

A Technology-Focused Hypothesis for a Possible Havana Syndrome Mechanism

By Martin Broughton
Independent Researcher

United Kingdom

Summary

The microwave auditory effect (MAE), first systematically studied in the 1960s, provides a biophysical basis for inducing intracranial sounds and vestibular symptoms via pulsed microwaves, with modern radar systems and AI enabling precise, remote targeting of individuals across global networks. An example would be a Maven type operating system combined with Frey effect/MAE Parameters. Maven by Palantir is an AI-enabled battlefield decision-support platform that fuses data from satellites, drones, radar, signals intelligence, and other sources into a single operational picture. It can simulate battlefields by combining those inputs into a digital map, identifying and classifying objects, highlighting likely targets and friendly forces, and letting commanders test faster courses of action before deciding how to respond. An added potential would be that visual information could be perceived via spatial patterns of electrical activity mimicking visual neurons.

Introduction

The microwave auditory effect (MAE) refers to the perception of clicks, buzzes, or other sounds when a person is exposed to appropriately pulsed microwave radiation, without any conventional acoustic source. The prevailing biophysical explanation is rapid, localized thermoelastic expansion in cranial tissues and the inner ear, which launches pressure waves that stimulate the auditory pathway. Classic work by Allan H. Frey in the early 1960s established that normal and nerve-deaf subjects could perceive such microwave-induced sounds at distances from inches to hundreds or even thousands of feet from a transmitting antenna, depending on the pulse parameters and peak power density.

Historical Foundations

Frey's "Human Auditory System Response to Modulated Electromagnetic Energy" demonstrated that perception depended critically on carrier frequency, pulse width, and pulse-repetition rate, and that different parameter sets produced distinct percepts. Subjects reported sensations such as "buzzing," "clicking," and "hissing," and Frey showed that altering the pulse pattern could induce severe buffeting of the head or a pins-and-needles sensation, distinct from ordinary

heating, as well as effects on balance without overt dizziness in some conditions. These results were consistent with a thermoelastic model in which very rapid temperature transients (micro- to millikelvin) in brain and cochlear structures launch acoustic waves that are then processed by the auditory system.

Subsequent work in the 1970s focused on quantifying energy deposition and refining dosimetry for MAE exposures. Don R. Justesen, in “Microwaves and Behavior,” highlighted the contributions of James C. Lin, Arthur W. Guy, and Chung-Kwang Chou in “squeezing the last eliminable error” out of energy-dosing measurements, thereby tightening the quantitative relationship between incident fields, absorbed energy, and perceived auditory effects in both animals and humans. Lin’s monograph “Microwave Auditory Effects and Applications” summarized these advances and emphasized that precise control of field parameters was essential for reliably eliciting specific auditory sensations while characterizing underlying thermoelastic mechanisms.

Walter Reed Speech and Morse Code Demonstrations

Justesen’s 1975 article reports that laboratories in the United States replicated Frey’s findings and extended them to actual information transfer using MAE. At Walter Reed Army Institute of Research, Arthur W. Guy used a telegraph key so that each closure and opening triggered a microwave pulse directed at his own head, allowing him (a trained telegrapher) to receive complex messages in Continental Morse code as distinct MAE clicks, without any conventional receiver. In the same period, Joseph C. Sharp and Mark Grove demonstrated direct “wireless” communication of speech by recording spoken words onto tape, processing that audio to create a sequence of pulses, and using those pulses to modulate microwave energy such that the subjects perceived distinct words intracranially.

According to Justesen, Sharp and Grove “recorded by voice on tape” and then used an electronic system to convert the analog speech waveform into a pulse-rate modulated pattern that controlled the microwave source, allowing them to transmit and recognize at least nine different words via MAE alone. The experimental chain therefore included: tape recorders for storing speech, a keying or gating system that translated amplitude variations into pulse sequences, and a microwave transmitter whose pulsed output, when aimed at the subject’s head, produced intracranial perception corresponding to the original taped words. In modern terms, the tape-recorder and keying hardware form an early, analog “codec,” which could straightforwardly be replaced by digital signal-processing hardware and then by software running on general-purpose computers to generate arbitrary MAE-compatible pulse trains from text or recorded audio.

Thermoelastic Expansion and Symptomatology

The thermoelastic model predicts that short, high-peak-power pulses will produce rapid temperature transients that generate impulsive pressure waves inside the head. Frey's data and later interferometric measurements are consistent with this, and they show that the perceived character of the MAE—simple clicks versus more complex sounds—depends on the pulse envelope and repetition pattern, not just average power. Within certain regimes, changes in pulse width, repetition rate, and burst structure alter not only loudness but also the qualitative percept, including reports of head “buffeting” and tingling or pins-and-needles sensations in the cranial region.

