Technological Simulation of Hallucination

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ABSTRACT

Objective: Evidence for technologies capable of remote sound or voice transmission isolated to individuals is surveyed along with target tracking capacity that can maintain apparent psychosis. **Method:** Examination of government reports, engineering databases, the patent database post 1976, PubMed, and the Internet for available pertinent authentic sources. **Results:** Ultrasound and radio frequency methods are described to remotely isolate voice to individuals. Accounts of ultrasound and radio frequency energy forms used on people also exist. **Conclusion:** Evidence indicates development of technologies capable of remotely isolating sound and voice to an individual. Covert misuse of such technologies would result in simulated hallucination, which has no diagnostic recognition.

"Such a device has obvious applications in covert operations designed to drive a target crazy with 'voices' or deliver undetectable instructions to a programmed assassin."

--Robert O. Becker regarding microwave hearing voice transmission, who was twice Nobel Prize nominated for biological electromagnetic fields research. [1]

INTRODUCTION [b]

Medical professionals regard the perception of voice or sound, which cannot be heard by others nearby as hallucination excepting only tinnitus, and deem such phenomena as psychotic manifestations on persistent, disturbing complaint. Though 'hearing voices' can involve numerous diagnoses, [2] this symptom is often considered characteristic in schizophrenia with 47-98% prevalence, [3] but the symptom has reported prevalence in dissociative identity disorder (DID) of 30-64%, [4] and in bipolar disorder of 7-48%. [5] Patients frequently believe that such voices are externally transmitted to them. [6] Apparently unrecognized by the psychiatric community, two technologies have the described capacity to remotely transmit voice or sound in an individually isolated manner. Considering that misuse of such technologies could simulate hallucination and confuse diagnosis, the available body of evidence for such capacity is reviewed.

Herein is substantiated:

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[b] Abbreviations: ABR = Auditory Brainstem Response. DID = Dissociative Identity Disorder. FOIA = Freedom of Information Act. Hz = cycles per second, and is an eponym honorific abbreviation for Heinrich Rudolph Hertz. LRAD = Long Range Acoustic Device. MHz = Mega-Hertz denoting one million cycles per second.

1. Development of remote ultrasound and radio frequency technologies for transmitting sound or voice, which can be isolated to an individual.
2. Human tracking technologies.
3. Reports and published anecdotes of ultrasound and radio frequency energy use against people.

METHODS

Literature examination by relevant terminology was performed on PubMed, National Technical Information Service, Google search, US and European patent office databases, as well as Compendex, the Wilson Web, and Inspec. Ultrasound and microwave bioeffects references were also cross examined for relevance per article. Inclusion/exclusion criteria are pertinence and authenticity.

Time series bibliometry of citations from the most recent radio frequency hearing review was plotted in histogram with differentiation of known military support (Figure 1). The significance of difference in total publication rate was assessed by t-test [c] of means for baseline publication prior to 1972 from the 1961 Frey substantiation compared with the 1973-1980 apparent publication upslope (the 1956 citation is only an advertisement mentioning microwave hearing with omission increasing conservative comparison). Regression was plotted for the baseline with no upward trend, and per the concerns of single case time series analysis, [7] the 1973-1980 upslope data were adjusted by per datum subtraction of the mean from Frey 1961 through 1972 publication baseline for the presented p value.

ULTRASOUND VOICE TRANSMISSION

The loud, steady production of two different tones results in a third tone equal to the frequency difference between the original tones. The sounds so created are known as the tones of Tartini [8] who was an 18th century violinist, and result from air non-linearity that causes sound to scatter itself. The effect also occurs in water for sonar generators called parametric arrays, with the short ultrasound wavelength permitting high directional projection. Acoustic tones produced in air by ultrasound beams were first reported in 1962, [9] followed by several abstract reports, [10] [11] [12] and then had more complete publication. [13] Voice modulated on an ultrasound beam is caused to peal off by another ultrasound beam in loudspeakers for directionally

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[c] t – test formulas:

$$\frac{\bar{x} - \bar{y}}{\sqrt{\frac{s_x^2}{n_x} + \frac{s_y^2}{n_y}}}$$

Where:

(The back slash-forward slash and underline combination above represent the square root of the denominator terms.)

