Wolfgang Hagen

On The Place Of Radio

This speech will be "on the radio", about the place of the radio, a phrase that is by no means unambiguous in German, in the German language and in Germany.

On the place of the radio could be taken to mean talking on the radio, over the radio, through the ether, as people used to say. This thing called ether, the epitome of physics from days gone by, whose child the radio is, actually never existed. On the radio - that could also mean the sound coming out of the radio, from the loudspeaker, from behind the microphone. If you can still call that radio in the age of the ghettoblaster.

It could just as well be a CD or a tape we are listening to; after all, some radio broadcasts sound as if somebody was playing an endless loop. On the place of the radio could finally mean talking about where it came from, its roots, its origins, if there is any such thing. And then: on the place of the radio could mean talking about the status quo, the place that the radio has in our lives, as they say, so this could well mean the end of radio or its future past.

You see, the question for the place of the radio is like radio itself. "Listen... I heard...you said...there was....something on the radio..." - Here we go with all the ordinary little ambiguities in every other letter received from listeners. What is it that represents the radio and what does the radio stand for? The first thing I learnt from my elders about two decades ago, when they were already working in the place all my expectations were focused on was: "Radio, my dear young friend, is the haute école of solitude and misunderstanding." So let us stick to language because - as Nietzsche has shown us since 1878 - that is the place where all misunderstandings arise.

"The significance of language..." said Nietzsche, "lies in the fact that in it, man placed a world of its own next to the other world, a place he thought to be so solid that he would be able to unhinge the rest of the world and become its master. To the extent that man believed, over long periods, in concepts and the names of things as eternal truths, he acquired the pride that made him rise above the animal: he really believed to possess cognition of the world in language."

Nietzsche, twentieth century contraband in the middle of the nineteenth century, aims at his contemporaries and their science. Nietzsche criticised an ideal of science, the ideal of the nineteenth-century natural sciences, which Nietzsche was quite familiar with, and saw that it was about to claim an almost complete system of representation for mankind, one that was mainly linguistic and mathematical in nature, a system of standardisation, measurement, literalisation, naming, classification, anatomisation, of the Darwinisation,

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1 Opening lecture for "Recycling the Future", ORF, Vienna, December 4, 1997
physiologisation of mankind. Most of our technical terminology dates back to this Nietzschean epoch, the age that Nietzsche looked at so critically.

Four years before the Nietzsche quote, the technical term came into being in a rather unspectacular manner, the word that was going to participate in the inflation of language in its own way: the word "radio".

Its author was the Englishman William Crookes, a practising occultist and chemist who has remained one of the great chemists of all times until today, for several reasons. It was the year 1874, and he had been involved in determining the specific atomic weight of thallium for some time. That is, the weight of a shiny, green and soft heavy metal the discovery of which - from a green line in the combustion spectrum - is also ascribed to William Crookes. He used the most modern tools in his work on its atomic weight: highly exhausted, or high-vacuum, glass tubes in which he places very thin thallium platelets. A generation of physicists was to call these tubes "Crookes' tubes" after him.

To his great surprise, the researcher found that the thin platelets began to revolve in the vacuum once they were exposed to light. In fact, it was not an entirely coincidental discovery but based on a speculative theory of gravity. Today, it is all but forgotten that numerous physicists and other scientists from the Victorian age since Michael Faraday believed that gravity was materially identical with electricity, electric attraction, magnetism and light, for example the rays of the sun. Crookes believed to have found a representation thereof. His thallium platelets revolved under the rays of light. Was this not some kind of weight at work? Because of the radiation, the "radiant matter" which he thought was the driving force, he called his tube appliance "radio-meter". Today, it is available as a desk decoration, or for lampshades.

This error of physics does not mark the beginning of radio history. Of course, it is not the rays of light, the photons that make the platelets revolve but the heat differential between the top and bottom of the platelets. The side facing the light source warms more than the other one so that gas molecules hitting them are repelled in different ways. The whole thing only works at a certain extent of exhaustion in the tube, to boot; there must be no complete vacuum. However, Crookes did not know that. Nevertheless, it did not keep Crookes, a self-taught physicist like the bookbinder Michael Faraday, from keeping the world in suspense years later, when he already knew, by presenting his theory of the "fourth", "radiant" aggregate state. His radio-meter tube, he claimed, had revealed a primal force which was supposed to be a uniform force, a symbol, the representation of an eternal truth. An insight into the world.

Let me add that Crookes may have invented the word "radio" but he did not represent a primal force and insight into the world. However, he had found what could be considered a blind trace, an "epistemic thing", an "uncertain object", as more recent historians of science would call it. Crookes had claimed the existence of radiant matter out of a speculative context, and he had developed a representation device that allowed him to depict cathodic rays in highly evacuated tubes.
The theory that went with it was useless but the setting of object claim and representation was sufficient. The next generation of physicists invested a lot of research into this uncertain object for twenty years so as to finally enable measurements of the radiation that led to more recent nuclear theory, i.e. the massless x-rays and the mass particles which were to dominate the twentieth century, the electrons. X-rays and electrons were discovered in 1895 and 1897 respectively by means of extended Crookes' tubes, which is what the researchers called the device - the experimental appliance developed by an ambiguous character, a physico-occultist researcher who believed in telepathy, described the telekinetic phenomena and materialisations occurring at the séances of media such as Donald Dunglas Home and Henry Slade, and took levitating tables seriously.

