Louise Amoore (2011, in press, *Theory, Culture and Society*)

Data derivatives: On the emergence of a security risk calculus for our times

> There is real time decision making, and then the offline team who run the analytics and work out the best set of rules.
>
> (Border security software designer, 2009).

> The rockets *are* distributing about London just as the equation in the textbooks predicts. As the data keep coming in, he looks more and more like a prophet. It's not precognition, he wants to say, all I'm doing is plugging numbers into a well known equation, you can look it up in the book and do it yourself.
>
> (Thomas Pynchon 1973: 63).

Introduction: the data and the prophets

In his novel *Gravity's Rainbow* Thomas Pynchon – the novelist himself a former technical writer for Boeing – depicts the coincidence of two sets of otherwise apparently random data. On a carefully drawn map, an 'ink ghost of London', the statistician Roger Mexico has marked out 576 squares, the strikes of German V-2 rockets represented by red circles. 'Can't you tell from your map here', demands his colleague Ned Pointsman, 'which places would be safest to go into, safest from attack?' 'No', replies Mexico, 'every square is as likely to get hit again […] the odds remain the same as they always were. Each hit is independent of all others' (1973: 65). In the rendering of his map of the data of individual rocket strikes, Mexico claims no predictive insight, no pre-emptive decision or precognition, 'plugging numbers into a well known equation' he simply follows an already calculated formula, 'you can do it yourself'. Meanwhile, the American Lieutenant Tyrone Slothrop creates his own London map – the private data of his sexual encounters in the city, 'a cluster near Tower Hill, a violet density about Covent Garden, a nebular streaming on into Mayfair, Soho', each paper star corresponding precisely with a V-2 rocket strike yet to come (Pynchon, 1973: 22). For the spies and the military strategists Slothrop's apparent pre-emptive instincts are 'the perfect mechanism'. 'He's out there', reflects Pointsman, 'he can feel them coming, days in advance. It's a reflex. A reflex to something that's in the air right now […] a sensory cue we just aren't paying attention to, something we could be looking at but no one is' (1973: 57).

In a quiet London office in 2009, Pynchon's character Pointsman's ambition – to make it possible to know how to be safe from attack, to render the calculable data of Mexico's map but to do it via the pre-emptive logics of Slothrop's scattered data points – is apparently in process of realisation. A group of mathematicians, software designers and computer scientists 'work out the best set of rules' governing the links between otherwise scattered items of data. Their algorithmic models supply one element of the UK's e-Borders programme: a risk-based system that deploys processes of data mining and analytics in order to derive a risk score or flag for individuals entering or exiting the UK. As the commercial advertisements for the initial lead contractor for e-Borders – the US arms manufacturer Raytheon – illustrate, though the border guard 'scrutinizes to keep us safe', her sovereign attentiveness is governed by data 'solutions that let her know what to look for' (see figure 1).[1] In the world after 9/11, the question 'how do we thwart a terrorist who has not yet been identified?' comes to dominate the horizon of security, with the answer

coming in the form of data and the 'joining of dots that should have been connected before 9/11' (Department of Homeland Security 2006). Thus, for our times, before a plane can land, a border crossed or a port entered, the most prosaic and apparently scattered of data (from past travel bookings and credit card transactions to visa applications and in-flight meal choices) appears to hold out a new promise – that if only it can be integrated, the 'gauge set' and the algorithm 'refined', the various programmes of UK e-Borders, EU PNR, USVISIT and ATS might render pre-emptive security action possible.[2] The sovereign decisions of the border guard – who to stop, question, search, detain – are in effect deferred into, as Mexico notes 'a well known equation'. And yet this screened calculation is only made possible by the multiple other judgements, dispositions and reflexes that 'set the gauge', joining the scattered items together to produce the 'best set of rules'.[3]

What is the logic of this joining of dots and setting of the gauge? It is an ontology of association, and it works according to association rules (Amoore 2009a). Importantly, just as Pynchon's rocket strikes and sexual encounters are associated, related but not causal – 'all talk of cause and effect is secular history' (1973: 167) – contemporary risk calculus does not seek a causal relationship between items of data, but works instead on and through the *relation* itself. The ontology of association does have a mathematical means of calculating uncertainty, an equation: if *** and ***, in association with ***, then ***. In the decisions as to the association rules governing border security analytics, the equation may read: if past travel to Pakistan and duration of stay over three months, in association with flight paid by a third party, then risk flag, detain; if paid ticket in cash and this meal choice, in association with this flight route, then secondary searches; if two tickets paid on one credit card and seated not together, then these questions. Understood in this way, it is not strictly collected data that become an actionable security intervention, but a different kind of abstraction that is based precisely on an absence, on what is not known, on the very basis of uncertainty. Coalescing the imaginative mapping of Slothrop's pre-emptive sensory cues with the protocols of Mexico's numbers plugged into a 'well known equation', the processes of data integration, mining and analytics draw into association an amalgam of disaggregated data, inferring across the gaps to derive a lively and alert new form of data derivative – a flag, map or score that will go on to live and act in the world.

