



Erkki Kurenniemi: Electronics in The World of Tomorrow, a short film ca. 1964.

A screenshot. Photo: CAA, FNG

DIY Futurology:

Kurenniemi's Signal Based Cosmology

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Unlike the history to which it put an end, the media age proceeds in jerks, just like Turing's paper strip. From the Remington via the Turing machine to microelectronics, from mechanization and automatization to the implementation of

a writing that is only cipher, not meaning – one century was enough to transfer the age-old monopoly of writing into the omnipotence of integrated circuits.

– German media theorist Friedrich A. Kittler
(1999, 18–19).

In what ways should we consider Erkki Kurenniemi a topic of research for media archaeology? It could work through an excavation of his archives, practices and thoughts as an alternative to the normalized narratives of media art history. Kurenniemi is an example of the non-anglosphere media art pioneers, whose career runs parallel to many of the themes discussed by better known artists, for instance, in the U.S. His trickster-nature and wild interdisciplinarity are a testimony to such histories where media, art, technology and science become entangled: a rather different story from the usually cybernetic-centred American histories, but also oddly familiar in how it remediates narratives and cybermyths. But Kurenniemi is interesting for media archaeological research on the history of media art in other ways too: his practice is a combination of DIY engineering and scientifically fuelled narrativization of the role of high-tech in our globalizing societies. It is in this sense that Kurenniemi is symptomatic of this stance towards art/technology and practice/theory crossings that brand contemporary media art discussions.

A Symptom of Media Change

While waiting for July 10, 2048, Erkki Kurenniemi's 107th anniversary and the date when his *data body* is expected to carry on after the biological body has inevitably failed, let us consider Kurenniemi more as a symptom than a person. This focus on symptoms does not imply a negative connotation of sickness and failure; rather, it means that there is something deeply symptomatic about his artistic and intellectual career, enfolded with the archival fever of his everyday life. In other words, let us also consider him as a *symptomatologist* (Deleuze 1995, 142–143) who, besides being a participant in the emergence of the close ties between art, science and technology, is able to reflect on that in so many ways through his actions. Our culture is about the constant fluctuations between art, science and technology, and it is defined by the variation of such relations.

As an analogy, consider the role of the high court judge Daniel Paul Schreber for the 20th century cultural and media theory. He was not only an example of a clinical illness (schizoid paranoia) that he suffered from but also someone who demonstrated a sense of archival modernity. Schreber's case study became famous through Sigmund Freud and other commentators, but also because of his own writings: *Memoirs of a Nervous Illness* (1955, [1903]). In terms of archival mania, this rather peculiar and very poetic description of his years of mental suffering can

be considered to be very significant to our understanding of what new media technologies were about to do to the world and our lives at the end of 19th century and early 20th century, for instance. For media theorists, such as Friedrich A. Kittler, Schreber became an emblematic figure of the so-called Man, a case study in how modern media technologies are about the meticulous documentation of every possible sphere of life from thoughts to actions. Our ways of living, thinking, memorizing and even hallucinating were conditioned by the technological environment that mediated our relationship to the world, to others and even to ourselves. In Schreber's case, he fantasized about celestial scribes who tracked down and documented his every single thought – like a meticulous recording machine that never misses a beat, a glimpse of a thought or a feeling, or a half-baked idea: it's all there, a substitute of God in the form of a recording, storage and perhaps even an archive. As theorists like Kittler argued, Schreber's writings and hallucinations embodied something rather essential about the modern technical media culture and the position of humans in the emerging sphere of communication.