Because the pressure waves interact with both cochlear structures and vestibular organs, some parameter sets plausibly exacerbate vestibular disturbance, producing vertigo, nausea, imbalance, and a sense of motion, even when thermal rise is minimal on average. In principle, pulse sequences that emphasize specific temporal and spatial gradients of deposited energy could differentially tax central nervous system circuits responsible for equilibrium, autonomic regulation, and fatigue, which aligns qualitatively with reported symptoms such as dizziness, sickness, loud internal pitches, and profound tiredness in some exposure reports. Given that Frey induced effects at distances up to thousands of feet from a transmitter under controlled conditions, any system with comparable peak power, beamforming, and pulse control could operate covertly at stand-off ranges while keeping average power low.

Global Reports and Target Differentiation

Open-source accounts of “Havana syndrome” and related incidents involving diplomats and security personnel describe clusters of neurological and vestibular complaints, including vertigo, imbalance, headaches, tinnitus, and cognitive difficulties, with cases reported at U.S. and Canadian diplomatic facilities and residences in multiple countries, including London. Although the etiology remains contested in the public literature, these clusters often note a distinction between affected service or diplomatic personnel and nearby civilians, including people in the same neighborhoods or hotels who did not report comparable acute events. If such a differential pattern were real and systematic, it would be consistent with a scenario in which a targeting and tracking system can distinguish between specific individuals (for example, embassy staff) and bystanders, allocating focused exposure to the former while minimizing spillover to the latter.

Radar Architecture and MAE-Compatible Modes

Many contemporary radar systems use electronically steered arrays and programmable digital waveform generators, allowing software-defined control over pulse width, pulse-repetition frequency, intra-pulse modulation, and beam steering. In standard operation, these radars transmit pulse trains optimized for ranging, Doppler measurement, and imaging, and their built-in tracking algorithms continuously adjust beam direction and timing to keep moving targets within the main beam. The same RF hardware—transmitter, power amplifiers, antenna arrays—can be driven with alternative waveforms that are not optimized for ranging but instead for eliciting MAE, provided that peak power, duty cycle, and pulse timing are configured within the regimes known from Frey and later dosimetric work to produce microwave auditory perception.

In such an implementation, a radar set would provide the RF source and high-gain antenna, while firmware or software updates would introduce one or more “hidden” waveform profiles that approximate the short, high-peak-power pulse trains associated with the MAE. An engineer with deep design access—firmware keys, configuration tools, and network access lists—could, in principle, define special modes that are not exposed in routine operator interfaces yet can be enabled remotely on designated radars, switching them between conventional search/track waveforms and MAE-optimized pulse trains under software control. Once activated, these special modes could radiate MAE-compatible pulses either directly in the main search beam or through specifically tasked narrow beams transmitted from the antenna, depending on how the beamforming network is configured.

Integration of MAE with Tracking and AI

The same tracking algorithms that keep a radar beam locked on an aircraft or vehicle can be adapted to maintain a narrow beam on a human target, including compensation for head and body motion using high-resolution range-Doppler or imaging data. If the beam is kept on the target’s head, the person in the main lobe experiences a concentrated field and therefore perceives internal sound, whereas individuals outside the primary beam experience far lower power densities and may perceive little or nothing. This selective illumination naturally supports scenarios in which only the intended target reports “voices” or high-pitched internal tones while others nearby remain largely unaffected.

Modern radar systems already rely on programmable digital waveform generators and DSP chains that can be updated via firmware or software to support new modulation schemes. To handle both tracking and speech modulation, the signal chain could be extended so that, in addition to conventional pulses, it accepts an audio envelope (derived from text-to-speech, voice recordings, or other sources), converts that envelope into a Frey-compatible sequence of high-peak-power pulses, and schedules those pulses in sync with beam steering. On the control side, the existing tracking loop keeps the beam centered on the target, while an added software

module manages the timing and pattern of MAE-optimized bursts so that the radar is simultaneously performing spatial tracking and transmitting voice-modulated RF to the same spatial coordinates.

Speech Synthesis, Voice Cloning, and Pulse Modulation

The Walter Reed experiments used tape recorders and keying hardware to map analog speech waveforms to microwave pulse sequences, but they were limited by the fidelity and flexibility of 1970s tape and analog electronics. In that architecture, “voice on tape” provided the baseband audio, a keying system or envelope detector generated a control signal whenever the waveform crossed a threshold or zero axis, and this control signal gated the microwave transmitter, translating speech amplitude variations into variations in pulse timing or repetition rate. As Justesen notes, Sharp and Grove were able to hear and correctly identify multiple different words using this approach, demonstrating that simple analog processing plus a keying system sufficed to encode intelligible speech for MAE transmission.

