

HISTORY OF THE NEUROPHONE

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The first Neurophone was made when I was 14 years old, 1958. When I was 15 years old, I gave a lecture at the Houston Amateur Radio Club, during which I demonstrated the Neurophone. The next day I was contacted by a reporter from the Houston Post. He said that he had a relative who was nerve-deaf from spinal meningitis and asked if we might try the Neurophone on his relative. The test was a success. The day after that, an article on the Neurophone as a potential hearing aid for the deaf appeared and went out on the international wire services.

The publicity grew over the next two years. In 1961, Life magazine came to our house and lived with us for over a week. They took thousands of pictures and followed me around from dawn to dusk. The article appeared in the September 14, 1962 issue. After that, I was invited to appear on the I've got a Secret show hosted by Gary Moore. The show was telecast from the NBC studios in New York. During the show, I placed electrodes from the Neurophone on the lower back of Bess Meyerson while the panel tried to guess what I was doing to her. She was able to 'hear' a poem that was being played through the Neurophone electrodes. The poem was recorded by Andy Griffith, another guest on the show. Since the signal was only perceived by Ms. Meyerson, the panel could not guess what I was doing to her. As a result of the Life magazine article and exposure on the Gary Moore Show, we received over a million letters about the invention.

The U.S. Patent Office started giving us problems. The examiner said that the device could not possibly work, and refused to issue the patent until 1967. It was only after my lawyer and I took a working model to the patent office that the patent was issued. This was an unusual move since inventors rarely bring their inventions to the patent examiner. The examiner said that he would allow the patent to issue if we could make a deaf employee of the patent office hear with the device. The employee was able to hear and the patent for the Neurophone was issued.

A research company, the Huyck Corporation, became interested in the invention. Huyck was owned by a very large and powerful Dutch paper company with offices throughout the world. They began researching the device and were favorably impressed but because of the problems with the patent office they dropped the project.

At Huyck I met two friends who remained close to me for many years, Dr. Henri Marie Coanda, the father of fluid dynamics, and G. Harry Stine, scientist and author. Harry Stine wrote a book called *The Silicon Gods* (Bantam Books),

which was about the potential of the Neurophone as a brain-to-computer connecting interface device.

The next stage of Neurophone research began when I went to work for Tufts University as a research scientist. Together with a Boston based corporation, we were involved in a project to develop a language between man and dolphin. Our contracts were from the United States Naval Ordnance Test Station out of China Lake, California. The senior scientist on the project was my close friend and business partner Dr. Dwight Wayne Batteau, Professor of Physics and Mechanical Engineering at Harvard and Tufts.

HOLOGRAPHIC SOUND

In the Dolphin Project we developed the basis for many potential new technologies. We were able to ascertain the encoding mechanism used by the human brain to decode speech intelligence patterns, and were also able to decode the mechanism used by the brain to locate sound sources in three dimensional space. These discoveries led to the development of a 3-D holographic sound system which could place sounds in any location in space as perceived by the listener. In other words it could be sent in a way where the sound appeared to be coming right out of thin air!

We also developed a Man-Dolphin language translator. The translator was able to decode human speech so that complex dolphin whistles were generated. When dolphins whistled the translator would produce human speech. We developed a communication system between ourselves and the two dolphins we were working with at that time. The dolphins were located in the lagoon of a small island off of Oahu, Hawaii. We had offices at Sea Life Park in Boston and commuted between the points to test our various gadgets.

We recorded dolphins and whales in the open sea and were able to accurately identify the locations of various marine mammals by using the concepts discovered in our work. The system used the same method as the human brain in locating sound sources.

A person can locate sound sources in space because of the way the outer ear handles incoming sound signals. You can test this by closing your eyes while having a friend jingle keys around your head. With your eyes closed you can pinpoint the location of the keys very accurately.

