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The war inside your mind: unprotected brain battlefields and neuro-vulnerability

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Abstract

The 21st century featured explosive discoveries, inventions, and finely crafted technologies where the vaguely dangerous and ambiguous mix of genomics, neuroscience, nanotech, robotics, cyber, and other advanced scientific ventures leads to unknown and possibly unpleasant outcomes pose an acute dilemma. The engineered convergence of advanced technology such as cutting-edge medical technology frontiers of cognitive dynamics, decoding key neural functions, explaining brain biochemistry, and exploring excursions into neuromodulation and plasticity research make the brain a prime object of sustained scientific desire. Today it has become a covert contentious battlefield. Experts in neuromedicine, technology, societal security, and strategy must grasp that a variety of technologies that arguably enhance brain function, influence or augment intelligence, link brains with computers, and enablenon invasice access to the brain-are highly attractive. Now the grim reality is that like so many other aspects of science and technology all ostensibly benign, decent, therapeutic, and beneficial they also contain a dark, malevolent, destructive warlike side as well. Our brains are vulnerable daily within a complex electromagnetic—cyber—RF saturated environment and that vulnerability is critical to grasping our collective dilemma. Cognitive integritys is a paramount risk for our times.

Keywords: *neuroscience, cognitive warfare, hostile neuromodulation, noninvasive technology for brain influences*

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1. Introduction

1.1. The war for your brain—targeted cognitive conflict and mind wars

Brain theory and cognitive functional analysis rests as it does on various theories where the exact role of neurons, dendrites, axons, the central nervous system, and external environmental factors such as electromagnetic sensitivity and interactive microbiome effects may act independently or in concert in ways much less clear than desired. Integrated neuronal elements and supporting neural systems that govern or influence thinking, perception, judgment, reasoning, central nervous system (CNS) functionality, plasticity, and proprioceptive behavior are equally ambiguous despite the pace, focus, and scope of ongoing research. Now in the 21st century, we must grapple with yet another threshold challenge, and enduring mystery—externally based brain manipulation, cognitive influence, and insidious targeted degradation is possible via technology designed to elicit harmful neurobiological effects where brain security itself is under threat. This is a wholly new form of brain research involving the very risky era of true mind wars.

In his 2006 book **Mind Wars**, author Jonathan Moreno speculates about the enthusiastic quest to discern what makes the brain function, how the mind operates, and what the interplay of thoughts, ideas, and how emotions govern behavior with such sophistication in ordinary human life. Over 15 years ago, Moreno wondered aloud in his book about what novel ethical questions are raised by the emergence of new neuroscience applications for war, which will alter human identity by modifying memory, cognition, and core physical, emotional, and spiritual capabilities. This is a classical challenge to serious neuroscience studies, brain activity research, normal neurological operations, plasticity, and core brain functions [1].

Surely since 1970 significant scientific inquiry and national security research have been conducted along two lines of pursuit, which are equally driven in pace while they are quite different in perpetual focus. One aspect of this parallel energy has been rooted in medical inquiry focused primarily on ways to understand the brain, what governs neuromechanics, neurobiology, and the inherent neurobiological functions of the mind for purposes of healing it, maximizing its operation, and fostering its restoration. On the other hand, resolute military planners and analysts have been energetically engaged with zeal and passion very much in equal measure to discern and decode how the mind functions so that it can be insidiously exploited, impaired, degraded, and externally influenced in potential stealthy ways to steer the outcome of future conflicts. This dichotomy is not

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accidental but underscores the inherent dilemma in brain science for the 21st century and beyond. The brain as the battlefield is unquestionably the issue.

1.2. Dual use neuroscience: the healing imperative versus the harming imperative

One salient point worth noting is the traditional history of using science and technology for dual-use outcomes and operations in medical sciences and military sciences. This is vitally important as grasping domains of neural activity, cognitive performance, and essential elements of neurobiological health and routine operations become the equally valuable domain of research for therapeutic purposes as well as eventual weaponization. We have witnessed this numerous times since the First World War in the areas of nuclear, chemical, biological, aeronautic, maritime, vehicular, communication, and satellite systems where every technology designed to expressly confer societal benefits can be redirected to instead for harmful and deadly military purposes.

In the 1990s, the National Academy of Sciences (NAS) published a study on brain mapping that tried to explore the newly emerging field as a direct offshoot of earlier efforts launched in 2013 by the Obama administration in its Brain Initiative (**Brain Research through Advancing Innovative Neurotechnologies**). That project was originally designed to be a collaborative, public-private research initiative to support and develop innovative applied technologies to create a dynamic understanding of brain functions and neural operations and unlock the mysteries of brain disorders, such as Alzheimer's and Parkinson's diseases, depression, and traumatic brain injury. The NAS sought to identify complex neural and anatomical connections; enhance research capabilities for understanding the biochemical, molecular, and genetic mechanisms that control brain structure and functions; and increase existing knowledge about crucial brain functions to discern the dynamics of plasticity and the interactive patterns of dendrites, synapses, integral brain chemistry influences, and overall brains vulnerabilities. Ostensibly this overall effort was designed to maximize beneficial treatment and remedial therapeutic strategies for better brain health stability and restoration of fundamental neural operations. The various programs were positive in orientation and purpose to better understand the origins and intricacies of brain diseases as well as finding effective means of communication across the diverse disciplines of neuroscience (basic and clinical) and computer science and informatics (encompassing digital graphics, database technology, and electronic networks). In effect, the majority of well-known brain research was governed by the "healing paradigm", which encompassed all varieties of treatment, intervention, surgery, and ongoing care designed to alleviate brain disease and minimize its most pernicious effects.