Thus, we have clarified the origin of the name of our medium, "radio", even though radio has very little in common with the truth about radiation Crookes was concerned with. For a long time Heinrich Hertz, too, experimented intensively with Crookes' tubes. However, we remember him as the man who discovered electromagnetic waves. It was in 1887, 14 years later, when he made the discovery out of a mixture of prior theoretical knowledge, playful coincidence and the pure joy of experimenting with an engineer's perfection, something which gives historians of science a reason to wonder about the whole thing until today. No matter if Hertz knew from the start what he had found or not, he first called his waves "electrodynamic effects", then "electrodynamic waves", then "electrical vibrations", then "electrical waves" and finally "waves of electrical power", but never "radio waves". Hertz never even mentioned the word "radio".

What is more: from the very beginning and for the following six years until his untimely death, Hertz always said that it was impossible to turn his discovery into something practical, technical, useful for, say, the purpose of telegraphy.

The waves were there, produced by slow sparks from a Ruhmkorff coil. In terms of theory, it was not really surprising that they were there because the Victorian physicists around the Scottish mathematician James Clerk Maxwell had predicted that potential almost twenty years earlier. Now they were able to produce them with the help of what Hertz had proudly recorded with his own camera, and Maxwell's opinion was also confirmed. That was it. Neither Hertz nor the Victorian physicists had any idea about a practical reception device for these incredibly fast electromagnetic frequencies.

Looking for something else, the effects of induction, Hertz had first produced evidence of these waves using simple wire meshes. What he needed was good eyes and a microscope. After 1888 infinitesimal dipoles emitted sparks in every physicist's laboratory, but reception, i.e. the proof of the effect which the waves produced this way had, remained a matter of well-trained eyes.

So there is no clear and unambiguous answer to the question for the origin of radio. Hertz had found the waves but to establish further properties of these, he had no more than the things you can see here. Hertz admitted that the wire meshes and contraptions sealed with sealing-wax looked fairly primitive, which they were, and it was almost an art
that Hertz was able to furnish proof of such far-reaching discoveries such as the
refraction and diffraction of very short waves.

Hertz had discovered electromagnetic waves, but not radio. Hertz became a professor
in Bonn, and his letters reflect clearly that he was sick and tired of things after two further
years of unsuccessful research. The next step, the next link in the genealogical chain of
the radio is not found in physics. But again, the environment is deeply occultist-
psychocryptic; one could even call it a climate of hysteria.

The next step is taken in the legendary hysteria clinic of Jean-Martin Charcot, the
famous Salpetrière, where a Viennese neurologist named Sigmund Freud, sniffing cocaine
out of sheer excitement, saw the first real hypnosis performed on hysterical women in
1885. The clinic was also quite important as a birthplace of psychoanalysis. I don’t know
if Freud also visited the laboratory for electric shock treatment. That was where they tried
to treat hysteria from what was then believed to be its electro-physiological roots. Around
1890, the Catholic professor of physics Edouard Branly from Paris went to the Salpetrière
every morning to practise the therapy that was always also an experiment: Branly, the
physicist, applied electric shocks to women suffering of hysterical fits. He administered
local shocks to their bodies, using the rheophor, the electrical brush. <Didier-Huberman>

At lunchtime, Branly retreated to his university laboratory to repeat in an experimental
model what he had done to living persons in the morning: applying electricity to nerves. In
the morning, he treated live nerves with electric shocks, in the afternoon he did research
on electrical models of nerves. This is how the first receiver in radio history was
developed.

Branly succeeded in producing a china bottle filled with strange scobs which
conducted electricity under electromagnetic radiation and became non-conductive again
when the radiation was interrupted by means of a little mallet: the Branly tube. Branly had
found what could be termed the model of a hysterical neurospasm. When the radiation
hits the bottle, the coherer, as it came to be called later on, neurospasm, catalepsy,
catatonia set in. No radiation: normal state.

The coherer, the electromechanical nerve model, is at the actual beginning of what we
call radio and what will soon be named that way in England and America. Again, nothing
was based on a targeted strategy, nothing was intentional. Branly did not realise that
radio waves were transmitted, everything was still "blind tactics", as Derrida said.
However, these tactics were guided by the great objective of nineteenth-century physics.
From Crookes to Branly, researchers had been looking for the most comprehensive
representation of man and his cosmic-material condition, and they were looking for it in
mechanical models, or as Hermann von Helmholtz said: "The final objective of natural
sciences is .... to end in mechanics." <Helmholtz 1869/71:164> First, Oliver Lodge, a
Liverpudlian physicist much appreciated by Helmholtz, and - I’m sorry - another
practising occultist, made the Branly bottle, also known as the Branly tube, part of his
tools, unashamedly renamed it "Lodge coherer" and used it for an experiment which in
1894 was to become the seminal experiment of radio. In a lecture commemorating the
death of Heinrich Hertz, Lodge first presented to the scientific community of Liverpool full-fledged radio equipment, a local presence, a place of the radio.