If you distort your pinnae (the projected part of the exterior ear -- the part we see -- collects and directs sound waves into the inner portions of the ear) by bending your outer ears out of shape, your ability to locate sound sources will be reduced

or destroyed. The so called cocktail party effect is the ability to locate specific voices in a noisy party. This is due to the brain's ability to detect phase differences and then pay attention to localized areas in 3-D space. Thus we can not only tell who is speaking but the location of the speaker can also be detected. A favorite 'intelligence' trick is to have sensitive conversations in a 'hard room' with wooden walls and floors. A microphone 'bug' will pick up all the echoes and this will scramble the voice. Almost all embassies contain 'hard rooms' for sensitive conversations. If you put a microphone in the room with a duplicate of the human pinnae on top of it, you will be able to distinguish the voices and tune out the echoes -- just like we do in a party.

In order to locate whales and dolphins under water, we used metal ears 18 inches in diameter that were attached to hydrophones. When these ears were placed under water, we were able to accurately localize underwater sounds in 3-D space by listening to the sounds with earphones. We used this system to pin point the location of whales and dolphins. Sound travels five times faster under water so the artificial ears had to be larger to give the same time-ratio encoding as we find in the air. We also made large plastic ears that were tested in Vietnam. These ears were of the same proportions as real ears but much larger. They enabled us to hear distant sounds with a high degree of accuracy enabling us to locate the position of the originating sounds in the jungle. It seems that we can adapt to ears of almost any size. The reason we can do this is that sound recognition is based on a time ratio code which the brain translates into what we 'hear'.

We were able to also reverse the process. We could take any sound recording and condition it so that it would be perceived as coming from any point we wished to project it in 3-D space. Using this system we could spread out a recording of an orchestra so that it was as if we were listening to the music coming from many points in a room just like a live concert.

We developed a special Neurophone that enabled us to 'hear' dolphin sounds up to 250,000 Hertz well beyond what is otherwise possible with the human ear. By using the device as part of the Man-Dolphin communicator we were able to perceive more of the intricacies of the dolphin language. The human ear is limited to about 16,000 Hertz (vibrations, pulses or cycles per second) while dolphins generate and hear sounds up to 250,000 Hertz. Our special Neurophone enabled us to hear the full range of dolphin sounds.

As a result of the discovery of the encoding system used by the brain to find sound location in space, and also to recognize speech, we were able to create a digital Neurophone.

When our digital Neurophone patent application was sent to the patent office, the Defense Intelligence Agency slapped it under a secrecy order. I was unable to work on the device or talk about it to anyone for another five years. This was terribly discouraging. The first patent took twelve years to obtain and now, after all of our work, we had our work locked up in a national security order.

SPEED LEARNING -- NEW SOUND

The digital Neurophone converts sound waves into a digital signal that matches the time ratios codes understood by the human brain. These time signals are used not only in speech recognition but also in recognizing the location of sounds in 3-D space as mentioned earlier in the "jingling keys" example.

The digital Neurophone is the version that we eventually produced and sold as the Mark XI and the Thinkman Model 50 versions. These Neurophones were especially useful as speed learning machines. If we played educational tapes through the device, the information is very rapidly incorporated into the long-term memory banks of our brains.

THE EARLY DESIGNS

The first Neurophone device was constructed by attaching two Brillo pads to insulated copper wires. Brillo pads are copper wire scouring pads used to clean pots and pans. They are about two inches in diameter. The Brillo pads were inserted into plastic bags that acted as insulators.

The wires from the pads were connected to a reversed audio output transformer that was attached to a hi-fi amplifier. The output voltage of the audio transformer was about 1,500 volts peak-to-peak. When the insulated pads were placed on the temples next to the eyes and the amplifier was driven by speech or music, you could 'hear' the resulting sound inside your head. The perceived sound quality was very poor, highly distorted and very weak.

I observed that during certain sound peaks in the audio driving signal, the sound perceived in the head was very clear and very loud. When the signal was observed on a oscilloscope while listening to the sound, the signal was perceived as being loudest and clearest when the amplifier was over-driven and square waves were generated. At the same time, the transformer would ring or oscillate with a dampened wave form at frequencies of 40-50 kHz.

