

American Psychologist article: 1973 Voice to Skull Demonstration

Artificial microwave voice to skull transmission was successfully demonstrated by researcher Dr. Joseph Sharp in 1973, announced at a seminar from the University of Utah in 1974, and in the journal "American Psychologist" in the March, 1975 issue, article title "Microwaves and Behavior" by Dr. Don Justesen. **USE YOUR BROWSER'S ZOOM FEATURE TO MAKE READING THE SCANS EASIER. (Try the "View" menu.)**

American Psychologist

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Victor Frankenstein surgically fathered the famous fictional monster, but the fiend was conceptually mothered if not physically spawned by electricity in the form of lightning from the heavens. Perhaps unwittingly, perhaps intuitively, author Mary Shelley (1831) touched a deep truth in the maternal metaphor: Life did originate from electrical discharges into the primeval fog. Indeed, life continues to preserve in all of its earthly forms from the most primitive cell to the most complex organism an elemental dependence on electrical phenomena. Understandably, the curiosity of the scientist about the electrobiological goings-on of the earth's flora and fauna is shared by the layman. A large popular literature is accumulating and embraces experiments and anecdotes that range from the ostensibly respectable to the seemingly bizarre. Recently published texts by Tompkins and Bird (1973) and by Burr (1972, 1973) are not only exemplars of the literature but are rich sources of reference materials. One reads, for example, that plants have nervous systems that yield differing electrical signals on "stimulation" by *kind* or *malevolent thoughts* of human beings (Backster, 1968). One also reads that many Soviet scientists are giving credence and careful study to ESP and related phenomena, not in defiance of Marxian dictates of materialism but quite in keeping with them. The Soviets are championing earlier theoretical notions of Georges Lakhovsky (1934) to the effect that each plant or animal cell is an oscillatory system capable of transmitting and receiving high-frequency electromagnetic energy over a distance. While affirming that electrical events are

This article is based on materials presented in a seminar to the faculties of Psychology and Engineering at the University of Utah (Salt Lake City, Utah) on August 21, 1974. The author's research program is supported by the Veterans Administration and by U.S. Public Health Service Grant FD00650. Acknowledged in the preparation of the manuscript are E. L. Wike and C. L. Sheridan, for a critical reading; Kay Wahl, for artwork; and Lynn Bruetsch and Virginia Florez, for typing. I also thank John Osepchuk of the Raytheon Corporation for his searching criticism of the manuscript; our opinions differ, his advice is appreciated.

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Microwaves and Behavior

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Below image gives the description of the successful modulation. (Note that the fidelity of current-day voice to skull transmission is much higher, after three-plus decades of apparent development.):

water, for example, in carbon-impregnated plastic and in crumpled sheets of aluminum foil. Even subjects who cannot hear microwaves when directly radiated by them can readily perceive clicking sounds when a piece of energy-absorbing material is interposed between the head and a radiator of pulsed microwave energy. Oddly enough, the mass of the interposed material does not seem to be too critical; I successively used smaller and smaller pieces of material as sonic transducers until it was necessary to impale tiny pieces on a toothpick, yet the clicking sounds induced in the material by microwave pulses were clearly audible to me.

The demonstration of sonic transduction of microwave energy by materials lacking in water lessens the likelihood that a thermohydraulic principle is operating in human perception of the energy. Nonetheless, some form of thermoacoustic transduction probably underlies perception. If so, it is clear that simple heating as such is not a sufficient basis for the Frey effect; the requirement for pulsing of radiations appears to implicate a thermodynamic principle. Frey and Messenger (1973) demonstrated and Guy, Chou, Lin, and Christensen (1975) confirmed that a microwave pulse with a slow rise time is ineffective in producing an auditory response; only if the rise time is short, resulting in effect in a square wave with respect to the leading edge of the envelope of radiated radio-frequency energy, does the auditory response occur. Thus, the rate of change (the first derivative) of the wave form of the pulse is a critical factor in perception. Given a thermodynamic interpretation, it would follow that information can be encoded in the energy and "communicated" to the "listener." Communication has in fact been demonstrated. A. Guy (Note 1), a skilled telegrapher, arranged for his father, a retired railroad telegrapher, to operate a key, each closure and opening of which resulted in radiation of a pulse of microwave energy. By directing the radiations at his own head, complex messages via the Continental Morse Code were readily received by Guy. Sharp and Grove (Note 2) found that appropriate modulation of microwave energy can result in direct "wireless" and "receiverless" communication of speech. They recorded by voice on tape each of the single-syllable words for digits between 1 and 10. The electrical sine-wave analogs of each word were then processed so that each time a sine wave crossed zero reference in the negative direction, a brief pulse of microwave energy was trig-