In this paper I elucidate the data derivative as a specific form of abstraction that is deployed in contemporary risk-based security calculations, acting on and through people, populations and objects in novel ways that are little acknowledged or understood either in the natural or social sciences (but see Daston and Galison on intuitive thinking and scientific imaging, 2007: 309; Lane and Whatmore on flood risk mapping, 2010). To be clear, the form of data derivative emerging in contemporary security risk management is not a 'more advanced' form of abstraction, but rather a specific form of abstraction that distinctively correlates more conventional state collection of data with emergent and unfolding futures. The data derivative comes into being from an amalgam of disaggregated data – reaggregated via mobile algorithm-based association rules and visualized in 'real time' as risk map, score or colour-coded flag – such that it is not of the same order of being as what we might call modernist disciplinary data.[4] It is not that derivative forms supersede disciplinary data modes, and indeed among the reaggregated data elements are conventionally collected visa and passport data, but rather that the *relation between* the elements is

itself changed. As Michel Foucault put the problem in his 1978 lectures, 'mechanisms of security do not replace disciplinary mechanisms' as though a succession of techniques, but instead 'what above all changes is the dominant characteristic, or more exactly, the system of correlation between juridico-legal mechanisms, disciplinary mechanisms, and mechanisms of security' (2007: 8). It is precisely the emergence of novel forms of correlation that are distinctive to the data derivative form in the domain of security, though of course these are familiar qualities in the financial derivative.

Derivative instruments in finance are novel forms of risk management in which the relationship between the instrument and an assumed underlying value becomes fleeting, uncertain and loose. 'The central characteristic of derivatives', write Dick Bryan and Michael Rafferty, 'is their capacity to dismantle or unbundle any asset into constituent attributes and trade those attributes without trading the asset itself' (2006: 44). By 'slicing and dicing' and reaggregating underlying values, the financial instrument of the derivative thus sheds any encumbering causal relation to the underlying asset. Indeed, as Duncan Wigan suggests in his analysis of financial derivatives, the instruments 'abstract from any linear relationship to underlying processes of real wealth creation', rendering them 'indifferent' to the components of individual stocks or bonds, for example, on which they draw (2009: 159). Thus, for example, the so-called 'sub-prime crisis' sliced and bundled together credit default swaps and collateralised debt obligations indifferent to underlying values such as house prices or capacities to repay mortgage debt (Langley 2009). One might intuitively suppose that the state of emergency precipitated by the sub-prime crisis has marked the limit point of the derivative, and yet the response to the financial crisis has itself ushered in the demand for ever more precise and finite degrees of risk disaggregation.

The data derivatives I observe emerging in contemporary security practice are similarly inferred from underlying fragmented elements of data toward which they are for the most part indifferent. It is precisely this capacity to move, to be shared, traded or exchanged indifferent to, and in isolation from, underlying data components that is at the heart of derivative risk flags, maps and scores. Indifferent to the contingent biographies that actually make up the underlying data in fields such as PNR, the data derivative is not centred on who we are, nor even on what our data says about us, but on what can be imagined and inferred about who we might be – on our very proclivities and potentialities. The questions I will pose here are: what is the specific form of abstraction embodied by the data derivative? What are the conditions of its emergence and how is it produced? In what ways does it come to life, travel across domains and how is it authorized to act? What kinds of subjects and populations does it imagine and bring into being? I will focus on four elements of the lived, lively and material being of the data derivative: temporalities; norm/anomaly; the virtual and the visual; and mobilities.

Temporalities: 'making present the future consequences'

The specific deployment of data as derivative acts on and through a population whose dynamics are as yet unknown, a population yet to come. It is not strictly the case that systems of automated targeting, integrated databases and software coded calculations witness some form of acceleration in terms of temporality, though of course this has been a central theme in discussions of 'netwars', 'virtuous war' and

so on (see Der Derian; Martin 2007). Indeed, by contrast the data derivative allows for a certain quality of suspended time – a 'stilling' of the frenetic crossings of the global political economy in advance of arrival. The significance of the temporal register, then, lies not in a speeding up, but in an algorithmic 'framing of time and space' (Mackenzie 2007: 97) that has a distinctive orientation to the unknown future. As Brian Massumi has put it, 'pre-emption brings the future into the present. It makes present the future consequences of an eventuality that may or may not occur, *indifferent to its actual occurrence'* (2005: 7-8, *my emphasis*). The pre-emptive deployment of a data derivative dos not seek to predict the future, as in systems of pattern recognition that track forward from past data, for example, because it is precisely indifferent to whether a particular event occurs or not. What matters instead is the capacity to act in the face of uncertainty, to render data *actionable*.

