RHIZOPE

ART & SCIENCE – HYBRID ART AND INTERDISCIPLINARY RESEARCH

Kunst ja teadus – hübriidne kunst ja interdistsiplinaarne uurimus

Exhibition / Näitus 29.05 – 24.08.2014
Conference / Konverents 30.05 – 1.06.2014

EESTI
KUNSTIAKADEEMIA

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Foreword

Art and science collaboration and various hybrid research practices have become common vocabulary of the 21st century. The intertwining of different fields and paradigm change that involves scientific innovation, new technologies and historical/cultural traditions are reflected in many of the works of art that expand our imagination and provoke several questions that are important today. The intertwining between music, art, natural and computer sciences can be seen in new media, biotechnology, telecommunication art and other art practices of experimental nature.

How to understand and spur the collaboration and synergy between different fields of life, how do new values and unprecedented forms of collaboration arise that are not limited by the narrow boundaries of disciplines isolated from each other? The analysis of contemporary experiments may dishevel old categories but the main goal – improved understanding of the nature, surrounding environment and therefore oneself – is unchanged. Interdisciplinary workgroups create common ideas everywhere in the world, the blistering pace of scientific and technological development allows involvement in this on very different levels.

Playful, risk-seeking and provocative forms of collaboration are very welcome from the perspective of the cultural whole. The main goal of the Rhizope exhibition and conference is to find and exhibit creative projects that were conceived through the collaboration of art and science by involving very different artists and creative practices into this process. Both members of Estonian graduate schools, as well as internationally renowned artists and workgroups are invited to participate. Our goal is to involve in the process as broad a spectrum as possible from social sciences and humanities to technical sciences, to discuss the emergent phenomena of the 21st century.

This Rhizope catalogue contains articles, conference speeches and summaries and overviews of the works at the exhibition. It features longer discussions devoted to analyzing aspects of collaborations between art and science, and we also reference important phenomena in Estonian art history: HARKU 75, Biotoopia and Tehnobia events and exhibitions.

The exhibition and conference idea was initiated by the Estonian Graduate School of Culture Studies and Arts and the Estonian Academy of Arts. Preparing this event was a long process made possible by support from people from many fields. In particular, I'd like to express special thanks to the members of the international jury – Laura Beloff (Finland), Renira Rampazzo Gambarato (Brazil) and Heie Treier, Raivo Kelomees, Kai Lobjakas, Liina Siib, Liina Unt and Veronika Valk from Estonia – for their help in spring 2013 in selecting the very best of the competition entries we received. I'd also like to acknowledge my fellow event working group members: Veronika Valk, Heili Sõrmus, Raivo Kelomees, Marge Paas and Liina Siib.

Thank you to everyone who contributed to the conference, exhibition and this book! To readers, we wish you happy rhizopian research and hybrid creation!

Piibe Piirma

Eessõna

XXI sajand pöörab üha suuremat tähelepanu kunsti ja teaduse koostööle ja erinevatele hübriidsetele uurimispraktikatele. Teadusliku innovatsiooni, uute tehnoloogiate ja kultuuritraditsioonide põimumist leiame paljudes kunstiteostes, mis avardavad meie kujutlusvõimet ning tõstatavad uusi küsimusi. Muusika, kunsti, loodus- või arvutiteaduste põimumist näeme nii uues meedias, biotehnoloogias, telekommunikatiivses kunstis kui teistes eksperimentaalse iseloomuga kunstipraktikates.

Kuidas mõista ja tiivustada erinevate elualade koostööd ja sellest potentsiaalselt tekkivat sünergiat? Kuidas arenevad meie väärtushinnangud ja ilmnevad uutmoodi koostöövormid, mida ei piira teineteisest isoleeritud distsipliinide kitsad piirid? Eksperimentaalse loomingu ja hübriidse uurimistöö lähem vaatlus võib senikehtinud arusaamad – hierarhiad, kategooriad – kahtluse alla seada, kuid põhieesmärk – püüd looduse, ümbritseva keskkonna ja seeläbi iseenda parema tundmise poole, on jätkuvalt köitev. Ühiste ideede kallal tegutsevaid valdkondadevahelisi töögruppe leiame kõikjal maailmas, teaduse ja tehnoloogia ülikiiresse arengusse võib sekkuda väga erinevail tasandeil. Kultuur kui tervik võidab mängulistest, riskijulgetest ja provokatiivsetest koostöövormidest.

