

Apocryphal Psychotechnologies

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The term “technological imaginary” is often used to describe the ways in which technological innovations are invested with meaning, as the development of new technologies is not only driven by specific social needs but also tends to express or embody more abstract social desires. Lee Worth Bailey argues that these technofantasies serve to reinforce the idea that technological progress is inherently good because they promise an ever-increasing degree of mastery or control over nature, yet they are also dangerous because they often obscure potential risks: “The central expectation of control, the desire for mastery, is an integral part of technological intentions, but it is an inflated expectation—an enchantment—that can lead to terrible consequences.”^[1] Bailey thus concludes that inventors and producers often use impossible fantasies or “enchantments” to promote public acceptance of new technologies and conceal their potentially disastrous side-effects, and he urges users to be more critical of these fantasies as well as the idea of technological progress itself as an inherent good.

While the concept of the “technological imaginary” is usually applied to real technological innovations, it has also inspired the concept of “imaginary technologies”—a term that refers to technological devices that were “never actually built” as well as purely conceptual technologies that “cannot be built” but “whose implied meanings, nonetheless, have an impact on the factual world of media.”^[2] Imaginary technologies offer valuable insight into the desires and fantasies that drive the development of new technologies because they embody these fantasies in their purest form—unfettered by financial constraints, practical considerations, or even physical laws. As Matthew Bernico points out, however, there is also the third category of “apocryphal technologies”—a term that refers to devices that are actually implemented yet do not perform the functions ascribed to them. These technologies may be intentionally fraudulent or simply misunderstood, yet regardless of their creators’ intentions their primary function is to promote belief in their own functionality: “[An apocryphal technology] doesn’t work in the strictly functional sense, but does work in the sense that it is a source of reification in the belief that it works.”^[3] Like imaginary technologies, in other words, the production of apocryphal technologies is fueled by desires and fantasies that can never be realized; unlike imaginary technologies, however, apocryphal technologies more clearly demonstrate the role that material objects play in the promotion

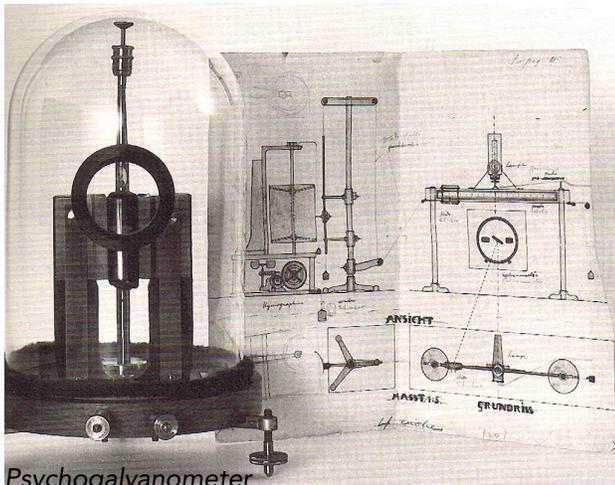
of technological “enchantments,” as their practical application often endows these otherwise imaginary technologies with a veneer of legitimacy and plausibility.

Apocryphal technologies are particularly interesting for the study of technological imaginaries precisely because they blur the boundaries between the legitimate and the illegitimate or the plausible and the implausible. For instance, it is often difficult to distinguish apocryphal technologies from real technologies because they tend to be based on the same underlying principles and assumptions. The aspirations that inform apocryphal technologies can also inform real technological innovations by serving as a springboard for new ideas or by anticipating the development of new inventions. The combination of fantastic effects and apparent plausibility also makes apocryphal technologies particularly suitable for conspiracy theories, which similarly encourage a belief in the impossible by imposing a veneer of truth and veracity. Unlike imaginary technologies, therefore, apocryphal technologies can promote faith in technological progress as well as fear of technocratic control. The following paper will explore the desires and anxieties that inform apocryphal technologies by examining a series of electronic devices that allegedly influenced (or were influenced by) the mind. While the claims made about these machines were not supported by scientific research, they were all based on a common understanding of the mind as an electronic apparatus that was subject to modification and manipulation, and they reflected a shared desire for a perfect mind-machine interface, which was imagined as a source of either unlimited power or complete powerlessness. At the same time that these psychotechnologies blur the boundaries between the legitimate and the illegitimate or the plausible and the implausible, therefore, they also illustrate the uneasy tension between utopian aspiration and dystopian paranoia—particularly with regard to the future of humanity.

Mind Reading

In the 1870s German neurologists Gustav Fritsch and Eduard Hitzig introduced the first electrophysiological conception of the brain by demonstrating that muscular contractions could be induced by electrically stimulating the exposed cerebral cortex of anesthetized dogs.^[4] The idea of

