# THE SOCIAL BASIS FOR FEARS ABOUT SCIENCE

## Introduction

On the 24th of September 2004, the Council of the European Union arrived at a '*political agreement*' to ban a family of organic chemicals, known as phthalates, from use in toys and childcare items (1). Pending formal adoption by the Council and a second reading agreement by the European Parliament, this brings to an end five years of debate about the toxicity of these compounds. During this time, the European Commission introduced a rolling series of '*temporary*' emergency bans, overriding the assessment of the Chair of its own Scientific Committee for Toxicity, Ecotoxicity and the Environment (2).

Yet, existing and over this period new, scientific research evidence, consistently and increasingly opposed the official view. Much like the presumed weapons of mass destruction in Iraq, the decision to ban phthalates was a conclusion in search of data. In the end, a cowardly and politically expedient decision was adopted by the out-going Commission to ignore the evidence. This allowed some to pose as champions of consumer welfare and no-doubt provided them with a sense of achievement after their many years in office.

The decision is bad news for science and, in the long-run it will be bad news for consumers too. Here, I explore how such a state of affairs came about, examining its social origins and identifying their wider ramifications in relation to European chemicals regulation in general. The suggestion is, that whilst scientific evidence remains paramount in such debates, the failure of scientists to understand and address the wider social context within which these are situated, leaves them unable to resolve such issues.

## Phthalates

I have explored in detail elsewhere the long and highly politicised saga behind the original banning of phthalates (3). It is not my intention to repeat this here. Essentially, after concerns were raised by certain campaign groups as to their possible toxicity, as part of a wider campaign against chlorine compounds, the European Commission launched an inquiry in 1997, despite many products containing them having been in use for over fifty years with no evidence of any harm.

It is important to understand this as having been driven more by political context than by scientific content. The European Commission and its scientific services were emerging from a long reorganisation and rapid expansion in the aftermath of the BSE debacle of the early 1990s. A new '*cautionary culture*' was developing, which advocated pre-emptive action in situations of uncertainty. This approach was formally confirmed by a special '*Communication from the Commission on the Precautionary Principle*', published in 2000 (4). This latter requires the use of worst-case scenarios in scientific decision-making.

Accordingly, in relation to phthalates, a family of organic compounds often added as a softening agent to PVC, assumptions were originally made that a child might chew on plastic products for up to 12 hours a day. It was assumed that such chewing might lead to extraction and ingestion of the compounds, and adverse effects were postulated, including cancer and hormonal disruption, based on extrapolating data obtained from exposing rodents to very high doses of phthalates over prolonged periods.

Despite all of these assumptions having been shown to be gross exaggerations over the intervening period - it is now accepted that such chewing lasts typically less than two minutes per day, this does not necessarily cause extraction nor ingestion, and outcomes in rodents neither reflect typical exposures nor human metabolisms - application of the precautionary principle has dictated that in many instances, irrespective of the new evidence, the worst-case data should be held to be the most significant (5).

This approach - self-consciously orienting itself towards identifying with presumed consumer fears - reflects a growing cynicism and mistrust in all forms of authority, whether scientific, corporate, or political. It is the projection of a sense of crisis and an absence of purpose amongst the elites of society. But ironically, whilst adapting to the new agenda of caution and transparency might have appeared to make sense to those bereft of any wider visions, it also lent itself to driving public concerns and ensuring that policy would be made on the basis of volatile emotion rather than considered reason.

In a similar vein, it is possible today to purchase a small kit supposedly designed to help survive a chemical or biological attack on the London Underground (6). Some may scoff, but once the matter had been raised as a serious possibility in the aftermath of 9/11, then following the logic of our times, surely it makes complete sense to take such apparently reasonable precautions? The problem is, that whilst such responses may appear to be a response to contemporary circumstances, in many instances they can be shown to be the drivers of our perceptions too.

**Perceptions**

A false and unhelpful polarisation has been established within such debates as to the need to distinguish between objective data and subjective perceptions. Scientists, usually side with the former, arguing, quite reasonably, that all decisions should be evidence-based, rather than perception-driven. Social scientists however, have tended to pose as the people's champions by siding more with the public's presumed subjective view of things. Perceptions matter, they argue, because people act on the basis of their perceptions, irrespective of the supposedly objective evidence (7). These actions then have real consequences, which no government, corporation or scientist can afford to ignore.