The next Neurophone consisted of a variable frequency vacuum tube oscillator that was amplitude-modulated. This output signal was then fed into a high frequency transformer that was flat in frequency response in the 20-100kHz range.

The electrodes were placed on the head and the oscillator was tuned so that maximum resonance was obtained using the human body as a part of the tank circuit. Later models had a feedback mechanism that automatically adjusted the frequency for resonance. We found that the dielectric constant of human skin is highly variable. In order to achieve maximum transfer of energy, the unit had to be returned to resonance in order to match the 'dynamic dielectric response' of the body of the listener.

The 2,000 volt peak-to-peak amplitude-modulated carrier wave was then connected to the body by means of two-inch diameter electrode disks that were insulated by means of mylar films of different thicknesses. The Neurophone is really a scalar wave device since the out-of-phase signals from the electrodes mix in the non-linear complexities of the skin dielectric. The signals from each capacitor electrode are 180 degrees out-of-phase. Each signal is transmitted into the complex dielectric of the body where phase cancellation takes place. The net result is a scalar vector. This fact was not known at the time I invented the device. This knowledge came later when we learned that the human nervous system is particularly sensitive to scalar signals.

The high frequency amplitude-modulated Neurophone has excellent sound clarity. The perceived signal was very clearly perceived as coming from within the head. We established quite early that some totally nerve-deaf people could hear with the device. For some reason, however, not all nerve-deaf people hear with it the first time.

We were able to stimulate visual phenomena when the electrodes were placed over the occipital region of the brain. The possibilities of Neurophonic visual stimulation suggests that we may someday be able to use the brain like a computer or television screen.

HOW DOES IT WORK?

The skin is our largest and most complex organ. In addition to being the first line of defense against infection, the skin is a gigantic liquid crystal brain.

The skin is piezo-electric. When it is vibrated or rubbed, it generates electric signals and scalar waves. Every organ of perception evolved from the skin. When we are embryos, our sensory organs evolved from the folds in the skin. Many primitive organisms and animals can see and hear with their skin.

When the Neurophone was originally developed, neurophysiologists considered that the brain was hard-wired and that the various cranial nerves were hard-wired to every sensory system. The eighth cranial nerve is the nerve bundle

that runs from the inner ear to the brain. Theoretically, we should only be able to hear with our ears if our sensor organs are hard-wired. Now the concept of a holographic brain has come into being. The holographic brain theory states that the brain uses a holographic encoding system so that the entire brain may be able to function as a multi-faceted sensory encoding computer. This means that sensory impressions, like hearing, may be encoded so that any part of the brain can recognize input signals according to a special type of signal coding. Theoretically, we should be able to see and hear through multiple channels not just our eyes and ears.

The key to the Neurophone is the stimulation of the nerves of the skin with a digitally coded signal that carries the same time-ratio code that is recognized as sound by any nerve in the body.

All commercial digital speech recognition circuitry is based on so-called dominant frequency power analysis. While speech can be recognized by such a circuit, the truth is that speech encoding is based on time ratios. If the frequency power analysis circuits are not phased correctly, they will not work. The intelligence (sound) is carried by phase information. The frequency content of the voice gives our voice a certain quality, but frequency does not contain information. All attempts at computer voice recognition and voice generation are only partially successful. Until digital time-ratio encoding is used, our computers will never be able to really talk to us.

The computer that we developed to recognize speech for the Man-Dolphin communicator used time-ratio analysis only. By recognizing and using time-ratio encoding, we could transmit clear voice data through extremely narrow bandwidths. In one device, we developed a radio transmitter that had a bandwidth of only 300 Hertz while maintaining crystal clear transmission. Since signal-to-noise ratio is based on bandwidth considerations, we were able to transmit clear voice over thousands of miles while using milliwatt power.

