

RAISING AWARENESS OF DUAL USE: A CASE STUDY OF THE EU HUMAN BRAIN PROJECT

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OUTLINE



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A1. Neuroscience in the News

- Professor Barbara Sahakian, Professor of Clinical Neuropsychology, Cambridge University (16/2/17)

The I Paper

- *The acid test*

“Workers in Silicon Valley are ‘microdosing’ on LSD to improve their office performance – but does it work and is it safe?”

- *Mind reading made real by new brain scanners*

“So far judges have resisted using brain scans as evidence in court cases, but they can show if someone is telling the truth.”

A2. The New State Neuroscience Projects

□ *Neuron*, **92**, November 2, 2016

▣ *The US Brain Project*

“The BRAIN Initiative: Building, Strengthening, and Sustaining” (570-573)

▣ *The Japanese Brain Project*

“Brain/MINDS: A Japanese National Brain Project for Marmoset Neuroscience” (582-590)

▣ *The Chinese Brain Project*

“China Brain Project: Basic Neuroscience, Brain Diseases, and Brain-Inspired Computing” (591-596)

A3. G-Science Academies Statement 2016

- *Understanding, Protecting, and Developing Global Brain Resources: Recommended Objectives*
 - ▣ Support Fundamental Research on Brain Principles and Technologies
 - ▣ Address Brain Disorders with Next-Generation Integrative Programs
 - ▣ Promote Theoretical Neuroscience for Creating Brain-Based Applications
 - ▣ Integrate Brain, Behavioral, and Social Sciences for Education and Life Management

A4. BRAIN 2025: A Scientific Vision

□ *Executive Summary*

- “ In considering these goals and the current state of neuroscience, the working group identifies the analysis of circuits of interacting neurons as being particularly rich in opportunity, with potential for revolutionary advances....The analysis of circuits is not the only area of neuroscience worthy of attention, but advances in technology are driving a qualitative shift in what is possible, and focused progress in this area will benefit many other areas of neuroscience.”

B5. The CBW Threat Spectrum

- Chemical Weapons
 - ▣ Classical Chemical Agents (Nerve Agents)
 - ▣ Industrial Chemicals (Chlorine)
- Mid-Spectrum Agents
 - ▣ Toxins, Bioregulators (SEB, Substance P)
- Biological Weapons
 - ▣ Traditional Biological Agents (VEE)
 - ▣ Genetically Modified Agents

B6. Dual Use Today

- *Scientific Advisory Board (2012)*
 - “The types of chemicals and pharmaceuticals known to have been considered as incapacitants from open-literature sources were discussed. Most are centrally acting compounds that target specific neuronal pathways in the brain. All of them emerged from drug development programmes undertaken from the 1960s to the 1980s....In the view of the SAB, the technical discussion on the potential use of toxic chemicals for law-enforcement has been exhaustive....The SAB recommends to the Secretariat that it start preparations for verification activities...”

B7. Article II.9 of the CWC

- "Purposes Not Prohibited Under this Convention" means:
 - ▣ (a) Industrial, agricultural, research, medical, pharmaceutical or other peaceful purposes;
 - ▣ (b) Protective purposes, namely those purposes directly related to protection against toxic chemicals and to protection against chemical weapons;
 - ▣ (c) Military purposes not connected with the use of chemical weapons and not dependent on the use of the toxic properties of chemicals as a method of warfare;
 - ▣ (d) Law enforcement including domestic riot control purposes."

B8. Evidence of Military Interest and Concerns

- Potential areas of concern noted in *Emerging Cognitive Neuroscience*
 - ▣ Use of Neuropharmacological Agents as Incapacitants
 - ▣ Nanotechnologies or Gas-Phase Technologies that Allow Dispersal of Highly Potent Chemicals over Wide Areas
 - ▣ Technologies for Highly Potent Blood Pressure Agents or Sensory-Specific Pharmacological Targeting
 - ▣ Drug-Delivery Systems Applied to the Blood-Brain Barrier

B9. Weaponisation of CNS-Acting Chemicals for Law Enforcement

- Australia, *C-19/NAT.1*, 14 November, 2014
 - “ 3. The weaponisation of CNS acting chemicals for law enforcement purposes is of concern to Australia due to the health and safety risks and the possibility of their deliberate misuse, both of which have the potential to undermine the global norm against the use of toxic chemicals for purposes prohibited by the Convention.
 - Fentanyl...are probably the best known of the CNS acting chemicals....However, there are other anaesthetics, sedatives or analgesics...”