the brain as an electrical apparatus was later confirmed and further developed by British physician Richard Caton, who constructed the first device that could translate the electrical currents in the exposed brains of monkeys and rabbits into visible wave forms.^[5] The use of this device was limited due to the fact that it could only be applied to exposed brains, but scientists soon found that it was also possible to measure electrical currents in the nervous system by placing electrodes on the surface of the body and using a galvanometer to measure changes in skin resistance. In the late nineteenth century, for example, physicians at the Salpêtrière Hospital in Paris found that resistance levels among hysterical patients changed in response to various stimuli,^[6] and they gradually became convinced that there was a direct correlation between skin resistance and psychological processes.^[7] In 1890 Russian physiologist Ivan Tarchanoff also claimed that skin resistance varied according to the emotional state of the subject, and he developed a device to measure this effect that became known as the Psychogalvanometer.^[8] German physiologist Wilhelm Wundt subsequently used a Psychogalvanometer to measure the emotional sensitivities of subjects to various words, which inspired its adoption as a lie detector,^[9] and Swiss neurologist Otto Veraguth speculated that these tests might have therapeutic value,^[10] which inspired Swiss psychiatrist Carl Gustav Jung’s use of Psychogalvanometers to identify areas of mental conflict that could be explored in therapy.^[11] By the early twentieth century, therefore, the nervous system was understood as an electrical system, thought was understood as an electrical impulse, and the brain was understood as a generator of psychic energy. The function of the Psychogalvanometer was fundamentally apocryphal, however, as it reflected an understanding of electrical resistance as a literal metonym for mental or psychological resistance.



Psychogalvanometer

The electrical measurement of thought soon inspired new scientific theories regarding the function of memory. For example, German biologist Richard Semon introduced the concept of “engrams” to describe how sensory stimuli produce electrophysiological changes in an organism that alter the flow of nervous energy whenever the same stimuli are repeated.^[12] This concept inspired American science fiction writer L. Ron Hubbard’s theory of “dianetics,” which was similarly based on the idea that sensory stimuli could be imprinted onto the nervous system and that these imprints could influence the flow of nervous energy. What Hubbard added to this electrophysiological understanding of the mind was the idea that engrams served to stifle the flow of nervous energy and that word association tests could be used to identify and eliminate mental blockages, thereby releasing untapped reservoirs of psychic energy and potentially even psychic powers. In his original manifesto for this new “science of mental health,” Hubbard also presented an explicitly technological theory of the mind by describing the brain as “a computer machine that could work from data stored in memory banks” and arguing that the optimization of this machine was an engineering problem rather than a psychological problem, as it involved locating and eliminating “electronic blocks.”^[13]

American inventor Volney Mathison attended some of Hubbard’s lectures in 1950, and they inspired him to develop an electronic version of the Psychogalvanometer (known as the Electropsychometer) that could allegedly identify engrams by detecting skin resistance using hand-held electrodes. Mathison described this device as

a “psychic X-ray” machine that could “read the mind” by “disclosing especially painful past events that had impinged upon the central nervous system.”^[14] Once the locked-up energy produced by these events was discharged, the Electropsychometer would no longer respond to repeated stimuli, thus confirming that the subject was “clear.”



Electropsychometer

Mathison presented this device to Hubbard, who was convinced that Electropsychometers “detect with accuracy things which would have otherwise been hidden from man forever” and that they “give an auditor a deep and marvelous insight into the mind.”^[15] Hubbard even patented his own version of the Electropsychometer (known simply as the E-Meter), which was put into use as early as 1951. For Hubbard and his followers, therefore, the E-Meter seemed to prove the validity of dianetics.



E-Meter

Numerous critics have already addressed the apocryphal nature of this device, as the registration of skin resistance is influenced by the strength with which the electrodes are held as well as the salinity of the sweat on the palms.^[16] Critics also doubt “whether any galvanic skin response is, in fact,

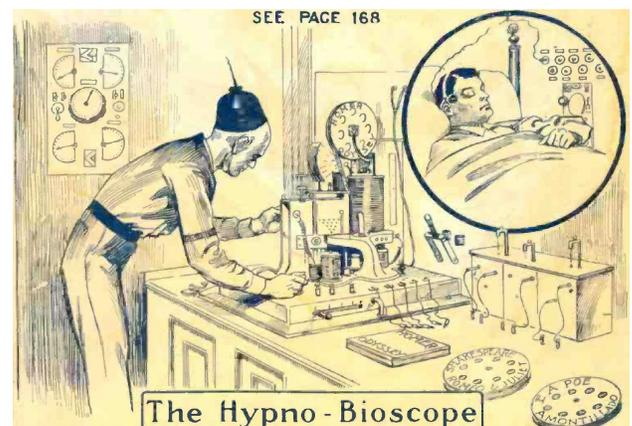
correlated with preconscious ideas” and whether audited subjects might be “rationalizing” or “fabricating.”^[17] In other words, the E-Meter clearly registers real electrical activity within the nervous system, yet this activity is not necessarily related to specific mental or psychological processes.^[18] As Stefano Bigliardi points out, the idea that the E-Meter is “infallible” and “precise” largely depends on the fact that it is a technological object, and it “seems to benefit from a kind of ‘appeal’ that technological objects, be they demonstrably functional ones or not, can bear.”^[19] I would add that the belief in its legitimacy was also based on a pre-existing discourse that conceived of the brain as an electrical apparatus and that this discourse inspired the techno-fantasy of an electronic interface that could read as well as revise previously undetectable mental structures. The belief in its ability to revise mental structures also inspired various conspiracy theories, such as William S. Burroughs’ assertion that “telepathic experiments have been carried out on similar instruments” and that “fear, resistance, guilt, shame, can be produced from a distance by a sender who concentrates on persons or situations to which the receiver has a strong negative reaction.” Burroughs thus concluded that the E-Meter could be used to control people’s minds from a distance and that “perhaps RON really audits you all.”^[20]

While the claims made for the E-Meter have been widely dismissed, there are many other meters currently on the market that similarly promise to facilitate control over the mind through the measurement of electrodermal activity, such as the Ability Meter, the Clarity Meter, the Psychotechnics Meter, the Phoenix Meter, and the Mindwalker Meter. These devices are widely used in experimental psychotherapy, and they are generally trusted because they register real physiological phenomena; however, they remain apocryphal because they are informed by the same idea of a direct correlation between skin response and mental processes as well as the same goal of developing a mind-machine interface that would provide a sense of mastery over consciousness itself.