There is something similar in Kurenniemi, even if he is not mad and his hallucinations are grounded in the contexts of scientific literature and technological practice. His writings can, of course, often be characterized as veering closer to science fiction. His style and writings are part of what we could call the late 20th

century and early 21st century *imaginary of technological culture*: the belief in the powers of technology as revealing a point of singularity of historical proportions. While this is rather central for the belief in progress of the modern technological culture, it also has its theological connotations in Christo-Judean thought: there is a point in history when everything is revolutionized, reaching a singular point, a new beginning. Indeed, one is tempted to see Kurenniemi as an intermediary between Schreber's hallucinations of celestial scribes, angels as careful notetakers, and the microchip revolution, which was supported by Silicon Valley and took the metaphysics of angels to the dimensions of technical media. In an AT&T promotional video from 1980, the narrator William Shatner voices this angelic development of microchips:

There was a time when philosophers argued the question of how many angels might fit on the head of a pin... well today, if we take the liberty of equating angels with transistors, we can make the case for the existence of a modern kind of miracle [...] (AT & T, 1980).

Such miracles, however, are nowadays taken up in the expressions of madness or by technology evangelists. The archival belief is embedded in modern technical media in the sense of non-human materiality that exceeds human materiality: our humanity is saved not by powers of angels of celestial

origins as it used to be, but by machines, as in Steven Spielberg's film *A.I.* (2001). But this belief, part of the imaginary of the digital world, is not restricted to the most recent media culture. Indeed, E. M. Forster traced this desire of immortality in the earlier media technology of printing – here quoted by Marshall McLuhan:

The printing press, then only a century old, had been mistaken for an engine of immortality, and men had hastened to commit to it deeds and passions for the benefit of future ages (McLuhan 2001, 190).

Time and the archive occupy a central place in Kurenniemi's interests and practice. He is a symptom and a symptomatologist of a drive towards both storage and archiving – two terms easily conflated. He marks the passage from the documentation of everyday life in storage and into archival form to the age of integrated circuits that do it for us: the moment of a jerk and a singularity which is seen as the imaginary moment when technology starts to write for us. But we need to pay attention to what we mean by archival and the writing of the archive. Mere storage is nothing unless you have a system – an archival moment when recording turns into something queryable, something searchable based on the logic of the archive. Media filled Kurenniemi's life, and he documented everything he could meticulously: the vast amount of writing, photographs and

moving image would form the basis of a possible future reconstruction of Erkki Kurenniemi, the flesh creature. The data would reproduce his mortal being, including its sexuality, thus functioning in a way in which society tries to in any case: reproducing sexual relations, modes of affect, habits of feeling and embodiment. Kurenniemi's singularity is an imitation of everyday power relations in that it aims to reproduce the flesh in the data, to convey the past generation to the next.

In the archive, there are endless piles of paper and bits of information in fragmented form, reminding of the central archival thinker of the 20th century, Walter Benjamin. For Benjamin, true history is not about linear success stories: it is about fragments. It is a necessary reconstruction and even a reimagining of pasts through its fragments, which forces us to consider any progress story unethical, and to look for another method of thinking about time: history of and from the ruins of the fragments of past lives, recorded, but never reaching, such systematicity or illusion of smoothness that we think our lives consist of. Instead, archival life reveals the jolts and jumps, but also the fact that only archival logic imposes order. The archive is the order, the command (Ernst 2013).

In this text I am pursuing this media-theoretical perspective on Kurenniemi as a symptom/symptomatology. This takes us inside his thinking with machines, which is one of the perspectives I

want to endorse: Kurenniemi is embedded in archival discourse and now an object of fascination for many projects related to media arts, science and archives. However, he is also a media thinker and a *tinkerer*. Erkki Huhtamo (2010) used the portmanteau term “thinkerer” when writing about the work and style of the media archaeological artist Paul Demarinis, and I wonder if there is something similar in Kurenniemi as well. He certainly fits in with the lineage of the various visionaries who were, in a way, mediators, and who escorted us from the imaginary of technologies to their full blown popular cultural status. He is a sort of a McLuhan for the Finns (see Kurenniemi 1971).