Näitus „Rhizope" ja konverents „Kunst ja teadus – hübriidne kunst ja interdistsiplinaarne uurimus" otsivad ja esitlevad kunsti ja teaduse koostöös sündinud loomingulisi projekte. Neist võtavad osa nii meie kohalikud, Eesti doktorandid kui ka rahvusvaheliselt tunnustatud kunstnikud ja loomingulised koosluved, kaasates protsessi võimalikult laia osa nii kunsti- kui teadusmaailmast – sotsiaal- ja humanitaarteadustest
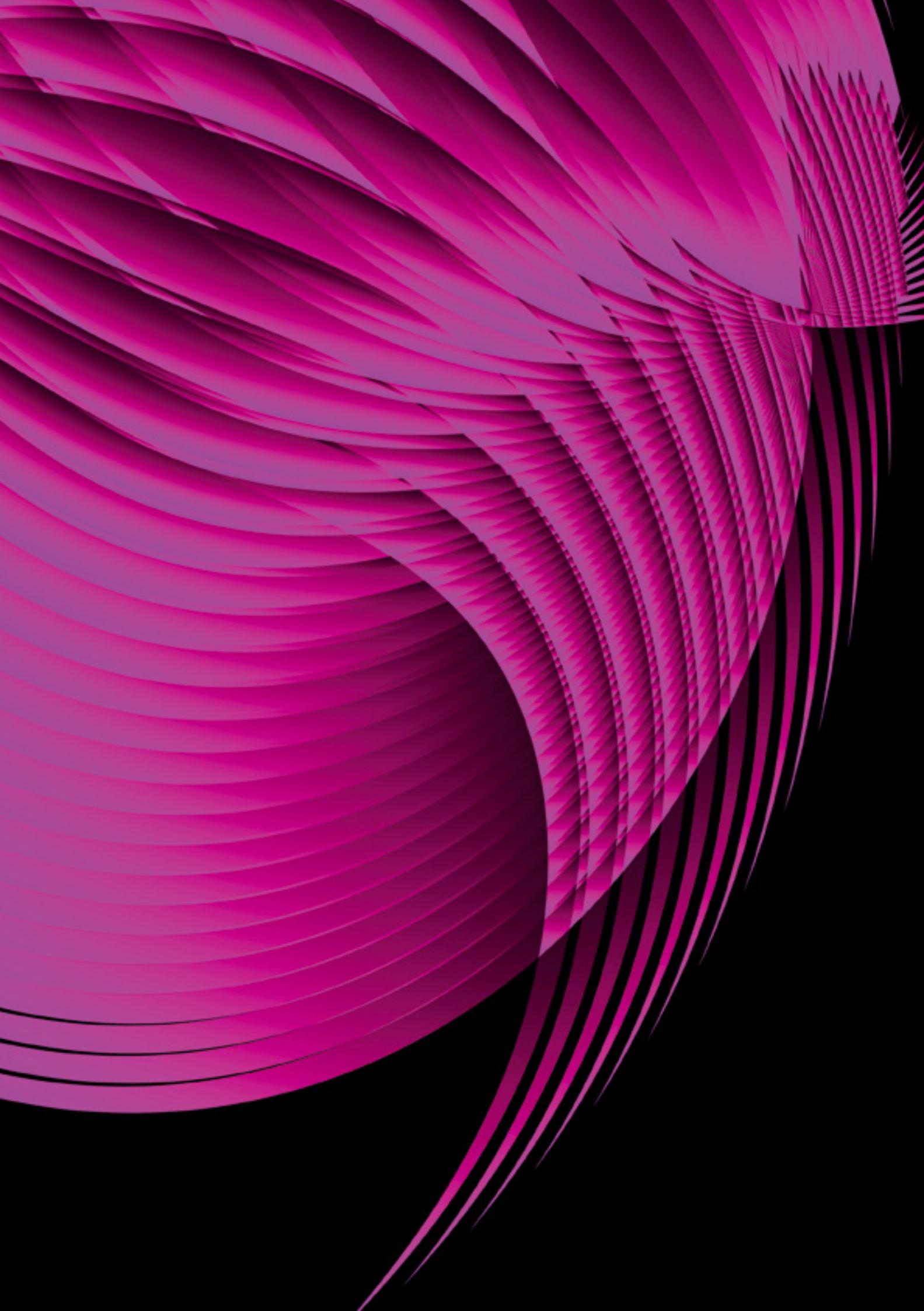
kuni tehnikateadusteni. Selle sündmuse ettevalmistamine on olnud pikk protsess, mida on nõu ja jõuga toetanud väga paljude valdkondade esindajad.