Sleep Learning

The idea of the brain as an electrical apparatus that transmits and records thoughts in the form of

electrical energy also informed the development of various apocryphal sleep-learning devices. In a 1911 issue of his magazine *Modern Electrics*, for example, Luxembourgish-American inventor and scientific fiction writer Hugo Gernsback conceived of an imaginary device called a Hypnobioscope, which “transmits words direct to the sleeping brain, in such a manner that everything can be remembered in detail the next morning.”^[21] An updated version of this device later appeared in a 1921 issue of his magazine *Science and Invention*, in which he described a centralized library of recorded messages that could be ordered in advance and then transmitted by radiophone directly into the subscriber’s “subconscious mind” during the night. This device was clearly intended to increase worker productivity and efficiency, as Gernsback noted that “over one-third of our lives may be said to be wasted by unproductive sleep.”^[22] It was also informed by the same principles as electronic mind readers. If the brain is understood as an electrical apparatus, for example, then learning can be imagined as a form of mental labor that can be optimized through automation. And if thoughts are understood as electrical impulses, then thought transference can be imagined as the transmission of electromagnetic waves, which could instill messages directly into the unconscious.



Hypnobioscope

The fantasies informing this device were sufficiently appealing that it was soon put into operation. In 1923, for example, Gernsback’s article inspired U.S. Navy Chief J. N. Phinney to test sleep learning on students at a military training center in Pensacola, Florida. The results of these tests indicated that a majority of the students had successfully improved

their ability to use Morse Code after sleep lessons, and Phinney concluded that “a part of the human brain continues to function while the body and the conscious brain remain dormant and that the device explained by *Science and Invention*, therefore, will do its work.”^[23] In 1927 American inventor Alois Benjamin Saliger also introduced a sleep-learning device called the Psycho-Phone, which was essentially a phonograph connected to a timer that played the contents of a wax cylinder in the middle of the night. Saliger claimed that messages transmitted during sleep have a powerful effect on the listener’s behavior because “during natural sleep the unconscious mind is most receptive to suggestions.” The Psycho-Phone was also sold with various cylinders that each contained a message concerning a different theme, such as “Prosperity,” “Life Extension,” “Inspiration,” “Health,” and “Mating.” For example, the “Mating” cylinder included the following statement: “I desire a mate. I radiate love. I have a fascinating and attractive personality. My conversation is interesting. My company is delightful. I have a strong sex appeal.” Saliger promoted the effectiveness of his invention by claiming that 50 of his customers had successfully found a mate after listening to this recording.^[24] While the Psycho-Phone was an electromechanical rather than a purely electronic apparatus, it was thus based on the same fundamental principles as Gernsback’s Hypnobioscope, as it reflected a technological understanding of the mind as a memory bank that could be directly accessed and programmed.



Psycho-Phone

The theory of sleep learning was eventually disproven in the mid-1950s by American neuroscientists Charles W. Simon and William H. Emmons, who demonstrated that the effects of

sleep learning were not due to sleep, as the devices actually woke people up, and who thus concluded that “learning during real sleep is...impractical and probably impossible.”^[25] Nevertheless, the sleep-learning industry continued to expand. By the end of the decade, the Linguaphone Institute was marketing a device called the Cerebrograph (essentially an updated version of the Psycho-Phone that employed a gramophone player and an under-pillow speaker), and the American Sleep Teaching Institute was offering a wide range of sleep-learning courses. In 1958 the *Wall Street Journal* reported that over 100,000 people had enrolled in these courses, and a prison in California was even using sleep learning to rehabilitate inmates.^[26] Aldous Huxley’s 1958 book *Brave New World Revisited* also reinforced the idea that sleep learning “works, it would seem, about as well as hypnosis,” although Huxley expressed some concerns about the potential dangers of this technology, such as the possibility that it might be used for the purposes of ideological conditioning.^[27] Sleep-learning technologies can thus be understood as Electropsychometers that work in reverse, imprinting rather than erasing information stored in the nervous system; however, they were still based on a similar understanding of the mind as an electronic apparatus that could be modified and manipulated by an effective mind-machine interface. They also illustrate the ambiguous nature of such technologies, as the utopian promise of increased efficiency and control was inextricably linked to a dystopian fear of a totalitarian society that threatened the integrity and autonomy of the individual subject.