Supermegatechnologies of Kurenniemi

One aspect that intrigues me relates to Kurenniemi’s way of moving across dimensions. Perhaps some of his quantum theory interests can be considered a logical part of his intellectual method – which is certainly an eclectic method – but something which I would argue to be a peculiar indication of his manner of working. This refers to his way of being able to maneuver between the concrete worlds of tinkering with electronics and building synthesizers and the cosmological theories of mathematics, sound and physics. Indeed, we need to understand that even if his ideas were of epic visionary scale in their grand claims, his work also includes signal bending and circuitry.

The two poles of Kurenniemi's fascination with machines are sometimes hard to summarize. He is known for his hyperbolic visions of information technology, which are well expressed, for instance, in the article "Supermegatechnologies" in the British journal *_things_* (Kurenniemi 2000). The visions of technology are expressed in terms of their quantitative capacities that boast with a numerology that seems limitless. It is as if Kurenniemi is adapting to the regular discourse of information technology, which has to do with performance capacity as the sole driver of the technological world:

Processor frequencies will soon exceed the gigahertz, RAM memories the gigabyte, and discs approach the terabyte (1000 gigabytes). The speed of local networks will soon be in the region of a gigabit per second (one byte = 8 bits). And nothing is enough, nothing like it. There were 20 years between the mega period and the giga period. The tera (10^{superscript12}) and peta (10¹⁵) periods will arrive in between twenty and eighty years. (Ibid.)

Kurenniemi loves the discourse of visionaries and continues with predictions of ubiquitous futures of information technology, augmented reality, geolocation and other themes that we now, of course, recognize as part of the everyday life. His mind picks up on details from various materials to the energy regimes of

computers, never losing sight of the paradox at the heart of this method: his vision aims at 2048 and to the redundancy of the flesh in the world of intelligent computers to which you can upload yourself, but his everyday understanding is completely embedded in the energy and material investment that our computers need. Computers are not immaterial – Kurenniemi never makes this amateur mistake which was typical of much of the cyber discourse of the 1980s and 1990s.

But Kurenniemi constantly aims for the larger dimensions. Indeed, the title of the journal article, an exhaustible list of ideas, refers to his vision of computers merging with bio- and nanotechnological developments, fulfilling the implicit idea of technologies being organisms. His vision is geared towards connectedness that is a matter of scientific ideas merging in ways that makes it impossible to talk of technologies as disconnected. This is the meaning of supermegatechnology for Kurenniemi, who admits that it is a rather poor term, but one that can be used as a placeholder: we need to account for the future as IBN (info-bio-nano) (instead of IBM one might add): information technologies joining up with bio- and nanotechnologies, or in other words, “material technology + chemistry” (Kurenniemi 2000).

Kurenniemi’s inspirations stem from the science fiction writers of the 1980s and 1990s, such as Greg Bear and Vernor Vinge, and

this is evident in his way of thinking. However, we need to recognize that such ideas were also part of the wider popular culture of the age, which can be argued to herald the emergence of technologies that take processing power in the new millennium to the heart of chemistry and biology, as well as to create new forms of visual culture, such as augmented reality. However, what I want to point out is that there is another archaeological layer to Kurenniemi that can be seen in his tinkering with musical instruments and construction of synthesizers in the 1970s. It is in these fragments that one sees how such visions of grand scale are also contextualized in the work and interests of a circuit bender-hacker. After all, Kurenniemi embodies some Finnish modesty, too; for the American counterparts (and influences), singularity happens earlier: for Vinge, already by the 2030s, for Ray Kurzweil in 2045. Kurenniemi is happy to follow a little later.

Engineering the Analogue/Digital Divide

Erkki Huhtamo (2003) has pointed out the existence of a media archaeological layer in Kurenniemi's *thinking*. It is not, of course, a huge revelation to anyone who knows Kurenniemi's work, but it is something that should not only be considered in terms of Kurenniemi's musical interests. Instead, as Huhtamo points out, Kurenniemi can be viewed as part of the media

archaeology of electronic arts and different interface experiments.

