

“Dual Use” and “Intentionality”: Seeking to prevent the manifestation of harmful desires.

A summary and some reflections on the “Dual Use Dilemma” conference held in Warsaw on the 9-10th November, 2007.

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The iconic destruction of the Trade Towers in New York on the 11th September, 2001 marks a watershed in the way we seek to comport our societies. The dangers we could face collectively takes many guises including scenarios in which bombs with or without added radioactive isotopes, poison gas and pathogenic microorganisms could be employed. How can we prevent the disasters planned by individuals and groups who seek to harm our societies? How can we prevent providing such groups with the tools of destruction? And how can we prevent the unwitting creation of means whereby, those skilled in the art, may fabricate agents of even greater destructive power?

Such questions have led us to the notion that the research we effect in the areas of nuclear energy, toxic gases and disease-causing microbes may not only be used for the benefit of our societies but also their harm. From this arises the concept of the dual use of both the knowledge examined by the application of the scientific method and the products made by the engineers. While it is clear there is a simple dichotomy between the beneficial and a harmful uses of either knowledge (science) or a physical tool, it should also be made clear that all elements of knowledge and all tools have many applications – so we may think of multiple uses - each of which may be further categorised under the dual use dichotomy. The generality of this situation may be illustrated by the efforts of A. Chamberlain (Megan Davidson, 2007) and her colleagues who wish to question all the researchers on the Duke University Campus engaged in microbiological work and ask them to imagine and write down possible harmful applications of the knowledge or materials that they are seeking to generate.

Many presentations at this conference dealt with the question of whether it is possible to so categorise research projects in these sensitive areas such that we should take specific actions either to prevent that research

progressing or to restrict the dissemination of the results to only those who have a “need to know”? To do this it is clearly necessary to define the sensitive areas. It seems to be clear that when dealing with pathogenic organisms there should be regulations dealing with the modification of their pathogenicity and the vaccines or antimicrobials that could be used to prevent or cure disease caused by such organisms. Such regulations might cover the nature of the changes that could be made, the people who may engage in such experiments, the way in which information derived from these studies would be disseminated, the involvement of special representatives of the public who may vet such projects and the implementation of disciplinary (as opposed to aspirational) codes of conduct (*****V. Nathanson – this volume) that are backed up by procedures akin to those that operate in the criminal courts. The possible need for such strictures was illustrated by S. Miller (*****This volume) who reported on the work in Australia where a mouse pox virus (Ectromelia) was unintentionally made more virulent following the introduction of an interleukin gene (IL-4) (Jackson, 2001). While many expert groups have looked into this problem (R. Flower (Royal Soc.), (2006) ***** D. Franz (Nat Acad) (2007)*****) the group assembled in Warsaw were able to examine some issues that were not covered in the published literature.

Of course it is possible to make lists of topics whose misapplication could lead to the development of information or materials that may be useful in an attempt to effect significant social damage. The reports referred to above do this *in extenso*. Yet this does not really touch the problem. To date those who have actually assembled bombs or devices to cause social damage have used materials that are readily available in over-the-counter shops or can be stolen from military stores, demolition companies, mining operations or quarries. Pasta flour, hydrogen peroxide, dynamite, cooking gas cylinders, Ricin made from beans, Cyanide rat poisons, Weed killer, fertilizer, Semtex, Chlorine and the simple chemical derivatives of phosphorous, halides and methanol that may be converted to Sarin are all available to those who have a mind to acquire them. Of course it is also possible to collect pathogenic microbes from humans or animals who become infected, the most outstanding of which are anthrax, plague, Francissella, foot-and-mouth disease virus, influenza and many other lethal agents. The transfer of current research ideas or materials does not seem to be involved in any of the known incidents of social damage that have been inflicted to date. So, we have to question whether the vigilance and exacting scrutiny with which we treat research projects at the cutting-edge of a nominated (for its proximity to the generation of a dangerous agent) subject area are actually the best use of such resources.

Indeed, it is the simple robust techniques that have been in use for many decades that are likely to be used to assemble weapons for societal destruction.

Notwithstanding this analysis, academies and institutions in many countries have made it their business to take a position with regard to the possible perverse use of the research that emanates from the laboratories under their influence. Each such country faces the same problems as set out above. But it has to be noted that there exists in the present literature and in trained biotechnologists sufficient information and capability to enable a determined person or small group of people to build highly destructive weapons. It is clearly unnecessary for such knowledge and skill sets to be at the cutting edge of the subject; from the weapon makers point of view, the tried and tested methods that are robust, simple and proven are more attractive than the sophisticated state-of-the-art capabilities that are at the limits of practicality and are not yet consolidated by the application of the research and development process that is needed to transfer a potential product from the laboratory bench into the manufacturing plant – a procedure that costs 10 times more than the research and takes 10 times the amount of time: an effort that is only expended on less than 1% of the possible products of the research process.