Käesolevast „Rhizope" kataloogist leiate artiklid, konverentsikõned, nende kokkuvõtted ja näitusetööde ülevaated. Selle sündmuse ettevalmistamine on olnud pikk protsess, mida on nõu ja jõuga toetanud väga paljude valdkondade esindajad. Toome välja mõned pikemad arutelud, milles analüüsitakse kunsti ja teaduse koostöö erinevaid aspekte, samuti viitame olulistele nähtustele Eesti kunstiajaloos: HARKU 75, Biotoopia ja Tehnobia sündmustele ja näitustele.

Näituse ja konverentsi idee algatajateks ja korraldajateks on Kultuuriteaduste ja Kunstide doktorikool ja Eesti Kunstiakadeemia. Näituse ettevalmistamisel on olnud suureks abiks väga paljud inimesed. Erilist tänu soovin avaldada näituse rahvusvahelisele žüriile, kes aitas 2013. aasta kevadel välja valida konkursi käigus laekunud töödest parimad. Žüriisse kuulusid Laura Beloff Soomest, Renira Rampazzo Gambarato Brasiiliast, Heie Treier, Raivo Kelomees, Kai Lobjakas, Liina Siib, Liina Unt ja Veronika Valk Eestist. Ürituse töögruppi kuuluvad Piibe Piirma, Veronika Valk, Heili Sõrmus, Raivo Kelomees, Marge Paas ja Liina Siib.

Täname kõiki, kes konverentsi ja näituse toimumisele ja käesoleva raamatu valmimisele kaasa aitasid! Lugejale soovime edukat risoopset uurimise ja hübriidset loomise kogemust!

Piibe Piirma

ARTICLES
ARTIKLID

Raivo Kelomees (PhD in art history) is an artist, critic and new media professor. He studied psychology, art history, and design in Tartu University and at the Estonian Academy of Arts. He is currently professor of the New Media Department at the Estonian Academy of Arts. He has published more than 300 articles in main cultural and art magazines and newspapers of Estonia since 1985. Book author, "Surrealism" (Kunst Publishers, 1993) and an article collections "Screen as a Membrane" (Tartu Art College proceedings, 2007), "Social Games in Art Space" (EAA, 2013). Doctoral thesis „Postmateriality in Art. Indeterministic Art Practices and Non-Material Art" (Dissertationes Academiae Artium Estoniae 3, 2009).

Selection video and media art festivals participation: French-Baltic Video Art Festivals (Grand Prix in 1994); WRO 95, Wroclaw; Second International Video and Electronic Art Manifestation in Montréal 1995; French-Baltic-Nordic Video and Electronic Art Festival, Riga 1997; 20th Tokyo Video Festival, 1998 (Silver Award); MuuMedia-Festival in Helsinki (1998); Ars Electronica Mediathek, Linz (1999); 4th International Festival of New Film, Split (1999); ISEA 2000 (Paris); Viper (Special Mention) 2000 (Basel); ISEA 2002 (Nagoya); FILE 2005 (Sao Paolo); 7TH International DARKLIGHT Festival 2006 (Dublin); Media Forum at the Moscow International Film Festival, 2006 (Moscow); Fluxus East. Fluxus Networks in Central Eastern Europe, Kumu Art Museum, 2008 (Tallinn), ISEA 2010 Istanbul, ISEA 2014 Dubai among others.