The data derivative, then, embodies a specific temporal orientation that differentiates it from the temporalities of the data abstractions of survey and census as techniques for encoding population (Bowker and Star, 1999). Of course, survey and census data forms also operate through abstraction, but they have a specific spatial and temporal location – akin perhaps to the abstraction of a photograph or snapshot in terms of decisions about angle, framing, sampling, and replicability in the future. The temporality of the security data derivative, though it draws on some conventional elements of survey data such as immigration data, is no longer that of the survey, but is better understood as a projection. Projections are produced from fragments of data, from isolated elements that are selected, differentiated and reintegrated to give the appearance of a whole. The multiple decisions about what to select, how to isolate, what should be joined to what, fall away in the appearance of a projected whole – a complete map, flag or score. In her discussion of filmic projection, Anne Friedberg suggests that 'for motion to be reconsitituted, its virtual reach relies on a missing element, a perceptual darkness between the frames' (2007: 92).

Like filmic projection, the gaps between underlying data items are precisely what makes the projected futures of the data derivative possible. As one major IT consulting company supplying borders programmes explains:

> Having different types of data sets allows you to do searches *across* those pieces of data, to be as certain as you can be that you understand who's coming into the country and why they're coming and whether or not you should take action.[5]

For the suppliers of software and risk management solutions for border controls, the emphasis is on what can be conducted 'across' items of data, on and through their very relation. There can be no certainty abut the association between data on a flight route, a method of payment, a ticket type, or a past 'no show', for their relation is not causal but correlative. What matters instead is the capacity to make inferences across the data, such that derivatives can be recognised, shared, and actioned. As the US Inspector General concluded in his review of data mining in US border security programmes, 'association does not imply a direct causal connection', rather it 'uncovers, interprets, displays relationships between persons, places and events' (2006: 10). What matters, then, is that some form of correlation can be drawn in the relationships, a correlation that is nonetheless indifferent to the specificity of persons, places and events. Rather as Donald Mackenzie notes in the 'base correlations' that

make financial derivatives actionable as instruments (2009: 14), it is the very relation itself that renders a calculable risk score, a flag on a border guard's screen, an already encoded course of action. The data derivative's ontology of association is indeed indifferent to the occurrence of specific events, on the condition that there remains the possibility for action – in the domain of finance, the derivative can be exchanged and traded for as long as the correlation is sustained; in the domain of security the data derivative circulates for as long as the association rules are sustained. In the process of making actionable, of course, as Alain Badiou signals in his engagement with the mathematics of set theory, 'the event is *decided* as such in the retroaction of an intervention' (2005: 17). Where the association rules of a piece of software code infer 'who's coming into the country' and 'why they're coming', they release into the world a data derivative that intervenes retroactively in order to have already decided the event.

Norm/anomaly: 'on this particular day, at this particular time, in this moment'

The emergence of the data derivative demands something of a renewed critical thinking about the specific form of the life of population as a terrain of governing. In Foucault's 1976 lectures 'Society Must be Defended' he delineates from 'the power of sovereignty' to 'take life and let live', his analytic of biopower: the 'technology of power over the population' in a form that 'consists in making live and letting die' (2003: 247). As Stephen Collier (2009) has argued compellingly, this stark annexation of biopolitics from sovereignty contrasts to a second later mood in Foucault's work on specific forms of biopower.[6] In Foucault's late reflections, the idea of governing as government of population 'makes the problem of the foundation of sovereignty even more acute and it makes the need to develop the disciplines even more acute' (2007: 107). In contrast to an epochal move from sovereignty to discipline to security, then, Foucault depicts their co-presence: 'a triangle: sovereignty, discipline and governmental management, which has population as its main target and apparatuses of security as its essential mechanism' (2007: 108). In the initial formulations population arose as a series of traits and behaviours which, once accurately categorised and calculated, can be acted upon as norm and anomaly. It is in this way that health data become vaccination programme, education data renders possible curriculum, assessment and audit, knowledge of the urban citizen becomes a sanitation programme and so on (Foucault 2003: 244). Yet, as the formulation of biopolitics moves to consider the sovereign as dealing with a complex and aleatory milieu of the human species, the relation of data to norm appears altered. No longer pursing a clear delineation of norm from anomaly, the data derivative functions through a *mobile norm*. Where, as Foucault proposes, 'normalization posits a model and tries to get people, movements and actions to conform to this model [the norm]', in the security apparatus he observes, 'the plotting of differential curves of normality' (2007: 57-63). To be clear, far from a world in which biopolitics eclipses sovereign and disciplinary power, we see a security apparatus that mobilises specific techniques for deploying the norm to govern uncertain and unfolding populations.

