

*The reality of Risk and the question of cause and effect*

a discussion paper for the CSA conference seminar on risk, 2008

In a recent article on the mapping of DNA<sup>1</sup>, we are told the following:

Had one of his parents been slightly less fortunate in their choice of a mate, James Watson might not have helped discover the structure of DNA in 1953. Instead, he would have been born deaf, and then lost his sight as he became a teenager. Equally, as he is, had he been less fortunate in the genetic lottery when he chose his wife, either of their sons might have had the same fate.

This is because Watson's complete DNA - his genome - contains a single gene for Usher's syndrome, an inherited disorder which affects hearing and sight. Watson's must have come from one of his parents. Usher's is a "recessive" disease - you need two copies of the gene to be affected. About five people per 100,000 carry the gene, so Watson's chances of being disabled weren't large. But they were real.

Using the figures given and elementary risk math, the chances of James Watson being disabled in this way were:

$$\frac{5}{100,000} \times \frac{5}{100,000} = \frac{25}{10bn} = \text{one in 400 million}$$

(In fact, less than this because, as the article later states, if both parents have the gene there is only a 1 in 4 chance of a child being disabled as a result.)

The figures in the article are no doubt either wrong or a gross simplification, as a simple google search will show<sup>2</sup>, but what is more interesting is the standard

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<sup>1</sup> *Mapping the Individual – cheaply* Charles Arthur. Guardian Technology 24 April 2008.

<http://www.guardian.co.uk/technology/2008/apr/24/research.politics>

<sup>2</sup> since the Guardian is arguably the most editorially careful of the UK newspapers, the implications of this in relation to the general standard of journalism are serious, but are not part of the remit of this brief paper

of “reality” which the journalist somnambulant (one can only assume he was dreaming in some way) applies. A risk of 1:400m is deemed to be “real”. This raises a question about popularist ontology: by what standard do we commonly measure “reality”? What is given the status of the “real” for us and in relation to legitimate debate in our culture?

Second example: I act as assessor for a not-for-profit organisation in the UK which gauges the competence of design firms in the construction industry (architects, engineers, etc) in respect of their health and safety skills. If, as a construction-industry designer, you wish to be placed on public-sector tender lists for work, you would often need to be assessed by this scheme<sup>3</sup>. Amongst others, the global engineering firm ARUP<sup>4</sup> is currently applying to the scheme. One of my recent tasks was to assess a firm of landscape architects whose offices happen to lie close to mine. On the day their application was being finalised, I noticed that they were arranging the installation of large plants on their roof terrace. Due to their apparent lack of competence in commissioning this work, it was being done in a risky manner: one of the operatives was standing unprotected on a parapet with a drop of 7m (25’) to one side. Not only that; the terrace itself was an inherently risky place to do work, because the parapet was less than 900mm (3’) high. Both the situation and the work being done were *per se* illegal in the UK. Yet these landscape architects will be assessed as “competent” in health and safety terms by means of a paper-based routine. In other words, the “reality” of their position *vis-à-vis* health and safety in society is established without reference to the “reality” (perhaps this word should not be in scare quotes) of the construction work they themselves commission, or indeed to any other real-world situation. We might speak of this situation metaphorically as a necessary ritual (the paper-based application to the

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<sup>3</sup> see [www.chas.gov.uk](http://www.chas.gov.uk)

<sup>4</sup> [www.arup.com](http://www.arup.com)

scheme); administered by a more or less sceptical priest (myself); for an agnostic congregation (the applicants); in order to confer a type of social cleanliness (the right to bid for public sector work, given an adequate standard of respect for health and safety issues).

Third example: as readers may be aware, there has been some debate recently about the risks of catastrophe as a result of large-scale scientific experiments, specifically Large Hadron Colliders in Europe. These risks have been analysed in reasonably coherent and understandable fashion by Adrian Kent<sup>5</sup>. In an earlier article by Dar *et al*<sup>6</sup>, physicists had come to the conclusion that the bounds of the chance of a catastrophic event (ie something like the destruction of the earth as we know it, together with all civilization and humanity) could be expressed thus:  $P_{\text{(catastrophe)}} < 2 \times 10^{-8}$  over the ten-year period during which the collider in Europe is going to operate. This hazard, as Kent notes, "has been widely referred to [in other papers and reports] in terms which suggest that it alone would be sufficiently reassuring to require no further analysis or risk optimisation"<sup>7</sup>. Expressed in layperson's terms, it implies a chance of less than one in 50 million, or about "the risk of a typical US citizen dying in a shark attack in any given year"<sup>8</sup>. However, as Kent notes, the Dar *et al* paper does not relate that chance to the potential seriousness of the result.