$\bar{x}$ and $\bar{y}$ are the means of the respective populations compared.
s_x and s_y are the standard deviations of the respective populations.
n_x and n_y are the numbers of samples in the population.

projecting sound, [14] [15] [16] [17] with mathematical prediction compared to experimental results. [18] [19] Basic methods for such speakers are described in the Audio Engineering Handbook. [20] Recently reported are improvements in emitters, [21] and directivity. [22] Though utilized as a term in many reports, 'loudspeaker' has somewhat misleading connotations for these speakers, since virtual point sound sources are generated within the ultrasound beams [23] without scattering outside the beam intersection. Error: Reference source not found A recipient perceives this sound projection technique as originating within the head without directional orientation as described from demonstrations for an audio engineering society, [24] an engineering news article, [25] and Popular Science [26] as well as non-lethal weapon applications patents.

An ultrasound voice transmission patent discusses non-lethal weapon use against crowds or as directed at an individual. [27] Communication that is understood as an inner voice can have powerful emotional reactions in people, "since most cultures attribute inner voices either as a sign of madness, or as messages from spirits or demons." Error: Reference source not found Another ultrasound voice transmission patent describes sound production particularly within cavities such as the ear canal. [28] An individual readily understands communication by the device across a noisy crowded room without discernment by others nearby. Sound can also be made to appear as originating from mid-air or from surfaces by reflection.

American Technology Corporation licensed this latter patent, and commercially sells their HyperSonic Sound® system, which has a technical treatment available [29] and a professional meeting presentation. [30] This company also has an acoustic non-lethal weapon called the Long Range Acoustic Device (LRAD™) that is deployed to the Navy, Coast Guard, Army, Marine Corps, military prison camps, and the US Border Patrol [31] [32] as well as ground troops in Iraq and Afghanistan. [33] An 80 % efficacy in deterring wayward Persian Gulf vessels by the LRAD has science news report. [34] The device is also deployed to police departments, Error: Reference source not found [35] [36] on cruise ships, Error: Reference source not found and at petroleum instillations, [37] while a version of the device is available for automatic operation in conjunction with remote sensor security systems. [38] A similar ultrasound method capable of limiting sound to one person, Audio Spotlight® has peer reviewed publication, Error: Reference source not found and is marketed. Audio Spotlight press releases indicate exhibition at Boston's Museum of Science, [39] the General Motors display at Disney's Epcot Center, [40] the Smithsonian National Air & Space Museum, and other public venues. [41] Press accounts detail transmission of sound to persons unaware of such use [42] by both developers, along with some description of more disturbing sound exposure, [43] which can include pain even with ear plugs decreasing the noise. Error: Reference source not found A non-lethal weapons program director confirms the lack of sound perception by other people nearby on ultrasound voice transmission. [44] Though ultrasound can pass through walls, [45] [46] the encoded sound from ultrasound speakers reflects audibly upon striking hard flat surfaces.

MICROWAVE HEARING

Radar technicians had microwave hearing effect anecdotes in World War II [47] [48] and the late 1940's. [49] Allan H. Frey was the first to substantially characterize the microwave hearing effect in a series of articles beginning in 1961, [50] [51] [52] yet much earlier less defined observations in Italian literature by Cazzamalli of 'radio frequency hallucination' [53] may well be the same effect. Subjects can hear appropriately pulsed microwaves at least up to thousands of feet from

the transmitter. Error: Reference source not found Peak pulse power largely determines loudness, though with some dependence on pulse width. Error: Reference source not found

