeted promotions. 'As soon as we get them buying diapers from us, they're going to start buying everything else too,' Pole claimed to Charles Duhigg ('How Companies Learn Your Secrets. *New York Times*. 16 February 2012). Pole sniffed out pregnant shoppers by looking for substitutions in their regular basket, e.g. to unfragranced or additive-free toiletries. These consumers received custom mailshots with vouchers for new lines of baby goods. An angry father of a teenage girl accused Target of encouraging her interest in babies, only to find that she was already pregnant. (He apologised to the store manager, who had called to apologise on behalf of Target).

[14] Given a small amount of auxiliary information, an individual's identity can be inferred purely on topological features (connections) of their networks. See Arvind Narayanan and Vitaly Shmatikov. 'De-anonymizing Social Networks'. Accessed 01/08/19 at https://www.cs.utexas.edu/~shmat/shmat_oak09.pdf

8. The easiest way to predict the future is to produce it

The ‘Smart City’ invites citizens to devolve their precious processing to it, allowing it to curate a pre-selected menu of options. Informed by neuroscientific research on perception and cognition, fed by behavioural data harvested from phones and smart cards, and driven by the need to compete in the attention economy, the agile vendor of products and services learns to nudge user behaviour (‘If you like the sound of that…’). Is the actual reason for Google’s heavy secrecy around its YouTube recommendation engine that the algorithms are driven by an unutterably simple-minded agenda – maximising ad-click-through? Reap viewer desire, inflate the filter bubble, but remain agnostic to content.

Some illusions need to be maintained. Prediction is much less hazardous when the user, confronted with an explicit and limited set of options, feels that she is choosing freely. And seemingly inconsequential changes in the framing of options may lead to dramatically different behaviour[15]. Swipe which way?

The act of prediction aspires to be an epistemic act. But a culture governed by predictive algorithms is less a factory of knowledge, and more a factory of conformity. A culture that understands itself to be predictable, homogenises. All prophecies become self-fulfilling (provocations).

9. A prediction

In a context where anything you think might be held against you – you will self-censor.

10. The fast mirror and the slow

To protect the Khazar princess Ateh from her enemies, blind men paint letters of a proscribed alphabet on her eyelids each night. Anyone who reads the letters dies. One morning, the princess receives a pair of extraordinary mirrors as a gift, one fast and the other slow. ‘Whatever the fast mirror picked up, reflecting the world like an advance on the future, the slow mirror returned, settling the debt of the former’[16]. Having not yet cleaned the letters from her eyelids, she looks into the mirrors and dies instantly, killed twice in an interblink.

11. What wouldn’t you want to foresee

Personal: If you could know exactly when you will die – would you want to? if you did know – who else ought to know? Should some predictions not be made, even if they could be? and exactly how would you police that?

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[15] The classic exploration is by Daniel Kahneman and Amos Tversky. ‘The Framing of Decisions and the Psychology of Choice’. *Science*, 211: 453–58, 1981.

[16] Milorad Pavic. *Dictionary of the Khazars. Female Edition.* Penguin. p. 23

Pedestrian: ‘Every technological intervention that is made with the intention of smoothing out urban experience deprives us of an opportunity to encounter something external to our own will, robbing us of a moment in which we might reflect on the contingency of our own values, choices and beliefs.’[17] Foreknowledge makes life – boring?

Anti-existential: Cassandra foresaw deglaciation, extreme climatic events, and ecosystem collapse, but was cursed by sulking Apollo never to be believed. This tragedy brings about no catharsis.

12. Correlation is enough: the end of theory?

The spectacular growth of data acquisition and computational capacity, together with the development of algorithms for data correlation and pattern recognition, have given rise to a new class of predictive models of unprecedented accuracy – it is claimed. For corporations who trade in network intelligence and surveillance, correlation suffices – with the healthy returns produced by pattern matching algorithms, there is no need to develop causal models. If economic gain can be secured on the basis of privileged knowledge of *what* will be the case, there is no need to understand *why* it will be so. Moreover, where the prediction engine is a neural network, it is very likely practically impossible to trace the reasoning behind a particular computation. Only the ends matter – not the means.

Evangelists of machine learning who place short term efficacy over deep causal understanding contend that science too should be conducted under such a program.[18] But in the natural sciences, theories are valued not merely for their predictive accuracy – other important criteria for choosing among competing theories that fit the same observations include consistency, simplicity, elegance, generality, and explanatory power.

Correlation is not causation.

13. What is it like to be a cat?

Predicting cats: the physics of the falling feline – just how it rights itself mid-air to land on its feet – exercised 19th century scientists including James Clerk Maxwell. A rigorous mathematical solution only emerged in 1969,[19] but already in 1894, the French physiologist Étienne-Jules Marey had published empirical studies with photographs that made crucial details of the cat’s double-rotational movement visible. Marey shot the

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[17] Adam Greenfield. *Against the Smart City.* Publisher. Date. Page#

[18] See for example Chris Anderson. ‘The End of Theory: The Data Deluge Makes the Scientific Method’. *Wired.* 23 June 2008. Accessed on 1/8/19 at https://www.wired.com/2008/06/pb-theory

[19] Kane, T R; Scher, M P. (1969), "A dynamical explanation of the falling cat phenomenon", *Int J Solids Structures*, **5** (7): 663–670, doi:10.1016/0020-7683(69)90086-9.

falling cat with his chronophotographic gun, a 12 frames-per-second camera that he had developed specifically to study motion. Through geometric analysis of image sequences, Marey not only gained insight into the underlying biomechanics, but also saw the possibility of optimisation and control. The French military was his first client.