This is in contrast to the requirements on employers in the European Union. The analysis carried out for the Large Hadron Collider experiment was not carried as far as a basic risk assessment of the type that any employer in the

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<sup>5</sup> Kent, Adrian, *A critical look at risk assessments for global catastrophes*  
[http://arxiv.org/PS\\_cache/hep-ph/pdf/0009/0009204v6.pdf](http://arxiv.org/PS_cache/hep-ph/pdf/0009/0009204v6.pdf)

<sup>6</sup> A. Dar et al., *Will relativistic heavy ion colliders destroy our planet?*, Phys. Lett. B, 470 142-148 (1999); archived at hep-ph/9910471

<sup>7</sup> *A critical look at risk assessments for global catastrophes* p5

<sup>8</sup> p7

EU must now carry out as a matter of course<sup>9</sup>. In this type of risk assessment, employers must multiply *the seriousness of the outcome* with *the possibility of its occurring* in order to complete a risk assessment, using a notional numerical figure for “seriousness”; so, for instance, in the situation described above where an operative is faced with the hazard of a fall from height (the means by which most fatalities and casualties occur in the construction industry), the chance of a fall (in this instance perhaps medium to slight) would be multiplied by the seriousness of the effect (almost certain death on the part of the operative) to give an outcome (the risk expressed in numerical terms) which would show that the risk was unacceptable. It was precisely this multiplication of effect with the chance of its outcome which was missing in the earlier paper on Large Hadron Colliders.

Kent’s article calls what an employer in the UK would term a “risk assessment” the “expectation”. He multiplies the chance of  $2 \times 10^{-8}$  (ie one in fifty million) by the population of the earth ( $6 \times 10^9$  – six billion) to give an “expectation” of 120 deaths over the ten year period. In other words, the risks associated with the Large Hadron Collider are the statistical equivalent of the risk associated with an activity which will kill 120 people over ten years. As Kent says, “put this way, the bound seems far from adequately reassuring”<sup>10</sup>. What is perhaps most remarkable in this whole scene is that the leader of European collider project, Alvaro de Rujula, was quoted as saying that it would be “absurd”<sup>11</sup> to multiply the chance of the event by the global population. It is calculations of precisely this type which EU employers are required by law to implement in relation to, say, the hazard of slipping on a wet floor.

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<sup>9</sup> implemented in the UK by means of the *Management Of Health And Safety At Work Regulations* 1999 SI 1999 No 3242 available at [www.opsi.gov.uk/si/si1999/19993242.htm](http://www.opsi.gov.uk/si/si1999/19993242.htm)

<sup>10</sup> *A critical look at risk assessments for global catastrophes* p7

<sup>11</sup> *Gambling with the Earth*, New Scientist 7.10.00, p. 4.

Reading these examples through the lens of Mary Douglas's work, in particular the essay *Risk and Blame* and its reference back to her earlier *Purity and Taboo*, we may well ask if there is essentially any difference between what she calls "the rational behaviour of primitives"<sup>12</sup> in their use of taboo to protect society, and our use of other so-called rational means to apportion risk and blame. If "communities tend to be organised on one or another dominant form of explanation"<sup>13</sup>, then an analysis of the use of risk and its associated ontological presuppositions leads one to agree with Douglas that risk is almost purpose-made for modern industrial society where we attempt to do exactly what the "primitives" (Douglas' word) taboo achieves, namely "to treat every death as chargeable to someone's account, every accident as caused by someone's criminal negligence"<sup>14</sup>. This insight provides a link between Douglas and Beck: industrial society becomes risk society, in Beck's terms, as the latent hazard-effects of industrialisation act reflexively (not *reflectively* – it is not a question of thought, as Beck clarifies later<sup>15</sup>) on society, both reconfiguring the means by which blame is apportioned *and* giving the means by which this reconfiguration can occur.