Microwaves are the higher frequency portion of the radio frequency spectrum. Frequency is denoted in Hz, which is an abbreviated eponym to honor radio pioneer Heinrich Rudolph Hertz, but Hz just means cycles per second. Frequencies relevant to microwave hearing are in Mega-Hertz (MHz) units or one million cycles per second, and Giga-Hertz (GHz) units or one billion cycles per second. Though most hearing effect literature refers to microwave hearing, radio frequency hearing is an appropriate term, since the phenomenon extends below the 300 MHz microwave definition cutoff frequency Error: Reference source not found to include 2.4 MHz magnetic resonance imaging radio frequency sources. [54] Lin extends the range of microwave hearing to frequencies into the 'tens of gigahertz.' Error: Reference source not found

Microwave hearing is the most accepted of low power microwave effects, because of direct perception by many microwave workers, and the well replicated animal definition Error: Reference source not found with numerous reviews of the phenomenon. Error: Reference source not found Error: Reference source not found [55 56 57 58] The sound produced is perceived within or near the head. Error: Reference source not found Microwave hearing results from rapid thermoelastic expansion causing sound waves within the head. Error: Reference source not found The cochlea is involved, but not the middle ear. Error: Reference source not found The thermoelastic effect elicits sound within substances with only certain materials or conditions able to emit air conducted sound. [59]

A review of microwave bioeffects describes "receiverless" and "wireless" voice transmission discovery in 1973 by Sharp and Grove, [60 d] who were then at the Walter Reed Army Institute of Research according to a different microwave hearing report submission date. [61] The method was simple: negative deflections from recorded spoken numbers were processed to cause triggering of microwave pulses. Upon illumination by such verbally modulated energy, the words were understood remotely.

An Army Mobility Equipment Research and Development Command report states microwave speech transmission with applications for "camouflage, decoy, and deception operations" as a main rationale for a microwave exposure brain blood flow study, which affirms "by proper choice of pulse characteristics, intelligible speech may be created." [62] Between the inclusive dates given for these affirmations of microwave hearing voice transmission development, the average simple sound radio frequency investigation publication rate increased 3.7 fold, even with per datum subtraction of any possible mean baseline trend (t-test $p < 0.02$) for normal statistics on the bibliometric time series of citations from the most recent radio frequency hearing review. Error: Reference source not found The Oskar, 1980 affirmation was published the year after the raw data historical peak of publications for total and military supported simple sound radio frequency hearing reports, where for 45 years of investigation, half of citations cluster for publication date in the decade after 1973 as given for Dr. Sharp's account of voice transmission discovery with the interval having double the number of articles with military support compared to other periods, and apparent clustering towards the dates of interest, Fig. (1). The rapid drop in simple sound microwave hearing publication coincides with evidence of Air

[d] Both these researchers had then recently done classified work on the weapons implications of the Moscow American Embassy irradiation according to Project Bizarre FOIA releases, see http://www.dod.mil/pubs/foi/reading_room/175.pdf.

Force interest in defining radio frequency "forced disruptive phenomenon . . . to interrupt, degrade or direct human central nervous system functioning." [63] The Air Force mentions radio frequency acoustic phenomenon, Error: Reference source not found but within the simple sound literature of expected interest as forced disruptive phenomenon are notations of vibration, [64] buffeting of the head as well as a "pins and needles" sensation, Error: Reference source not found and petit to grand mal seizures with unconsciousness for 4-5 minutes [65] at altered [e] pulse parameters.

Microwave Auditory Effects and Applications describes applications of remote voice transmission as "obviously not limited to therapeutic medicine." [66] A Defense Intelligence Agency review of Communist literature affirms microwave sound and indicates voice transmission. The report states: "Sounds and possibly even words which appear to be originating intracranially (within the head) can be induced." [67] Among weapon implications are "great potential for development into a system for disorientating or disrupting the behavior patterns of military or diplomatic personnel." Error: Reference source not found A US Army Intelligence and Security Command Freedom of Information Act (FOIA) release considers development of microwave hearing voice transmission as feasible, and to be adaptable to existing radar units. [68] Stated therein: "Application of the microwave hearing technology could facilitate a private message transmission. . . . be. . . disruptive . . . to a person not aware of the technology. . . . it could be psychologically devastating if one suddenly heard 'voices within one's head.'" Error: Reference source not found