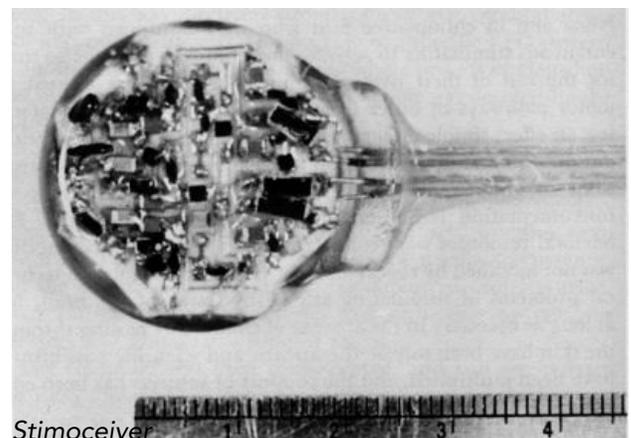
Mind Control

The idea that a mind-machine interface could potentially offer access to the unconscious and thereby manipulate human behavior soon led to speculation about the possibility of mind control. While the idea of mind control can be traced back to the pseudoscientific practice of mesmerism in the early nineteenth century—a practice that was also based on an electrophysiological understanding of the mind—it acquired a sense of scientific legitimacy in the early twentieth century following a series of experiments involving the electrical stimulation of the brain. In 1934, for example, American physicist Emory L. Chaffee and American neurosurgeon Richard U. Light claimed

to have produced emotional reactions in monkeys and dogs by stimulating different regions of the brain,^[28] and in 1949 American psychologist Irving Janis recommended that the U.S. Air Force study the “effects of electricity on the brain” in order to determine whether electro-convulsive therapy might “reduce resistance to hypnotic suggestions.”^[29] The CIA also funded an electromagnetic response laboratory at Allan Memorial Institute in Montreal, where Scottish-American psychiatrist Donald Ewen Cameron conducted his infamous “brainwashing” experiments. These experiments involved the process of “depatterning,” in which electroconvulsive therapy was used to erase the memories of a test subject: “All aspects of his memorial function are severely disturbed. He cannot well record what is going on around him. He cannot retrieve data from the past. Recognition or cue memory is seriously interfered with and his retention span is extremely limited.”^[30] This was then followed by a process of “re patterning” or “psychic driving,” in which the test subject was reprogrammed by repeating recorded messages for 16 hours a day. These experiments were directly inspired by sleep learning technologies,^[31] yet they were far more ambitious, as they sought to create entirely new personalities that could be optimized through mental conditioning. Cameron argued that these experiments promised a potential cure for mental illnesses like schizophrenia and that they would make the mental health industry more efficient by automating the therapeutic process: “This method of activating psychotherapeutic mechanisms not only created a great deal of time saving for the therapist but also appears to operate much more rapidly than ordinary psychotherapeutic procedures and hence constitutes a time-saving for the patient.”^[32] It was later revealed, however, that these experiments were also part of the CIA’s MKULTRA program, which sought to pursue the goal of “controlling an individual to the point where he will do our bidding against his will.”^[33]

While the results of these experiments were promising, it was impossible to employ this method over a long period of time, and researchers subsequently began to explore the possibility of brain implants that would facilitate long-term behavioral modification. This technique was pioneered by Spanish neuroscientist José Delgado, whose research was funded by the U.S. Office of Naval Research and the U.S. Air Force.^[34] Unlike

Cameron, who employed electro-convulsive therapy and sleep-learning technologies, Delgado designed radio-controlled Stimoceivers that could electronically induce emotions and behaviors by remotely stimulating different regions of the brain: “Radio stimulation of different points in the amygdala and hippocampus...produced a variety of effects, including pleasant sensations, elation, deep thoughtful concentration, odd feelings, super relaxation, colored visions and other responses.”^[35] He also proposed the development of miniaturized Cerebral Pacemakers that could be used for “long term, programmed stimulation of the brain to inhibit episodes of assaultive behavior, to increase or decrease appetite, to modify drives, and to modulate intracerebral reactivity.”^[36] Delgado envisioned a future in which such technologies would facilitate complete mastery over consciousness, and he described this process of “mental liberation” as “a continuation of our evolution,”^[37] which should be “a national goal at parity with the conquering of poverty or landing a man on the moon.”^[38] He also predicted that mind control would eventually be turned over to non-human operators by establishing “a two-way radio communication system...between the brain of a subject and a computer.” The computer would then monitor and modify the electrical currents in the brain in order to inhibit “certain types of neuronal activity related to behavioral disturbances such as anxiety, depression, or rage.”^[39] Delgado thus promoted the idea that computer-automated systems should govern all human thought and behavior, which he described as a “psychocivilized” society.



The potential dangers of brain implants were not lost on Delgado’s critics. In 1970, for example,

brain-implant research became the subject of a national scandal after American physicians Vernon H. Mark and Frank R. Ervin, with whom Delgado had collaborated, suggested that implants could be used to suppress the violent tendencies of black rioters.^[40] In 1972 American psychiatrist Robert G. Heath raised more questions about brain-implant research when he claimed to have altered the sexual orientation of a homosexual man by stimulating electrodes implanted in his septum (or cerebral pleasure center) at the same time that he was shown heterosexual pornographic material.^[41] This experiment was controversial for a number of reasons, including ethical issues (the subject was a prisoner who did not provide consent), reliability issues (eyewitnesses claimed that the conversion was ultimately unsuccessful), and funding issues (the experiment was allegedly financed by the CIA),^[42] but it also demonstrated the inherently apocryphal assumptions underlying brain-implant research, as it encouraged scientists to conceive of virtually every aspect of human identity (including race, gender, sexuality, etc.) as nothing more than electrical signals in the brain that could be manipulated and modified by an electronic device.