We may ask why it is that "the idea of risk could have been custom-made" to fill our needs in post-industrial society for "justice and welfare"<sup>16</sup>? The reason, I believe, is the co-incidence and interplay between the reconfiguration of the means of apportioning blame, and the (possible, becoming actual) method for doing this. It is a common strategy in rational analysis to separate off meta-questions about method from the "concrete" problems which are being analysed. This enables the question of method to be de-politicised, made neutral and thus natural, to a large extent thus unquestionable. On this basis,

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<sup>12</sup> *Risk and Blame* p4

<sup>13</sup> *Risk and Blame* p5

<sup>14</sup> *Risk and Blame* p15

<sup>15</sup> in *Reflexive Modernization* Beck, Giddens, Lash p6

the question of blame can be raised and then answered by means of a method of risk assessment and blame, with its attendant ontological presuppositions, without any recognition of the possibility that the convenience of those presuppositions may be feeding back into the process and encouraging it.

The specific “ontological presupposition” I am referring to here is that of cause and effect, which is the “dominant form of explanation” for our culture, and the underlying presupposition of the analysis of risk. The interesting thing about these categories are that in their linear, simple and temporal scope they prevent, *per se*, the raising of the question of such complex interplays of method and our notions of “reality”. The linearity of the categories of cause and effect disallow the consideration of a feedback mechanism *from* the phenomena of the convenience and simplicity of the category *to* its (resultant) hegemonic status. In short, the answer to Douglas’s ironic observation that the concept of “risk could have been custom-made” for post-industrial society is that it is *as much* that post-industrial society was made for *it*. The cause and effect goes both ways in a reciprocal motion.

This means that the category of cause and effect is not adequate to the analysis, since reciprocity of this type is not consistent with the rigorous definition of cause and effect. This is clearly shown in Kant’s first critique, where his table of categories, in the third part “Of Relation”, makes a distinction between relations “Of Causality and Dependence (*cause and effect*)” and those “Of Community (reciprocity between agent and patient) [*der Gemeinschaft – Wechselwirkung zwischen dem Handelnden und Leidenden*]”<sup>17</sup>. In Kant’s transcendental method, each category is related back to a means of judgement, in this case a “disjunctive” logic, as opposed to the “hypothetical” logic of

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<sup>16</sup> *Risk and Blame* p15

<sup>17</sup> Kant, *Critique of Pure Reason* (trans NK Smith) p 113

cause and effect. The link between the category of *community* and *disjunctive judgement* is complex, Kant says, and he goes on to give a succinct and useful analysis of them:

Now in a *whole* which is made up of *things*.... one thing is not subordinated, as effect, to another, as cause if its existence, but, simultaneously and reciprocally, is co-ordinated with it, as cause of the determination of the other.... This is quite a different kind of connection from that which is found in the mere relation [*blossen Verhaeltnis* ] of cause and effect... for in the latter relation the consequence does not in its turn reciprocally determine the ground<sup>18</sup>

In brief therefore, my argument for discussion is the following:

- examples of the use of risk analysis at various scales (DNA, the construction industry, multi-billion dollar scientific experiments) tend to show a lack of rational coherence, despite the judgement of “reality” which is associated with these analyses and the legal/social weight put upon them
- in Douglas’s terms, the supposed rationality of risk in our society and culture can be given the same status of that of taboo in “primitive” societies. That is, despite a patent lack of coherence and rigor about the use of the notion of “risk”, it maintains its strength as a means of judgement integral with our post-industrial society and its mores
- in other words, just as the “primitive” has *no choice* but to grasp at an immediate means of assessing blame and in so doing allows for judgement and justice, so too we require similar means
- but why *these* means? Why is “risk” so consonant with our society? The argument would be not only that it results from an over-reliance on the category of cause and effect and its associated means of hypothetical judgement (to use Kant’s terminology); but that the advantage of the linear method of “cause and effect” rationality is to

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<sup>18</sup> p117

simplify the analysis to such an extent that meta-questions of the feedback of the method on the thing being analysed can be ruled out

In short, matters which should perhaps be issues of “community”, with communal, complex and interplaying relations, are often analysed by means of an inappropriate category and an inappropriately simple means of judgement.

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