The Brunkan Patent "Hearing system" is a device for verbal microwave hearing. [69] The invention details microwave speech transmission with a parabolic antenna remotely illuminating the head. Complex sound is built up by patterns of bursts with a single burst composed of tightly grouped evenly spaced pulses. The microwave spectrum granted by the patent is from 100 to 10,000 MHz with pulse width from 10 nanoseconds to 1 microsecond, and bursts of such pulses lasting from 500 nanoseconds to 100 microseconds (a nanosecond is one billionth of a second, 10^{-9}; a microsecond is one millionth of a second, 10^{-6}). The 1000 MHz preferred operation is the optimal tissue penetration frequency. [70] A similar German patent for remote antenna microwave voice transmission is also based on microwave bursts. [71] A non-remote microwave voice transmission patent based on microwave bursts is designed so that the burst frequency matches the sound frequency. [72]

Microwave hearing literature confirms an ability to reproduce sound characteristics, and aspects of these patents. Though loudness is modulated by pulse power, Error: Reference source not found [73] closely spaced pulses also increase sound intensity, [74] [75] or lower the perception threshold. Error: Reference source not found The tonal quality of a pulse train corresponds to pulsation frequency, Error: Reference source not found [76] [77] and longer pulse widths produce lower frequency sound. Error: Reference source not found Microwave pulse width differentially influences cat cochlear nucleus auditory units that are responsive to different tones [78] over sound frequencies from 931 Hz to 25.5 kHz. [79] Twin pulse separation responses Error: Reference source not found have at least some analogy to human pitch discrimination parameters. [80]

Two separate devices with non-remote transducers show efficacy in peer reviewed publication either by independent analysis of operation, [81] [82] or the developers demonstrating improved speech discrimination. [83] [84] Although this latter report's title features electrotherapy, radio frequency hearing just previously was considered as electrophonic hearing [85] and a radio

[e] At presumably higher pulse parameters, but only fully specified in the last reference.

frequency method is stated, while equipment description is referred to an Air Force study. [86] This 1964 study is the first English radio frequency voice transmission report with improved word discrimination for the hearing impaired.

A 1993 classified non-lethal weapon conference demonstration of a microwave voice transmission device of Lockheed-Sanders manufacture is reported by Nexus Magazine. [87] Quoted descriptors are 'voice synthesis' or 'synthetic telepathy.' Error: Reference source not found This same year a US Department of Defense contract was awarded entitled "Communicating Via the Microwave Auditory Effect." Communication initial results are: "The feasibility of the concept has been established" using both low and high power systems. [88] A FOIA request for information on the project met with denial on the part of the US Air Force, on the grounds that disclosure "could reasonably be expected to cause damage to national security." [89] Though the Air Force denied FOIA disclosure, an Air Force report elaborates such a contract's purpose for "the possibility of covert suggestion and psychological direction" by "high fidelity speech" from microwave hearing enabling a capacity "to 'talk' to selected adversaries in a fashion that would be most disturbing to them." [90] [91]

This Air Force discussion framed as 'possibility' is belied by publication during the same year as patent application for a method for implementation of such capability [92] by Air Force employees [93] [94] with rights assigned to the Air Force. FOIA releases related to the patent list "a psychological warfare communication tool" under government use, [95] state experimental demonstration of intelligible speech transmission, [96] and provide some description of initial experiments. [97] This first patent was followed by another related patent, [98] neither of which evidence knowledge of previous development or citation of the obviously relevant Brunkan Error: Reference source not found patent.