Concerns about alleged CIA funding also led to speculation about the possibility of radio-controlled electrical stimulation—in other words, electrical stimulation without the need for either electrodes or implants. This apocryphal psychotechnology was first mentioned in the 1967 book *Were We Controlled?* by the pseudonymous “Lincoln Lawrence,” who claimed that the CIA had developed a Radio-Hypnotic Intracerebral Control (RHIC) device capable of erasing a person’s memory from a distance and implanting subliminal messages, including instructions to perform assassinations. Lawrence described RHIC as “the ultra-sophisticated application of post-hypnotic suggestion triggered at will by radio transmission,” and he claimed that it could be used with or without the subject’s knowledge. Lawrence also claimed that a global cabal of commodities merchants had used RHIC to force Lee Harvey Oswald to assassinate John F. Kennedy, as they hoped to make a fortune by driving down stocks.^[43]

The plausibility of this conspiracy theory relied on American neuroscientist Allan F. Frey’s discovery that microwaves could be used to transmit sounds directly to the auditory nerve. Frey described

the induced sounds as “a buzz, clicking, hiss, or knocking, depending on several transmitter parameters, i.e., pulse width and pulse-repetition rate,” and he noted that “the apparent source of these sounds is localized by the subjects as being within, or immediately behind, the head.”^[44] Frey thus concluded that the brain is a receiver of electromagnetic waves and that the range of possible noises could be expanded by modulating the microwave pulses. These experiments were funded by the U.S. Office of Naval Research, and similar experiments were conducted in the early 1970s at the Walter Reed Army Institute of Research by American psychologist Joseph C. Sharp, who was reportedly able to hear and understand spoken words “beamed into his brain...via a pulsed-microwave audiogram.”^[45] J. F. Schapitz subsequently submitted a proposal to the U.S. Department of Defense to study the potential use of microwave transmitters to establish hypnotic control from a distance:

“[T]he spoken word of the hypnotist may also be conveyed by modulated electromagnetic energy directly into the subconscious parts of the human brain—i.e. without employing any technical devices for receiving or transcoding the messages and without the person exposed to such influence having a chance to control the information input consciously.”^[46]

In other words, Schapitz’s proposal sought to test whether the “Frey effect” could be used to enable artificial or synthetic telepathy and whether these telepathic signals could be used to induce a hypnotic state. While it remains unclear whether this proposal was ever approved, American electrophysiologist Robert O. Becker concluded that these experiments had “obvious applications in covert operations designed to drive a target crazy with ‘voices’ or deliver undetectable instructions to a programmed assassin.”^[47]

Australian neuroscientist W. Ross Adey was also hired by the CIA as part of the MKULTRA program to determine whether the brain could be altered directly by electromagnetic waves. His experiments demonstrated that an “electric field...changed the firing rate of brain cells in monkeys and humans *if the field was pulsing at brain wave frequencies.*”^[48] He also found that “microwaves modulated in various ways can force specific electrical patterns upon parts of the brain” and that

“conditioned responses could be selectively enhanced by shaping the microwaves with a rhythmic variation in amplitude (height) corresponding to EEG frequencies.”^[49] Adey’s experiments thus demonstrated that it was possible to manipulate the brain using microwave devices in the same way that Delgado had manipulated the brain using implants, as electromagnetic radiation “could bend the mind much like electrical stimulation of the brain through wires.”^[50] According to Becker, this research “remains an important clue to the interaction between electromagnetic radiation and the human central nervous system at the brain’s most sensitive frequencies,” and it suggests the possibility of “confusion beam” weapons that could disorient targets.^[51] When Bobby Fischer defeated Boris Spassky during the 1972 World Chess Championship in Reykjavik, for example, “Soviets claimed that Fischer had had microwave equipment hidden in his chair and had debilitated Spassky with electromagnetic signals.”^[52]

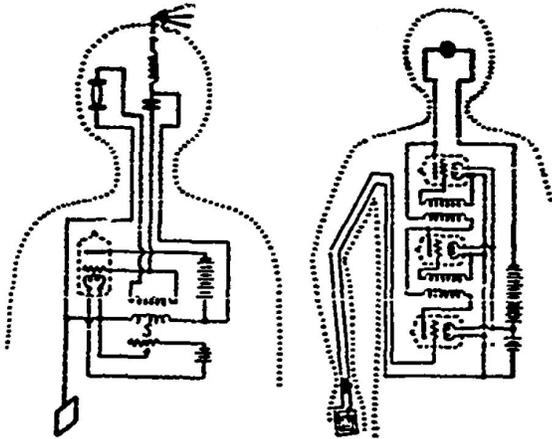
While there is no evidence that the CIA actually intervened in this chess match, it was clearly becoming difficult to distinguish between real and apocryphal psychotechnologies, as electronic mind control devices were often based on legitimate scientific research that was taken quite seriously by members of the intelligence community. For example, Russian physicist Vladimir N. Binhi acknowledges that “there is presently not even one good example of what we could consider a technology for remote mind control,”^[53] yet he still insists that “there are no fundamental constraints to the realization of remote electromagnetic control over the human brain with the goal to bring the mind into obedience of the will or another vulnerable state.”^[54] He also warns that “uncontrolled use of such a technology would pose a certain threat for society” and that “electromagnetic mind control should be investigated further as a possible future threat.”^[55] Like mind-reading and sleep-learning technologies, therefore, mind control devices similarly promised complete mastery over consciousness while simultaneously provoking fears of technocratic control through the loss of individual agency and autonomy.