The archives of the Department of Physics at Liverpool University hold the sketches for the experiment, which was carried out in the garden of the Department. On one side, there is Hertz's spark coil, representing the sending station with loudly banging sparks. On the other side, on a table placed at a distance of a hundred metres, there is the Branly nerve model, the coherer, as the receiving station for the signals. The experiment was successful, electromagnetic waves generated by spark oscillation closed the electric circuit of the coherer on the receiving side. That was the first, the very first local presence of the radio, a place of origin, as far as we know. Any engineer will see that it is easy to build a recursive machine from this as long as the electricity is on. The waves short-circuit the coherer, electricity is conducted. It operates a little mallet which interrupts the conductivity of the coherer and activates the spark coil, which in turn short-circuits the coherer. This recursiveness of does not have to be observed by the human eye any more. The media will continue to function even though humanity may have ceased to exist, as Lacan rightly assumed.

Lodge was at the same time member and temporary President of the Society for Psychical Research in London; his experiment in the garden was not the presentation of a new technical appliance but should furnish proof for a psycho-electric theory. If it was possible to stimulate a nerve model by means of electric waves, why should it then be ruled out that telepathy between people would work in a similar way? Lodge was after the physical proof that "thought transference", telepathy, was possible.

The same Oliver Lodge had sent exhaustive records to the journal of the Society. People sitting opposite each other, an agent and a recipient, transferred thoughts in the form of pictures on which the agent concentrated while the recipient painted them without seeing the original. A transmission experiment, radio of sorts, too.

Lodge also had a theoretical explanation in store, namely that our thoughts - if they were no less than electricity flowing through our brains - would be electromagnetic waves, physically speaking. According to Maxwell's theory of electricity, proven by Hertz's tests, every current is electromagnetism. If our thoughts are electric currents and thus electromagnetism, why should they not be able to spread like Hertz's waves, even outside our head? And if, which is what Lodge actually assumed, they were not even inside our head but would gather around our heads like moths around a flame, it would also be thinkable that they would emanate from our head in the shape of waves and arrive in a different head, or at least a different nerve, to be received there. Lodge believed that his endless records furnished empirical proof of telepathy in people, at least if they were not seated too far from each other.

In the 1894 garden experiment the physico-technical representation had after all been found. The spark coil stood for the sending head. The coherer nerve model stood for the receiving nerve. Receiving signals meant receiving thoughts. It worked. Eureka, nature itself created the representation of representation. Nature created thoughts as reproducible objects of nature. They are not necessarily our thoughts, they can be other
people’s thoughts, as well, they are electricity consisting of electric currents. There is something that we are thinking which is not us but measurable thought substance, and physics can finally embark on mastering it. This is the message at the heart and the power apparatus of the first successful radio experiment: a representation of our nervous system as a system of physics, an extension of our nerves in technical form, a first approach of nerve writing with the help of electromagnetic appliances. You will certainly feel that this contains elements of a media theory to be developed much later, by McLuhan, the theory that claims that technical media represent extensions of our central nervous system. No, it is the other way round: prior to all media theories and at its literal place of origin, it is an experiment dealing with the representation of the nervous system that gives birth to these media of transmission and broadcasting, starting with the radio.

In this first radio experiment of 1894, in the experimental setting of nerves receiving by means of electricity, the imperial utopia of nineteenth-century physics reaches its climax, not without a certain touch of ridiculousness, from today’s point of view. It was a notion of physics concerned with mastering the representation of representation, with developing a power apparatus that recorded the sensations, perceptions and thoughts of the human body as a discourse of nature that can be translated into mathematical terms and subjuged.

In the genealogy of radio as a medium, this simple and yet so telling experiment did not play any direct role. Until not too long ago, it had actually been lost to the history of science. I would not have been able to unearth it had it not been for a few Liverpudlian students of physics who repeated it some years ago to commemorate their forefather Oliver Lodge. After all, we know that the radio as a medium was created by the British army, not British university departments of physics and their imperial fantasies.

Now I will have to explain why this is so:

The historical joke is that the British telegraphy engineers, the practitioners headed by William Preece, master over many thousands of kilometres of submarine cables in the British Empire, definitely hated English physics of the late nineteenth century. These telegraphy engineers were responsible for the operations of the submarine cables around the island, around the most powerful nation of the world, but these lines, so important to the war effort, worked badly. Unexplainable signal disturbances, breakdowns, erratic failures. The physicists with their crazy theories of electromagnetism, ether weight and ether wind, did not offer any practical help, only grand theories. William Preece was the personification of the "electrician", the telegraphy engineer of the nineteenth century. An engineer with an autodidactic background, a craftsman, a practitioner who got things going like Thomas Alva Edison, a good friend of his, who had exposed himself to the ridicule of the English physicists because of his stupendous lack of knowledge in matters of submarine cable and therefore never set foot on the isles again. The relationship between the telegraphy practitioners and the physicists was thus characterised by mutual hatred.
There can be no other explanation; otherwise a 21-year old man named Guglielmo Marconi would not have had his chance.