B10. Joint Paper by 21 States Parties to the CWC, C-NAT.2, 24.11.2015

- *Aerosolisation of Central Nervous System-Acting Chemicals for Law Enforcement Purposes*
 - ▣ “We encourage States Parties to the Convention that have not yet done so to make their positions known, or to express their interest for further discussion, on the use of aerosolised CNS-acting chemicals in law enforcement...
 - ▣ Such discussion should focus on developing concrete recommendations for how to address CNS-acting chemicals in a way that would significantly advance one of the OPCW’s priorities – preventing the re-emergence of chemical weapons.”

B11. Neuroscience, conflict and security

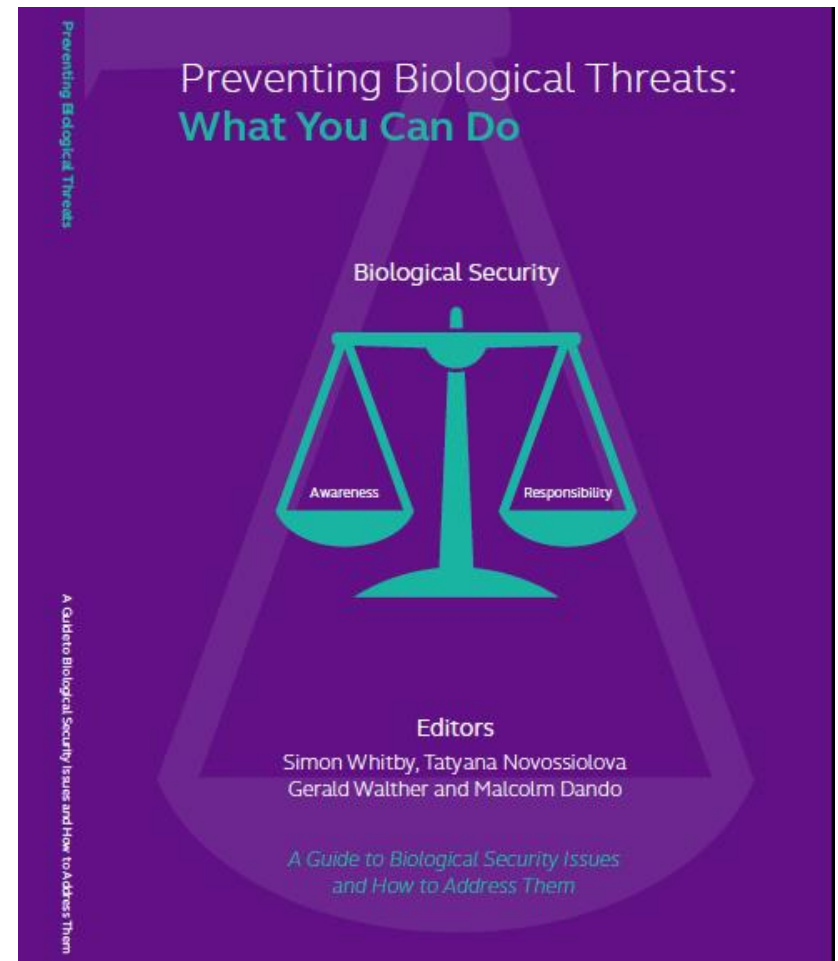
- *Royal Society, 2012: Brain Waves Module 3*
- Recommendation 1
 - “There needs to be fresh effort by the appropriate professional bodies to inculcate the awareness of the dual-use challenge (i.e., knowledge and technologies used for beneficial purposes can also be misused for harmful purposes) among neuroscientists at an early stage of their training.”