Raivo Kelomees (PhD) on kunstnik ja kunstikriitik. Ta on lõpetanud Tartu Ülikooli psühholoogia erialal 1984 ning Eesti Kunstiakadeemia disainerina 1994. Tal on EKA Kunstiteaduse Instituudi magistrikraad (2001) ning ta on kaitsnud doktoritöö teemal „Postmateriaalsus kunstis. Indeterministlik kunstipraktika ja mitte-materiaalne kunst" (2009, Eesti Kunstiakadeemia). Raivo Kelomees on alates 1980. aastate keskpaigast avaldanud artikleid, mis keskenduvad uue tehnoloogia kunstile, kirjutanud raamatu „Sürrealism" (1993), avaldanud artiklikogumikud „Ekraan kui membraan" (2007, TKK) ja „Sotsiaalsed mängud kunstiruumis" (2013, Eesti Kunstiakadeemia).

Meediakunsti festivaliosaluste valik: Prantsuse-Balti videofestivalid (Grand Prix 1994); WRO 95, Wroclaw; II International Video and Electronic Art Manifestation, Montréal, 1995; XX Tokyo Video Festival, 1998 (Silver Award); MuuMediaFestival, Helsingi (1998); Ars Electronica Mediathek, Linz (1999); IV International Festival of New Film, Split (1999); ISEA 2000 (Pariis); Viper (Special Mention) 2000 (Basel); ISEA 2002 (Nagoya); FILE 2002 ja 2005 (São Paolo); VII International DARKLIGHT Festival 2006 (Dublin); Media Forum at the Moscow International Film Festival, 2006 (Moscow); Fluxus East. Fluxus Networks in Central Eastern Europe, Kumu Art Museum, 2008 (Tallinn); ISEA2014 Dubai jt.

Specialized competence of art audiences and the signature of technology artists: a look at the history of artscience and criteria for evaluating it

Raivo Kelomees

The number of cooperative research projects in art has grown significantly in the last decade – something that is due to institutional developments as well as technological change and the digital age. One reason is that art educational institutions are pressured to incorporate a research requirement, which has given rise to a paradigm of "inquiry" in artworks. But the spread of research element in art is more complex, and the institutional factors play just as important a role as the momentum of art's own internal logic. We can't overlook developments based on artists' curiosity, their desire to try new media and create new works.

An attempt to determine the roots of the nexus between science, technology and art can lead us all the way back to the Renaissance, but the more recent history of the trend is connected with the early 20th century and the post-WWII art scene, in particular the 1960s. Cooperation-based and interdisciplinary projects became important in parallel with the potential of art reaching a certain point of exhaustion. Art's sphere of self-expression became a collective creative area, artworks became anchored in context and there was an influx of art into the natural and urban environment. All these changes and trends, coupled with the expansion of the traditional art creation materiality, created a spacious creative environment that has become almost the norm in the present-day. The terms used to describe all this – such as AST (Art, Science, Technology), and ArtScience –reinforce the feeling that single-medium-based art is a stranger at the feast of interdisciplinary joint creativity.

The motive force of ArtScience

Along with ArtScience, there's now the term Hybrid Art, which has been used by the Ars Electronica annual festival held since 2005 and which defines the media art landscape.

I would submit the following as the forces that define modern artscience and hybrid art:

1) changes stemming from the logic of art history, art history reaching a certain "end" and exhaustion; an aspiration, occasioned by lack of novelty, to create something new by recombining the old;
2) new and digital technologies entering the art sphere, which has given rise to a new type of artist proficient in rational use of technology and able to utilize technologies in art in a diverse manner;
3) institutional pressure factor – the requirement that educational institutions engage in research – has led to a need for art practices in which artists analyze themselves and their activity and the content of art practice becomes the observation of the practice itself;
4) non-standard problems arising from environmental studies, which have no suitable research practices and where art practices prove the most appropriate for examining and presenting them;
5) the performative science paradigm, which tries to unite the life sciences and biotechnology with local communities.