May 1895 to July 1897 - the two-year period when radio was born. The trace of blind tactics to which we owe European radio, is strange enough. As you can see, Guglielmo Marconi was young but scientifically speaking, he was a cipher. He was not even a student of physics because he had failed the admission exam in Bologna. In the bourgeois Villa Gaffone, where he lived, his neighbour was the Professor with whom he had sat for the examination. Even though the son had flunked, the Professor stayed a friend of the rich Marconi family. And Marconi, the 17- or 18-year old, had remained an enthusiastic craftsman, notwithstanding his poor academic achievements. By coincidence Professor Righi, the neighbour, was one of the four or five scientists in Europe who were familiar with all the equipment and experiments I have talked about. Righi had even improved the spark coil, generated higher capacities and enabled faster sparking. Marconi was allowed to copy the equipment in the garden, read all the treatises he found with Righi, knew all the previous experiments, got himself a coherer, which both Branly and Lodge had described, and made successful experiments himself. His mother was an Englishwoman; née Jameson, heiress from a whisky distillers' dynasty in Ireland, she made him send the collected equipment, skilfully hidden in crates and boxes, to England to present it to the English submarine cable engineer William Preece in 1895. He could have received the same equipment from Oliver Lodge, but never did, for the reasons given earlier. Marconi became famous because he benefited from a blind spot in the scientific-military network which was never flawless.

You know the rest. Marconi did not use any other appliances than those the physicists and researchers in Berlin, St. Petersburg, Liverpool and Bologna had long used, but he took the equipment left behind, or rather, he combined the bits and pieces and read them in a new way. Marconi did not think of representing humans in the ether or finding physiological electricity in the mechanics of thoughts; he was looking for success, money, signals and their reception, something that could be used for military purposes. First, tentative experiments were made in London, then across Bristol Bay in the south of England, an occasion on which engineers from continental Europe were invited to attend, such as Professor Slaby from Germany. Then came experiments across the Atlantic, from England to Newfoundland. The spectacular military applications function as a kind of link to the previous history of the equipment, which Marconi was to obliterate to the point of negation in terms of patent rights. Marconi claimed that his waves had nothing to do with Hertz and obtained patents on equipment that had long been known in scientific circles.

In this context, the name of the strange radiation was revived: "radio". First, it was called wireless, then "radio" telegraphy came to the fore. In 1906, at the first international conference on "wireless telegraphy", it was agreed that all telegrams sent over the wireless had to have the word "radio" in the letterhead. Triggered this way, the word "radio" inscribed itself indelibly into the world.
Radio had a name now, its own name, and in Europe it was practically nothing else than spark telegraphy; the situation remained unchanged far into World War I. Marconi companies used the entire spectrum. As a transmission technique, spark oscillation produces dampened waves, that is to say, waves which cannot be tuned to a fixed frequency. This is what the Marconi companies practised for years, and in 1912 it led straight into a legendary disaster.

It was on April 14, when the Titanic hit an iceberg. The California was cruising at a distance of less than 20 miles during that night but the Marconi radio operator was asleep when the Titanic sent its distress messages. The California could have reached the Titanic before it sank. But that was only found out later. The first Marconi station to receive a message from the Titanic was in Cape Race, Newfoundland, and they passed it on to the New York Times which published it on April 15, without referring to the emergency. A few hours later, stations on both sides of the Atlantic received an erroneous message full of hope: "All Titanic passengers safe, towing to Halifax". This was what the London Times published at a time when the Titanic had hit the ocean floor with 1,500 people aboard. It was the result of 'interference', radio stations disrupting each other, the result of a practice that had its roots in Marconi's claim to power over all frequencies.

On April 21, six days after the catastrophe, Captain Haddock of the Titanic's sister vessel, explained what had happened. Ham radio operators in America had sent messages across the ether a few hours after the disaster, which was also a radio catastrophe: "Are all Titanic passengers safe?" At the same time, the Marconi operator on the steamer "Asian" sent the following message across the same ether: "Towing oil tank to Halifax". Ham operators received both messages, compressed it in one and sent the combination around the world. Thus, interference, mutually picking up and sending signals on random frequencies, had reached a level that was clear for all the world to see, and it was a situation that could not persist.

Physically speaking, Marconi's telegraphy, which had used the entire range of frequencies for years and laid claim to ruling supreme over the ether had been an impossible state from the very beginning. After 1912, Marconi was reined in. The Titanic disaster prompted the US-Congress to adopt the first Radio Act, which introduced a regulation stating that one radio operator aboard every major vessel had to be on duty at all times, as well as the distress frequency rules, a separation of ham radio and professional frequencies etc.

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But what does it mean to rule supreme over the ether? In technical terms, it does not mean anything because the ether has never existed. In his first essay on the theory of relativity in 1905 Albert Einstein did away with it and declared any concept of the ether to be superfluous in physics. While modern physics thus jettisoned what had been the most important concept of representation for classical physics, the ether as the potential pre-condition of all worlds, all matter and all being, radio as a medium came into being as a reinforcement of the fantasy, at least in Europe. Looking at old radio manuals, you will find that the engineers driving this process stuck to the old ideas far into the twenties, believing in the reality of the ether the way they had learned to do. The ether as spirit, the ether as "being", as Hegel had written in 1805. A substance as delicate as the most
delicate of things, more delicate than any atom, permeating everything and at the same
time harder than steel, harder than a diamond - the epitome of what could be called
Victorian power, the physicalistic incarnation of an imperial notion of power where the
radio is now playing. For the radio engineer, the ether is the place of the radio, and in this
ether, physics and the military meet in a shared power apparatus. The state, the ether and
the power.