Aside from that largely beneficial, benign, and helpful strategy for brain health and well-being, there also lurked during the same period a darker more malevolent interest in brain issues which was rooted in the "harmful paradigm". This well-funded and comprehensive program sustained itself through a mix of overt clinical research (using laboratory animals) and covert projects with some involving imprisoned humans. These projects were supported by democratic, communist, and tyrannical governments simultaneously aimed at determining express areas of brain vulnerability and cognitive access to exploit, endanger, manipulate, and control human thoughts, behavior, and cognitive functions. One prime example inside the United States was the infamous MK-Ultra program, which was a top-secret CIA project involving hundreds of clandestine experiments—sometimes on unwitting U.S. citizens—to assess the potential use of LSD and other drugs for mind control, information gathering, and psychological torture. Project MK-Ultra lasted from 1953 until about 1973, details of the illicit program didn't become public until 1975, during a congressional investigation into widespread illegal CIA activities within the United States and in some instances around the world. Continued covert research on ways to penetrate and influence the brain, analysis, judgment, and thought among nations is likely to increase and diversify in future years.

It is important to recognize these projects were subsidized and sustained by governments of all types existed within the context of geopolitical rivalry and geostrategic leverage. For example, in 2021 Russia denied that it is investing in artificial intelligence (AI) technology that would allow humans to control cars, planes, and nuclear power plants through microchips implanted into their brains. Despite evidence the Russian government plans to spend 54 billion rubles ($740 million) on the brain-computer interface project as part of its massive science, healthcare, and infrastructure spending plan within the larger "Brain, Health, Intellect, Innovation for 2021–2029" program, devised by the Russian Academy of Sciences in collaboration with the Moscow State University, leaders vehemently denied that it was working on brain chip implants, saying the program had been ruled "unfeasible" in 2020. The degree to which routine covert collaboration between that academy and Russia's defense ministry is largely unknown but it should be expected that insights and revelations about exploitable brain function and vulnerability can be shared.

Inside China, a decade or more of investments undertaken by its leading scientist Mu Ming Poo who is the Director of the Institute of Neuroscience (ION) and Center for Excellence in Brain Science and Intelligence Technology of the Chinese Academy of Sciences (CAS). China's military [PLA] and the CAS have a reciprocal cooperative relationship in shared technology. China has put publicly supported emphasis on brain disorders and brain-inspired AI as immediate high-priority areas. Because China has the largest patient population in the world for all brain disorders, making research on prevention, early diagnosis, and early intervention particularly urgent, and offers the largest database for researchers to work on. Ongoing neuroscience research in China is heavily infused with thousands of monkeys as animal models for studying the neural mechanisms underlying brain functions under both normal and pathological conditions. China retains a high interest in investigating Connectivity and Activity maps where one map examines the wiring diagram of nerve connections among all neurons in the brain, very similar to mapping the "genome" displaying the complete sequence of all nucleotides and genes encoded along the entire DNA of an organism. An activity map displays the firing (spiking) pattern of all neurons in the brain associated with a particular state of the brain. Chinese authorities have also periodically admitted to the existence of research in so-called cognitive influence technology. Beijing has carefully explained that other governments have conducted related experiments. China is embracing research in sensors, brain-image scanners, and other high-tech equipment to study children's learning and performance in real time. "These benign technologies can help improve educational practice," explains Bruce E. Wexler, professor emeritus of psychiatry at

Yale University. But Wexler cautions on the many unknowns, pointing out the challenges of a range of learning styles, a lack of consensus on ideal attention levels, and the possibility that constant interventions might inhibit self-discipline and discourage creativity. The opportunity to pursue technology that leverages or influences cognition either for educational or for military purposes cannot be overlooked or ignored.

The net conclusion is that legitimate neuroscience research aimed at maximizing the "healing" imperative has to be understood as clandestinely co-existing with the "harming imperative" where dual-use science allows military experts to redirect neuroscience technology toward a weaponized purpose. Therefore, the explicit use of covert technology designed to target cognitive functions and neural operations for the purpose of degrading, impairing, or injuring brain health and its normal operations is obvious and real. The implications of our brains becoming targets of hostile neuromodulation must be understood.

1.3. Exploitable neuroscience areas of interest

Given the function and operation of the CNS, the ANS, the vagus nerve, dendrites, nerve cells, axons, synapses, and other elements in the brain's operational environment and its apparent linkage to human behavior, certain ambiguities about it reside largely in mystery, speculation, and theory. We know there are certain cognitive processes and foundational elements of thought and analysis but their direct causative triggers, operational sequence, and biochemical aspects are the stuff of ongoing medical research. We retain some degree of confidence that cognition is vital and perception is crucial without being able to explain how plasticity works and happens as it does. Many unanswered questions exist.

We also reckon that cognition can be impaired, expanded, and diminished but it still reflects a puzzle in neuroscience, which is rooted in studies of brain plasticity and what really governs that phenomenon. If cognition can be enhanced or reduced then specific influential factors essential to that must be understood. Therapeutic neuroscience research aims to heal, restore, treat, and renew damaged or impaired brains. Brain warfare destroys that notion and identifies cognition and brain function as legitimate targets.