It is precisely such differential normalities that circulate in the associative writing of the data derivative. As the deputy director of the UK e-Borders programme explained in an interview, the risk-flagged anomaly 'would never be self-evident. Only self-evident on this particular day, at this particular time, in this moment'. When the

software designers and mathematicians emphasise the importance of 'setting the gauge' – the refining of the algorithm governing the rules between items of data, so that data can be 'flushed' or 'washed' through – this does not depict a filter that catches those mobile bodies, monies or objects who deviate from a known norm. Rather, the data derivative works with a mobile norm, a norm that is itself modulated and aleatory, governed not by normalcy and deviations but by differential curves of normality. The e-Borders official thus describes a customs officer who can visually scan pages of data on multi transit point sea routes, identifying an apparent anomaly (multi leg journey associated with sea ports, associated with cash paid) as normal in specific circumstances, where the behaviour is linked to a contract seaman returning home. 'That is what we are trying to do', he reports, 'to automate that kind of intuition […] encode it'. The making of the association rules that automate such judgements is an iterative process described as a 'rapid fire Q & A' between the software designers, immigration, customs and counter-terror officers, policing authorities and front line border personnel in the 'offline team' – for example, 'what should the age range be for the drug mules route?', 'should we associate seating patterns with this one way ticket?', 'is the 50%+ risk score useful as an indicator at that time of day?'[7] Though the data derivative is indifferent to the underlying data, it does, as Brian Massumi suggests 'assert its own normality, of crisis: the anytime, anywhere emergence of the abnormal' (2009: 155) – living and circulating through multiple decisions about potential threats.

Among the designers of border security software, much is made of the fact that the data derivative does not live on in the conventional sense of being retained as personal data attached to an individual. Understood as a mode of data distinct from, and indifferent to, underlying values, however, the data derivative persists in the building and refining of the mobile boundaries between normal and risky travel behaviours at a given moment. 'Our data serves two purposes', reports a European Commissioner, 'they serve the real time risk assessment – do you fit the risk level? If not then they will serve a secondary purpose which is they will give an indication of how normal people travel compared to other kinds of people'.[8] In the iterative and oscillating setting of the risk gauge, then, the oft-cited '99.9% of people going about their business journey or holiday in a perfectly normal manner' are folded back into the ability to calculate risk against a modular norm. A 'low risk' derivative persists in the offline modelling of future rules, such that the fleeting encounter between frequent flier, iris scanner and automated gate manifests at some future date in other forms of encounter with other subjects. Indeed, even the apparent 'false positives' we might highlight as symptomatic of the excesses and slippages of the risk-based techniques, are successes on the register of refining the mobile norm. The false hits of multiple security interventions that prove negative can never be errors in the terms of the derivative, for they too are folded back into association. The apparent risk flag produced by the association of a ticket paid by a third party, one way, less than 5 days before travel, for example, produced clusters of false positives around ski routes where insurance companies repatriating injured travellers replicate this pattern. The addition of an association with particular flight routes to re-set the risk derivative in those circumstances, illustrates the indifference to error in, or alternative reading of, the underlying data.

The data derivative not only loosens the disciplinary relation of data to norm, it embodies also an indifference to conventional Galilean scientific notions of evidence

and accuracy (Stengers, 2000). As Lorraine Daston has argued powerfully in relation to the histories of scientific experiments and instruments, the history of science reveals not strictly a desire for ever greater degrees of accuracy and objectivity, but in fact a quite distinct emphasis on precision, for an 'intelligibility of concepts' which 'by itself, stipulates nothing about whether and how these concepts match the world' (1995: 8). To put the matter simply, it is of lesser consequence whether data accurately captures a set of circumstances in the world, than whether the models can be refined for precision. If the governing by norm we associate with census and survey required the 'large number' collection of data in order empirically to identify patterns, validate and calculate – such as for example in the prudentialism of actuarial models and insurance calculation (Ewald 2002), the mobile norms of data derivatives are oriented not to the conventional archive and *collection* but to *discarding*. As one software designer put the problem:

> It's about throwing away an item of data if it doesn't help you make the right decision […] We want the right amount of data to make a good enough decision, to take the right action at the border, to stop that person, refer to the police. It's giving them enough information for them to take the right action, with the right type of risk, enough information to make a judgement.[9]

When what matters is the derivative risk flag itself, and when this lives on in the refining of rules, in the absence of archiving in the conventional sense, the underlying data items can be all but instantaneously discarded, leaving only the trace of their association. Arguably, then, when the controversies surrounding the extradition of European PNR data to the US resulted in the reduction of underlying data fields (from 34 to 19), or when the Canadian privacy commissioner ruled that in-flight meal choices as 'cultural indicators' be filtered out of PNR data, these actions failed to adequately apprehend the life of the data derivative. The derived risk flags and scores are not dependent on collected or archived data – 'it's not about collecting more data', argue the UK Borders Agency, 'that just makes the stack bigger. We are throwing the straw away'. Because the data derivative is produced via the screening out of data, the political space of response that says 'protect', 'limit', 'make private' is problematized. In a sense it no longer matters precisely what the authorities are permitted to collect or how it is stored or protected. Akin to the financial derivatives that allow for *exposure to* the risk-reward characteristic of underlying assets without having to *possess* them (MacKenzie 2009), the data derivative is exposed to the underlying data without collecting them, created across the gaps and absences, in the interstitial spaces of inference and expansion.

The visual and the virtual

The very idea of the derivative has long been considered to have a 'virtual quality', such that financial derivatives are said to have a 'strangely imaginary or virtual character' (Arnoldi 2004:23), even where the emphasis is placed on 'how virtuality is produced' (MacKenzie 2009: 80; see also Knorr Cetina 2002). In the encoded and digital systems that are the milieu of the derivative it is most often an abstracted and virtual world that is depicted. Yet, as Brian Massumi reminds us, the knotted and folded potentialities of the virtual are not to be understood on the same plane as the calculated rationality of possibility that we find in the digital world. 'Nothing is more destructive for the thinking and imaging of the virtual', argues Massumi, 'than

equating it with the digital' (2002: 137). In the digital processes of programming, and the writing of code Massumi locates a 'numeric way of arraying alternatives so that they can be sequenced', a means of rendering calculable possible futures, 'step after ploddingly programmed step' (2002: 138). Understood in this way, the ontology of association does not aspire to virtuality at all, but to actuality and the actualization of an array of possibilities. In this sense, returning to Pynchon's novel, the data derivative shares more in common with Roger Mexico's statistically inferred map than with Tyrone Slothrop's affective world of pre-emptive sensation. When Ned Pointsman seeks to fold Slothrop's sensate map back into the capacity to foresee and intervene, or indeed when the intuitions and aesthetic sensibilities of software designers become an association rule, this does indeed become a numeric way of arraying alternatives, an already encoded systematization.

Perhaps the seductiveness of the idea of the virtual as the dwelling place of the derivative lies in part in the apparent dominance of the visual in its representation. Whether it is the screenic domain of the derivatives trader (Knorr Cetina 2006), the vigilant visualities of border security (Amoore 2007) or the scopic regimes of the flood risk map writer (Lane et al. 2010), the colour-coded flags, screened scores and red and blue maps appear acutely visual. Yet, the appeal to the 'sovereign sense' of the visual further establishes the data derivative as an already encoded set of possibilities, this apparently 'most reliable' of senses underwriting the rationality of the association (Mitchell 2005: 265; Bal 2003: 13). 'Let's say I have one thousand border staff', explains one security software consultant, 'the offline analysis is complex, but it must be fed back in a decisive format – that is what the system is about, displaying it on their screen'.[10] What appears as the virtual realm of algorithm and screen is more precisely understood as a visual economy – a means of dividing, separating, and acting upon arrays of possible futures. As the art historian Jonathan Crary has argued, echoing Massumi's sense of the digital as the systematization of the possible, the visual is 'not primarily concerned with looking at images but rather with the construction of conditions that individuate, immobilize and separate subjects, even in a world singling in which mobility and circulation are ubiquitous' (1999: 74). At the point that the data derivative becomes visualized on the border guard's screen, 'technology', as Barbara Maria Stafford has argued, 'screens out what supposedly does not matter', directing and delimiting attention (2009: 289). The virtual knots and slippages that were present in the room where a mathematician's intuition met a software designer's aesthetic sensibility fall away in the appearance of an already decided course of events. In the desire for precision over accuracy, the visualization 'automates the response', as the designers explain. Pynchon's Mexico was perhaps correct, 'it is plugging numbers into an equation, you could do it'.

