Neurotechnology for Autism through the Lens of the Global Neuro-rights Movement

Jennifer Jin
Master of Arts in Bioethics, Center for Ethics, Emory University

Abstract
The global prevalence of autism spectrum disorder (ASD) has reached record-breaking numbers in recent years, likely reflecting improvements in diagnostic and identifying tools for ASD. Due to advancements in diagnostic capability, a concurrent increase in demand has emerged for the development of new therapies for autism. Innovators have sought to address this demand by creating a new avenue for targeted therapies through neurotechnology, particularly neuromodulation, neurofeedback, and transcranial magnetic stimulation. Though these technologies are being rapidly developed and are already available for user consumption, innovators have neglected to give proper consideration for the ethical concerns raised by offering neurotechnology for individuals with autism. While many concerns are not unique to autism, it still presents a nuanced case of complexity requiring direct acknowledgment.

The ethical dilemmas surrounding neurotechnology development for individuals with autism can be uniquely explored through the lens of the ongoing global neuro-rights movement. Despite the intense debate regarding the validity of neuro-rights, stakeholders agree that rapid developments in neurotechnology and innovation have created an urgent need to protect and preserve the ethical principles underpinning neuro-rights from external harms. Given these concerns, it is imperative to examine the ethicality of offering neurotechnologies for individuals with autism and provide a nuanced, careful exploration of the relevant ethical principles. Neurotechnologies for autism offer promising interventions that directly impact the brain rather than mitigating symptoms, like most currently available therapies. However, we must be sure to consider all relevant stakeholders and urge innovators to develop neurotechnologies responsibly to secure and protect the ethical principles purported by the neuro-rights movement as fundamental to human rights.

Methods
1. Review of current neurotechnologies available for people with autism: neuromodulation, neurofeedback, transcranial magnetic stimulation
2. Comparison to current standard of care
3. Analysis of how the neurotechnologies adequately consider the three families of shared principles supported by various neuro-rights discussions

The need for neuroethics & neuro-rights in the autism space

Neurotechnology & how it impacts the brain

Potential of neurotechnology
Neurotechnology has the capacity to fundamentally change what it means to be human simply because the brain is not another organ; it is the epicenter of our mental and cognitive activity. Neurotechnology that has the potential to impact and alter our brains raises a multitude of unknown concerns to both humans and society as we know it.

Autism & the population being studied

Scarcity in the understanding of neuropathology
Even with decades of research, we still do not possess a full understanding of the neuropathology of autism. Presentations of autism are widely varied and there is no standard of reference that developers can follow. Thus, potential repurposings from modulating brain activity with neurotechnology are yet to be elucidated.

Lack of literature and dedicated discussion
There is scarcely any dedicated literature or discussion that analyzes potential ethical concerns for developing neurotechnology for autism. Though many of the relevant considerations are not unique to autism and have been thoroughly explored in other fields, particularly with the utilization of brain-computer interface (BCI) devices, autism presents a nuanced set of challenges that we must address.

Nonmaleficence & potential to advance injustice
By failing to address potential threats from neurotechnology, we can advance injustices against individuals with autism and send a harmful message that ethical considerations are not necessary. Since individuals with autism are vulnerable to exploitation and paternalism, disregarding them from the conversation even when such neurotechnology is already available for testing and consumption through public and private domains deprives them of protections that we assign and are eager to promote for other, more “neuro-capable” individuals.

Global shift towards neuro-rights
There has been a growing demand across the world to establish a new kind of human rights: neuro-rights. Neuro-rights are a set of fundamental normative rules designed to protect and preserve the human brain, the mind, and its outputs. They extend the ethical, legal, and natural principles of freedom and entitlement originally developed for an individual’s physical body to their cerebral and mental domain (Jin 2021). The need to discuss potential avenues of securing neuro-rights has become paramount due to the rapid development and advancement of neurotechnology in recent decades. We can no longer ignore the potential ethical impacts and implications that these neurotechnologies may have on not only our independent minds and bodies, but also on society as a whole. A global movement has been ignited in response to these needs through ambitious legislative efforts. One of the most notable is Chile’s constitutional reform bill, which seeks to “protect the integrity and mental indemnity of the brain from the advances and capacities developed by neurotechnologies” by establishing five new human rights (Guzmán 2022).

Since its inception, the bill has received both praise and criticism and has sparked intense debate. Some have lauded the bill as revolutionary and highly anticipatory of potential challenges that we will all grapple within the near future. Others, on the other hand, argue that the bill is premature, given that the “brain-altering” capacity of the technology is still limited. Many believe that before we can establish neuro-rights, we need greater consideration of the fundamental philosophy and epistemology behind relevant definitions and questions (i.e. What constitutes brain data? What is free will? Etc.). The push for neuro-rights has also been coupled with discussion surrounding regulation of neurotechnologies, which should be taken as two fundamentally distinct conversations since the establishment of neuro-rights this early may actually hinder innovation. Despite the contention regarding the relevance of the Chile bill as it stands in today’s society, we can all agree on one thing: this is truly just the beginning for neuro-rights.

Open Questions:
- Which principles or neuro-rights should we prioritize in the research/development or regulatory process?
- Is it therapeutically appropriate for people with autism to interact with this neurotechnology given the current regulatory landscape?
- Is neurotechnology for autism an ethically justified application?

3 Families of Shared Principles

<table>
<thead>
<tr>
<th>Neuro-rights Frameworks</th>
<th>Mental Integrity</th>
<th>Mental Privacy</th>
<th>Preservation &amp; Promotion of Freedom of the Human Mind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile (2021)</td>
<td>Free will &amp; self-determination</td>
<td>Equal access</td>
<td>Mental privacy</td>
</tr>
<tr>
<td></td>
<td>Personal identity &amp; autonomy</td>
<td></td>
<td>Protection against biases</td>
</tr>
<tr>
<td>Ienca &amp; Andorno (2021)</td>
<td>Mental integrity</td>
<td>Mental privacy</td>
<td>Cognitive liberty &amp; Psychological continuity</td>
</tr>
</tbody>
</table>

References

Neurotechnology
- Neuromodulation
- Neurofeedback
- Transcranial Magnetic Stimulation

Current Standard of Care
- Applied Behavioral Analysis
- Cognitive Behavior Therapy
- Speech & Language Therapy
- Occupational Therapy

Neuro-rights
- Free will
- Self-determination
- Equal access
- Mental privacy
- Personal identity
- Autonomy
- Protection against biases

Legal
- Copyright law
- Patent law
- Trademark law

Philosophical
- Human rights
- Autonomy
- Liberty

Psychological
- Mental health
- Cognitive function

Practical
- Access to technology
- Equity and accessibility

Global
- International cooperation
- Global standards

Open Questions:
- Which principles or neuro-rights should we prioritize in the research/development or regulatory process?
- Is it therapeutically appropriate for people with autism to interact with this neurotechnology given the current regulatory landscape?
- Is neurotechnology for autism an ethically justified application?