It may offend reason and sensibility to imagine brain wars as evidence of a looming contest where the indirect influence of brain functions by hostile nations and implacable enemies target cognition, perception, and analysis without fear of discovery or forensic attribution. However, we stand at the threshold of a contentious era latent with such pernicious and global threats, which merit attention.

The enhancement, and targeted erosion, of cognitive processes such as memory and analysis, for example, raises questions about how it occurs, what technologies enable it, and what aspects of cognitive function are truly vulnerable to degradation. We grasp a linkage between shortened telomeres as part of the aging process. Yet we pursue energetic cures for Alzheimer's disease and seek insights about driving factors behind autism and genius because of the belief that an underlying set of causes explains why it happens in our global population. Science and technology offers the opportunity for the engineered convergence of multiple technologies to magnify and enhance brain function. While seemingly benign and beneficial, we must contemplate the diversion of good science for evil purposes. Why not consider the same engineering paradigm for alleviating TBI as an alternate pathway to brain-altering weapons? Does it make sense in blending nanotech, genomics, electromagnetics, and other technological dynamics that **only a more productive brain can result**? Should this excursion in neuroscience fiction be encouraged or tolerated? Are the best experts pausing carefully to consider the impact or implications? What happens then?

Will acceptance of humans on a developmental curve of intelligence mean that efforts to maximize brain function and mental power in the future are risk-free, dangerous, or ill-advised? If serious transhumanism and brain implant research are launched where the brain-machine interface is fundamental, who will govern it and what baseline moral imperatives or ethical standards will guide it? Will the net result be a better world, one where ordinary people are better off, or open the door to totalitarian mind control? Or can one assert that the open-ended Pandora's box of totalitarian mind control has already been loosened? Can the risks, implied dangers, and unexpected negative outcomes be casually assumed away? Is the carefully engineered augmentation of human brains a desirable or lofty societal goal with no hidden or implied drawbacks? Instead is it evidence of true genius or simply the manifestation of madness itself?

The single best revelation that serious neuroscientists must confront is that for all the laudable therapeutic and treatment augmentation approaches, benign technologies, and creative devices developed for brain healing and cognitive well-being, a parallel arena of covert brain weapons, insidious cognitive disruptive technology, and palpable ongoing research to maximize neural threats and exploit neurobiological vulnerability are being researched, developed, and perfected in covert settings. This is the paramount challenge, emerging global threat and enduring medical dilemma of the 21st century.

1.4. Technological progress in neuroscience and the dance with the devil

Technologies we hardly imagined 50 years ago such as cell phones, hypersonics, advanced genomics, quantum computers, and vehicles for transiting space are prevalent and ubiquitous. The human brain has launched and nurtured these ideas and infused these technologies in ways that cause one to ponder if the brain itself is truly without limits. Is it desirable that brain enhancement and expansion of human cognition become the salient goal of human activity after 2030? Does this goal displace the quest for peace, an end to poverty, or the odyssey of ending human hunger and suffering? Does it open the door to human experimentation and risky neuroscience projects to attain brain enhancement? What cautionary standards and guidelines should govern medical research in this domain? If we are simply trying to end a variety of painful and devastating brain diseases and erase the causes of cognitive decline, why not invest a full-scale Manhattan Project on the matter? Such a fulsome inquiry must confront, discern, and discover the risks and implied dangers as well as the benefits of neuro-maximization. Absent an array of signals that the risks outweigh the benefits, should we expect or encourage medical science to run down this road?

We must always balance the good with the bad, the expected with the unexpected, the known with the unknown. Outcomes are not guaranteed and negative or harmful results on open-ended neuroscience research do impose a cost on its sponsors, creators,

and subjects. Basically, we raise the important question of whether the goal of enhanced brain function and maximized cognitive health should be pursued regardless of the risks involved. After all science and technology has brought society great things and may do so in this arena as well. Although we can seldom see or anticipate the actual end of all things we embark on today, we can pursue legitimate research as a worthy, acceptable, or tolerable risk to embrace. The offsetting reality is that science and technology has both beneficial and destructive potential owing to its dual-use nature and that exploitation of the best ideas for evil outcomes never goes away.

Now we generally accept certain technologies can alleviate troubling emotional or mental health issues and relieve those with traumatic brain injury. For example, the magnetic resonance imaging (MRI) and the MeRT (Magnetic e-Resonance Therapy) used by neuroscientists offer a benign and helpful pathway to reduced mental stress and reductions in chronic brain problems. Here the admirable skills of public health aim to heal and restore people suffering a variety of mental and cognitive woes. It can readily be extolled as marvelous and conferring verifiable relief on those afflicted. Neuroscience remedies are doubtless wonderful things.

However, can we also contemplate for a moment the deliberate redirection and repurposing of MRI technology for mentally harmful or disruptive effects? MRI treatments are delicate and include the risk of incorrect treatment dosage and exposure risks, which can be injurious. Basically, our brains lack sustained defenses against inadvertent MRI accidents as well as external nefarious efforts to degrade and distort ordinary thought and cognition. Instances of MRI resonance errors and accidents are very real. Should we accept that a hostile nation could subvert cognitive functions and redirect certain technologies such as MRI and TBI insights to instead disrupt and destabilize the brain? The idea is not far-fetched and medical science must reckon with the reality of this scenario as the inherent risks of devising deliberately harmful neuro-cognitive technologies and neurobiological disrupters for warfare use are genuine.

