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Artist collaborates with neuroscientist to build 'audio-neurons'

By Robert Barry
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Installation artist Tim Otto Roth has worked with a number of scientific institutions, including ESA to bring to life scientific data through interactive pieces. Wired.co.uk speaks to him about his latest work, a collaboration with a computational neuroscientist, which aims to create an entirely new musical instrument based around the way neurons interact within the brain.

Forty-two dinner plate-sized discs of light shiver and pulsate on the floor of the venue. Around them, three piccolo players sit cross-legged, emitting a series of stuttered, syncopated pulses which at once excite and inhibit the shimmering blue discs. Each disc is engorged or diminished by a different pitch, and as the lights grow past a certain threshold, they make a high-pitched piping sound themselves which triggers in turn other sounds, releasing a micro-tonal Mexican wave of electronic sounds that the system's creator, artist Tim Otto Roth, describes as a *klangteppich* --

a "sound carpet". It may not look much like it at first, but this is your brain on music.

Born in the small Black Forest town of Oppenau ("Few people, many trees") in 1974, Tim Otto Roth had little interest in the fine arts while he was growing up. But with the fall of the Berlin Wall, the teenaged Roth bought "by accident" a complete set of East German photo developing gear and promptly set up his own lab in his parents' cellar. At university, he first studied politics and philosophy, switching after a year to the art school -- not, he insists out of "an arty interest; more a technical interest, to explore what is photography." This kind of formal, technical enquiry into the nature of the image has informed his work ever since.

His first major project, exhibited in Marburger, Chicago and Berlin, was inspired by Apollinaire's poem, *Les neufs portes de ton corps* and saw him directly exposing the nine "doors" of a woman's body onto Ektachrome slide film. This work of crypto-pornography presents itself as a row of ten-by-eight-inch black sheets with dramatic flushes of red and yellow light bursting from white spots in their centres, shooting off in different directions. "It was an erotic work for me," Roth admits "because it was quite tactile... you really bring the film in touch with the female body." The bursts of light that give the images their violent effect were achieved with the aid of "a special kind of light source". This blending of the erotic and the highly technical has since become a characteristic of Roth's work.

In 2005-6 he presented his *Pixelsex* on the facade of Renzo Piano's 96-metre-tall KPN Tower in Rotterdam. The project, realised in collaboration with Andreas Deutsch's bio-modelling group at the Technische Universität Dresden, saw 900 green Planon lamps animated according to the principles of Stanislaw Ulam and John von Neumann's theory of self-replicating automata. Roth is keen to point in particular to the influence of Ulam, who first visualised the theory with the basic computer graphics then available. This gets to the heart of one of the crucial questions for Roth, "What makes a picture today" and the role of scientists in "advancing this concept" towards a "different grammar of how to interact in space". It was this piece (and its smaller scale predecessor in Munich in 2003) that first pushed Roth towards his current modus operandi of large-scale works in collaboration with scientific researchers which would ultimately see him reaching out to the outer limits of visible space.

From The Distant Past saw Roth working with spectrographic data from the Hubble Space Telescope, converting the "the oldest colours of the universe" into a laser diagram first projected on the Palazzo Cavalli-Franchetti in Venice, later at the Hayden Planetarium in New York. This project marked the beginning of a long-standing collaboration between the artist and the European Space Agency, for whom he is now part of a task force to bring the arts and sciences closer together. While working with the ESA, Roth learnt "how essential colour spectra are for astrophysicists"

-- a conception which, Roth claims, "completely undermines" the traditional views of artists.

Around the same time, he began an artist in residency programme at the ZKM Centre for Media Arts in Karlsruhe, which finally resulted in the Sonapticon -- a sonorous modelling of the firing of neurons in the human brain, first exhibited as part of a conference on neuroaesthetics held at the ZKM just last month. Roth collaborated with mathematical neuroscientist Benjamin Staude to create the piece, comprised of forty-two "audio-neurons" which make up, according to Roth, "a kind of minimalistic quasi-living organism consisting of sound".

The artist, whose parents were both teachers, learnt the clarinet as a child and was able to haul his old instrument out of retirement to test early versions of the Sonapticon. Taking his inspiration from MIT professor Tommaso Toffoli's description of the operation of cellular automata as a "universal synthesiser", Roth regards his creation as "a new instrument". The performance at the ZKM the other week was just "the proof of principle," he says. "It's not only a sound installation. If you work on it, you really can produce something like music."

So, I ask, should we look forward in the future to a concerto for orchestra and Sonapticon taking its place in the symphonic repertoire?

"Why not?" he replies.

Watch this space.