In some senses, both of these positions are true. There is indeed little point scientists focusing solely on the data if people consistently act differently. It has become a paramount task for scientists, to understand public perceptions in order to engage

better. However, it can equally be stated that there is a fundamental difference between understanding public perceptions, and adapting or pandering to these. This is an area that social scientists have not particularly explored in any depth. There has been a tendency to take people's views at face value without questioning these. Indeed, to question why it is that someone views things in a particular way appears almost rude in our non-judgmental, and non-confrontational times.

But challenging the public's view, rather than simply accepting it as a given, or relabelling it as 'lay values', thereby aggrandising its true worth and seeking to place it off-limits from any argument, is precisely what scientists now need to do (8). They need to develop an objective analysis of people's subjective impressions. Scientific evidence remains an essential component of this - there is little point debating matters without the hard evidence - but so too is a greater social understanding of why it is that the public may nowadays err toward the side of caution or be so mistrustful of what were once the authoritative voices of reason.

**Social Dislocations**

Over the last decade or so, social bonds within society have been severely eroded (9). We may be more networked technically, but there is probably no generation in living memory that has been so disconnected socially. This is manifest in both the formal and informal spheres of social engagement and participation. It has tremendous ramifications, particularly upon our perceptions of, and willingness to take, all-manner of risks.

At the formal level, people in advanced Western societies are increasingly unlikely to participate in the political process. Electoral turnouts are at an all-time low across the globe and this effect is even more striking amongst the younger age groups. Even when people do vote, it is often on a negative basis – against an incumbent, rather than positively – for a replacement. Nor are we as likely to be active, or even passive, members of political parties or trade unions in the same way our forebears were.

Politics itself is about more than simply quantitative voting. It is about the quality of discussion and engagement too. Yet, nowadays this seems to have been reduced to banal and petty personal lifestyle issues, such as the incessant debates over smoking, smacking, eating and drinking. This general retreat from a socially oriented focus on public affairs to a more individualised prioritisation of private matters is also a fairly recent development.

At the informal level, the changes are even more striking. Many have commented on the growing pressures faced by communities, neighbourhoods and families. In his book on the theme, '*Bowling Alone*', the American academic, Robert Puttnam also pointed to the demise of informal clubs and associations. Meeting up with friends, occurs less frequently than previously too. This loss of what is sometimes referred to as '*social capital*' has occurred and been experienced within a generation. It has dramatic consequences.

Not so long ago, for example, it was still possible to send children to school on their own, on the assumption that other adults would act *in loco parentis* – chastising them if they were misbehaving and helping them if they were in trouble. In many urban centres today, such a straightforward social arrangement can no longer be taken for granted (10). None of us ever signed a contract saying that we would look after other people's children. It was simply an unstated and self-evident social good. Now, we can no longer assume it to hold.

The extent to which once core social bonds have been displaced in a relatively short period of time is quite disturbing. Being less connected, leaves people less corrected. It allows their subjective impression of reality to go unmediated or unmoderated through membership of a wider group or association. In the past, such trusted networks or communities allowed people to pick-up on and incorporate conflicting opinions into their outlook. This allowed a sense of the possibility of addressing real problems in a wider collective fashion. Today, personal obsessions can grow into all-consuming world-views that are rarely open to reasoned interrogation or debate.

In part, it is this that explains our recent proclivity to emphasise or exaggerate all of the so-called risks that are now held to confront us. From BSE to GMOs; from mobile phones to MMR, all new developments, and many not so new besides, are now viewed through the prism of a heightened consciousness of risk.

Yet, as the recent episode relating to the SARS virus shows, it can be our own responses that prove to be the most debilitating on occasion (11). Nor are our fears restricted to the realms of science and technology. Many social activities, processes and problems have been reinterpreted to fit our new sense of isolation and fear. School-bullying, sun-bathing and even sex have joined an ever-growing panoply of concerns, along with paedophiles, child abduction and maverick GPs.

We may well be more aware, but we are also easier to scare. Being more isolated as individuals has made us more self-centred too, as well as risk averse. In turn, these developments have reduced the likelihood of our acting for some greater common good and make us less resilient, both individually and as a society.

This leads to a number of perverse consequences. One of these has been the inflation of the importance and impact of science. As the sense that many problems are ultimately social in character and that they can be resolved through social means has been eroded, so science has been left in a position of debatable superiority and primacy. Increasingly, social problems are only addressed at a technical level, as any sense of the desirability and possibility of a social solution evaporates.

For most ordinary people, living in a world without the benefit of the security conferred by social networks is an unnerving experience. It leads to an exaggerated perception of risks, now seemingly emanating from all quarters. The quite understandable response to this is to demand greater protection and regulation.

