



Online Consultation on Neuroscience and Dual Use

Introduction

Human Brain Project is a large research project on the human brain and brain-inspired computing. It is expected to make great progress in science in the nervous system, information and communication technology, and robotics and artificial intelligence.

As an EU-funded project, the Human Brain Project is committed to solely engage in non-military research. However, the resulting research may be of military interest for political, security, intelligence and military purposes.

History shows that science and engineering intended for civilian use can also contribute to new military tools. Chemical and biological agents, the atomic bomb, precision and long distance weapons, and more recently, semi-autonomous drones, all provide well known examples of military uses of scientific and technological research. This makes military use sound very violent. And it can be. But most of us actually use things in our everyday lives which also come from military research. The Internet, GPS, microwaves ovens, and the EpiPen (which is used to treat extreme allergic reactions) all derive from military research. In addition the military do a lot of research which benefits civil society. Such as research on the diagnosis and treatment for mental illnesses, such as Post-Traumatic Stress Disorder (PTSD) and depression, and research on prosthetics, such as prosthetic feet and robotic arms, is also beneficial for civil society.

The goal of this consultation is to explore the values, concerns and opinions of citizens in Europe regarding the use of neuroscience, even if it can potentially be used for political, security, intelligence or military purposes.

Watch an introduction to the Human Brain Project and dual use issues on: <https://youtu.be/hVw-MvyAo0>

Only civilian focus

Human Brain Project is funded by the European Union through Horizon 2020. All research in Horizon 2020 must focus solely on civil use. This also goes for the Human Brain Project. But it does not exclude military partners as long as the research is focused on civilian use.

Dual use and PSIM

'Dual use' is a term used to describe in science, technology and research that can be used for both civilian and military purposes. A more precise definition is 'PSIM', which stands for political, security, intelligence and military uses of e.g. science and technology.



Research on the human brain and the potential dual use

The Human Brain Project does not engage in any military-research, but some may want to use our research for military purposes, or we might work together with other research projects with military funding. We would like to learn what you think about it.

- 1) Does it make you concerned that the research from the Human Brain project can be used for political, security, intelligence and military purposes? (*choose one option*) You can use the text box to explain your choice (e.g. "I answered b because...").
 - a) No, not at all concerned
 - b) Yes, slightly concerned
 - c) Yes, moderately concerned
 - d) Yes, somewhat concerned
 - e) Yes, extremely concerned
 - f) I don't know/do not wish to answer

- 2) Is it acceptable if an organisation receives funding through the Human Brain Project, if they at the same time do military research? (*choose one option*)
 - a) Yes
 - b) No
 - c) I don't know/Do not wish to answer

- 3) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (*choose one option*)
 - a) Yes, the most important thing is to make progress in the research.
 - b) Yes, but only if it is based in another EU member state.
 - c) Yes, but only if it is based in an allied country of the European Union
 - d) Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons
 - e) No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.
 - f) I don't know/do not wish to answer

- 4) Should there be some kind of sanction if a researcher in the Human Brain Project deliberately contributes to research with political, security, intelligence and military purposes? (*choose one option*)
 - a) Yes, the researcher should be put under ethical surveillance.
 - b) Yes, the researcher should receive a fine.
 - c) Yes, the research organisation should receive a fine.
 - d) Yes, the researcher should lose his/her funding.
 - e) Yes, the researcher should lose the right to conduct research.
 - f) Yes, the researcher should be sentenced to prison.
 - g) No, there shouldn't be a sanction, but a warning.
 - h) No, there should not be a sanction at all.
 - i) I don't know/do not wish to answer.



- 5) The European Commission has big focus on open science, where research data and analysis are public for everyone. Should this also be the case with research that could have dual use potential? (*Choose one option*)
- a) Yes
 - b) No
 - c) I don't know/do not wish to answer
- 6) Do you believe that the public research programmes (in your country or in the EU) should fund research with intelligence and/or military purposes? (*Choose one option*)
- a) Yes
 - b) No
 - c) I don't know/do not wish to answer

Applications of brain research to political, security, intelligence and military use

In the following we will look at different ways brain research can be used for dual use. We would like to learn how you think about these possible uses, and what you find acceptable, and what concerns you.