There should be few experts surprised at the highjacking of legitimate medical and scientific research away from therapeutic purposes to instead create harmful weapons technologies. This has been the history of dual-use science for years as benign and helpful science is perverted and re-engineered for weapons purposes. The overall concept of devising a technology to deliberately impair or degrade a healthy brain and diminish its cognitive functions seems alien but is genuine, macabre, and very real.

Targeting healthy brains to disrupt, impair, destabilize, and degrade their innate functions using stealthy technology sounds like Science Fiction but it isn't. While many of our cognitive instincts against danger are sound our brains to stop short of being alerted instinctively to every conceivable pitfall, calamity, and risk. We can fall victim to shock and surprise without warning. Try for a moment to picture our brain as a target and an objective to be conquered, neutralized, and crippled by a determined clandestine foe. As wild and criminal as it seems, this has happened to many people and has been verified as a confirmable neuroscience assault incident. Those adversely affected by targeted disruptive cognitive degradation technology in recent years have stepped forward to claim harm and seek relief knowing a shroud of serious doubt and medical derision is often levied at them. If this harmful technology exists, where is the proof of its existence that the naysayers claim to have? Worse, the medical profession appears stymied by the absence of a coherent case definition and uniform treatment protocol for these victims. However, these randomized attacks on human cognition and brain function are significant, affecting hundreds, and have continued to inflict adverse effects. Evidence abounds regrettably that this is happening in our midst.

1.5. Brain vulnerability—scalar waves and NeuroStrike

Brain vulnerability to RF signals, electromagnetic forces, and other indirect or external technologies shown to be potentially hazardous and harmful to cognitive function, and which contain the genuine risk of injury if not properly dosed or calibrated by medical professionals, is well established. What is far less well-known is the episodic evidence, and a fragmentary array of compelling facts indicates that nefariously engineered, designed, and devised technologies that aim specifically to impair, disrupt, or degrade brain functions and reduce cognitive performance are real. These technologies operate clandestinely but frequently and often effectively as the novel deliberates new weapon of the 21st century. Here the suspension of disbelief and foundational medical curiosity should guide our inquiry.

Two rudimentary examples of this neuro-disruptive and cognitive degradation technology can be found in the metaphysical and biophysical realms of Tesla waves and their bio-effects along with remote convergent technology platforms targeting individuals for the purpose of eroding their cognitive abilities. This is not specious speculation, nor does it depict a future technology risk decades away, instead both are here now despite being misunderstood, ignored, or overlooked purposely because of the challenge they truly represent. Deconstructing and decoding these harmful technologies is a crucial medical challenge.

Aside from well-known brain vulnerability to RF and electromagnetic forces, we must confront the reality that fundamental aspects of Tesla wave [or scalar wave] technology include certain discernible effects on human biology. Scalar waves are three-dimensional self-contained waves that spin on one fixed axis. These non-linear waves disseminate throughout the bodies through crystalline lattices of elaborate collagen networks as they help in increasing every hydrogen atom's energy covalent level in the body. These hydrogen bonds are crucial to our body's ecosystem as they hold our DNA together. Scalar waves operate at a frequency range that aligns with the Schumann Resonances, which reflects the massive electrical activity between the surface of the Earth and the ionosphere in the form of standing perpetual waves of electricity. Schumann Resonances are standing waves, which resonate with human biosystems at 7.83 MHz. Each lightning burst creates electromagnetic waves that circle the Earth between its surface and the ionosphere. Some of the waves—if they have the right interactive wavelength—combine and increase in strength to create a Schumann resonance with human effects. Evidence from research shows a degree of cellular, neuronic, and immune suppressive factors influenced by elements of scalar waves [2].

Quantum biologist Dr. Glen Rein in 1989 described scalar waves as "non-electromagnetic fields" that transmit information and other fields of consciousness. Scalar waves operate independently of distance and time and propagate at faster-than-light speed. Their effect is three to five times stronger than that of electromagnetic

fields (EMFs) and cannot be detected by conventional instruments for measuring electric and magnetic fields. They are also referred to as quantum fields, tachyon fields, neutrino fields, Tesla waves, non-Hertzian waves, and longitudinal waves. Rein theorized that coupling between harmonic oscillators represented by scalar wave action potentials generated from active neuronal networks in the CNS reveals a non-linear nature exhibiting several types of quasi-particles, each with their own characteristic resonant frequencies. These allegedly mediate the non-linear phenomenon carriers of biological information along macromolecules like DNA. He posited that scalar waves influenced alpha-helical intra-membrane proteins involved with signal transduction mechanisms in the brain [3]. His research tried to explain the implied interactive effects of scalar waves on human biophysiology and its plausible impact on neurobiology.

Scalar waves may have a significant, but poorly understood, series of effects on human physiology and brain function as well as neuronal networks inside the CNS. Rein also suggested that scalar waves are more biologically influential and active than their linear electromagnetic counterparts. Some studies of the direct effects of scalar energy on nerve cells in tissue culture indicate that scalar energy can modulate the basic biochemical communication between nerve cells mediated by neurotransmitters. It suggests scalar energy can directly affect the nervous system apart from any autonomic feedback signals from the body and may indicate that scalar energy, like electromagnetic energy, can have a direct effect on the cell membrane and neurotransmitter uptake. He also theorized that scalar energy waves could ultimately convert to electromagnetic energy in biophysical membranes.