**Elite Fears**

For the elite of society, isolation is also unnerving. It leads to a lack of clarity as to aims and purposes. Acutely conscious of the gap between themselves and ordinary people, as the latter withdraw from the political sphere, this has accelerated their crisis of legitimacy. Yet, the elite still have to justify their position in society. This became particularly pronounced with the demise of the Cold War political framework whereby the world was divided between the two mutually-opposed visions of a socialist left and a free-market right.

In fact, ever since the end of the second world war, the old left, who had once put great store in scientific endeavours as effective means for countering old-fashioned forms of prejudice and power, had started losing their faith in the power of human reason. In part, this was because they came to associate post-war science such as the Apollo Programme and the Manhattan Project with American militarism (12). With the defeat of the left externally, best symbolised by the disintegration of the former Soviet Union and the taming of the left internally, through a series of political defeats over the course of the 1980s, the new left sought to make new alliances, including with the environmental movement, in order to boost its numbers and shape a new, more consumer-oriented agenda.

In the meantime, the right, who had been briefly triumphal in the aftermath of the collapse of the Berlin Wall, came to realise the extent to which they had actually been held together as a political force by the threat of organised labour. Gradually, in a period when profits were harder to come by and social and scientific change had became problematised, capitalists too were on the look-out for new sources of moral authority.

Increasingly, in an age fearful of driving any broader, bolder social mission forwards, the two camps converged upon a new agenda, repackaging themselves as societal risk managers. The new role for politicians in our '*culture of fear*' is to protect us from the presumed threats that lie beyond (13). This new agenda conveniently covers-up for the absence of any real purposeful and progressive mission for humanity. It can also generate tremendous instabilities as all sides now use fear as a vehicle with which to cohere their increasingly isolated constituencies (14).

It is within this context that we should understand the contemporary obsession with encouraging public engagement in scientific debates and science policy-making. This speaks more about a social and scientific elite who have lost their own sense of purpose and are trying to include the public artificially in decision-making. It focuses more on process than upon content. Such apparent deliberation is also designed to avoid blame for any possible future problems. It poses as radical and democratic but is in fact about abdicating responsibility and effectively denigrates real expertise (15).

In actual fact, what we really need to restore an appropriate sense of proportion within science, as well as to enhance social participation, is to restore principled political debate and public engagement.

**Inflating Science**

With our sense of the possibility of social change diminished and our presumption that it must therefore be science that controls our lives, there has come an inflation both of the importance and of the impact of science. Many also now hold that we live in a '*runaway world*' marked by increasing interdependencies and uncertainties (16). In fact, we have been interdependent for quite some time. Certainly, for as long as commodity exchange has been the dominant mode of social reproduction. If the assumption is, that this process is happening any faster today than previously, then that is debatable.

The pace of social and scientific change over the sixty-five year period starting two centuries ago between the creation of Richard Trevithick's first steam engine and the advent of transcontinental railroads across the United States of America, or the pace of change over a similar period starting a century ago between the Wright brothers' first powered flight and man walking on the moon, are probably somewhat more dramatic.

Nowadays, arguments about uncontrollable change seem to focus almost entirely on the largely undelivered promises of biotechnology on the one hand – a technology that is now over fifty years old – and the potential of the internet on the other. But, with regards to the latter, whilst it is possible to order an elephant on-line, it is still not possible to have it delivered that way. Improved delivery would require far more radical change to the real world, rather than the virtual one, by developing our existing transport networks rather more substantially than is currently envisaged. That would have real social and scientific consequences.

Nevertheless, fears about science often dominate the news. That these concerns are out of all proportion with the actual potential of the technology is rarely discussed. And situating this '*culture of fear*' or '*age of anxiety*' within its proper social context of alienation and mistrust in all forms of authority does not feature at all.

**REACH**

It is within this context that on the 27<sup>th</sup> of February 2001, the European Commission launched its White Paper '*Strategy for a Future Chemicals Policy*' (17). This took for granted that the impact of chemicals on human health and the environment were '*a cause for concern*'.

It is worth noting that this approach to dealing with the supposed problem posed by unregulated chemicals was largely driven by the Commission's own insecurities. The perceived need to be seen to be taking precautionary actions had been shaped well before by the BSE debacle, the advent of the precautionary principle and the consequent emergency ban on phthalates.