In 1969, Kurenniemi was developing his digital synthesiser Dimi-A. (DS1/11 '73-11-20; trscr 20.3.2000). This was followed by the Dimi-O (O short for “optical organ”), which had a more complex structure: besides an improved interface (you were supposed to be able to control the synthesizer by gestures thanks to a video camera input system), the machine included a graphic representation of the memory on a 32 x 48-pixel sized grid. The grid was to represent time (vertical axis) and the chromatic scale (horizontal). The interface was actually intended to function as an input mechanism for graphic notation, but it became “misused” for gestural interfacing: dancers, pantomime and the conductor’s hand offered an updated version of the Theremin device for the 1970s late hippie generation.

In Kurenniemi’s world and within the technological scene of art and culture, synthesizers were a shortcut to computing. In general, he was keen to contextualize his personal history as part of the emergence of computing, gradually from the 1940s and 1950s bulky mainframes (see also Suominen and Parikka 2010) to the microelectronics’ revolution of the 1960s and especially the 1970s. Like so many others, Kurenniemi was introduced to computers at the university’s physics department. In addition to the institutions in possession of the computational

machines, we need to keep in mind another important context that was important for the wider emergence of technical media culture: music studios. Indeed, in Finland, for instance, it was equally important that the University of Helsinki started building their electronic music studio in the 1960s (Kurenniemi 2001), thus joining the various developments of experimental media culture across Europe.

Kurenniemi's first experience of digital computers came in the 1960s with the "Swedish-made Wegematic 1000, with vacuum tubes, a drum memory, and a thirst for kilowatts of power" (Kurenniemi 2004). However, these first touches also inspired him to start developing his own machines and led to an interest in the internal worlds of machines: the notebooks and fragments containing his writings and fragments about microchips and Phillips logic modules back in the 1960s, for instance (Kurenniemi s.d.). As he writes in his "self-obituary" (Kurenniemi 2004), reading about Buchla and Moog voltage-controlled synthesizers also inspired him to engage in first-hand experimentation. This was a crucial feature for those in his generation that had some contact with computers – usually only professionals in banks and universities – who were gradually getting into circuitry via music machines. And it also resonates with the DIY spirit that was part of the technical media culture both before and after the war: the radio-amateurs of the earlier part of the 20th century (Douglas 1989) met their

match in the burgeoning electronic arts scene of DIY technicians, who often misused the leftovers of the military technologies of World War II (Kittler 1999, 96–97)

But besides entertaining visions of the supremacy of the digital world, Kurenniemi, like so many others, had to work with hybrid machines:

I began developing an integrated analog/digital music studio with combined voltage and digital control. Digital signals were used as triggers or gate signals, and also as square-wave sound. The final musical pieces were still edited the traditional way, by cutting and splicing analog full-track audio tape. (Kurenniemi 2004).

And since the 1970s, this hybrid combo was defined in terms of the first available microchips, controlling the analog synthesizers with oscillators and filters. It was already in this period that Kurenniemi's engineering was informed by an interest in the abstract. The building of synthesizers and the plans regarding associative memory were influenced by Teuvo Kohonen (a famous Finnish researcher of neural networks). And it was not only that Kurenniemi was moving from the analog to the digital in a progressive manner: the later Dimi-T machine was a machine which was intended to register the electrical activity of the brain. The signal produced was an early form of brain-

controlled interfacing, which was used to “modify the pitch of a voltage-controlled oscillator” (Kurenniemi 2004). In fact, Kurenniemi was aware of the earlier experiments in the US in the 1960s, and he was probably thinking of Alvin Lucier’s brain music. Moreover, the famous Midi-S (the sexophone) was very closely tied to the skin-based world of humans – being a kind of a human-machine circuit controlling the sound collectively as well as ideally, sensually. It was something of a sexual revolution turned into technical media: a group sex device that registers and modulates sounds that on a political level were part of the critique of the monogamous bourgeois system.