C12. InterAcademy Partnership, 2016

- *DOING GLOBAL SCIENCE: A Guide to Responsible Conduct in the Global Research Enterprise*
 - ▣ Chapter 1. Responsible Conduct of Research and the Global Context: An Overview
 - ▣ Chapter 2. Planning and Preparing for Research
 - ▣ Chapter 3. Preventing the Misuse of Research and Technology
 - “...Researchers need to participate in discussions about the possible consequences of their work, including harmful consequences in planning research projects...”
 - ▣ Chapter 4. Carrying Out Research

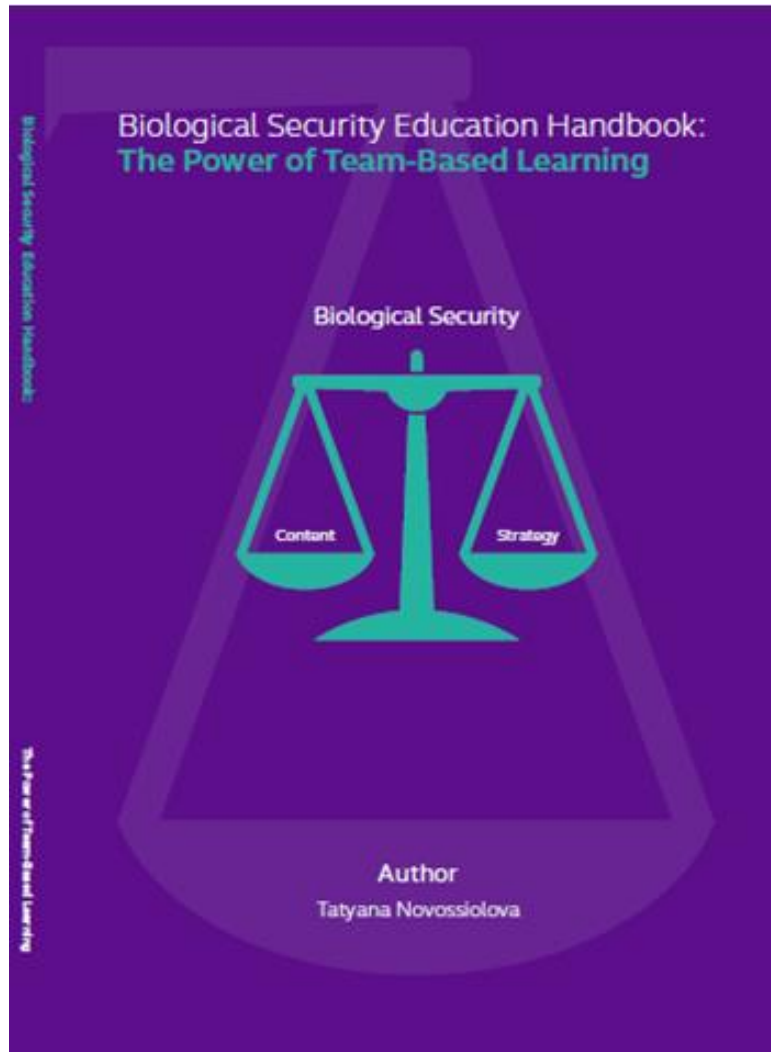
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<http://www.brad.ac.uk/social-sciences/peace-studies/research/publications-and-projects/guide-to-biological-security-issues/>



**Threshold
Concepts**

**Active
Learning**



**Open-
Source**

**Easy-to-
Adapt**

**Easy-to-
Replicate**

C15. The EU Human Brain Project

□ *SP12: Ethics and Society*

□ WP12.1

- The HBP Foresight Lab (Nikolas Rose)

□ WP12.2

- Neuroethics and Philosophy (Kathinka Evers)

□ WP12.3

- Public Dialogue and Engagement (Lars Kluver)

□ WP12.4

- Ethics Management (Bernd Stahl)

C16. The HBP Education Website

- “The HBP Education Programme has developed a distance learning course programme, the HBP Curriculum. The course aims at addressing students outside of their area of specialisation (e.g. neuroscience for computer scientists). This is complemented by offering teaching in transversal competencies relevant to the project goals, such as research ethics, broader ethical issues raised by scientific research, IPR management or legal and organisational solutions for exploiting project results.”