Objectivist, mechanistic and serial strategies in Estonian art

Any discussion of Estonian art of this type must begin with an event called "Harku 75". It took place in Harku near Tallinn, in 1975, and it was a cooperative event produced by young scientists and artists, and ultimately a cooperative activity held between artists and musicians. The scientists offered an environment for interaction and exhibition space at the Experimental Biology Institute in Harku.[1] "Harku 75" presented intermedia and multimedia, the event can be considered to have definite parallels with international developments. Due to the fact that the Soviet Union was isolated behind the Iron Curtain, it remained "underground";such art did not appear at official exhibitions.[2]

We know that research-oriented art aspires to objectivity, provability, non-subjectivity. If we look at Estonian art, we readily see the antecedents for the development. Leonhard Lapin wrote in 1975 in his presentation "Objektiivne kunst" (which he presented at the "Harku 75" exhibition):
"An objective artwork is not an expression of reality, but a part of reality, reality itself. An objective artist cannot express, but constructs; his or her creative process is not so much emotional and spontaneous as intellectual."[3]
It is noteworthy that Lapin stresses the state of a component of reality of an artwork, the ulterior motive of which, as later becomes evident from the text, points to the industrial and urban environment. Another nuance found in the text is the assertion that the artist does not express but rather constructs. Here Lapin stands in counterpoint to the lyrical-romantic movement, which is "...a mix of post-impressionism, Fauvism, Expressionism, Cubism – continuing the traditions of the Pallas Art School."[4] He critiques it as well:
"Yet this direction is not capable of offering anything besides the sensuous, creating new visual structures only thanks to an eclectic synthesis of various artistic currents from the interwar era."

Lapin links objectivism with the activities of the 1920s artists and the Estonian Group of Artists. He considers the mid-1960s to be a resurgence of Objectivism, seen in the work of Kaljo Põllu and Tõnis Vint. The activities of the groups Ank 64 and SOUP 69 are covered and Lapin gives us a short history of the art of the 1960 and 1970s, which is now become public and official.

Toward the end of the article, Lapin writes:
"Objective art, which is currently at the level of laboratory experiments, may be quite subjective, seeking ultimately a universal language for expression for art. His goal is to become an integral part of the new, industrial reality, the manmade environment. His goal is to shape a new relationship, solve a new problem – person-machine.[5]

Themes related to man and machine are treated in Lapin's later series "Machines" (1973–1979) and its sub-series "Woman-Machine" (1974).
Commenting on the topic of seriality and knowledge, Lapin notes[6] that he was influenced by Tõnis Vint, who is one of the most charismatic Estonian artists of the 1960s. Vint was in turn influenced by Ülo Sooster, whom Vint

visited in Moscow and who also visited Tallinn. (Sooster, although Estonian, stayed in Moscow after serving in a Siberian prison camp.) Sooster had contact with the progressive artists working at Znaniye publishers. Yuri Sobolev was the head artist, and Ilya Kabakov and Vladimir Yankilevsky were also at Znaniye. There scientific ideas were hatched. All manner of fantastic theories were permitted to see the light of day there, which the artists illustrated. In Lapin's opinion, this "scientific" nature came from this environment.[7] Back in the 1960s, there was a general infatuation with all things science-related.

Lapin also opined that seriality was related to scientific methods."I think it's the systematic work and conducting of experiments that is part of science – the fact that experiments are conducted, conducted until the experiment gives you something else."[8]

A year earlier, in 2006, when asked "what is objective art?" Lapin provided commentary on his 1975 positions as follows:
"I thought up this term myself. In the West there was talk back then of object art and art objects, but the term 'objective art' means that art was not just a reflection of the external environment but that objects were also created, objects that were independent with regard to the external environment, based more on scientific analysis, like scientific discoveries."[9]

Lapin deems the practical reason for seriality to be the fact that individual works do not have an impact at the exhibition. "If you put an idea into one work, it doesn't have weight at the exhibition."[10]

He said he worked with series, which was a kind of mechanical principle that one idea can be developed in different directions.[11]

In this manner, Tõnis Vint and Lapin represent the approach that a work is in fact a series of works, not an individual picture.