The ideology of the radio ether dominated World War I all over Europe. Not even the
revolutionaries of the Spartacus association and the Soldiers’ Councils were able to do
without the power apparatus; in 1918, they demanded that the vagrant radio operators
from the demobilised army should become civil servants as quickly as possible. In 1918 it
was entirely undisputed in all political camps that the state had to take control over the
ether, that overdetermined power apparatus.

The only things that needed to be changed in the German-speaking world was the
term. "Radio" was unclear and smacked too much of English dominance. In the 5th
edition of his "Germanised Dictionary" of 1918, Otto Sarrazin, the famous Germaniser,
invented the appropriate words: "Funken", "Funkwesen", "Funkspruch, -antwort, -gruß, -
verbindung" and "Funkweg", "Funkung", the verb "funken" and "funklich" <Drubba: 1978,
241> - all words were derived from the German word for spark. In 1919, a department of
"Funkelegraphie" is founded at the Postal Office of the German Reich, the first man to
head it is Hans Bredow.

Nothing was to remain of the word "radio" in German before it had actually started to
exist. The minutes of a meeting held in 1919 prove that Bredow first mentioned the word
"Rundfunk" for "broadcasting". The opposite was called "Natfunk", the transmission of
summary reports from the National Assembly. "Rundfunk" was not meant for everybody,
only for trained personnel at the receiving appliances. The license to listen, the
broadcasting license fee, was later on derived from it and has continued to exist to this
very day. Participating in the state ether was subject to a fee. Official decree no. 418
published in the official journal of the Postal Ministry of the German Reich in 1924 defined
the word "Rundfunk" as the "transmission of wireless broadcasts".

The license came with consequences. We learn from the recent publications on the
history of programmes in the early years that what was then and is now called censorship
ruled in Germany and Austria from very early on. During the days of the Weimar Republic,
every manuscript for broadcast radio had to be submitted to the commissions for cultural
or political matters before a programme could go on air. With the sole exception of Kurt
Tucholsky, protests were rare and helpless at best. News were read once or twice a day,
and they were called official announcements. There were hardly any live interviews, and if
there were, they had to follow a detailed list of approved topics. Radio during the Weimar
Republic, a democratic republic, was subject to censorship, and regulations became even
stricter after the reform of 1932. The authoritarian dominance of the state over the
medium, the sovereign control and the submissiveness of programming reality had its
roots in the history of the technology, as I have shown. And it was also given
metaphysical reasoning. Let’s have a look at the aesthetic and formal definition of the
radio as phrased by Richard Kolb, the leading radio play theorist of the twenties.
The text was quoted by other radio play theorists and radio producers over and over again, well into the sixties. It says:

"The wireless waves are like the mental current flowing through the world. Everybody is linked with it, everybody can open up to it, to receive from it ideas that move the world. ... The invisible mental current that comes from the origins and makes the world vibrate is vibrating itself, directed and led by the creative word that was there in the beginning and carries in it the will to cognition of its creator inside."

Kolb is the theorist of voices and pitches which were clearly characteristic of German radio, and this includes radio in Austria. Certain pitches and cultured voices prevailed for as long as until the sixties, and some have even survived until today. Voices that exaggerate, with rolling R’s and long I’s, overly stressed articulation, drawn vowels and overacted sounds. Richard Kolb coined the phrase of the "voice as a being without body" for this artificial vocal culture, a belcanto of bodilessness, in which every trace of roughness, of materiality has been smoothed out, as Roland Barthes would say. "Through the voice as a bodiless being, the word can rise as a procreating force, no longer bound to imaginings and visible appearances, it becomes pure energy as the expression of ... emotional perfection."

Kolb said that the action of radio plays does not take place next to us, where the loudspeaker or the radio is located, and not in front of us, like on stage or on a screen, but "exclusively within ourselves". According to him, "we do not hear people moving and talking, we feel the movement of these people directly in ourselves."

In terms of programme history, we have to acknowledge that Richard Kolb’s theory, which appears to be pure metaphysics, doubtlessly reflected a practice that existed and is occasionally still pursued. For this reason, Kolb, a dyed-in-the-wool Nazi, never really fell from grace with radio-play people well into the sixties. More than any other media, our medium, radio, had that aura of telepathy for a long time, something which an invisible voice, bodiless and trained to stay invisible, pretended to produce. Every traditional newsreader still has that bodiless vocal quality we have become used to.

You have already guessed: Kolb’s theory is archaic, but only to the extent that it repeats the original radio experiment unwittingly and without knowing it:

"The electrical waves," Kolb said to underpin his theory, "hit people, go through them, and it would not be so absurd to think that human beings had nerves for the direct reception of these waves, to be then perceived in the brain. Since we do not have such a sensory organ, we must set up, outside of our bodies, a closed circuit that reacts sensitively to the influence of free electricity so as to re-transform words, turned into electrical vibrations by means of a membrane, and leads them to the human brain via the ear."

