The Cognitive Revolution Symposium

The convergence of human and artificial intelligence raises a host of new ethical, social, and security questions. How do we promote a culture of responsibility in the communities behind this revolution?

Place: swissnex San Francisco
Date: Saturday, May 19, 2018
Time: 08:00am-5:30pm

The Cognitive Revolution Symposium takes the Mental Work art-science exhibition as a starting point for reflection on the emergent future of human-machine interaction, focusing on promoting a culture of responsibility within the communities at the forefront of this revolution.

Our lives have become increasingly intertwined with machines. Two decades ago, computers were limited to our desks. Smartphones have brought them into our hands, smartwatches onto our wrists, and smart speakers into our homes. Today, brain-computer interfaces (BCI) challenge us to consider an even more intimate interaction with machines: directly via brain activity. In combination with AI, this next step in computing creates a deepening convergence between natural and artificial intelligence.

BCI and other neurotechnologies hold the potential to revolutionize the treatment of many neurological conditions, enhance mental and physical abilities, and change the way we work. But the same advances could unintentionally increase social inequalities, and provide corporations, governments, hackers, and terrorists with novel ways to breach and manipulate people's mental processes. The progress of the field puts into question our idea of individual agency, the sanctity of one's private mental life, and other basic human attributes.

While it might take years for BCI and other neurotechnologies to gain widespread adoption, research in corporate and academic labs is accelerating quickly, and AI is already commonplace. Now is the time to develop ways to inspire reflection and exchange among scientists and engineers on the ethical and socially responsible use of their technologies, while addressing their inherent dual-use nature.

In this view, the symposium aims to convene experts from BCI research, AI, neuroscience, ethics, international security, policy, social science, human rights, education, design, and communication, with a twofold objective:

1. Identifying and prioritizing ethical, social, and security dilemmas around the Cognitive Revolution
2. Envisioning strategies to promote a culture of responsibility around those dilemmas

Keeping in line with Mental Work's connection of art and science, we are also inviting up to three science-fiction writers to participate, with the aim of imagining and investigating emergent futures through short science fiction stories blending art, technology, and policy from the conference into fictional narratives.

Speakers:

-   José Millán, Defitech Foundation Chair in Brain-Machine Interface, EPFL
-   Jean-Marc Rickli, Geneva Center for Security Policy
-   Marcello Ienca, Health Ethics and Policy Lab, ETH Zurich
-   Benjamin Bollmann, Head of Science, swissnex San Francisco
-   *More to be announced soon.*

Program

08:00am-08:15am	Introduction
08:15am-09:00am	Scientific and technology trends
09:00am-10:00am	Emerging ethical implications
10:00am-10:15am	Break
10:15am-11:15am	Emerging social and economic implications
11:15am-12:45pm	Emerging security implications
12:45pm-02:00pm	Lunch at Pier 17
02:00pm-03:30pm	Mapping and prioritization
03:30pm-04:30pm	Towards formal and informal educational methods
04:30pm-05:00pm	Wrap-up and next steps
05:00pm-05:30pm	Drinks at Pier 17

Partners

The Cognitive Revolution Symposium is organized by the Geneva Center for Security Policy (GCSP), ETH Zurich's Health Ethics and Policy Lab, and swissnex San Francisco. The Mental Work exhibition and public programs are made possible thanks to the generous support of the Bertarelli Foundation, which tackles some the biggest challenges in neuroscience, and marine science and conservation. Based in Switzerland, it supports neuroscience research at Harvard and EPFL, including at Campus Biotech, a research center in Geneva established by the Bertarelli family, Hansjörg Wyss, the Wyss Foundation, EPFL, and the University of Geneva. Mental Work is part of Presence Switzerland's Swiss Touch campaign, a series of events dedicated to leveraging Switzerland's innovative and forward-looking edge. Additional support comes from Pro Helvetia, the Swiss Arts Council.
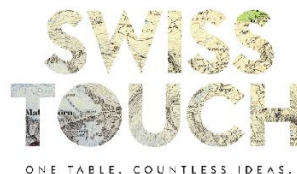
More Information

One of the most rapidly advancing areas of scientific research and development in human-machine interaction is human enhancement, which utilizes machine capabilities to enhance human abilities such as memory, stamina, and intelligence. Emerging research in this field, including a [nanoscale artificial brain,](#) [exo-skeletons,](#) [prostheses,](#) and [electrical brain stimulation,](#) raises urgent ethical and security concerns. Furthermore, human enhancement technologies including BMIs are being reportedly developed and tested not only for civilian purposes but also as [military applications,](#) a phenomenon known as "dual-use."