Some dual use of brain research could for example be the increase of performance of military personnel, new investigation techniques, development of brain-inspired computers and autonomous robots, and the production of new types of biological and chemical weapons.

- 7) The idea of mind-reading has been a steady focus of military research over the years. We can't do it yet. But we can do brain scanning, that shows activity in the brain, which we then can try to read. Advanced forms of brain/mind scanning can probably be used for interrogations, lie detectors, for analysing sympathies/ideological tendencies or to support manipulation (i.e. "brain washing") etc. But they can also be very useful in health care. When do you think one should be allowed to use brains/mind scanning technologies? (*Choose as many answers as you like*)
- a) In police intelligence gathering
 - b) For optimising the recruiting of soldiers
 - c) In terror/military investigation
 - d) In mental manipulation of enemies
 - e) In the employment of new employees
 - f) To communicate with patients in coma or similar situations
 - g) To diagnose mental diseases
 - h) To research pharmaceutical drugs
 - i) In political negotiations
 - j) It should never be allowed
 - k) Don't know /do not wish to answer



- 8) The research in the Human Brain Project can also be used to study how medicine or neurotoxins can change the behaviour of people without providing lethal threats. This could for example be airborne compounds that make people lose memory, become more passive, trusting, aggressive, or sleepy, have greater endurance, or lower their threshold for pain. These compounds can be used in legal and illegal ways, and some compounds may be illegal in themselves. Do you think that research should be carried out, if there is a risk that the results can be used for illegal purposes? (*Choose one option*)
- a) Yes, even if there is a big risk that it can be used for illegal purposes, the research should be allowed
 - b) Yes, if there is only a small risk that it can be used for illegal purposes, the research should be allowed.
 - c) No, if there is a big risk that it can be used for illegal purposes, then the

- 9) Do you have any concerns in relation to the research in drugs that can change the mental state of someone? (*Choose one option*)
- a) No, we already today have different kinds of drugs that change the mental state of a person
 - b) Yes, I'm concerned that it becomes normal to change the mental state of a person
 - c) Yes, I'm concerned that drugs used to remove anxiety or remorse will result in more violent robberies, fights etc.
 - d) Yes, I'm concerned that if it becomes easier to treat soldiers then there are fewer concerns about what they experience
 - e) I don't know/do not wish to answer

Drugs to change mental states

Around 7-8% of all people worldwide will at some point in their lives have Post-Traumatic Stress Disorder. Different events can trigger it, which often involves a trauma or injury. Soldiers are at a greater risk of it. To avoid or minimize the risk of Post-Traumatic Stress Disorder, researchers are looking to develop drugs, which minimize feelings of anxiety and remorse.

- 10) We are going to list some potential dual use of brain analysis and artificial intelligence. Which of them do you find acceptable given that they are used by your own/allied military and according to the rules of warfare? (*Choose as many answers as you like*)
- a) Lie detection
 - b) Analysing emotions e.g. aggression/sympathy to specific pictures, postulates, arguments etc.
 - c) Analysing patterns of thoughts or behaviour - e.g. mapping aggressive/protective tendencies
 - d) Deception detecting, detecting and predicting patterns of thoughts, emotions, behaviour...
 - e) I don't find any of them acceptable
 - f) I don't know/do not wish to answer



- 11) One research area in the Human Brain Project is to connect the nervous system to computers through implantation of brain-computer interfaces. This could for example be done in order to analyse the brain/nervous system; adjust emotional reactions; enhance memory; let the human body control mechanical equipment; or let the mind control prostheses. Do you have any concerns regarding implanted brain-computer interfaces? (*Choose up to three options; add other concerns or comments in the text box*)
- Hacking, someone gets control over the device/brain
 - Mind control, that someone can control the mind through the interface
 - Tracking, signals from the device is picked up and used for surveillance
 - Changing personality, the device changes you - for example by lowering your aggression level or preferences
 - The development of Super-Humans for warfare
 - That otherwise healthy civilian people will start to use it for personal enhancement
 - Other [insert box]
 - I don't have any concerns
 - I don't know /do not wish to answer