This is even clearer in Raul Meel's art – in particular "Taeva all/Under the Sky", a silkscreen print project consisting of tens of silkscreen paintings.

The particularity of this project, started in the early 1970s, is that each painting is created by printing two superimposed images. Before that, though, the artist played with formulas to test the permutations "theoretically." The basis for the combination was two colours – blue and black – and six images, the visual basis of which were schemes taken from "Masinaehitaja käsiraamat I" (1968).

Each combination was recorded as a formula of letters and numbers, for instance: DM90/CS-180. This formula means that the uppermost is a black (M) D shape turned 90 degrees clockwise and the lower one is a blue (S) basic C shape turned slightly less than 180 degrees. Meel wrote down 5,328 such formulae.[12]

For Meel, working with formulas and running through visual works before executing them was similar to the "scientific method" as well as to the creation of a certain "model." Still, the criterion of trueness was the artist's

intuitive decision regarding whether the result was "right". Meel wrote dry formulas as the preliminary work leading up to the art in order to create actual prints, of which not all were necessarily acceptable to him. The artist made the decision regarding whether the composition was right based on a inner feeling.

What happens if such an artwork ends up in a gallery, before an audience? The worst is that the viewer "does not agree" with the choices made by the artist, the combination (formula) and, having an understanding of the rules of composition, and conjectures that a different combination would have been better. But understandably, the artist is in the dominant position, and the artwork is like a proposition that the viewer accepts or not, deems "true" or not. If the work is not accepted, the question is how statistically significant the non-acceptance is. If a non-accepting viewer is only one of ten, then the artist is "in the right" but if most viewers do not agree, them the artist was "wrong".

But what happens if the artist is "wrong"? In a totalitarian society, the result can be physical repressions, while in a democracy the worst case is scorn and opprobrium; as a rule, it depends on the case. For the most part, feedback is not harsh, if the artist is fortunate, he experiences a criticism of "non-acceptance", which he can agree with or not, but which undoubtedly affects his reputation. In this manner, an artwork that doesn't resonate in the consciousness of most viewers simply goes ignored. It might happen that it becomes relevant only later, as has happened with artists who have been discovered posthumously. Then we can say their art has taken on resonance and met with majority approval. We can certainly cite such examples from science as well - that a scientific assertion made at some time is not understood by the public and is more denounced, with the scientist facing repression. The fate of Giordano Bruno (1548–1600) is a classic example. He defended a heliocentric view of the universe, was branded a heretic and burned at the stake. But the influential non-acceptance by the Catholic Church cannot be compared with the non-acceptance that artists experience in the modern art scene.

We can also find examples in Estonian art, such as Valdur Ohakas, Ülo Sooster, Olev Subbi, whose artistic work met with negative reactions in the Stalin-era Soviet Union, and they ended up in Siberian prison camps.

Biological techno-utopia

I would consider another key episode in the development of artscience in Estonia to be the third annual exhibition of the Soros Centre for Contemporary Art, held in 1995. Its curators were Sirje Helme and Eha Komissarov, but Ando Keskküla was also behind the event.

Biotoopia was derived from three words – biology, technology and utopia. Sirje Helme's foreword for the catalogue defined the paradigm and context for the activity. She wrote that biotopia focused on the meeting point of two worlds – the biological and the cybernetic– which could be a critical point in the creation of a future utopia. The exhibition programme left no room for juxtaposition or opposition of art and science or even their treatment as different paradigms.