Kolb wrote this in 1930, and basically it all boils down to the same things as the original experiment made by the Victorian physicist Oliver Lodge I described earlier. However, it also boils down to the connection that will be created between a people and their Fuehrer less than three years later during the brief period so precarious for the Nazis, the time
between January 1933 and mid-1934, when it is by no means clear - at least not for Goebbels, who wrote about it in his diary - that this nasty group of characterless muggers and windbags he knew so well would really stay in power. Supported by terrorism and law-breaking, the Nazis did stay in power, and the mass-media appeal of their Fuehrer who got his message across so well on the radio also contributed to their political survival. For one and a half years, the Fuehrer poured his daemonic amalgamation of ideas over the people; staged personally by Goebbels, the reporter and director, his words were disseminated via radio sets forced into conformity, via the ether, tuned to the one frequency of the Pan-Germanic Reich. In a way unheard of before, he used the radio for his political purposes, with stock phrases from theosophical Aryan cult theories, from the mythologies by Guido von List, who gave the Nazis the swastika, from the Ostara fantasies by Lanz von Liebenfels, from the electricity and providence teachings by Hans Goldzier. If you listen to Hitler’s speeches broadcast on the radio in ‘33 and ‘34, and you can still find recordings of them - and if you have read the excellent study by Brigitte Hamann, the historian from Vienna, you will know where the daemonic-occultist tone and the phraseology of the Fuehrer come from. Hitler’s radio madness is a mixture of his readings of 1908 to 1913, the time he spent in Vienna, and the only things he actually read. Racial sectarians, techno-visionaries and people who explained what the world was about, Lanz von Liebenfels, Guido von List, Hans Hörbiger, Arthur Trebitsch. To put it in a nutshell, Hitler’s radio speeches from those days combined the political and techno-cultural occultism rooted in fin-de-siècle Europe; in 1933, when fantasy and technology met during a comparatively brief but decisive period, this enabled the short-circuit, the connection between the people and the Fuehrer, in a way that would not have been possible without the radio.

One always has to remember that this place of the radio, its physical trials and tribulations, its imperial connection with the ether apparatus that had such great political and techno-cultural impact is the European heritage of the medium. The radio continued to be indebted to this heritage for a long time after 1945, when it had already become a public corporation in an explicit democratic reversion of Pan-Germanic broadcasting.

Politically, the connection between any kind of Fuehrer and his people was disrupted, everything was decentralised, federalised, but the idea that the radio could teach the people remained. I am very much in favour of the democratic impetus and after all, I work within the system myself. But I would like to warn against the snag. If you declare that the radio is our instructor, you do not avoid the apparatus of some universal ether which the radio, the old Pan-Germanic radio, owed its actual power to.

In the sense that Kolb saw it, with the radio waves that came from the creator and the mental current, the radio will only work if it is basically one channel, ether, the ether. For this reason, the Nazis kept radio frequencies artificially scarce because Goebbels wanted forced conformity, not diversity which would have been technically feasible. This has been forgotten by many: since 1928, Hans Bredow kept suggesting very high frequency, which had long come of age for radio use, as a basis for the introduction of regional radio in the Reich. But VHF was a military matter, to be the frequency used in the blitzkrieg and for General Guderian’s tanks in Poland and France. And it was. Instead of enlarging the
frequency band, the allied forces further reduced the number of frequencies after 1945. In 1948, the Copenhagen Frequency Conference found that the old Pan-Germanic Reich had no more than 80% of radio coverage. In many respects, it was only the introduction of the dual system in the eighties, the multiplication of channels in the Federal Republic of Germany that finally ended a radio development which had started with Marconi. I will revert to that.

But first let me explain why I mentioned radio in Europe and the European place of the medium several times. The reason is that things developed differently in America. American radio has different roots in the history of technology. In America, there was no Heinrich Hertz and no submarine cable physicist named Lord Kelvin. The basic physical knowledge for radio to come into being was imported from Europe. However, it was received in a different way via the millions of immigrants arriving there between 1870 and 1910. Let me briefly explain the most significant difference between the two radio eras, the European and the American one; after all, it is important for the place of radio today.

When Marconi first visited New York in 1909, he was celebrated in the papers but smiled at rather condescendingly by his American fellow engineers. The navy had already had a slightly weird but functioning wireless radiophony system for four years. American engineers sneered at slow spark transmitters, the wide-band attack on the non-existing ether. They existed in America because they had been imported from England and Germany, but as from 1900 the Americans themselves built alternating-current transmitters, for which reason the history of American radio is the outcome of an entirely different development in the history of technology, i.e. of the "battle of the systems". It was a fierce battle between two systems of generating electricity, and it was also fought at political level. I will have to be more specific here.

In the late nineteen-eighties the electrification of America began. On the one hand, there was Thomas Alva Edison’s direct current supply for the rich parts of New York, where incandescent bulbs replaced gaslight as from 1888. Direct current supply was technically feasible over short distances only, and people wanted it that way. Direct current had to be used where it was generated. It was a good idea but expensive and thus for the rich only. Cheap sources of electricity such as Niagara Falls were of no use. Direct current generated there would never have arrived in New York. On the other hand, there was alternating current technology which made it possible to span long distances between power generation and consumption. AC technology, developed by fairly radical socialists such as the immigrant engineers Steinmetz and Tesla, who promised to supply the masses, was supported by a budding system of capitalist corporations opposing Yankee capitalists of the Edison and General Electric type.