For years the Center for Army Lessons Learned acknowledged microwave hearing voice transmission as a non-lethal weapon in a 'voice to skull devices' weapons thesaurus entry, [99] but this entry was excluded [100] subsequent to request for congressional investigation of such development, and any implementation or misuse thereof. [101] The US Navy has awarded a contract for the development of an aversive non-lethal weapon termed MEDUSA, which is based on the microwave auditory effect, and is to be able to focus on a single individual. [102] However, no voice transmission is indicated for the Navy system. Error: Reference source not found

When electromagnetic signatures of spoken words are applied to the head at very low field levels (1 microTorr), word choice is reported significantly affected for related words along the same emotional dimensions as the applied word. [103] Though inspired by microwave hearing, this report is not of direct auditory perception, but of subliminal word choice influence. The authors suggest that such an influence, even though weak could shift the direction of group decisions in large populations, and have previously elaborated the possibility for more general electromagnetic influence on populations. [104]

TARGET TRACKING TECHNOLOGY

Diagnostic confusion with major psychotic states would require target tracking for the maintenance of isolated hearing effects on people. Common technology utilizes the radio frequency hearing spectrum, which encompasses cell phone, [105] [106] TV, and radar frequencies. [107] Since the ability to direct radiation is related to wavelength, which becomes shorter with

increasing frequency, [f] microwaves are directive in a manner similar to light, [108] except with structural penetrating ability. A variety of methods assist radiation localization for collimation or focusing including masers, [109] and antennas that are parabolic, have lens materials, [110] or are arranged in phased array. [111] Phased array antennae can be of small configuration with the formation and direction of radar beams without physical motion by precise phasing of current between array elements for constructive and destructive interference. Error: Reference source not found

Jane's Radar and Electronic Warfare Systems lists 13 target tracking systems specifying such capability on personnel at ranges from 4-20 km, which are utilized by countries around the world. [112] Automated target tracking involves a track initiation processor acquiring a target, while a data association filter maintains a tracking lock on the target [113] with this process utilized to continuously direct a radar beam at a target for tracking position. [114] Even a quarter century ago, specifications for weapons fire control designs whereby aiming was entirely determined by radar tracking were commonly evident with numerous radars dedicated to one weapon. [115] Radars devoted to tracking isolated targets are presently prominent enough to merit a few paragraphs in a recent science and technology encyclopedia. [116] Other components can be directed by radar tracking, such as a camera at a human target for commercial security surveillance. [117] One patent describes human target tracking with automatic aiming of electromagnetically induced pain, now a declassified capability, Error: Reference source not found [118] and even remote assessment of physiologic stress. [119]

Movement excursions less than a frequency's wavelength alter the phase of a target echo waveform as compared to the transmitted frequency. Since waveform phase relates to distance in wavelength, this allows radar assessment of life by breathing and heartbeat measurement from body surface excursions, which is reviewed respecting medical or rescue use, [120] and hypovolemic states are discriminated. [121] Surroundings without motion do not return echoes with waveform out of phase from the transmitted signal in contrast to living subjects, so that vital organ cycle detection is utilized in through wall radar discernment of humans developed for security purposes. [122] The capacity is evaluated as a covert polygraph for lie detection. [123] [124] One system [125] for radar visualization of humans through walls utilizing just range radar with a moving target indication method, has a 5 inch resolution, [126] and is approved for sale by the US Federal Communications Commission. [127] Another such system resolves spatial variation as small as 0.6 cm, [128] and the Camero Xaver™ 800 system evidences three dimensional imaging, apparently more available to, or priced towards military applications. [129]

Patents for rescue [130] and security systems [131] with radar detecting vital organ motion describe the ability to distinguish individuals through obstruction by frequency analysis, which forms a type of "electronic fingerprint." Besides vital organ oscillation from phase change contributions to the human radar signature, another method is based on the Doppler effect, whereby motion adds or subtracts energy to a radar echo thus effecting return signal frequency change in proportion to velocity. Doppler effects produce individual variance of human signals [132] with gait [133] and heartbeat [134] considered as biometric identifiers. Humans have good radar reflectance, Error: Reference source not found and body parts can be resolved by through wall imaging. [135] Human motion generated Doppler frequencies are regarded as a frequency spectrogram resulting from moving centers of body and appendage radar scattering, where just thigh height would provide reasonably accurate discrimination between males or females based