Research on the bioeffects and neurobiological implications of electromagnetic systems have been undertaken by several experts since the late 1960s. During the cold war, experts disagreed over the existence of so-called “bioenergetic weapons” and whether Soviet scientists were developing them. One Pentagon contract scientist named Delgado strongly asserted the plausibility of electronically inducing emotions and behaviors remotely by focusing on specific areas of the brain claiming that “radio stimulation of different points in the amygdala and hippocampus might product a variety of effects such as elation, enhanced concentration, super relaxation and other responses”. Likewise, the indirect ability to induce negative cognitive and behavioral effects is implied as well. U.S. scientist Alan Frey discerned that microwaves could directly transmit sounds via the auditory nerve, which sounded like “…a buzz, clicking, hiss or knocking…” concluding firmly that the brain is a passive net receiver of electromagnetic waves. This reinforced work by Dr Ross Adey who found effects of EMFs on the efflux of calcium from brain tissues and their sensitivity to weak intrinsic and environmental fields with major biochemical, physiological, and behavioral effects was genuine [4].

Since 2016, when U.S. diplomats posted to the embassy Havana first reported annoying neurological problems necessitating their medical evacuation from Cuba strong doubts, suspicions and strident criticisms were levied by media and medical experts alike. Since then records display that a widening array of similar victims were identified in the 2016–2018 period among diplomatic, military, and intelligence community staff. Their work was most often overseas engaged in trade, commerce, science, or energy issues. A very large group of persons has been adversely affected by this electronic form of cognitive warfare where nanopulsed RF, acoustic factors, and elements of nanotech combine to inflict serious neurobiological impairment in its victims. It is far less illuminating to know the actual number of verified victims than to ponder instead the mere existence of this harmful technology, its pernicious use against defenseless people, its possible military applications, and discerning exactly what form and structure of technology could be causing this series of cognitive impairment events. This technology and its insidious effects I have officially termed as NeuroStrike [5].

If we allow ourselves to consider how silent, covert, and insidious neuro-modulators can impair cognitive functions, damage analysis, and decimate ordinary reasoning along with speech, memory, and spatial orientation, we must recognize it is no longer theoretical science fiction. Further are the world’s best neuroscience experts cognizant of the persistent problems quantum computers and AI can introduce or resolve—or regrettably and inadvertently generate? Regrettably we find enhancing NeuroStrike scope and effectiveness via enhanced quantum AI, and unlimited IOT involves a spectrum of risks we can hardly envision let alone regulate. If a convergently engineered mix of IOT, AI, quantum, nanotech, ChatGPT, and other technologies yielded a healthier brain, why would anyone aim to thwart that? Our caution flags remain subdued. As a result, we have placed our support behind mixing these technologies in explicitly convergent strategies to attain a better future [5]. In effect, we openly create an electronic gateway to a more ideal, tranquil, stable, and secure future where that formula is attractive. Is this a calculated gamble resulting in brain maximization or servitude?

What criteria should govern the application of risks in these areas of neuroscience exploration? The explicit convergence of these technologies contains zero risks according to some critics who see mostly benign effects. The energetic pursuit of AI to replicate or augment human brains illustrates the dilemma. AI designers consider text-based regurgitation of massive databases, integration of disparate knowledge repositories, and a less than subtle ability to persuade, influence, reason, or imagine in complex cognitive operations to parallel key brain functions as essentially equivalent to the human brain itself. Just blending these cutting-edge technologies includes great complexity mixed with a largely manageable set of risks they say. But how best to evaluate, estimate, and judge the net implications of that work? The merger and explicit convergent engineering of nanotech, quantum, IOT, and cyber over the next few years in overall efforts to parrot brain functions contains risks and unseen consequences, which even the experts themselves cannot—or refuse to—fathom. The inspired venture into an abyss is one of our own making.

Then there is the question of brain research and its net impact on human free will, judgment, and rational thought. If we allowed ourselves to imagine how neuroscience might inadvertently diminish those precious qualities while pursuing a “better brain”, would that be enough to impose a halt on enhanced brain research? Likely not. Worse we fail to grasp the subtle uncharted influence of such research on the building blocks of human biological systems.

Telomeres are DNA-protein complexes located at the end of chromosomes, which protect chromosome ends from degradation and fusion and wither with age. Nobel prize-winning scientist Elizabeth Blackburn in 2006 showed the influence of telomeres on genes and DNA diminishing with each instance of

cell division. Telomere length (TL) in blood cells is well known as a biomarker of human aging and disease; however, little is known regarding variability in TL in nonblood, disease-relevant tissue types. Telomeres have the job of protecting DNA during its replication, and progressive shortening of them can result in DNA damage. It has been demonstrated through research that telomere shortening is associated with cognitive impairment. The exact extent to which telomeres can be adversely influenced or impaired by external electromagnetic factors or scalar waves or even NeuroStrike technology is largely unknown. However, it is fair to assert that telomeres are likely vulnerable, along with other aspects of tissue integrity, to the negative effects of that technology. Research already shows how telomeres exhibit radiosensitivity in older adults and suggests there may be a wider scope of influence [6].