As was noted by Dr Franz and expressed by Dr Pustovit and this author, there is a second arm to the emergence of a destructive weapon, and that is the will, desire or intentionality of the weapon maker. Of course, such considerations are normally dealt with by psychologists, sociologists and philosophers rather than by biotechnologists or nuclear engineers. Nevertheless, it behoves us to examine these issues here as they are crucial to the determination of our approach to the situation we face.

There are a number of different approaches to the issue of intentionality. The first is to determine whether or not a person has a state of mind that is consonant with the construction and deployment of a weapon designated to destroy a body of people. Secondly, we might ask how such a state of intentionality came into being. Thirdly, we have to decide on how to deal with the people who express such states once they are detected. Fourthly, we have to discover ways of intervening such that these states of mind do not occur.

But dealing with the mind is unlike any other topic. There are those who opine that mind is something special whose workings cannot be explained by the interaction of energetic entities, atoms, molecules and cells. (What I refer to as an Energy Plus or EP approach). While others are content to

seek explanations for the working of the mind as the emergent property of the interaction of energetic or material entities. (What I refer to as the Energy Only or EO position.) For the former, EP group, it is difficult to see how we might advance our thinking or our ability to intervene as we may be dealing with one or more entities whose properties lie outside the properties of energetic or material entities. Such properties defy tangibility and may work in manners that are contrary to the cause and effect relationship we hold to exist for all rational actions and events. We might say that when an individual intends to do serious harm to others that such an urge just welled up inside their mind without identifiable stimulation or preconditions. This clearly presents problems in detection, anticipation or correction. This being the case, the only possible response is to set aside any hope of intervention and place all one's efforts in the prevention of the acquisition of the physical means to make and deploy a weapon.

Alternatively, a mind that is based on the properties of material entities only, the EO situation, is tangible, logical and comprehensible by the application of observation, reason and scientific method. Here we can hope to learn the series of events that leads up to a mind that has the intention of doing harm. There is also the prospect of being able to change the desire profile away from such destructive urges. And we should be able to detect a harmful intentionality, hopefully, before any harm is done.

For such reasons, it becomes useful to examine the case histories of those who have expressed an intent to inflict harm and have survived its damaging effects. It may also be possible to gain information from people who know others who are expressing the symptoms of seeking a way to be harmful. We may also seek out people who have been trained and are fully conversant with the production of harmful agents so as to attempt to understand how they see the world and their position in it. But we can go further. Modern techniques of non-invasive body scanning by Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) have produced images of the mind as it thinks particular classes of thoughts. What this is teaching us is that particular thinking processes occur in definable positions in the brain. Should we wish to deceive a person with an answer, it is possible to detect an activity in a position of the brain that correlates with the attempted deception. This does not mean that we may subject each person in the society to brain scans while asking them questions about their harmful intentions. But it does show that it is possible to detect certain states of mind and this leaves open the possibility of research to make such states more readily apparent. Indeed,

we will be provided with skull caps that enable us to control images on a computer screen (*****Pell, 2007) which could provide an entry to discover the deeper states of mind that govern our intentionality. It then becomes a short step to imagine Radio Frequency Identification (RFID) tags that, on excitation, beam to an observer the state of a person's brain.

As neuroscience and engineering progress, we will have to take a careful and considered position on the amount of information that may be taken from us either knowingly or surreptitiously, in exchange for a sense of security of our persons in public places. How might we build into this situation the safeguards that can provide us with the notion that if we deal fairly with our societies they will deal fairly with us? Multi-tiered control systems based on the application of ethics, laws and power have to be engineered along with the corresponding education and training systems.

It seems that the problem of dual use has, of necessity, led us into areas of social engineering. Because all we produce, whether it be knowledge or widgets, is capable of causing benefit or harm, we have to recognise this situation and seek to obtain the maximum benefit from it. One problem is that we are not always sure as to where the benefit lies. Were we to take the simple objective function, "that all we seek is to enhance the chances of the survival of humans both as individuals and groups", then we have an operating principle from which we can learn and grow. There is not a single answer to how we might go about this quest, but what is clear, is that natural selection will exert its effects on the diverse approaches we adopt to achieve our objective function. From this will arise new species of humans and new ways of living – the future will indeed be as exciting as the past and just as difficult to fathom.

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