Replacing tape recorders and hardware keying with computers is technically straightforward because digital audio is natively represented as a sequence of samples that can be algorithmically converted into pulse trains. Text-to-speech engines and voice-cloning models can synthesize audio that mimics a specific speaker’s accent, timing, and prosody, and DSP software can then transform this synthetic waveform into a sequence of pulses whose timing, width, or repetition pattern matches the desired MAE modulation strategy. Once the pulse pattern is computed, the radar’s programmable waveform generator can be instructed to emit those pulses at the proper instants, so that the induced microwave-auditory perception resembles that particular person’s voice rather than a generic tone or click sequence. This capability could create a database of AI-generated voices for impersonation, as seen in recent cases including fabricated audio of Marco Rubio in the US.

Human Population Monitoring and Forecasting Models

Models for monitoring, forecasting, and predicting human behavior using radar networks, supercomputers, and weather-prediction-style systems—applied to civilian populations instead of atmospheric dynamics—are technically plausible with current technology. This adaptation leverages established principles from radar signal processing, data assimilation, and ensemble forecasting, repurposed from meteorology to track and model human activity patterns across populations. Radar data ingestion resolves 3D positions, velocities, and micro-Doppler signatures for thousands of targets; supercomputers like Frontier handle the computational load; and 4D-Var or ensemble Kalman filters fuse radar observables with auxiliary data for probabilistic nowcasts and forecasts.

Global Scalability and Remote Operations

Global radar networks, spanning military, air traffic, and maritime surveillance installations, enable coordinated operations across continents, with remote pulse-parameter switching via satellite links or secure networks allowing real-time adaptation of MAE waveforms from centralized command nodes. Supercomputer-driven population models forecast target movements (e.g., a diplomat's path through a city), cueing nearby radars to lock beams and deliver modulated pulses intracranially —such as transmitting "get off the X", which is a snippet of a prior conversation that was played back to one of the diplomats in the US embassy in Cuba—precisely when the target is isolated from civilians. The global surveillance system proven by Edward Snowden could be part of the data used in this system and contribute towards prediction/forecasting, integrating metadata like location histories and communications to refine digital twins and impersonations. This architecture supports distributed attacks on diplomats in hotels, residences, or streets worldwide, including reported Havana Syndrome cases in London, with AI databases enabling personalized, context-aware intrusions that mimic familiar voices or reference private details.

Image Perception Hypothesis

Images can be perceived once processed with an encoding strategy. This is software that is designed for visual perception. Machine learning via neural networks etc can make the process more effective by predicting which stimulation patterns will elicit specific percepts.

- A computer processes the image into a stimulation pattern (using feature-based, biomimetic or hybrid encoding).
- The spatial patterns could be transmitted via radar.
- The brain processes the information.
- The information is perceived as the image on the screen.

Discussion and Implications

The published MAE literature establishes that pulsed microwaves can induce audible sensations, including speech and Morse-code reception, via thermoelastic expansion and that relatively modest additions of signal-processing hardware or software can transform simple clicks into complex, intelligible intracranial communication. Justesen's account of Guy's Morse reception using a key system and Sharp and Grove's tape-based speech transmission at Walter Reed provides a concrete historical demonstration that MAE can carry meaningful information using technology that predates modern DSP and AI by decades. In an era of software-defined radar, beamforming arrays, machine-learning-driven tracking, and population-scale forecasting models, the technical pathway from those early laboratory setups to computer-controlled, globally scalable systems that differentiate between civilians and selected service personnel or

diplomats is conceptually direct, although public documentation does not confirm any such deployed capability.

References:

[1] Allan H Frey https://soundhealingresearchfoundation.org/wp-content/uploads/2024/09/Allan_Frey_Human_auditory_system_respons.pdf

[2] Microwave auditory effect - Wikipedia
https://en.wikipedia.org/wiki/Microwave_auditory_effect

[3] [PDF] Microwaves and Behavior
<https://zoryglaser.com/wp-content/uploads/2020/05/MICROWAVES-AND-BEHAVIOR.pdf>

[4] [PDF] Microwave Auditory Effects And Applications
http://gbppr.net/mil/havana/Microwave_Auditory_Effects_And_Applications-Book_by_James_C_Lin_PhD_1978.pdf

[5] Auditory Response to Electromagnetic Energy | PDF - Scribd
<https://www.scribd.com/document/299608367/Human-Auditory-System-Response-to-Modulated-Electromagnetic-Energy>

[6] Microwave Auditory Effects <https://citeseerx.ist.psu.edu/document?doi=af27816f9325db2560534ff8f075a04acaa7ff44&repid=rep1&type=pdf>

[7] [PDF] Microwave Auditory Effects And Applications - samim
https://samim.io/dl/Microwave_Auditory_Effects_And_Applications-Book_by_James_C_Lin_PhD_1978.pdf

[8] American Psychologist article: 1973 Voice to Skull Demonstration
http://www.gbppr.net/mil/havana/1973_voice_to_skull.pdf

[9] [PDF] SYNTHETIC TELEPATHY
<https://www.roi.ru/tmp/attachments/718817/synthetictelepathyandtheearlymindwars--kopiia1509733759.pdf>