This critical and essential warning derives from a fundamental awareness of how our bodies, brains, and internal systems respond to electromagnetic waves, signals, and influences. Understanding that engineered externally mounted gateways to exploit human cognition and systems designed to impose nefarious neural degradation or misdirection starts with a keen awareness of how electromagnetic phenomena interact with our brains and nervous systems. We know that transcranial magnetic stimulation (TMS) is a technique used to induce a short-term interruption of normal activity in a relatively restricted area of the brain caused primarily via rapid changes using a strong magnetic field near the focus of treatment activity. Modern pervasive societal technology, including nonionizing radiation from power lines, wireless devices, and cell phone towers, is ubiquitous in our environment and practically unavoidable. Also we face risks arising from extremely low-frequency EMFs, which routinely surround home appliances as well as high-voltage electrical transmission lines and transformers. Evidence of adverse health effects from EMF, including its controversial influence on the brain, ranges from studiously inconclusive to menacingly harmful. Few experts today wish to conclusively state that continuous EMF exposure is a genuine health hazard. However, we do know that exposure to high levels of non-ionizing energy, such as at radio wave frequencies, can potentially damage the structure and function of the nervous system. In some ways, the perverse politics of environmental science mitigates a deeper dive into human health implications [5]. Human tolerance of unrestricted technology application is the paramount ethical and moral dilemma of our time [7]. A prime lesson for neuroscience is to learn more about what it all means.

Looking at how humans are configured both biophysically and biochemically as genuine repositories for electromagnetic activity and the record of human sensitivity to, and influence by, electromagnetic factors is beyond debate. Human sensitivity to, influence by and neurobio9logical reaction to ambient EMF levels in the environment is indisputable. The intensity of electromagnetic radiation in the human environment emanating from these fields—which are ubiquitous and normally found in developed areas—is both significant and plentiful in human health terms. Normal EMF impact on living organisms derives from its direct tissue penetration and even more. Specifically, the nature of our brains as a biological organ automatically includes a degree of electromagnetic sensitivity and responsiveness to EMF. Scientific theory and research into human intelligence note that in order to retain intelligent thinking and sustain cognitive systems there needs to be a constant, globally available, synchronization system that continuously stabilizes the brain. Relevant significance can be found in the electromagnetic signaling system, supported by a biochemical system. EMF exerts both a thermal and non-thermal effect on brain tissue, and its effects on other parts of the body (nervous system, endocrine system, visual system, cardiovascular and immune systems) are well established. More specifically, EMF radiation is persuasively reported to affect the CNS, brain chemistry, and histology and traverses the blood-brain barrier [5]. We lack better evidence to ascertain what the biophysical and neurological impact of EMF on human life really indicates or implies.

Radiofrequency (RF) EMF and extremely low-frequency (ELF) MF have been classified as “possibly carcinogenic” to humans by the International Agency for Research on Cancer (IARC). The production of reactive oxygen species (ROS), potentially leading to cellular or systemic oxidative stress, was frequently found to be influenced by EMF exposure in animals and cells [8]. We also understand that limited medical applications of EMF for treatment and diagnostic purposes found in the electroencephalograms (EEGs) and MRI used to treat neural disorders are commonplace. Repurposing and re-engineering these technologies for harmful, disruptive, and damaging effects are just as real.

Effects of pulsed and sinusoidal ELF fields on the electrical activity of the nervous system have also been studied extensively. While only high-intensity sinusoidal electric fields or rapidly pulsed magnetic fields induce sufficient current density in tissue to alter neuronal excitability and synaptic transmission or to produce neuromuscular stimulation, their net effects at verified intensities are beyond dispute. When a person focuses attention or tries to remember something, this activity fires thousands of neurons simultaneously at the same frequency generating a wave—but at a rate closer to 10–100 cycles per second. If that were not enough to ponder, aside from the brain the heart is the largest most potent EMF inside the body exceeding brain electromagnetic sensitivity by 60 times.

It is well known that weak EMF could cause all sorts of dramatic non-thermal effects in body cells, tissues, and organs. When other technologies are mixed in such as nanotech and genomics, they complicate the task of discerning whether these factors, or other environmental factors, are controlling or influencing behavior, analysis, and perception. When nanotech aspects are added to EMF influences, available research shows high risk of ambient neurotoxicity not only exists from nanotech in foods but adds a degree of mystery to the challenge of decoding all influences on neuroplasticity. It is quite a leap of geopolitical conspiracy to assert that certain nations have already embarked on a deliberate and perverse campaign to degrade human cognition and devise a neurobiological weapon. However, the fact that it is scientifically possible to achieve doesn’t nullify the risk of its covert and ambiguous existence. Some evil and dangerous regimes may actually want to leverage nanoparticles resident in humans as silent bio-transducers of external ELF signals [9]. This view assumes in the array of contending states already committed to a global arms race of exotic futuristic weapons that some would find this stealthy non-kinetic form of covert warfare intriguing [10]. Neuroscience is not accustomed to seeing itself as the object of wanton weapons development, superpower lust, and redirection of perverse energy. Instead this is simply to draw attention to the ramped-up risk for human health based on the presence of nanoparticles in various aspects of our normal lives dwelling covertly there largely without our knowledge or consent.

Their inherent potential as magnifiers of neural degradation must be studied, examined, and grasped.