Similarly, in an interview much later, in the early 2000s, Kurenniemi notes how the development of digital computing opened up a whole range of connections between sound and technology. Indeed, Kurenniemi is perhaps not a media theorist, but he constantly makes observations that resonate with the analytical accounts of scholars in digital aesthetics and media history: in this case, Kurenniemi speaks about how the generalized nature of the computer as a musical instrument has made electronics obsolete. He speaks of it as a historical remnant among other past musical instruments (Kurenniemi 2001). As a matter of fact, what Kurenniemi is producing is not just a macro-level explanation of historical change, and even his grander visions can be traced back to his hands-on practice and the legacy carried over by experimenters engaging directly with

signal processing and circuits. It is a DIY sort of engineering practice as well as a DIY sort of scientific thinking which cannot be contained within the narrow confines of science. Indeed, there is much to be gained from his ideas about media pedagogy as well – at the moment they are mainly implied, but they are nevertheless something we should pay attention to: oscillate wildly in your technological thinking and doing! (Cf. Kurenniemi 2001 for Kurenniemi's notes on why he left the university already in the 1960s). Kurenniemi's notebooks are always a mix of the two poles of this oscillation: inspiration from Edward de Bono's writings concerning the mind mixed with Kurenniemi's meditations on flip-flop circuits and computer architecture (DRY 1974 1.nb).

Kurenniemi's poetics meets with the technical conditions of their survival in the archival sense. Rummaging through his notes that proceed towards 2048, we have to be aware of the signal space in which they take place: the scratch of the microphone recording, leaving traces like the scribes who write down everything in Schreber's hallucination: the recording media sets itself as part of the narrative. We hear words, but we also hear the noise recorded by the microphones. So, we do not focus only on the narrative content but on the signals as well: it is the clicks and signals, blows and microphone noises that also escort the voice and computerized philosophy of Kurenniemi.

(00:00:00) (Click click, radio signal, blows in the microphone five times, click, blow) *One, two, three, puppadadud. Fuck, fuck, fuck, this is sensitive. There we go. (blow) Yeah, a dreaming computer... will be the last human invention. Well not the last one, but... the last invention. Because a dreaming computer will already have dreamt up everything. Prior unconscious. Well, no. Dead computers may only be in two spaces: in an idle loop waiting to be interrupted or in a conscious space receiving and handling external information, printing it. A sleeping computer is not in an idle loop. Yeah, well of course it is, it does ask questions and wakes up when needed but otherwise it dreams. It is organizing its files, optimizing, associating, organizing, thinking, planning. And only when called upon, it interrupts its sleep for a little while to answer a question. (The sound of the microphone being touched, cut) (Kurenniemi C4008-1 1/11)*

Conclusions

By way of conclusion, there is an interesting tension between the way in which Kurenniemi constructs his discursive position and his expertise in technological practices. I want to argue that this is actually characteristic of his wider methodology in general. It is evident in many of his expressions and views, and it is summarized, for instance, in his sweep of how he sees musical

and compositional practices. As Kurenniemi explains in an interview, even after the introduction of the European modernism and avant-garde, composing was still regarded as a concretization of an abstract Idea by the quasi-religious figure of the composer (Kurenniemi 2001). He contrasts this with the field of popular music, which is geared more towards the process of communication and microtechniques in which the music takes place as a relation between people and technologies: for him, the techniques of tape cutting and manual editing are emblematic of the process of how music was entangled as part of life, and in this way the social realm infiltrated the sphere of sound.

This article can also be regarded as a guideline to Kurenniemi's ideas of technology: it is part of various microtechniques that support the wider abstract writings and notes concerning tonal systems, musical spheres and mathematics. The world that starts with the signal and the work of a theorist-engineer-thinkerer is also one of signal bending. Kurenniemi emerges as a figure of both media archaeological significance and theoretical curiosity due to the *analytical weirdness* in his writings, his archives and his DIY technologies.

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