gered. By radiating themselves with these "voice-modulated" microwaves, Sharp and Grove were readily able to hear, identify, and distinguish among the 9 words. The sounds heard were not unlike those emitted by persons with artificial larynxes. Communication of more complex words and of sentences was not attempted because the averaged densities of energy required to transmit longer messages would approach the current 10 mW/cm² limit of safe exposure. The capability of communicating directly with a human being by "receiverless radio" has obvious potentialities both within and without the clinic. But the hotly debated and unresolved question of how much microwave radiation a human being can safely be exposed to will probably forestall applications within the near future.

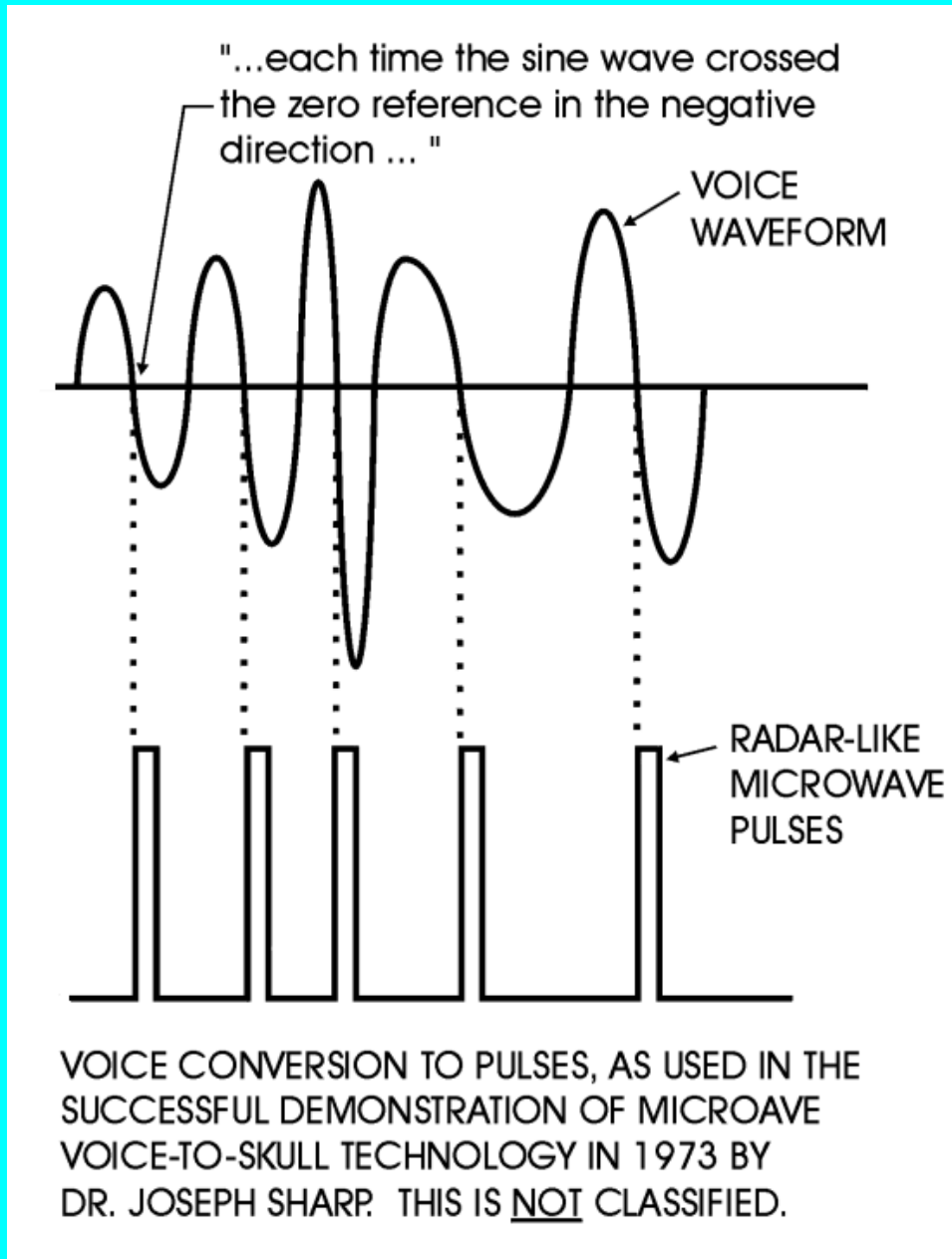
The U.S. limit of 10 mW/cm² is actually an order of magnitude below the density that many investigators believe to be near the threshold for thermal hazards (Schwan, 1970). There are two camps of investigators in the United States, however, who believe that the limit is not sufficiently stringent. In the first camp of conservatives are those who accept the Soviet's belief that there are hazardous effects unrelated to heating from chronic exposures to fields of low density (< 1 mW/cm²); some agree with Milton Zaret (1974), a New York ophthalmologist, who holds that severely debilitating subcapsular lesions of the eyes may develop years, even decades, after exposure to weak microwave fields. Others tend to reject the notion that weak microwave fields produce this anomalous cataract, because of lack of substantiating evidence from the clinic or the laboratory (Appleton & Hirsch, 1975). But these conservatives are possessed of a vague unease simply because the Soviet's limit of continuous permissible exposure is three orders of magnitude below that of the United States.³