Understood not strictly as a world of abstracted virtualities or screenic vision, but more precisely as a domain of the arraying of possibilities by association, the data derivative cannot be seen as it is so often portrayed – as the irrefutable 'electronic footprint' of the data subject, left behind in the residue of a digital world. Rather, the data derivative has become a means of dividing, separating, particularizing subjects (Deleuze 1992), literally bringing them to attention and making them subjects of interest. Thus, for example, when the bombings in London in July 2005 coincided with IBM's trialling of the UK's e-Borders programme – Project Semaphore – the British Prime Minister Tony Blair requested that Semaphore be extended to the Pakistan-London flight routes, and a new person of interest was written into the

association rule and brought to attention: 'the British citizen of Pakistani origin'. The screening of PNR data, then, visualizes subjects of interest through the surface data but also, as Kaja Silverman (1996) has observed of the screen 'through the illusion of depth, a deep reach into databases and analytics'. As commercial players have reported, it is not the surface items that provide the 'complete picture of a person' that is sought – 'that only tells us who someone is, we want to know why they are here'. My surface data may say that I am a British citizen, but the analytics will ask why I am here.

What are the implications of visualizing subjects in this way? Alexandra Hall and I have elsewhere considered this to be a form of 'digitized dissection' – an anatomical disaggregation of a person into degrees of risk (2009: 450). How does a person of interest come to be seen? How are they targeted? How can they respond? Could they ever reply 'no, that is not me', or 'it is me but that is not why I am here, that is not my intention'? When the writers of risk algorithms for the e-Borders system account for their disinterest in the underlying personal data, in a sense this is the case – for it is the capacity to abstract and intervene that counts:

> When you're doing analysis to refine rules, that's completely anonymous. You may know everything else about them except their name – they're unknown. Except, well they're not, we know lots about them, we know there is a person who has been doing this and this and this. We just don't know their name yet and we can stop them before we know it.[11]

Such is the extent of the indifference to the singularity of underlying data in the making of the derivative, that the slippages and excesses of the systems centre precisely upon those underlying elements that perhaps ought not to be missed. For example, as the derivatives of the sub-prime market continued to proliferate in 2006, the underlying foreclosure rates on mortgages (foreclosure itself a disciplinary technique of punishing the debtor) arguably should have signalled an increasing problem. Similarly, the failed apparent transatlantic bombing attempt on December 25th was said to have evaded security because of the 'failure to join up the dots' in PNR analytics and notably not because of the failure to simply identify a name that already existed on a watchlist (New York Times 2009). So overwhelming is the pursuit of the as yet unknown future threat, that the sounding alert of the watchlist – buried deep below the visible surface of contemporary emergency governing – is rarely heard.

Mobility at the service of security

When Michel Foucault mapped the tentative contours of a security apparatus, for him it was oriented not to the concern to prevent events from happening, to 'let nothing escape', but rather to 'open up and let things happen' (2007: 44-5). Associating disciplinary techniques of governing with the will to prevent and stop things happening, 'to prevent it and ensure it does not take place' (31), for him the 'space of security refers to a series of possible events', a 'different sort of problem' that must 'allow circulations to take place' (65). To clarify again at this point, it is not that the security apparatus supersedes the disciplines, but precisely that the techniques of the security dispositif occupy what Collier calls a different 'problem space' (2009: 80), occluding those of disciplinary governing at specific moments, in

particular places. While disciplinary techniques position mobility and security in a fraught relation, one when where prevention is achieved precisely by stopping, halting, prohibiting, the security apparatus places mobility at the service of security. The technology for placing mobility at the service of security is risk itself – a set of practices that flag 'differential risks, zones of higher risk and zones of lesser or lower risk' (Foucault, 2007: 61). Pynchon's question of 'where do we go to be safe' is replaced by modulating zones of differential risks. In the security apparatus there is no further need for capture, permissions and prohibitions, for what is governed is circulation itself. In the world of the financial derivative mobility at the service of security is writ large – what matters is not whether a particular underlying value rises or falls, but only that this volatility or 'implied volatility' has itself been rendered tradeable (MacKenzie 2008: 251). In effect, movement in any direction can be secured so long as it is possible to correlate the mobility to some future amalgam of possible outcomes.