The military applicability of these technologies raises ethical and [humanitarian](#) questions. Experts argue that continued development of the "[enhanced warfighters](#)" or "[supersoldiers](#)" has immense ethical implications for moral decision-making on the battlefield. According to a [recent announcement,](#) the Defense Advanced Research Project Agency (DARPA), an agency of the United States Department of Defense, is developing technologies to record neural activity and stimulate the brain that could be used to affect people's feelings and behavior. First tests of these technologies in humans are currently ongoing. DARPA projects also include the design of brain implants which could be used to treat mood disorders; [devices](#) that could enable soldiers to run a "four-minute-mile" (4MM) using exoskeletons; and [implants](#) that constantly monitor soldiers' health and improve physiological and psychological condition in combat.

A number of brain-computer interfaces and other neurotechnologies [are being tested](#) by National Security organizations for non-civilian purposes, some of which have shown [cybersecurity vulnerabilities.](#) If deliberately misused, devices that influence pain sensation could also be used to exercise torture on civilians for military purposes or hostages in an act of non-state actor terrorism. "Brain-reading" applications could be also used to extract information during interrogation. Additionally, technologies that enhance memory could be used to selectively erase memories or even create [false](#) ones, which have already been [successfully implanted](#) in the hippocampus of mice.

In parallel, [unsupervised self-experimentation](#) of neurotechnology is growing. Even though [recent studies](#) show that awareness of human enhancement technologies is still not widespread in the general public, the [DIY community](#) conducting neuro-enhancement research or neuro-hacking is expanding. Some [ethicists](#) argue that it is our duty to improve ourselves for the betterment of society. [David Adam,](#) the author of "The Genius Within," independently uses a variety of controversial enhancement methods such as DIY brain stimulation through transcranial direct current stimulation (tDCS). Further examination of the security implications of this research could include the non-state actors' acquisition of the widely available DIY methods and to what extent they could be used to induce mass terror. A better understanding of the developments of these technologies as well as an assessment of how these technologies could proliferate into malicious actors is needed.

What's more, while there is a growing consensus that privacy and security should be considered as ethical priorities, the technical and ethical complexity of neurotechnology raises a variety of moral challenges, including the permissibility of cognitive enhancement, fairness and justice issues in technology deployment, informed consent standards for clinical neurotechnologies, data use policies for commercial BCI applications, user-centred and ethically aligned design of new prototypes and many others.

As this brief overview shows, although at their infancy, brain-machine interfaces raise important ethical and security issues and are likely to have an important impact on future societies. It is therefore urgent to bring together researchers from science, technology, ethics and policy to jointly reflect on the potential security and ethical implication of neurotechnology.

References

1. [Four Ethical Priorities for Neurotechnologies and AI](#)
2. [From Healthcare to Warfare and Reverse: How Should We Regulate Dual-Use Neurotechnology?](#)
3. [The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation](#)
4. [Neuroscience, Ethics, and National Security: The State of the Art](#)

About Mental Work: The Cognitive Revolution Starts Here

Running at swissnex San Francisco from May 17 to July 27, 2018, Mental Work is accompanied by a rich program of public and invite-only events to discuss scientific, ethical, security, and societal questions related to neurotechnologies and machine intelligence. The EPFL edition of the exhibition has already garnered widespread acclaim in the media. We expect to scale this result in the Bay Area, while advancing the public discourse on the future of human-machine interaction.

Mental Work was born through a collaboration between EPFL BCI scientist José Millán, San Francisco-based artist [Jonathon Keats](#), and London-based curator Michael Mitchell.

More info:

- Mental Work's opening event is taking place at swissnex San Francisco on May 17
- [Exhibition page](#) on swissnex San Francisco's website
- Exhibition page www.mentalwork.net
- [Article](#) about Mental Work by sci-fi author Bruce Sterling in WIRED magazine