[f] By the relation: wavelength times frequency equals the speed of light.

on relevant biometric distribution (expected accuracy for sex; male – 84%, female – 91%). [136] Stationary surroundings only return echoes at the transmitted frequency, so the Doppler effect usefully identifies moving targets inside structures. Other information available to radar is the human radar cross section, which is about one square meter, [137] but is proportional to a target's weight, [138] and varies with the subject's orientation with respect to the radar antenna. [139] Further general target recognition methods are based on polarization characteristics, and the frequency amplitude response. [140]

Target illumination tracking systems have at least microsecond response times. Such responses require no wide scan area to lock illumination upon a person at achievable speeds. Less than 1/100th of an inch in a microsecond is traversed at 90 miles per hour.

Battlefield human tracking specifications are not expected to consider urban obstruction. Radar capability through obstruction is apparent from the optimization and adaptation of military radar to commercial through-the-wall surveillance development, [141] with open literature surveys or overviews available. [142] [143] [144] Most materials negligibly attenuate radar at the lower microwave frequencies. High frequencies in the millimeter wavelengths (95 GHz = 3 mm) can provide detailed imaging of humans, but are not suitable for brick and concrete. Error: Reference source not found Though lacking in more detail, some human image can be obtained at frequencies as low as 10 GHz, which also has good building material penetration. Error: Reference source not found

Raytheon's Motion and Ranging System is battery operated, briefcase sized, has a 100 foot range, [145] provides two dimensional tracking, and can report range to motion of 30 targets. [146] [147] Another system characterizes through wall capability as at "any distance." [148] A portable, battery operated radar report states detection of individuals through 3 walls. [149] Other literature reports detection of personnel through several intervening walls, Error: Reference source not found or through a single brick wall 15 inches, [150] and ½ meter wide (about 5 brick courses). Error: Reference source not found Since through-wall surveillance systems evident in the open literature are subject to commercial regulatory, pricing, portability, and imaging constraints, they cannot be regarded as the capability limit especially regarding radars for less economically constrained security markets, or without portable design.

ACCOUNTS OF MICROWAVE AND ULTRASOUND USE AGAINST HUMANS

Ultrasound behavioral influence technology use in Northern Ireland is cited. [151] The device could focus on one person, though voice transmission is unconfirmed. The Americans employed the system in Vietnam, which is termed the squawk box, while a news report characterizes psychological effects as 'spooky,' annoying, and intolerable. [152] British police inventories list the specific device, though a spokesman denied use. [153] The Long Range Acoustic Device has published descriptions of utilization for clearing occupants from a building to execute a search warrant, repelling a pirate attack from a cruise ship, and 'drawing out snipers' for destruction, Error: Reference source not found besides acknowledged use as a 'hailing' device with the demonstrations and developer 'pranks' noted above.

The most documented citizen microwave irradiation was of peace protesters at Greenham Common American Air Force Base in Berkshire England, who prompted investigation of unusual symptoms [154] that fit well with electromagnetic exposure syndrome. Error: Reference

source not found Radiation measurements exhibited microwaves with symptom experience up to a hundred times the background level, and rose sharply on protests nearer the base. Error: Reference source not found That some of the women 'heard voices' has report. [155]

Though the source is otherwise postulated, radio frequency field measurement is reported in the vicinity of an Australian DID case, [156] which is a disorder with indicated precedent for intelligence service interest and use. [157] The radiation intensity ranged from 7 mV in an adjacent room to 35 mV next to the head. Other published anecdotal cases affirm microwave field measurement without strength publication. [158] [159] [160] A security company advertises investigations of electromagnetic harassment including microwave voice transmission with field measurement. [161]