Psychotronics

While there is no evidence that the CIA ever

developed RHC technology, Soviet physiologists L. L. Vasiliev and I. F. Tomashevsky reportedly developed a method of remote mind control that employed telepathic messages to hypnotize test subjects.^[56] Vasiliev also argued that telepathic communication is common among animals (as seen in the homing capabilities of birds and fish as well as the hive or swarm behavior of certain insects), whereas in humans “it is not a progressive element in the evolutionary process, but rather an atavism—a primitive attribute preserved in man from his zoological ancestors and resuscitated in some nervous or mentally deficient persons.”^[57] Vasiliev thus urged scientists to study psychic phenomena by locating “gifted” people who had regressed to the state of their distant progenitors, and he sought to secure funding for this research by emphasizing its potential military applications.

Due to the fact that psychical research “was contrary to the spirit of materialistic science in the USSR,” Soviet researchers often sought to explain psychic phenomena using legitimate scientific facts, methods, and theories.^[58] For example, Soviet physicist P. P. Lazarev suggested the possibility of “catching in space a thought in the shape of an electromagnetic wave,” which would provide “a firm basis for an explanation of the phenomena of hypnosis.”^[59] Soviet engineer B. B. Kazhinsky similarly described thoughts as electromagnetic waves and the brain as an electronic apparatus or “biological radio station” capable of transmitting and receiving electromagnetic waves over long distances. He supported these claims by noting that there were elements in the nervous system that resembled “solenoid loops and paired capacitor plates similar to the well-known elements of the closed Thompson oscillation circuit, a vibrator of discrete currents and electromagnetic waves.”^[60] He thus concluded that every “thought process” was accompanied by “bio-electromagnetic and bio-radiation waves” that could be “transferred and intercepted,”^[61] and he described the nervous system as “a repository of the most sophisticated instruments of biological radio communication whose construction is far superior to the latest known instruments of technical radio communication.”^[62] He even proposed a device that would implant artificial thoughts into a brain from a distance using radio technology, although there is no evidence that such a device was ever designed or built.



Biological Radio Stations

The study of “biological radio communication” was subsequently taken up by Soviet engineer I. M. Kogan, director of the newly founded Department of Bioinformation of the Scientific and Technical Society of Radio Engineering and Telecommunications at the Popov Radio and Technical Institute in Moscow. In an effort to replicate Vasiliev and Tomashevsky’s experiments, test subjects were hypnotized and placed in a Faraday cage, which excluded all radio waves except extremely low frequency (ELF) waves. The subjects were then awoken at an arbitrary time by a “mental order” from a sender, who remained in a separate room. Based on these experiments, Kogan similarly concluded that there was a radio system built into the human brain that allowed for communication via ELF waves in the 10 Hz region (the “alpha” wave frequency).^[63] He also used information theory to determine that the rate of information transfer varied depending on the distance and that the transmission of coded messages provided the most effective means of communication. Kogan thus not only reinforced Kazhinsky’s theory of the brain as an electronic apparatus, but he also employed the same tools to study the brain that an engineer would use to analyze and optimize the performance of electronic systems.

The next logical step was the development of electronic devices to amplify and enhance biocommunication. Polish researcher Stefan Manczowski argued, for example, that if telepathy relies on the transmission of electromagnetic waves, then it should be possible to amplify these

signals via radio, which could potentially facilitate a dramatic expansion in the dissemination of propaganda.^[64] Soviet engineer Vladimir Fidelman, who also worked at the Popov Radio and Technical Institute in the late 1960s, developed one of the first devices to reduce noise and enhance signal strength in telepathic communication. This device, which became known as the Teleflasher, used photic stimulation to induce a meditative state that would allow the sender to concentrate and clearly shape thought pulses, and it reportedly allowed senders to successfully transmit 100 out of 134 numbers from more than a mile away.^[65] At roughly the same time, Czech researchers introduced the term “psychotronics” to refer to “the field dealing with the construction of devices capable of enhancing and/or reproducing certain psi phenomena.”^[66] In a manifesto presented at the Moscow Parapsychology Conference in 1968, these researchers described psychotronics as a natural extension of the science of “bionics” or biologically-inspired engineering, which employs biological systems as a model for the development of new technologies:

“Its main objective is to complete the set of laws governing the animate and inanimate world with new psychic, physical, and biological knowledge derived from certain extraordinary manifestations of the human psyche. Further, the objective is to seek the practical consequences of the problems involved by using either man as intermediate link or by eliminating man and using an artificial synthesis.”^[67]

Like their American counterparts, therefore, researchers in the Soviet bloc were similarly attempting to develop an electronic interface that would link the mind directly to a machine.