To prevail in the scramble for unconquered territory, an army must tune its soldiers' movements. Like the falling cat, it cannot rely on luck.[20]

Contemporary predictive analytics is a direct descendant of Marey's work, via the early 20th century time and motion studies of Frank and Lillian Gilbreth.

Cats predicting: biomechanical explanations do not exhaust totemic associations with luck and death: the feline mind remains mysterious to us. Oscar, the resident cat at the Steere House Nursing and Rehabilitation Center, Providence, Rhode Island, has an 'uncanny ability to predict when residents are about to die. Thus far, he has presided over the deaths of more than 25 residents on the third floor […] His mere presence at the bedside is viewed by […] staff as an almost absolute indicator of impending death.'[21] And if an artificial agent made such predictions well, would you heed it?

Correlation is not causation, and behaviour is not experience.

14. Self-fulfilling prophecies (II): cybernetic failures

'[V]irtually all predictive policing models […] use crime data from police departments. But police department data is not representative of all crimes committed; police aren't notified about all crimes that happen, and they don't document all crimes they respond to. […] If a police department has a history of over-policing some communities […], predictive policing will merely reproduce these patterns in subsequent predictions.'[22] Similarly fundamental errors in conceptualisation and specification can be found across other sectors where predictive analytics are hailed to be panacea, including job recruitment and university admission[23]. In control theory, positive feedback is a source of instability. The amplification of historical bias is an elementary failure of cybernetics.

15. Enclosure of the future (foreclosure)

In its full expression, the corporate-governed 'Smart City' epitomises the *new new enclosure movement.* The enclosure movement of 13th century England took common land into private ownership. The neoliberal transfer of common services, utilities,

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[20] *Dreams Rewired*

[21] David M. Dosa. 'A Day in the Life of Oscar the Cat'. *N Engl J Med* 2007; 357:328-329. 26 July 26 2007.

[22] William Isaac & Kristian Lum. 'Setting the Record Straight on Predictive Policing and Race'. *In Justice Today*. 3 Jan 2018. Accessed on 1/8/19 at https://medium.com/in-justice-today/setting-the-record-straight-on-predictive-policing-and-race-fe588b457ca2

[23] Cathy O'Neill discusses the discriminatory admissions procedures o a Medical School perpetuated by algorithm in her *Weapons of Math Destruction*. Penguin 2016. pp115–118.

community knowledge and space to private enterprise, beginning in the 1980s, constituted a new enclosure of the entire pubic sphere. Today's *new new enclosure movement* driven by prediction engines is the most egregious of all – it brings about the enclosure of the future, which is also a part of the commons.

There's a more personal world out there
A world that knows what you like and predicts what you need.
Where your experience feels less like it was produced by a machine,
and more like it's coming from a friend.
This is the world we're creating…[24]

Prediction engines warrant close public scrutiny for their impact on human rights – in particular, the rights of privacy, autonomy and self-determination, the right to information, rights to due process and freedom from the arbitrary effects of social sorting – and the 'right to a future tense'.[25] The opacity of such machine procedures threatens to make our own decisions opaque to ourselves – was that truly an informed choice that we made? And when the very idea of human agency is in flux, the cogency of rights discourse is diminished.

16. Towards the superfluous human

(IMAGE only)

17. Reclaim the future

Even as we are objects of prediction and optimisation technologies and their algorithmic amplification of arbitrariness, bias and error, we are further subject to autocratic decisions from centralised power. Competitive advantage and revolutionary surprise are rooted in asymmetries of knowledge; volatility is celebrated equally by Mark Zuckerberg ('move fast and break things') and Donald Trump ('we must as a nation be more unpredictable'[26]). There's a widespread belief within the Silicon Valley tech elites that they are 'the people who not only can [shape the future], but […] the only people who can.'[27]

To reclaim the future – perform (*parfournir*: furnish) the unexpected? One suggested mechanism of resistance is the deployment of Protective Optimisation Technologies

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[24] Public statement by data analytics company WIBI, which had major investment from Google's Eric Schmidt.

[25] Shoshana Zuboff. *ibid.*

[26] Foreign Policy Remarks of D. J. Trump, Federal News Service. 27 April 2016.

[27] Robert Scott, founder, Further Future Festival, quoted in Nellie Bowles. '"Burning Man for the 1%": the desert party for the tech elite, with Eric Schmidt in a top hat'. *The Guardian*, 2 May 2016. Accessed 01/08/19 at: https://www.theguardian.com/business/2016/may/02/further-future-festival-burning-man-tech-elite-eric-schmidt

(POTs)[28] – techniques to collectively nudge or pollute the data and inferential processes of optimisation systems; détournement for the algorithmic age. Despite various vulnerabilities (unintended consequences, hijacking by special interest groups, the ethical chasm of deception…), such tactics of collective action might well prove effective as a first salvo in the battle against centralised predictive power. However, sustainable systemic change requires robust models for accountability and transparency, processes for deliberative justice, and a conception for human and planetary flourishing. Reclamation does not suffice; an envisioning is necessary.

A reformulation: prediction is the uncanny sister of hope.

[28] R. Overdorf, B. Kulynych, E. Balsa, C. Troncoso, S. Gürses. 'POTs: Protective Optimization Technologies'. arXiv:1806.02711v3 [cs.CY]. August 2018.