As to the reason that art and science were not placed in opposition, she wrote:
It is first and foremost because the global village does not necessarily mean only the assimilation of people and their views and the rapid spread of information. It could also connote undividability, the absence of oppositional pairs, the disappearance of narrow specifications and the equal distribution of tasks between the "villagers".[13]

Helme also referred to the popular notion that „Yet the popular view that is still holding its ground makes a simple differentiation between art and science. Artist deal with emotions, scientists with reality and logic. This means that the well established schemes, the ideology of Romanticism on the one hand and the world view based on Newton's mechanical uninverse on the other, are still being used".[14]

At the end of the introduction, Helme lays out a development arc which, as we would see later, experimental scientists and artists would start to follow in the decades that ensued.

"An exhibition "Biotoopia" which is inspired by a kind of technological fundamentalism offers the artist the possibility first of all to analyse the pivotal moments we find ourselves in, our problems, fears, pains and hopes from the acceptance of the new environment to its total negation, and at the same time, to point out that the code of life has hitherto consisted of four letters, but that the computer environment might be capable of reaching the frontier where the generation of new artificial life would no longer be impossible."[15]

The significance of "Biotoopia" lay in the fact that the authors' set expanded, with scientists, doctors and people from other walks of life joining their ranks. Margus Punab (andrologist), Raik-Hiio Mikelsaar (medical researcher and molecular biologist), Andrus Salupere (technology scholar), Raivo Vilu (bio-technologist) added a key dimension to the exhibition.

At the exhibition, Andrus Salupere (whose name is accompanied also by physical mechanics researcher and academician Jüri Engelbrecht and mathematician and physicist Pearu Peterson,) presented the project "The Formation and Interaction of Solitons". A soliton is a wave of permanent form, that is localized and has constant value, writes the author. From that point, Salupere answers the question, "Why are solutions to certain equations included here in this exhibition?" It turns out that it is a scientific visualization, but it could also be expressed by his more basic comment: "The diagrams often turn out to be especially interesting and beautiful ... "[16]

Margus Punab showed, in four photos and three prints, images of deteriorating spermatozoa. This alluded to the declining fertility of males over the last half century. Raik-Hiio Mikelsaar presented molecular models created at the University of Tartu's general and molecular pathology institute; the models were used in academics and research in various countries.
In the catalogue, Raivo Vilu wrote about the possibility of life on the Internet, which forced the reader to strain his imagination and signalled what an arduous task it is to copy the code of life, asking whether it would become

possible. In spite of the massive power of computers, they are not capable of becoming alive by processing DNA. He closes his piece on an optimistic note: the Internet is creating an environment where it could become possible. „We are probably very soon going to find out the codes and patterns of artificial life. And we are to hope that it would be a friendly kind of life," Vilu writes.[17]

It's no coincidence that the most provocative, edgy achievements of science and technology are related to manipulation of living matter, projects where artists and scientists have been able to modify living matter or create new combination of living things. Ten years or so after Biotoopia, we see projects on the international art world that already actually copy and splice DNA. This can be seen in Eduardo Kac's "Genesis" (1999), "GFP Bunny" (2000), and "Natural History of the Enigma" (2003/08). Critical positions regarding DNA manipulation can be seen in Paul Vanouse's works "Latent Figure Protocol" (2007-09), "Ocular Revision" (2010), and "Suspect Inversion Center" (2011-). Articulating the relationships between the technological and biological is the key preoccupation in Oron Catts' work and his research initiative in Perth, Australia (Tissue Culture & Art Project, 1996). Along with colleague Ionat Zurr, he has coined the term "semi-living" to connote real half-alive tissues that are created and used in experiments.

Technobia

"Tehnobia," curated by Leonhard Lapin at the Tallinn Art Hall in 2006, is worthy of note. Its novelty lay in the proclamation that nature, culture and the human organism were a collective life form. With its appealing exhibition title, Lapin built on his earlier interest in fusing technology and the human organism.

"Tehnobia" constituted a break-in through an open door, as quite a few techno-bio-exhibitions had already taken place by then. Reviews of the exhibition were informed by "Biotoopia" and a number of Ars Electronica festivals, such as "Genetic Art - Artificial Life" (1993), "Fleshfactor" (1997), "LifeScience" (1999), "Next Sex" (2000) and "Code" (2003).[18] In some manner, they all dealt with uniting the living and the technical, either on the level of thought-experiments or prototypes.