The initial goal of psychotronics was the development of a device capable of receiving energy from the nervous system and storing it for future use, and the first such device was developed by Czech inventor Robert Pavlita and became known as the Pavlita Generator. According to Soviet neurophysiologist Genady Sergeev, who conducted EEG tests on Pavlita, “magnetic, electric, and other types of waves were given off” during the charging process, which proved that “it is possible to transfer energy from living bodies to nonliving matter.”^[68] Researchers also argued that the Pavlita Generator could grant psychic abilities

to non-psychics, thus overcoming the problem of psychic scarcity. Czech psychologist Zdeněk Rejdák, who was affiliated with the Czechoslovakian Society for Applied Cybernetics' Department for Psychotronic Investigation, even claimed that psychotronics represented "a scientific-human conception to counterbalance the scientific-technical revolution we are experiencing," and he warned that without these technologies the world would be flooded by "mechanical and human robots, thereby stepping up estrangement and social disintegration."^[69] In other words, researchers claimed that these psychotechnologies reaffirmed the value of human consciousness in the face of its impending replacement by artificial intelligence, as they illustrated the unique powers of the human mind and they offered a comforting vision of a future in which humans would not be replaced by machines.

Despite these claims, critics often noted that the Pavlita Generator also had the potential to function as a psychic weapon. For example, American inventor Thomas E. Bearden described an accident, in which Pavlita's "daughter became semi-paralyzed and her life was in grave danger, requiring him to work feverishly without stopping for about two days to build a second device to reverse the effects of the first." Bearden also claimed that Pavlita had been placed "in charge of a secret project that has succeeded in building two weapons, one of about two hundred miles range and the other of unlimited range."^[70] A report submitted to the U.S. Defense Intelligence Agency in 1975 was even more emphatic with regard to the potential dangers posed by psychotronic weapons: "If bioenergy can be reliably controlled and focused by such devices, death could be caused by disruption of fundamental brain rhythms, heart control, or biological clock mechanisms."^[71] In 1980 Lieutenant Colonel John B. Alexander asserted that the Soviet Union had already developed such weapons, which heightened "the need for more coordinated research in the realm of the paranormal,"^[72] and a report submitted to the U.S. Army criticized "the apparent absence of an organized U.S. military or government effort to investigate the offensive and defensive potential of psychotronics."^[73] At the same time that psychotronics promised untold powers, it thus simultaneously provoked fears of a "psi gap" that could destabilize the fragile balance of the Cold War.

Cognitive Enhancement

The same techniques that were imagined as controlling the mind or disrupting neural processes were also imagined as enhancing cognitive abilities through biofeedback and electrical stimulation. For example, the techniques of transcranial direct current stimulation, transcranial magnetic stimulation, and transcranial electrotherapy employed weak electrical currents or magnetic fields to increase or decrease cortical excitability, which could allegedly be used to relieve pain, improve memory, heighten concentration, accelerate learning, augment intelligence, enhance creativity, and cure mental illnesses. The development of these devices was closely related to the rise of the new age movement and the growing popularity of non-western medicine, yet it was also based on the same research that informed the development of mind control devices and psychotronic weapons, as it reflected a similar understanding of the mind as an electronic apparatus. For example, Joseph Light's Transcutaneous Electro-Neural Stimulation (TENS) device used electric currents to alter mental states and produce a heightened state of consciousness, and it was inherently based on a notion of the brain as an electronic apparatus and of thoughts as electromagnetic waves. As Light explained: "When these electrical waves change, either in frequency or in amplitude, our state of mind changes too: one pattern of waves for doing arithmetic, say, another very different one for daydreaming." It thus "makes sense that shooting an electrical current through the brain should directly, at times radically, alter one's mental state."^[74] TENS thus employed the same technology that was thought to enable RHIC; instead of provoking fears of technocratic control, however, it was presented as the ultimate form of self-control.

In the 1980s American writer Michael Hutchison promoted many such devices, which were similarly designed to enhance cognitive abilities. For example, Canadian engineer David Graham's Potentializer generated a low-voltage, pulsating electromagnetic field that was designed to trigger neural activity in all parts of the brain and thereby increase the production of "alpha" waves. According to Graham, the benefits of this device included "streamlined neural response of the brain (a measurable factor of intelligence), acceleration of learning and expansion of mental

capacity.^[75] Charles Honorton's Tranquilite similarly induced a meditative state by synchronizing brain-wave activity between the hemispheres of the brain and shifting brain-wave patterns into the "alpha" and "theta" range. The apocryphal nature of these devices was made particularly evident when the manufacturers claimed that they were also capable of enabling or amplifying psychic abilities. For example, the Tranquilite was inspired by Honorton's work at J. B. Rhine's Parapsychological Laboratory at Duke University, where he discovered that most "psi" experiences occur when the body is in a state of relaxation and the mind is cut off from sensory input. Honorton decided that a device capable of artificially inducing such a state could potentially increase psychic abilities, and he claimed that psychic phenomena had been recorded in half of his experiments with the Tranquilite, which was considered statistically significant.^[76] American inventor Denis Gorges' Whole Brain Wave Form Synchro-Energizer and Robert Monroe's Hemi-Sync were also designed to synchronize the hemispheres of the brain in order to enable the retrieval of unconscious memories as well as facilitate "twilight learning" or learning while in a trance state. Hutchison also claimed that the Synchro-Energizer facilitated telepathic communication,^[77] and Monroe claimed that the Hemi-Sync produced out-of-body experiences, which allowed him to establish contact with "a variety of intelligent energy forms."^[78]