In 2012, chemists at New York University (NYU) created a nanoscale robot from DNA fragments walking on two legs just 10 nm long. This invention was termed a "nanowalker"; with the help of psoralen molecules attached to the ends of its feet, it takes its first baby steps: two forward and two back. Its creators envisage a future molecule-scale production line, where molecules are shifted until the right location is reached. In this unique way, a nanobot injects chemistry like "spot-welding" on a car assembly line. This is a fairly clear example of "biomimetics", where with nanotechnology they can imitate some of the fundamental biological processes in nature, such as the behavior of DNA, to engineer new methods and perhaps even improve them [11]. The "nanowalker" implies a high-intensity level of serious research, which by itself seems benign but when convergently mixed deliberately with other technologies such as nanotech, neurotech, biotech, and others, paints a different picture as one contemplates the distribution of dangerous weapons systems.

UN agencies have also noted this development asking whether the developmental trajectory of nanomaterials as they potentially affect biological systems is really a worthwhile thing. The WHO recently went on record as well saying, "The properties of nanomaterials, and of engineered nanoparticles in particular, have raised concern about unwanted or unexpected interactions with biological systems, which could result in adverse consequences to human and ecosystem health. Though rapidly growing, knowledge on these aspects is limited and many uncertainties remain" [12].

So we are left to speculate about the interactive aspects of nanotech embedded as it is with RF, electromagnetics, and other advanced technologies thus far mentioned on human neurological health and cognitive performance. The sheer magnitude and interactive complexity of these convergently engineered technologies creates a widely unknown degree of risk and possible misuse by those engaged in doing so. There is no international oversight or treaty-based system, which governs, directs, or depicts the true nature of ongoing convergent technology research on a global scale. Worse, we lack the kind of reliable data that point to specific neurobiological impacts on human cognition and neurophysiology, which connects with extended use of laptops, smartphones, and immersive virtual games. In keeping with an open-minded consideration of factors that can both stimulate and degrade cognition, we cannot afford to rule out the insidious effects of certain social media platforms such as TikTok.

Metaverse and A/R systems that are increasingly popular display not only strong consumer appeal but are embraced as periodic but engrossing entertainment; serving as a platform for exchanges of video material among people, it provides a subtle but powerful impact on human cognition, especially among young adults whose brains are still undergoing cognitive growth and biophysical maturation. We reckon their brain chemistry and neurological stability are still developing and yet that offers the ripest and most delectable target for TikTok to exploit or nfluence [5, modified footnote]. What does or should neuroscience know about this?

A 2022 Harvard medical review of the issue involving TikTok found that the first-known examples of social media-induced sociogenic illness were recognized in the period 2020–2022. It was a time coinciding with the COVID pandemic. Neurologists began seeing increasing numbers of patients, especially teenage girls, with unusual, involuntary movements, and vocalizations reminiscent of Tourette syndrome. After ruling out other explanations, the tics in these teenagers seemed related to many hours spent watching TikTok videos of people who report having Tourette syndrome and other movement disorders. Posted by social media influencers, these videos have billions of page views on TikTok; similar videos are available on YouTube and other sites [11]. This is not intended to condemn TikTok but merely refers to it as a platform of high-level psycho-social influence on a population whose cognitive immaturity makes them highly susceptible to its immediate and downstream influences. As such, it is a legitimate area of neuroscience research, which enables a better grasp of its genuine immediate and more subtle long-term effects on a developing brain. Entertainment and diversion aside, if TikTok is truly benign in cognitive impact terms we should know it just as much as knowing if it inflicts hidden harmful effects.

Just as the maturation of quantum, AI, IOT, nanotech, neurobiological factors, EMF, magnetobiology, scalar waves, and NeuroStrike, all evolving together in parallel but interactive ways demonstrates the implied global risks involved it is accordingly crucial to understand what the net cognitive and neurobiological effects actually are. Idle speculation, sensational allegations, and wildly unconfirmed rumors about grossly negative or positive effects of these combined technologies on human cognition and neurobiological health are unknown. The era of NeuroStrike, unrestricted cognitive warfare, and targeted neuromodulation by hostile nations or groups is upon us. Defenses and protection against it are nearly impossible to find today. However, we must do so as it is not only disadvantageous for attaining a healthy society and globally secure population but essential and critical for the security and well-being of the planet itself. Personal liberty, freedom of thought, sanctity of the person and cognitive integrity is in jeopardy without it.

2. Discussion

The issues raised in this essay suggest broad swaths of society and government, in partnership with academia and serious science, must wrestle with the threshold ethical and rational dilemmas, which an era of unrestricted mind wars indicates as genuine and unavoidable. There are no arms control treaties, which deal with this issue; there is no stable UN agenda, which tables and examines these questions; and few world leaders are prepared to acknowledge the era of risk for covert extended mind wars is surely here ready to be unleashed. No universal injunctions or legal restrictions pose a barrier to the onward growth and evolution of cognitive warfare and targeted neural degradation systems. As a result, we will find ourselves adding a wholly new technology nightmare to everyday life dwelling smugly alongside nuclear weapons, environmental cancer, pandemics, catastrophic natural disasters, and other well-known scourges to humanity's continuation.