Despite the lobbying of certain environmental campaign groups, there was no great public clamour or demand for new regulation of the chemical industry. And the industry itself can point to the significant measures it had taken and success it had had in cleaning up its own act over the previous decade (18).

Regardless, the new REACH system, which stands for the Registration, Evaluation and Authorisation of CHemicals, was to be implemented and put in place by 2012. This required the testing of all chemicals produced in volumes greater than 1 tonne per annum, which by some estimates consisted of some 30,000 substances (19).

It may come as a surprise to some to find out that chemicals which had been on the market prior to 1981, when testing had become mandatory, had never been subjected to toxicity and carcinogenicity tests. It may seem to be rational to do so. But considering that many of these substances had the equivalent of billions of hours of exposure data available through continued use, sometimes for over fifty years, the key questions ought to have been; (a) how useful would the new system be? and (b) why was it being required now?

In fact, an early study by the UK Medical Research Council – Institute for Environment and Health (MRC-IEH) suggested that the proposed changes were both unfeasible and unnecessary (20). They pointed to the fact that there were only some sixteen contract research organisations (CROs) across the European Union both capable and willing to undertake the vast number of live animal tests that would be required to clear the backlog.

This would be made worse by the fact that due to contemporary cultural attitudes toward animal-testing, such procedures would probably lead to wide-scale public protest. What's more, due to the diminishing popularity of pure science subjects such as chemistry at University level, the number of graduate chemists qualified to perform such experiments is steadily declining.

Next, according to the MRC-IEH, even performing Base Level tests on those 10,000 substances produced in volumes greater than ten tonnes per annum would require until 2017 for the procedures to be completed. Otherwise, sticking with the European Commission's lower production threshold would take until 2048.

It should also be noted that these tests would not include tests for neurotoxicity or endocrine disruption, both issues of current concern amongst environmental campaigners, nor would they encompass higher tier testing, using species other than rodents or fish, nor indeed had time been allocated for the verification of results and their effective reporting.

Finally, it was suggested that the total cost would be of the order of 8.7b euros, far exceeding the Commission's own estimates and that in terms of animals to be experimented upon there would be a requirement for some 8.4m rodents (45.8m

including their off-spring) and some 4.4m fish. To put these latter figures into perspective it should be noted that to date since testing was introduced in 1981, less than 1m vertebrate have been used in toxicity tests.

Detractors of this argument have suggested that much of the data already exists, if only held behind closed doors by private corporations. They have also pointed to the possible use of facilities across the globe, as well as the possibility of using computer models to by-pass the need for animal testing altogether (21).

These suggestions appear rather disingenuous. Environmental lobbyists do not trust the companies they campaign against, so why would they now trust them with any data they might provide, assuming this existed in the first place? What's more, much data that is produced is often uncorroborable as scientists use varying procedures with different rodent species and unique diets to perform tests. There certainly is an urgent need to agree on such basic protocols before assuming it is possible to compare results obtained from numerous laboratories worldwide.

Finally, whilst the aspiration to use computer models such as quantitative structure activity relationships (QSAR), or other *in vitro* techniques may be laudible, and indeed endorsed by the European Commission itself as the way forwards for the future, these remain a long way from being achievable within the time-frame set (22).

Hence, it would appear, that far from assuaging public concerns regarding the possible toxicity of chemicals, the European Commission have done little more than raise those concerns, whilst making it almost impossible for them to be resolved in the immediate future. And by prioritising all such chemicals, despite the absence of any evident harm over the last twenty years, they are in effect prioritising none.

**Social Costs**

The precautionary principle demands an endless appeal to worst-case scenarios. As such, it has encouraged a proclivity to prioritise speculation over evidence. 'What if?' is now more commonly asked and focused upon than what is. Ironically, this approach unites the so-called Hawks in the White House with environmental campaigners. Predicting the worst and then acting as if this were true displays an almost pathological rejection of the human potential, favouring regulation and restriction over deliberation and freedom.

That the above is true should have been clear when Donald Rumsfeld famously confused everyone at a press conference with talk of his '*unknown unknowns*' (23). The phrase had first appeared in a paper written by Robin Grove-White, the Chairman of Greenpeace UK who is a Professor of Environmental Science at the University of Lancaster (24). Indeed, Rumsfeld went on to conclude his statement by noting that '*absence of evidence is not the same as evidence of absence*', itself a classic environmentalist mantra. The fact that absence of evidence is the only evidence we can ever accumulate to point toward evidence of absence seems to escape such reasoning.