These devices thus reflect many of the same fantasies as earlier psychotechnologies, as they similarly promised to facilitate mastery over consciousness, yet it seems that they did not provoke any concomitant fears of technocratic control. On the contrary, Hutchison claimed that these devices were actually preparing the way for the next stage in human evolution, as humans could now control and direct their own mental development: "If evolution involves the development of new mental powers, stimulating the brain to new levels of achievement, then [these] machines...might be seen as evolutionary tools."^[79] Instead of simply facilitating self-improvement or self-actualization, Hutchison thus implied that psychotechnologies could potentially improve society as a whole, and this claim was essentially an updated version of Delgado's vision of a "psychocivilized society," in which psychotechnologies would supposedly solve all

social problems. The primary function of these devices, in other words, was to promote a belief not only in their own functionality but also in their positive benefits for the future of humanity, and this idea has been the driving force behind the recent expansion of psychotechnologies. Not only are these technologies more commonly available, but many of them are now classified as medical devices whose costs are covered by health insurance. In most cases, however, the claims made by their inventors and manufacturers are not supported by scientific research, and their long-term effects remain unknown. Some scientists even argue that they pose a serious risk of neurological damage, and there have been calls to introduce regulations to limit their sale and distribution.^[80]

Conclusion

The scientific status of psychotechnologies has become even more ambiguous in recent years due to new developments in brain research. For example, a study published in 2006 described the development of brain implants that would allow paralyzed patients to manipulate cursors on a screen or move prosthetic limbs by thought alone.^[81] A study published in 2012 also reported that sound cues administered during sleep could be used to reinforce memories,^[82] and a study published in 2017 even claimed that it is possible to learn new information during certain phases of sleep.^[83] The U.S. Defense Advanced Research Projects Agency has also revealed their plans to develop "thought helmets" to facilitate artificial telepathy between soldiers^[84] as well as "thought-controlled weapons" to reduce response times during combat.^[85] The term "psychotronics" has also been adopted as a term to describe weapons that employ electromagnetic fields to "alter the body's psychological and data-processing capabilities," and military analysts argue that these weapons represent a new form of "information warfare," in which "the individual soldier, not his equipment, becomes the target of attack."^[86] The boundaries between real and apocryphal psychotechnologies are thus becoming increasingly blurred, as devices for mind reading, sleep learning, mind control, and cognitive enhancement have gained a greater degree of legitimacy and are now receiving priority attention and funding.

It seems clear that these legitimate scientific and technological advancements were made possible

by the history of apocryphal psychotechnologies, as they fulfill many of the same functions and are informed by many of the same principles. More specifically, they reflect a similar understanding of the mind as an electronic apparatus or neural network that can be optimized through improved engineering as well as a similar understanding of thoughts as electromagnetic waves that can exercise a certain degree of influence from a distance. One might even go so far as to say that the development of apocryphal technologies was a necessary but not sufficient condition for the development of real psychotechnologies, as they allowed scientists to imagine the complete integration of minds and machines, which effectively became interchangeable, interconnectable, and interoperable. The development of real psychotechnologies also reflects many of the same techno-fantasies, such as the idea that mind-machine interfaces can enhance cognitive abilities or grant psychic powers, which suggests that they are informed by the same vision of cybernetic symbiosis as the next stage in human evolution. Real and apocryphal psychotechnologies can thus be seen as promoting the same underlying technological imaginary—that is, the idea that technological progress is inherently good because it facilitates a greater degree of mastery and control—which has assumed renewed importance in recent years due to growing fears concerning automation and artificial intelligence.

As I have shown in this paper, however, the positive celebration of technological progress embodied in these devices was often accompanied by dystopian visions of a society in which propaganda is transmitted directly into the brain, governments control citizens through mental conditioning, and wars are waged on the battleground of the mind. According to these visions, the integration of minds and machines does not enable mental liberation but instead poses a threat to the autonomy of the individual subject, as it eliminates dissent and expands technocratic control. The utopian vision of human transcendence that inspired apocryphal psychotechnologies was thus often accompanied by a dystopian vision of human obsolescence, as the same devices that promised to enhance cognitive abilities were also imagined as manipulating and modifying mental processes. The reception of apocryphal psychotechnologies is particularly interesting, in other words, because it

reflects social desires as well as social fears, and this ambiguity was fueled by the sense of uncertain plausibility that surrounded these devices and the liminal space that they occupied between the possible and the impossible or the realistic and the fantastic. While this ambiguity often allowed charlatans to take advantage of gullible consumers, it also allowed critics to perform a kind of risk-benefit analysis by considering the social and political implications of brain research—particularly when it was funded by intelligence organizations seeking to develop military applications. Instead of simply accepting the “enchantments” of technology, the public appears to have already been debating the negative consequences of these innovations long before they were actually realized, and the technological imaginary informing their development needs to be read alongside more recent efforts to debate the potential dangers posed by such devices.

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