To clarify at this point, the data derivative places mobility at the service of security by precisely trading on and through fluctuations. Unlike the 'prudentialism' of settled out categories in risk modes that rely upon statistical probabilities (Ewald 2002) – for example, this profession, that salary, this neighbourhood, that health history – the data derivative embodies a risk mode that modulates via mobility itself. Like its commercial origins in retail data mining (see Amoore 2009b), the data derivative does not seek out the settled categories of 'this customer', 'this traveller', 'this migrant' or 'that visa applicant', but instead wants to recognise bodies and objects in movement, in and through their very transaction. To give an example, one group of software designers supply the UK government with social network analysis tools for security applications, these tools having been originally developed for 'customer intelligence'. The writing of association rules for customer intelligence raises questions of the movements across and relations between people and places – 'do these customers influence each other?', and 'is this link significant?' The data left in daily transactions and mined for risk criteria is not strictly a body of evidence of what a mobile subject did or did not do, but a set of relations from which the derivative can be written.

Perhaps the very heart of the ambitions for writing security via mobility is the so-called 'automated gate', a pre-screening, biometrically identifying, fluid border that can, as its designers see it 'change daily and evolve' (Accenture 2008). The automated gate does in effect replace the border guard at airport security checkpoint or on international rail terminal plaza – the derivative risk flag or score automating the decision as to the opening and closing of the gate. It does indeed appear to, in Foucault's terms, 'open up to let things happen', but it does so via risk-based 'rules and algorithms' that modulate, 'change daily and evolve' (UKBA 2009). As one UK software consultant described the place of the automated gate in the London Olympics, for e-Borders the 'Olympics of 2012 represents a showcase for short, sharp pre-arrival and pre-departure screening, tied to biometric ID'. It is through the daily patterns of mobility itself – PNR data into the UK; credit card transactions for the purchase of stadium tickets; Oystercard data for London transit – that the 'constant iteration between the setting of criteria and checking the matches' takes place, so that 'technology opens the border rather than closing it' (UKBA 2009). The checking of matches pushes at the limits of the criteria, such that there are no singular and definitive criteria for admission or refusal. The rhythms of the 'Q & A' by

the mathematicians and software designers resonate across the writing of the derivative, into the city streets and stadia – into the security intervention and flowing back into the refining of rules.

Conclusion: data and decision

> Why is your equation only for angels Roger? Why can't *we* do something, down here? Couldn't there be an equation for us too, something to help us find a safer place?
>
> (Pynchon, 1973: 63).

The opening citations of this paper suggested the dilemmas and difficulties of deploying data, preemptively and by risk calculation, to render a safer place – a world of security. The statistician Roger Mexico has 'tried to explain' the V-bomb statistics to his lover Jessica, insisting on 'the difference between distribution, in angel's eye view, over the map of England' and the contingent uncertainty 'of their own chances, as seen from down here' (1973: 62). There is a gap, he reminds us, between the visual and political economies of arraying data on map or screen and the difficulties confronted by any future promise of a 'safer place'. Jessica struggles to sustain both pictures on a visible register: the statistical probabilities as calculated in Mexico's distributions, and the more properly virtual potentialities of their own life chances in the city. 'She couldn't keep them both in sight', writes Pynchon, 'pieces keep slipping in and out' (63).

The slippages in the relations between data and decision are present also in the contemporary data derivative as it moves back and forth between 'angel's eye view' (the off line analytics) and 'a safer place as seen from down here" (the real time decisions of border guard or security official). In one sense it would be accurate to concur with Jacques Derrida, that where decision is 'simply the application of a body of knowledge of a rule or norm', in fact no decision meaningfully takes place (1994: 37). Because the many 'decision trees'[12] of the data derivative effectively automate the responses of border security staff, the data derivative annuls the possibility of actual decision. 'The decision if there is to be one', proposes Derrida, 'must advance towards a future which is not known, which cannot be anticipated' (1994: 38). The 'real time decision', then, is simply read off from the derivative – replacing the agonism and radical uncertainty of decision and placing responsibility in the realm of response. A responsible decision would have 'to decide without it, independently from knowledge', acknowledging the absolute contingency and uncertainty of all relations, all associations. Indeed, it is the case that real decision does haunt the room where the systems of automated rules based targeting are built. In the numerous judgements – how to refine the algorithm, what should this item infer in conjunction with this one? What level of secondary intervention would be warranted for this level of association? – the potentialities and emergent virtualities are present at the edges. As Donald MacKenzie notes in his observations of the making of financial derivatives, 'there is an element of judgement' in the momentary decisions made by the brokers of what to 'display on the screens' (2009: 80).

