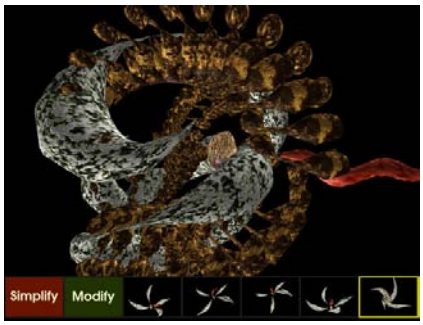
Project	**SonoMorphis**
Format	Interactive audio-visual installation with genetic graphics and sound
Task	Idea audio Project leader audio Architecture and development audio software Specification audio hardware, system integration Sound design
Status	Realized 1995 – 1998
Display	The stationary installation has been shown as part of the permanent exhibition "Masterworks of Media Art" at ZKM Media Museum Karlsruhe since 2004 The mobile installation has been shown at: SurroGate Festival, ZKM Karlsruhe 1998 Stuttgarter Filmwinter, CAVEE version. Fraunhofer IAO 1999 EXIT Festival Paris 2000 VIA Festival Maubeuge 2000 Warsaw Autumn 2000 Festival Schloss Kapfenburg 2001 Festival ZKM Music Institute, Karlsruhe 2002 Art of Immersion, CAVE version. BEC / Fraunhofer Gesellschaft Bonn 2002 Opera Festival Munich / Festspiele+, House of Art Munich 2004 Digital Bauhaus II, Bauhaus-University Weimar 2006 SonoRemorphed at Panoramic Projection Festival, ZKM Karlsruhe 2007
Info	on1.zkm.de/zkm/meisterwerke/lintermann_belschner www.bernd-lintermann.de/SonoMorphis
Credits	Bernd Lintermann (Graphics) ZKM Karlsruhe (Production Support)

Concept

An organic object is projected in front of the visitors. By means of a control mechanism the user can rotate the object in all directions and observe it from various perspectives. Control sliders allow the viewer to vary diverse parameters of the object. The graphics and sound are inseparably linked to each other. In this way the space is always filled with new audiovisual bodies. "SonoMorphis" represents the attempt to creatively apply the results of our studies in open computer systems.



In this work the interaction follows the evolutionary principle of mutation of the graphic and acoustic structure and selection from six available variants. On the visual level, specific formal patterns that have been extracted from the natural world are combined arbitrarily and generate creations that are both familiar and yet have never been seen before. The momentary state of the graphic objects controls the sound level in "SonoMorphis". The parameters of the graphics must be interpreted from acoustical viewpoints in such a way that a musical structure emerges from them. In this way automatic compositions arise, the results of which are functions of their components and are variable in the details of their contours, complexity, and their behaviors. The overlapping of visual levels and sound levels produces an open structure that can be continually and endlessly configured in new ways by each viewer.

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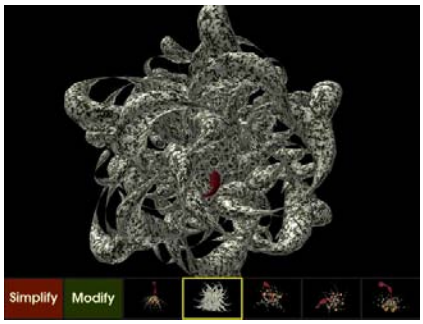
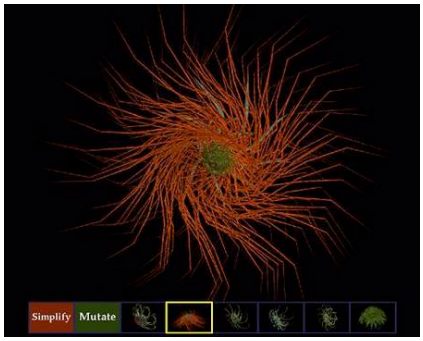
Users evolve a three-dimensional organic object which is created using genetic algorithms. The organic is defined by a genom, a set of components, which is successively mutated by the users. Out of six randomly generated mutations users select one, which in the succeeding steps becomes the starting point for new mutations. This way users choose a thread through a space out of approximately 1080 possible forms.

In the real space users additionally change the shape and dynamic behavior of the life-like organic object via an interface box. Both systems are coupled and operate on the same data set constituting the genom. Actions in the web space effect the real space and vice versa. If a change on the web happens, the organic in the real space slowly morphs towards the web selection, a change in real space directly affects the next web action.





Sound

The basic idea is to put the sonic and visual representations of the installation's structure into as close a relationship as possible. Material, shape, and spatial position of the visible organic correlate with sound properties like timbre variations, pitch alterations, dynamically moving positions, and the like of the projected sound in the real space. The correlations rely in part on easily graspable rules for the sake of clarity, in part on juxtaposition and more sophistacated transformations.

Both sound and projection relate in equal parts to the same underlying abstract structure which they make palpable to the user. The sound acoustically represents selected properties of the genoms, i.e. their structure, position, and behavior in a non-arbitrary way. The easiest way to think of this representation metaphorically is that of a musical instrument: a set of rules with associated variables by which to generate sound, with the possibility included to control these variables in real-time according to the underlying genoms' structures.

As one of the installation's aesthetic goals is the bodily impression of the generated object on the user, a sound synthesis technique was in demand, that is able to both render a visible object's genuine sound thru all its user-inferred alterations in shape and space in a plausible way, and to be abstract enough where needed to not duplicate a real-world artefact. The technique of choice is known as physical modelling which derives the emerging sound from the physical properties of an assumed object, i.e. its shape, material, excitation mode etc.

Based on associative relationship to the genoms' textures, each acoustic representation has first been assigned a set of material properties, causing its basic timbre. Second, the genoms' shape is taken into account, controlling the representations' basic modes of vibration and their reaction to parameter-induced deformations. Third, the single graphic objects' current spatial positions are mapped to the sound space, rendering their horizontal movement as well as their proximity to the user.

It is possible and intended to handle the installation as flexible as a musical instrument, consisting of an image and a sonic component. Observation of the system's behavior during exhibitions has shown its ability to respond to users' varying approaches, playing styles, and temperaments in a differentiated and recognizable way.

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Press

Interactive installation artists such as Ken Feingold, Masaki Fujihata, and Germans Bernd Lintermann and Torsten Belschner, positively encourage viewers to create their own narratives or associations with their interactive works, designing them with this purpose -- and challenging notions of authorship. [www.artandculture.com 2002]

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