Mimicking the human brain - Artificial Intelligence, autonomous weapons, and deep learning

A large effort is done in the Human Brain Project to develop new computer systems which can mimic the human brain - both as programmes in 'normal' computers and as computers that in principle are built the same way as the brain. This could lead to strong artificial intelligence and so-called deep learning, which can be used for identifying early signs of cancer in the blood, better weather forecasts or self-driving cars. However, it could also lead to dual use functions, such as fully autonomous weapons or weapon systems, or autonomous enhancement of equipment.

Brain-computer interfaces

Brain-computer interfaces refer to devices that communicate with neural brain signals, allowing the user to control a computer, prosthetic, enhancing the brain etc.

There are two types of brain-computer interfaces, invasive and non-invasive.

Invasive devices are installed inside the body through surgery, where non-invasive are devices you can put on, like a helmet.

Artificial intelligence

Is a kind of machine intelligence that resembles the functions of the human mind, and can do things such as problem solving, learning and planning.

Deep Learning

Mimics the way the brain works in order to recognize patterns in digital sound and images in large data sets, while it keeps improving itself by learning from its mistakes.



12) Deep learning is very complicated, and we cannot fully understand *how* the computer systems learn and how they reach certain conclusions. Do you think it is problematic if we cannot understand how the artificial intelligence thinks, acts, and learns? (Choose one option)

- a) Yes, it is most important that we can monitor, understand, and control artificial intelligence.
- b) No, the results are more important.
- c) I don't know.

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- a) Hacking, someone gets control over the device/brain
- b) Mind control, that someone can control the mind through the interface
- c) Tracking, signals from the device is picked up and used for surveillance
- d) Changing personality, the device changes you - for example by lowering your aggression level or preferences
- e) The development of Super-Humans for warfare
- f) That otherwise healthy civilian people will start to use it for personal enhancement
- g) Other [insert box]
- h) I don't have any concerns
- i) I don't know /do not wish to answer

Autonomous robot

Is a robot that can act or do tasks on its own. In its purest form it can operate without human control. It can for example identify and engage with targets without asking permission and without a human operator.

13) Who should be responsible for the actions of fully autonomous weapons/systems? (Choose up to three choices, and use the box to comment or add suggestions)

- a) The person in charge of the operation
- b) The person in charge of the area that the weapon system is operating within
- c) The purchaser (military)
- d) The company that produced them
- e) The persons responsible for the coding of the system
- f) The robotics/weapon system itself
- g) Some sort of mandatory insurance system
- h) No one
- i) Don't know/do not wish to answer



- 15) Deep learning and artificial intelligence in general are very powerful tools for Big Data analysis. They have the potential to help us understand diseases and develop cures, to improve weather-forecasts, or to predict and prevent traffic accidents. On the other hand, the same tools and data are in risk of abuse, for instance, as a means of increased surveillance by companies or suppressive governments. So it has the potential to save lives, but also to harm people. When you think of artificial intelligence, do you see it as: (Choose one option)
- a) A very positive development
 - b) A somewhat positive development
 - c) A both positive and negative development
 - d) A somewhat negative development
 - e) A very negative development
 - f) I don't know/do not wish to answer

About you

We would like to get to know a little bit more about you to better understand who the people answering this survey are.

16) Year of birth:

17) Sex:

- a) Male
- b) Female
- c) Intersex/other

18) Country of residence:

19) Postal code:

20) Area of residence

- a) City or urban area
- b) Suburban area
- c) Rural area

21) Education:

- a) Primary and lower secondary education
- b) General upper secondary education
- c) Vocational Education and Training
- d) Bachelor or equivalent
- e) Masters or equivalent
- f) Doctoral degree or higher
- g) I don't know / Do not wish to answer

Your personal data will not be shared with anyone, but as we are committed to open data, your anonymized answers could be shared with others for research purposes.