Surely this must be a primary task for critical enquiry – to uncover and probe the moments that come together in the making of a calculation that will automate all

future decisions. To be clear, I am not proposing some form of humanist project of proper ethical judgement, but rather calling for attention to be paid to the specific temporalities and norms of algorithmic techniques that *rule out*, render invisible, other potential futures. One might signal, for example, the failure of critical attention to the expansive role of intuition and inference in the making of financial derivatives such as credit default swaps and mortgage backed securities. Similarly in the security domain, because the entire array of judgements made – their prejudices, their intuitions, sensibilities and dispositions – are concealed in the glossy technoscientific gleam of the risk-based solution, there is a place for critical thought to retrieve this array and arrange it differently. Indeed, the slippages and excesses of risk-based security – for so long a critical resource for enquiry, to point to the excess and the lack – are the very terrain of the data derivative. Derivatives occupy that very space of excess – the volatilities, uncertain and indifferent relationalities of missing elements that can be inferred and projected. To point to the excess is no longer a sufficient route into critical thinking about techniques of enumerating and governing.

If the data derivative is making a security architecture that, as Friedrich Kittler (1997: 30) has it, 'covers the noise of war' – the data stream 'masking the unliveable outside', the very impossibility of absolute security – it also colonizes precisely what is liveable about a life: a life of associations and relations that is not amenable to calculation. The data derivative is drawn, as Pynchon's character Jessica realizes, and as Friedrich Kittler suggests, by 'scanning lines and dots of a situation that forgets us' (1997: 30). The derivative risk form acts through us and the prosaic, intimate, banale traces of our lives, but yet it forgets us. As necessarily incomplete, complex, undecided people, it forgets us. The very potentiality of life presupposes something of an unknown future. There are, of course, threats and dangers – it is against these that the data derivative is posed – but to live in association with others, to have relations, to be *a* life, as Gilles Deleuze put it, *a life indefinite*, with potentiality, 'defined not by moments but between times' (2001: 29), this is also part of the promise of what is liveable and never amenable to calculation. It is also what is ethical about political life – that it is difficult, to decide is difficult, and that whether mathematician 'deciding the best set of rules', software analyst 'refining the algorithm', or border guard 'engaging action', a decision that is not simply the reading off of risk flag or protocol can only proceed without recourse to what is projected in the flags, maps and scores of the data derivative.

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Figures

Figure 1: Raytheon – ‘our solutions let her know what to look for’

Notes

[1] At the time of writing the UK government has terminated its contract with prime contractor Raytheon, citing ‘just cause’ of delays in delivery of elements of the programme. The sub-contracted suppliers of software and analytics – including a data analytics organisation recently purchased by BAE Systems – continue their delivery of the e-Borders system and the National Border Targeting Centre is now the UK Border Agency’s central hub for assessing border security risk (Home Office, 2010).

[2] There are two forms of data submitted by airlines on their passengers and crew. The advance passenger information data (APIS) is a limited data field, including passport number, name and flight details. The passenger name record data (PNR), available from the moment a flight is booked, contains up to 40 data items, though with some of these data filtered out to comply with privacy laws in a particular country. It is this PNR data that is run through the analytics in order to derive a risk flag against a passenger.

[3] Interview with border security software designer, London, May 2009.

[4] There are substantial literatures on how systems of number were deployed to govern populations from the nineteenth century (Rose 1991). What Ian Hacking has called ‘the making up of a population’ via ‘the enumeration of people and their habits’ (1986: 46) witnessed the proliferation of disciplinary data collection in the forms of survey and census to identify, register, map, order and administrate. It is in relation to these specific forms of data abstraction that modern concepts of rights, liberties and protection have formed, for example rights to privacy, data protection and freedom of information.

[5] Interview with IT consultants supplying data analytics to border control agencies, Brussels, August 2009.

[6] Collier reads Foucault’s analytic of biopower in History of Sexuality and Society Must be Defended as early forms that are elaborated and more nuanced in Security, Territory, Population and the Birth of Biopolitics. Indeed, both Gilles Deleuze (1988) and Giorgio Agamben have signalled a ‘crisis in Foucault’s work’ after the first volume of The History of Sexuality, a crisis centring on the question of life within ‘the field of biopolitics’ (Agamben, 1999: 221).

[7] Interview with UK e-Borders officials, London Heathrow, March 2009. The iterative process of refining rules by questions and answers in ‘real time’ analysis refers to the process of piloting the e-Borders concept on designated flight routes in Project Semaphore, delivered by IBM.

[8] Interview with European Commissioners on use of Passenger Information Units, Brussels, July 2009.
[9] Interview with border security software designers, London, August 2009.
[10] Interview with security software consultant, London, September 2009.
[11] Interview with border security software designers, London, August 2009.
[12] Algorithmic models are often referred to as 'decision trees', depicting the 'branches' of associative calculations – for example, automated systems for diagnosing health problems will ask questions at each branch – if fever is present follow this branch, if associated with this symptom, another branch, if it is absent… and so on until an intervention is flagged – seek urgent medical attention, or treat with analgesics.