By focusing on the possible rather than the probable, campaigners have pushed services in the European Commission and elsewhere to highlight hazard over risk in discussions about chemicals. Hazard, is the potential a substance or situation contains to cause harm. Risk, on the other hand, is the likelihood of such harm occurring. By elevating hazard lobbyists effectively remove human action, understanding, competence and will from the equation. Everything can be perceived as a hazard, however, it is whether and how we do and use things that transforms them into risks. By focusing on hazard, activists hope to by-pass difficult discussion.

Another area of contention has been the claim that what is happening in the field of chemicals regulation is to enhance '*consumer protection*'. This sounds so wonderful it is hard to imagine what sort of person would oppose it. But in fact, like much of the language used in the environmentally sustainable lexicon, it is found upon closer inspection to be almost meaningless. Who are the consumers? When did they all get together to agree on these things? If they did not, then who is it that claims to represent their views? How representative are they? How much protection do consumers want or need?

More recently, in order to avoid accusations of representing a nanny-state tendency, the debate has shifted ground to suggesting that consumers have a presumed '*right to know*'. It is hoped thereby that consumers will regulate themselves and if not, be chastised by others. But this too is problematic. What information do consumers have a right to know? How much of this needs to be made available? Following the phthalates debate alone could take many months of detailed investigation. Would families not suffer whilst parents stand frozen in the supermarket aisle reading all of the relevant literature? And, where and how should this information be made available?

And there is something far worse than the paralysis by analysis implied above. More and more, it is becoming evident that informed consumers are quite literally worrying themselves sick. Sweden, the country with the highest degree of social awareness as to the toxicity of chemicals in the world and the country whose politicians and officials have consistently been in the vanguard to promote this new agenda, also suffers from the highest rates of self-reported multiple chemical sensitivity in the developed world (25).

Numerous studies now point to the fact that risk communication and awareness-raising tends to drive public concern rather than assuage it. That is because the public presumes that if the government and officials are launching an inquiry into something or demanding a higher regulatory hurdle for a particular product, then this is because there is some legitimate concern over it (26). What's more, the situation can never be resolved, for if the government were to refuse such calls for further evidence, in order to err upon the side of caution, then they would either be accused of gross negligence or be suspected of a cover-up.

The point is that in almost all instances the real driver is not the science, but the social dislocation that has created a generation unable to trust any form of authority, inclined

to assume the worst and demanding constant reassurances that can never be fulfilled. This has now led to a situation whereby we constantly divert resources toward addressing the latest scare, whilst detracting our attention from the real and often more plausible sources of risk and problems in society. Highest amongst these latter should be the precautionary principle itself.

**Conclusions**

Banning phthalates appears unexceptional in its own terms. It seems almost reasonable, once concerns had been raised as to their possible toxicological impact upon infants, to pursue a course characterised by caution and further research. Their removal from the market place is unlikely to generate much immediate economic pain for those companies which produced them.

But concerns about phthalates helped pave the way towards the new European chemicals regulation strategy REACH. Now, thousands of chemicals which have been in regular use for over twenty years will have to face a battery of toxicological tests, despite our having literally billions of hours of exposure data as to the consequences of their use. The outcome is a regime that is both unnecessary and unfeasible within the proposed time-scale, and which will in consequence, lend itself toward needlessly heightening public concern still further.

The specifics of any issue is only part of what is at stake here. Over the last decade or so, as a society, we have increasingly grown used to various calls to ban, regulate or otherwise restrict certain products and activities. These have included chemicals, food items, mobile phones and vaccines. And outside the realms of science, worries have been raised over school bullying, sun-bathing, child safety and terrorism.

Each of these contains its own rational kernel of specific concerns. It is only when we take a step back and examine the entire landscape that we become aware of the extent to which risk, or to be more precise, our perception of risk, has now become a new organising principle for society.

This heightened consciousness of risk lends itself to exaggerated fears and social paralysis as we endlessly seek reassurance, both scientific and moral, for what we are doing. It can also lend itself to distracting us from what remain more likely sources of risk, thereby diverting social resources needlessly and putting ourselves at greater risk in consequence.

It is clear that the risks facing society today are not disproportionately different to those faced a generation or more ago. Rather, society has become less confident about its ability to deal with these and manage change. By raising problems at a time when these are in decline, and by positing widespread testing that is neither desirable nor achievable, there is a danger of feeding the climate of risk aversion rather than assuaging it. Worse, by becoming unwilling and therefore unable to shape our own

future, events will end up being forced upon us through our own anxieties, thereby placing us at greater risk.

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