DISCUSSION

Ultrasound voice transmission technology is well confirmed by peer reviewed literature, deployed in military Error: Reference source not found Error: Reference source not found Error: Reference source not found or police situations, Error: Reference source not found Error: Reference source not found Error: Reference source not found publicly demonstrated in museum exhibits, Error: Reference source not found Error: Reference source not found Error: Reference source not found and for sale to the public. [162] [163] Microwave hearing literature defines pulse parameters that elicit audition, which would be considered hallucination by psychiatrists on complaint of covert simple sound transmission, and provides a foundation for radio frequency voice transmission citations. Peer reviewed literature Error: Reference source not found Error: Reference source not found and a government report Error: Reference source not found confirm non-remote voice transmission systems. There are four patents for remote radio frequency voice transmission, Error: Reference source not found Error: Reference source not found two of which were developed by the US Defense Department. Error: Reference source not found Error: Reference source not found Successful independent development of such methods is indicated twice: Original successful Army experiments Error: Reference source not found followed by increased historical density of total and military supported simple sound investigations that peak the year before publication (Figure 1) of a bioeffects study citing speech transmission as rationale, Error: Reference source not found and alternative news report of device demonstration. Error: Reference source not found Later, the Air Force had their own initial experiments Error: Reference source not found that with more development became patents, Error: Reference source not found Error: Reference source not found and successful demonstration is stated. Error: Reference source not found Duplicated effort is usual to classified programs.

Though there is only some publication of microwave field strength around victims Error: Reference source not found Error: Reference source not found or measurement anecdotes, Error: Reference source not found Error: Reference source not found Error: Reference source not found with some publications of remote radio frequency voice transmission use being in media of variable reliability, such reports are supported by descriptions of non-lethal weapon applications Error: Reference source not found Error: Reference source not found Error: Reference source not found and designation as a weapons capability. Error: Reference source not found Error: Reference source not found Error: Reference source not found The fact is that these accounts or any remote harassment complaints have no adequate investigation because medical texts and professors teach that such claims are symptoms of mental illness, despite abundant indications that voice transmission and human tracking has long enabled feasibility for continuously

isolating sound or voice to individuals. Engineering development must be appreciated as often proprietary, and less published than open science, especially in areas with covert application. Implementing microwave hearing voice transmission apparently would involve little more than programming a radar tracking beam for the necessary characteristics.

Former President Carter's National Security advisor, Brzezinski logically makes the compelling prediction of a more controlled and directed society dominated by a power elite willing to use the latest modern techniques for influencing behavior without hindrance by liberal democratic values. [164] Since prevalent expertise assumes that voice transmission perception by any possible victim only has basis as a psychotic symptom without reality, serious complaints have such disregard that the ability to bear witness in journalistic or police investigation, and court proceeding is readily compromised. Potential targets are multiple, and may include anyone worth manipulation: domestic adversaries; witnesses of improprieties; security risks, which may only comprise classified disclosures; those prone to committing advantageous felonies; and even those psychologically similar to other targets for development or training purposes. Any such voice transmission technology is most applicable within the same language and culture. Security agencies have little legal accountability, especially in utilization of unrecognized technology. Legality is readily circumvented by executive orders (particularly declaring an emergency situation), which can be sealed with the prerogative only accountable to co-equal government branches.

Though complaint of 'hearing voices' is routinely diagnosed as psychotic [165] with organized and academic medicine largely ignoring any technology for such capacity, Error: Reference source not found some psychiatric recognition exists for a high likelihood of microwave non-lethal weapons testing of thought or behavior influence on unwitting civilians, [166] and the need for new diagnostic criteria. [167] The current standard of care severely discredits anyone claiming such an affliction. Longstanding complaints by numerous individuals about remote voice transmission to the medical community Error: Reference source not found are too correspondent with the technological development herein documented to further ignore. The rationale for civil rights abrogation based on the presumption that such symptoms have no plausible external etiology requires justification by rational investigation. Without adequate investigation, final diagnoses cannot be regarded as conclusive, but must be viewed as presumptive. Undermining such presumption are some hallucination brain response reports that support microwave hearing as a simulated hallucination mechanism by indicating involvement of the initial hearing pathway, which is a promising criterion for differential diagnosis. [168]

Microwave hearing is actually heard through the cochlea of the inner ear causing activation of associated brain nuclei resulting in the Auditory Brainstem Response (ABR). [169] [170] [171] The ABR is a validated hearing evaluation technique for unresponsive patients. [172] The ABR could be altered for patient indication of voice transmission/hallucination instead of audible tone presentation. An ABR is not expected to occur from endogenous hallucination that has inner speech mis-identification as the current leading theory.