The other camp of conservatives tends to reject the possibility of hazardous nonthermal effects,

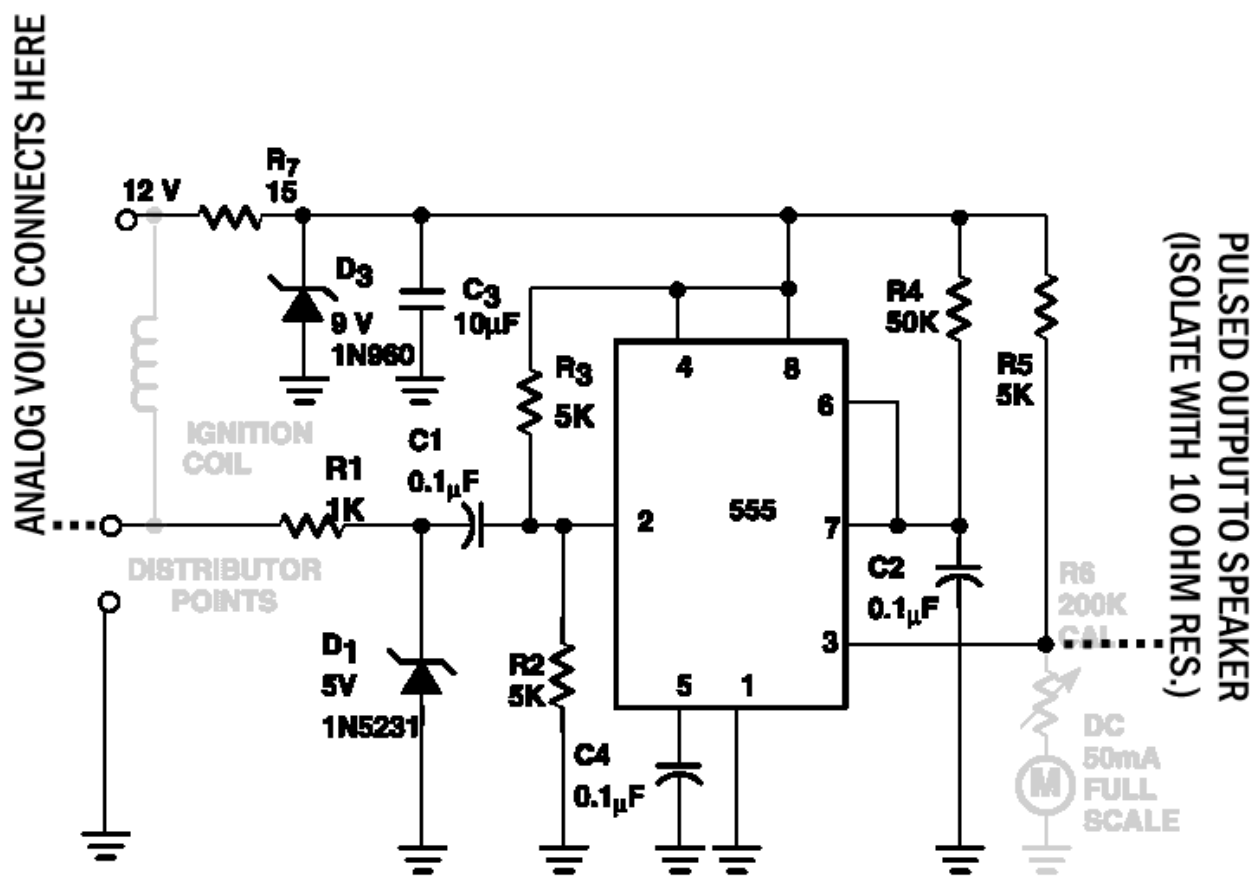
³ The Soviet's exposure limit of 10 μ W/cm² is three orders of magnitude below the exposure limit in the United States, but a different, that is, *emission*, limit holds for microwave ovens purchased for use in the American kitchen. In the United States at the present time, a newly purchased microwave oven may not emit radiation at a density greater than 5 mW/cm² as measured at a distance of 5 cm from the oven's surface. A user who stands 1 m from an oven that emits energy at the maximum permissible quantity would probably be exposed to a density of only a few microwatts per square centimeter—this is because electromagnetic energy when radiated from a point source attenuates markedly as it propagates through space.