When they run fast enough, alternating current generators also produce electromagnetic waves, the same as oscillating spark discharges, which were at the roots of European radio. It is a side effect occurring when very high AC frequencies are generated. In 1906, such an "alternator" was used for the first broadcast of words and music in America. In contrast to Marconi’s slow sparks, waves generated by an AC transmitter have a fixed frequency. If you want to generate a signal, you have to modulate the waves instead of declaring that the sheer existence of waves is a signal. That was the
technical ontology Marconi had actually practised for almost a decade, throwing bundles of waves into the ether, as I have described earlier. AC transmitters such as those by Alexanderson and Steinmetz were only able to send signals if it is modulated in an agreed AC transmission frequency, e.g by increasing or reducing the amplitude of the frequency. This is called amplitude modulation, or AM.

No doubt that wireless broadcasts of words and music were tested much earlier and to a greater extent than in Europe, even prior to 1905. The radio tube, developed by Lee de Forest after a blind idea by Edison dating back to 1880, rediscovered by Ambrose Fleming in 1905, was ready for practical application in 1906. As from 1912, it was readily available and led to ham radio becoming wide-spread. Thus, the development of American radio was fundamentally different from radio in Europe as regards the history of technology and the underlying apparatus. From the start, American radio, a child of AC technology, was the outcome of corporate initiatives, like AC technology itself.

Technically speaking, the radio also had to be implemented from the very beginning as wireless telephony, with communication on an agreed frequency. Furthermore, fin-de-siècle America was not only the land of Yankee capitalism and the plight of millions of immigrants, it was also a country full of inventors' inventors, of many thousand autodidactic craftsmen, romanticists and visionaries such as Tom Swift, George Westinghouse and Thomas Alva Edison.

There is no doubt that the wild electricity madness of the American inventors' inventors was based on cosmogenic and para-occultist fantasies, too. The best example is the spark discharge craze of Nikola Tesla, an immigrant from Serbia and inventor of the rotary current generator. Tesla, who lived in a hotel all his life, invented a thought camera, and is adored to this very day by an international sect considering him the prophet of tachyons, particles faster than the speed of light, is sitting in the thunderstorm of his artificial flashes like someone awaiting redemption through the radio.

In Europe, all this caused people to ridicule the American system. The Americans, those anarchists, are transmitting radio on one frequency in the whole country. Hans Bredow never got tired of laughing about that. Those amateurs, that chaos. Everybody can buy a call code from the Department of Commerce for a mere song, and nobody takes care of ensured reception. We have to do it differently in Europe, said Bredow, with rules and governmental control. The administration of the ether according to the postal regulations, put a lead seal on the receiver against a fee, you know.

Nothing but chaos in America? America, the home of radio anarchy, administered by technical illiterates since Dr. Conrad in Pittsburgh was the first to buy his call code license KDKA in 1920?

No, the only thing Mr. Hoover, the Secretary of Commerce who later on became President of the United States, had not expected was the explosion in the number of stations which bought licenses. In 1920 there were 10,000 licensed ham radio operators in the whole country, and more than 100,000 registered receivers. Thus, it comes as no surprise that Hoover counted 700 radio stations in the country in 1924, presumably more than all the stations in the world taken together. The fact that they all had to use the same
frequency was not only regulated in great detail by the Radio Act of 1912, it actually corresponded to the American radio apparatus, though this may sound paradoxical. From the very beginning, radio in the United States meant transmitting and receiving on one frequency. A corporate model. First, one station transmits for a certain time, then another one, and the others are silent and wait for their turn. In Germany, "Welle 400" also broadcast from the Fox House for a few hours, then there was an intermission, silence in the ether. In the USA it was a pragmatic decision in the best sense of the word, taken by the licensor Mr. Hoover, who was not an engineer. He still spoke of radiotelephony after several million receivers which did not transmit had been sold in 1925. That could not work out, and it was corrected in 1927, when the FCC was founded, a body that is still working.

The apparatus involving corporate communication, receiving and sending, forced the US radio to include seriality in its sending principles. Thus, a programming apparatus developed out of the technical one. Radio had to be transmitted in a sequence, not in parallel, not in a hegemonial way, not exclusively, not representatively. The corporate, serial apparatus, which was no less based on "blind tactics", makes for the fundamental difference between American and European radio in terms of 'contents'.

This does not mean that the American military would not have expressed a massive interest in the new medium. During World War I and II, all radio programmes were censored and ham operations were prohibited and liable to heavy penalties. After World War I, the navy made massive attempts to gain control of all radio operations in the USA, as did the Postal Office in the German Reich. However, the corporate and serial praxis of the medium had become too strongly rooted. In 1919, the navy's bill was rejected by Congress and licenses continued to be granted in the same way as before the war.

If you are only able to transmit at certain times and then have to leave the frequency to somebody else - for years, there was "Blue Monday" in Chicago, a day when all Chicago radio stations had to keep silent - if everything had to be done in sequences or series, the programme would have to be that way, too - and it was.

As you know, practically everything on the American radio was planned as a serial from the beginning. "Sam 'n' Henry", or "Amos 'n' Andy", as it was renamed in 1925, after the networks CBS and NBC had been founded, became the forefather of all American radio soap operas, a pattern that was followed by a total of 6,000 radio serials until the fifties, with up to 4,000 sequels for some serials. The secret of these serials was not so much in their dazzling numbers but the formal law they were subject to: self-referentiality. In their plots, the serials refer to themselves. Due to their repetitive qualities, they can generate plots and characters that are entirely different from those popular in Europe, classical stage formats or literary models. Through the gaps between them, serials turn listening into a serial way of re-hearing, and this is only made possible by the serial technical qualities of the medium.