Radio frequency field measurement in the vicinity of complainants, especially with attention to directional cranial localization is appropriate with any field elevation further characterized. Investigation of electrophysiological deficits correspondent between microwave bioeffects and schizophrenia [173] compared with and without electromagnetic shielding might provide differentiation with existing magnetic resonance imaging, and magnetoencephalography facilities shielded from commercial signals, but radar effectiveness must be proven. At least the

burst-pulse microwave voice transmission patents are pulsed at such high frequencies that an additional ultrasound component is expected, Error: Reference source not found similar to microwave thermoacoustically induced ultrasound tomography. [174] Even recordings claiming an ability to capture harassment sounds Error: Reference source not found have support in that condenser microphones are responsive to the thermoacoustic effect though as induced by a laser. [175]

Considering the number of patients who complain of remote influence and actual authentic indications of such technology, due investigative diligence is required to avoid the appearance of ethical negligence in remuneration for unsubstantiated opinion that violates basic human rights. The ambiguity of diagnostic supposition is supported by extensive correlations of microwave bioeffects with reported schizophrenia symptoms other than 'voices.' Error: Reference source not found Even the most apparently bizarre of Schneiderian symptoms may have basis in that recent EEG analysis studies confirm and extend the feasibility of thought reading, which was reported initially by a 1975 Defense Advanced Research Projects Agency study, and there are references to 'remote EEG' microwave methods. [176]

Certainly there exists natural etiology by the numbers afflicted across hallucination involved disorders. Presently the possibility of diagnostic confusion introduced by any implementation of particularly microwave hearing voice transmission is undefined. However, the highest incidence of any unappreciated etiology would be expected in the 'paranoid' schizophrenia subtype.

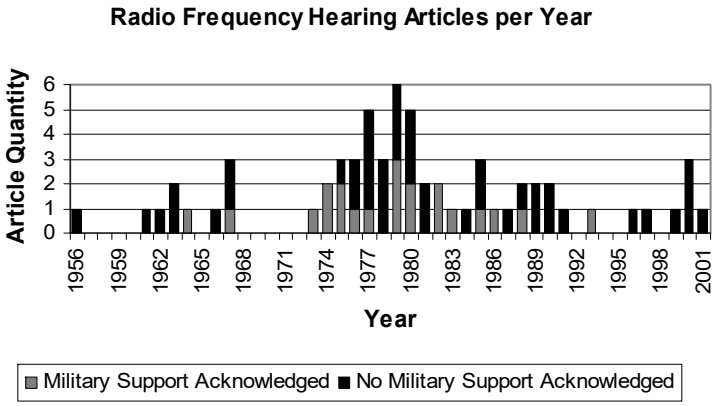

Figure 1. Histogram of article quantity per year for Elder and Chou, 2003 Error: Reference source not found radio frequency auditory response review citations. Simple sound radio frequency hearing publications increase on and after the date given (1973) for Dr. Sharp's account of successful microwave hearing voice transmission for total and military supported investigations. Maximal quantities for each category occur the year before the Oskar, 1980 Army Mobility Equipment Research and Development Command study affirms microwave hearing speech transmission as a study rationale. Acknowledgement of military support in prior or post periods are half the rate that occurs for investigations dated from 1973 through 1983, wherein 45 % of these studies acknowledge military support. Though some military supported reports originated from naval laboratories, the primary military funding source was the Office of Naval Research with only one study having additional Army funding contribution, and another study solely Air Force funded. Note the relative lack of publications during the O'Loughlin and Loree patent period of development (1996-2001).

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