Improved signal-processing algorithms are the basis of a new series of Neurophones that are currently under development. These new Neurophones use state-of-the-art digital processing to render sound information with much greater clarity.

ELECTRONIC TELEPATHY

The Neurophone is an electronic telepathy machine. Several tests prove that it bypasses the eighth cranial nerve, the hearing nerve, and transmits sound directly to the brain. This means that the Neurophone stimulates perception through a seventh or alternative sense.

All hearing aids stimulate tiny bones in the middle ear. Sometimes when the eardrum is damaged, the bones of the inner ear are stimulated by a vibrator that is placed behind the ear on the base of the skull. Bone conduction will even work through the teeth. In order for bone conduction to work, the cochlea or inner ear that connects to the eighth cranial nerve first must function. People who are nerve-deaf cannot hear through bone conduction because the nerves in the inner ear are not functional.

A number of nerve-deaf people and people who have had the entire inner ear removed by surgery have been able to hear with the Neurophone.

If the Neurophone electrodes are placed on the closed eyes or on the face, the sound can be clearly 'heard' as if it were coming from inside the brain. When the electrodes are placed on the face, the sound is perceived through the trigeminal nerve.

We therefore know that the Neurophone can work through the trigeminal or facial nerve. When the facial nerve is deadened by means of anesthetic injections, we can no longer hear through the face.

In these cases, there is a fine line where the skin on the face is numb. If the electrodes are placed on the numb skin, we cannot hear it but when the electrodes are moved a fraction of an inch over to skin that still has feeling, sound perception is restored and the person can 'hear'.

This proves that the means of sound perception via the Neurophone is by means of skin and not by means of bone conduction.

There was an earlier test performed at Tufts University that was designed by Dr. Dwight Wayne Batteau, one of my partners in the United States Navy Dolphin Communication Project. This test was known as the "Beat Frequency Test". It is well known that sound waves of two slightly different frequencies create a 'beat' note as the waves interfere with each other. For example, if a sound of 300 Hertz and one of 330 Hertz are played into one ear at the same time a beat note of 30 Hertz will be perceived. This is a mechanical summation of sound in the bone structure of the inner ear. There is another beat, sounds beat together in the corpus callosum in the center of the brain. This binaural beat is used by the Monroe Institute and others to simulate altered brain states by entraining (causing brain waves to lock on and follow the signal) the brain into high alpha or even theta brain states. These brain states are associated with creativity, lucid dreaming and other states of consciousness otherwise difficult to reach when awake.

The Neurophone is a powerful brain entrainment device. If we play alpha or theta signals directly through the Neurophone, we can move the brain into any state desired.

Batteau's theory was that if we could place the Neurophone electrodes so that the sound was perceived as coming from one side of the head only, and if we played a 300 Hertz signal through the Neurophone, if we also played a 330 Hertz signal through an ordinary headphone we would get a beat note if the signals were summing in the inner ear bones. When the test was conducted, we were able to perceive two distinct tones without beat. This test again proved that Neurophonic hearing was not through bone conduction.

When we used a stereo Neurophone, we were able to get a beat note that is similar to the binaural beat, but the beat is occurring inside the nervous system and is not the result of bone conduction.

The Neurophone is a 'gateway' into altered brain states. Its most powerful use may be in direct communications with the brain centers, thereby bypassing the 'filters' or inner mechanisms that may limit our ability to communicate to the brain.

If we can unlock the secret of direct audio communications to the brain, we can unlock the secret of visual communications. The skin has receptors that can detect vibration, light, temperature, pressure and friction. All we have to do is stimulate the skin with the right signals.

We are continuing Neurophonic research. We have recently developed other modes of Neurophonic transmission. We have also reversed the Neurophone and found that we can detect scalar waves that are generated by the living system. The detection technique is actually very similar to the process used by Dr. Hiroshi Motoyama in Japan. Dr. Motoyama used capacitor electrodes very much like those we use with the Neurophone to detect energies from various power centers of the body known as chakras.