Sport shows featuring Ronald Reagan, music ranging from ragtime to swing and beebop, game shows of all descriptions, but also the famous and highly sophisticated
CBS Workshop introduced in 1930; they were all programmes and products of the radio that materialised in and as serials.

"The War of the Worlds", the most famous American radio play, was also part of a long serial, "Mercury Theater on the Air". Apart from the BBC, which featured a few American serials, this kind of seriality, which means that programmes for this medium work best in self-referential sequences, has remained largely unknown in Europe until today.

The commercial aspect of American radio was also there from the very start: programmes were sponsored, and this is significant. The part that is forgotten is that it was not commercialisation that gave rise to the serials but that serials brought a special type of commercialisation. We would not have commercials - those thirty-second radio plays that are quite original at times - if they had not been created by American radio. I am deliberately calling it an aural artform, and it was quite well developed when television took over the heritage of radio in the late forties, practically levelling it out. There is no programme of the early years, and until today, that would not have been tested on the radio for a long time. David Letterman, Nick Carson, the talk shows, the news shows with one or two anchormen, all these programme forms were derived from the radio. American radio had always been multi-station, never singular radio. From the early thirties, all major cities had three to six channels, a real choice for the listeners. We know that "The War of the Worlds" would not have resulted in such a panic because of the presumed Martian invasion, had not CBS cancelled the McCarthy show on that October 30, 1938 so that NBC had five times as many listeners as usual, i.e. almost 20 per cent.

By way of conclusion, I would like to make two remarks about the place of the radio. The first one deals with art. I only know one definition of art that comes from the radio context, and it is from American radio. It is by John Cage and dates back to 1937.

In front of people who can relate to Heidi Grundmann's "Kunstradio", I do not have to say much about John Cage. From his childhood on, Cage was obsessed with radio. At the age of 12, in 1924, the little brat started doing a weekly boy scout programme for KNX Los Angeles, a serial, of course, with live piano music and a shrill-sounding studio combo composed of schoolmates. The show was on every Friday. Cage's most famous and important radio feature was "The City Wears a Slatch Hat", put on air as part of the CBS Workshop serial in 1942. It was feedback of all the sounds of the city, Los Angeles again, funnelled into the programme and back into the city. In 1937, and that's what I was driving at, John Cage formulated his famous creed "The Future of Music":

"I believe that the use of noise to make music will continue and increase until we reach a music produced through the aid of electrical instruments which will make available for musical purposes any and all sound that can be heard."

This text from 1937 is a dual text, and immediately after the famous implicit definition that music is noise, the concept of noise is explained as follows:

"Wherever we are, what we hear is mostly noise. When we ignore it, it disturbs us. When we listen to it, we find it fascinating. The sound of a truck at 50 m.p.h. Static between the stations."
Cage found his new notion of music through a definition of noise, which in America could only become apparent as "static between the stations". Radio as a series of stations is an experience nobody could have made in Europe in the thirties. Cage’s definition of noise as static also includes self-referentiality since that static noise is nothing but the self-referentiality of the tubes and demodulators singing themselves instead of sending a signal. Thus, the most far-reaching definition of art in this century, John Cage’s notion of music, basically comes straight from the innards of American radio. Cage, the son of an inventor who held several radio patents which Cage junior managed into his old age, saw radio as what it had always been, a whole set of self-referential experiments. As regards art, it is the only place it legitimately belongs to in the technical media because it understands the technical media as what they are: an a priori of industrialised civilisation, operating with blind tactics, originating from experimental equipment left behind by technology and physics.

My second concluding remark will be about the place of radio itself. Everyone of us listening to the radio knows that the radio converges. Firstly, the American and European radio histories converge. This is important enough and creates a new situation. In a strange new culture of listening in passing, listeners on both sides of the Atlantic find not only serials but also fixed programme formats. The place of radio thus clearly turns out to be transient, a place of transition, no matter how often it repeats itself. The second convergence in the place of radio is in digitalisation, i.e. the computability of everything that can be mapped in frequencies. Digitalisation has long reached the radio and most other technical media and makes them equivalent with each other. This gives rise to arbitrariness and a questionable ideal of communication, pretending that nothing about communication is material, nothing can resist it roughly and toughly and persistently and urgently, nothing that can for example be heard only.

As a matter of fact, the digitalised media, those making everything computable, making all computed images, writings, graphics, sounds, videos, scriptures and engravings equivalent, can also simulate what is rough and tough and urgent - virtually, so to speak. Here, we are called upon to do and organise the unforeseen. For example, to give to radio an unchangeable place which it proposes to dismantle by accepting it. A place of the radio that wants to and has to make a planned paradox materialise. This place has to be held, in particular by a medium called radio that is about to lose its place. It is a place showing that nothing remains where it is in the media. The weekly "Kunstradio" on this Vienna station has always been such a place. Let us defend its existence roughly and toughly and urgently, for ears like those of John Cage. For those that cannot turn a deaf ear because they still have not heard enough.