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Below image illustrates Dr. Joseph Sharp's voice to skull modulation method described above in the American Psychologist journal article:



Below image shows a way to demonstrate Dr. Joseph Sharp's voice to skull modulation method, converting speech or music to a string of pulses. In Sharp's experiment, the pulses were microwave signals, similar to radar, but the demo circuit below puts out simple DC pulses which can be fed to a speaker. It emits no microwave signals and is totally safe.



USING A 555 CHIP TACHOMETER DRIVER CIRCUIT TO SIMULATE DR. JOSEPH SHARP'S MICROWAVE VOICE TO SKULL VOICE-TO-PULSES CONVERSION METHOD

Below image shows current day microwave hearing weapon using the same principle as Sharp's voice to skull:

<http://www.navysbirprogram.com/NavySearch/Summary/summary.aspx?pk=F5B07D68-1B19-4235-B140-950CE2E19D08>

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Phase I Summary Report

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AWARD DETAILS

Contract # M67854-04-C-1012

(Portions deleted)

Start / End Date 11/19/2003 - 05/19/2004

FY Reported 2004

Title Remote Personnel Incapacitation System

SUMMARY INFORMATION

Objective of Phase Effort

The main goal of the Phase I project was to design and build a breadboard prototype of a temporary personnel incapacitation system called MEDUSA (Mob Excess Deterrent Using Silent Audio). This non-lethal weapon is based on the well established microwave auditory effect (MAE). MAE results in a strong sound sensation in the human head when it is irradiated with specifically selected microwave pulses of low energy. Through the combination of pulse parameters and pulse power, it is possible to raise the auditory sensation to the "discomfort" level, deterring personnel from entering a protected perimeter or, if necessary, temporarily incapacitating particular individuals.

Summary of Results from the Phase I Effort

The major results of the Phase I effort were that - An operating frequency was chosen - Hardware requirements were established (commercial magnetron, high-voltage pulse former) - Hardware was designed and built - Power measurements were taken and the required pulse parameters confirmed - Experimental evidence of MAE was observed

... it is possible to raise the auditory sensation to the "discomfort level" ...

... measurements were taken and the required pulse parameters were confirmed ...