C17. Five Online Courses, 2017

- Specialist Courses for Non-Experts
 - ▣ Brain medicine for non-specialists
 - ▣ ICT for non-specialists
 - ▣ Neurobiology for non-specialists
 - Complementary Courses
 - ▣ Research, ethics and societal impact
 - ▣ Intellectual property rights, translation and exploitation of research
- “Each course will be complemented by a short face-to-face workshop as a supplement to the respective online course...”

C18. Research, Ethics and Social Impacts (i)

□ Course Director: Abdul H. Mohammed, Karolinska Institute/Linnaeus University, Sweden

“The course will explore ethical and social issues that have arisen, and continue to arise, from the rapid research developments in neuroscience, medicine and ICT. Lectures will focus on key ethical issues contained in HBP – such as ethics of robotics, dual use, ICT ethical issues, big data and individual privacy, and the use of animals in research. The learning activity will consist of assigned readings classroom discussions and videotaped lectures.”

C19. Research, Ethics and Social Impact (ii)

□ Lectures

- ▣ 1. Neuroethics of Neuroscience and Neuroscience of Ethics (Christine Mitchell, Harvard Medical School, USA)
- ▣ 2. Computer Ethics and the HBP (Bernd Stahl, De Montfort University, UK)
- ▣ 3. The Ethical Robotist (Alan Winfield, University of the West of England, UK)
- ▣ 4. Responsible Research and the Human Brain Project (Nikolas Rose, King's College London, UK)
- ▣ 5. Scaling up Neuroscience - Responsible Research and the Big Brain Projects (Nikolas Rose, King's College London, UK)
- ▣ 6. Neuroscience and the Problem of Dual Use (Malcolm Dando, University of Bradford, UK)

C20. Backup Material (i) References

- *Two recent books directly relevant to the problem of incapacitating chemical weapons are:*
 - ▣ Michael Crowley (2016) *Chemical Control: Regulation of Incapacitating Chemical Agent Weapons, Riot Control Agents and their Means of Delivery*. Palgrave, Macmillan, Basingstoke.
 - ▣ Malcolm Dando (2015) *Neuroscience and the Future of Chemical-Biological Weapons*. Palgrave, Macmillan, Basingstoke.
- *For the history of offensive biological weapons programmes see:*
 - ▣ Mark Wheelis, Lajos Rózsa, and Malcolm Dando (eds.) (2006) *Deadly Cultures: Biological Weapons Since 1945*. Harvard University Press, Cambridge, Mass.

C21. Backup Material (ii) Questions

- *Questions on Dual Use*
- Is the problem of dual use just about what scientists do in the laboratory and publish or are there wider aspects of the problem and, if so, what are those wider aspects? Should such issues be of concern to neuroscientists?
- Briefly review the debate on dual-use biotechnology as it has developed over recent years (See Chapter 2 of *Preventing Biological Threats: What You Can Do*).
- Outline the major stages in the development of chemical and biological weapons in the 20th century State offensive programmes. To what extent do you think these weapons programmes fed off advances in civil neuroscience?

D22. Conclusions

- There is certainly a huge job needing to be done to effectively raise awareness of dual use and to improve the dual-use education of life scientists.
- These objectives will not be achieved quickly.
- However, there are imaginative ways in which the job can be done more efficiently.
- One way forward is to think about using the internet and modern ICT to greater advantage.
- The HBP Video Lecture series is an example of what can be done, but other such initiatives are surely possible?

For the Video Lectures

- Go to the HBP Education website and select HBP Curriculum