The challenge is fairly simple while the answer is enormously complex—thwart the emergence of mind war technology or curb its further development—but how? Competition and rivalry among nations with highly advanced weapons systems, and strong investment in acquiring or devising more of them, shows no sign of ending. It also appears to be much too late for science and medicine among the global community of nations to fence off this area of deliberate neurobiological mischief and protect it from yielding calamitously bizarre and harmful outcomes. Political

leadership is needed as much to protect unguarded society as it is to erect robust defenses while they pursue steps to eradicate the threat. However, as with nuclear weapons—we have learned to adjust and live with the problem knowing that tolerating cognitive warfare systems does nothing to halt its continuation.

The era of real cognitive warfare is certainly upon us. However, it also poses a unique dilemma—how do governments take steps to protect their leaders and citizens from the onset and indiscriminate use of cognitive warfare technology by enemy nations while at the same time devising reliable technologies to attain a geostrategic deterrent edge or advantage over those hostile states and interests to discourage the use of this technology for destructive purposes? This is both a starting point for further research and an enduring persistent challenge for those concerned about minimizing or neutralizing cognitive warfare.

3. Conclusion

National leaders aware of the changing environment of high-technology warfare involving many complex systems must grasp what the implications of targeted neuromodulation and covert cognitive warfare mean for societal stability and security. This is especially true for nations led by hostile, tyrannical, rapacious, and warlike nations when equipped with this technology. More pointedly imagine what several equally equipped nations with mind wars technology could unleash. The reckoning we face is knowing that in complex fields of electromagnetics, cyber, directed energy, genomic, neurotechnology, and nanotechnology our ability to impose governance and regulation of these scientific areas of research no real boundaries or rules of conduct exist. There is a glimpse of some relief possible if wider knowledge of the emergent cognitive warfare risks we all face are more widely known and studied. For example, we must discuss and examine the impact of this on humanity itself, its sanctity and security as a starting point. What is missing is a full-scale international program of research and sponsored study on these issues:

- Effects of RF, nanotech, scalar waves, cyber, directed energy, neurotech, and other advanced technologies on global human health and cognitive well-being.
- Discern and study the latent and observable effects of social media platforms, systems, and virtual technologies, which allow people to absorb and accept experiences that may be cognitively harmful and where hidden damage to human reason, thought, and judgment can be found.
- Conduct long-term research on external technologies designed to deliberately attack or degrade human cognition, neurobiological health, and devise programs to restrict and curtail their use.

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References

1. Moreno JD. Mind wars. Brain science and the military in the 21st century. New York: Bellevuee Press; 2012.
2. Rein G. Biological interactions with scalar energy cellular mechanisms of action. Proc. 7th Internal. Assoc. Psychojronics Res., George, Dec., 198B. Lecture. Available from: https://www.

eesystem.com/wp-content/uploads/2018/02/Biological-Interactions-with-Scalar-Energy-Cellular-Mechanisms-of-Action_EES_bio_scalar.pdf

3. Muehsam D, Chevalier G, Barsotti T, Gurfein BT. An overview of biofield devices. Glob Adv Health Med. 2015; 4(Suppl):42–51.
4. Delgado JM, et al. Intracerebral radio stimulation and recording in completely free patients. J Nerv Ment Dis. 1968; 147(4):329–40.
5. McCreight R. Neuro-cognitive warfare: inflicting strategic impact via non-kinetic threat. 2022 Sep 16. Available from: https://smallwarsjournal.com/jrnl/art/neuro-cognitive-warfare-inflicting-strategic-impact-non-kinetic-threat; also see US National Academy of Sciences report: An assessment of illness in U.S. government employees and their families at overseas embassies. 2020 Dec 5. Available from: https://nap.nationalacademies.org/catalog/25889/an-assessment-of-illness-in-us-government-employees-and-their-families-at-overseas-embassies; and see also US Department of Defense response to House Report. p. 117–88, accompanying H.R. 4432, the Department of Defense (DoD) Appropriations Bill, 2022, "Anomalous Health Incidents/ Havana Syndrome," Jan 13, 2023.
6. Ayouaz A, Raynaud C, Heride C, Revaud D, Sabatier L. Telomeres: hallmarks of radiosensitivity. Biochimie. 2008; 90(1):60–72.
7. Quora. How the human body creates electromagnetic fields. 2017 Nov 3. Available from: https://www.forbes.com/sites/quora/2017/11/03/how-the-human-body-creates-electromagnetic-fields/?sh=18253d8556ea
8. WHO. WHO guidelines on protecting workers who work with nanomaterials. 2017 Feb 2. Available from: https://www.ncbi.nlm.nih.gov/books/NBK525054/
9. Nanoparticles in food: small size, big health problems? Available from: https://www.webmd.com/special-reports/food-additives/20150722/nanoparticles-food-additives
10. Shmerling RH. Tics and TikTok: can social media trigger illness? 2022 Jan 18. Available from: https://www.health.harvard.edu/blog/tics-and-tiktok-can-social-media-trigger-illness-202201182670
11. Liu M, et al. Biomimetic autonomous enzymatic nanowalker of high fuel efficiency. ACS Nano. 2016;10(6):5882–90. doi: 10.1021/acsnano.6b01035
12. Neurostrike – The cyber, cognitive, nanotech and electronic gateway to mindfully impaired metaverse [Mccreight]. 2021. Available from: https://kstatelibraries.pressbooks.pub/cyberhumansystems/chapter/8-neurostrike-the-cyber-cognitive-nanotech-and-electronic-gateway-to-mindfully-impaired-metaverse-mccreight/