From "Biotoopia" to "Tehnobia", the intervention of science and biotech in the creation of exhibition items was theoretical, if not lacking. This was more of a typically artist-like metaphorical game and an acknowledgment of the greater role the prevalent technological world was playing. There was still not "wet" art to be seen.[19] "In the Art Hall, we see symbolic representations, art projects – and that is after all what this art exhibition is, not a real intervention on the borderlands of life and technology," I wrote at the time.[20]

Artist's experiment and scientific experiment: the "provability" and creative distinctiveness of an artwork

If we examine the category of hybrid art, questions about "provability" and verifiability arise. How true are they, aside from being compelling artworks?

The problem is that artists create works that are so complex and technically opaque that it is not possible to evaluate the work's technical structure without specialized skills or technical instruments. An artist's work as an artistic statement cannot be refuted without an expert analysis.

An artist's experiment is distinct from a scientific experiment in the sense that provability is not the main consideration in art. The finding of the artist's work is presented as a visualized, digitized or objectified position. Its truth-value is confirmed or disproved by art-critical text. It may happen that subjective, non-true, "bluffed" art work that is based on scientific knowledge takes on a value in social discourse, having something to say to the public or in the art context in an original way.

An art-critical text accepts or disputes a work. But a critic may be just as misled as the viewer. A critic may deem as truth whatever the artwork presents through the artist's "mouth". The chain reaction of acceptance that comes about as a result makes it pretty much automatic that ordinary viewers will accept the value of the work.

If the work is declared "false", fraudulent, this could have the same significance than were it to be deemed true. In the case of art the most important thing is whether it "works" – does it generate a response and interest, and not leave viewers ambivalent. If projects in science can be distinguished as either true or false, in art truth can mean that it functions in terms of art communication. On the other hand, a work that does not generate feedback, and as a result is invisible – even if the assertion it makes is scientifically true and correct – may be false.

I would highlight one more parameter encountered in art: creative distinctiveness and creation of a "trademark". This is the use of a common visual element or theme that makes the artist and the art recognizable, distinguishable. A "trademark" can also be created for substantive or commercial reasons. Considering that achieving distinctiveness became a consistent artist strategy in the visual art of the 20th century, the question is: to what extent do we see this in technological art and hybrid art approaches?

Works that require specialized competence

Works that require specialized competence are ones that must be evaluated by a specialist in a technology or profession in order for its trueness to be validated.

Eduardo Kac's "Natural History of the Enigma" (2003/08) involved a protein produced by Kac's genes in petunia leaves. In a private conversation with the biologist, I learned that it was not possible to interlace plant and human tissues. I could ask whether I would be able to distinguish the "edunia" created by Kac from natural petunias." A biologist might be able to do so. As an art observer, I am completely within my rights to agree or disagree with Kac when I see bio-art-manipulated plants that do not differ to any notable degree from the originals. Thus the viewer cannot prove without additional technology that Kac's work is what the artist claims it to be. The question mark on whether the work is true or

not is, in fact, what constitutes his or her "artistic truth". This is so even if it remains just a conceptual project, a proposed idea for a possible future work.

Looking for counterarguments, I happened upon the blog of Danny Chamovitz[21] (professor of molecular biology and plant ecology at Tel Aviv University since 1996), who believes that Kac's "Enigma" is not a "hybrid" but 0.003% Kac and 99.997% petunia (he sees the term hybrid as more biology-based; it has a somewhat different shade of meaning in art).

In his writing, Chamovitz refers to the fact that plants have genes (BrcA and Cftr), that are shared by humans, and thus all plants are "plantimals" – the word that Kac used in his project. We could also say that people have genes (Det1 and Cop9, which are necessary for photomorphogenesis) and these are also shared by plants – could we be viewed as "aniplants", then?[22]

To what extent can laymen viewers be fooled? The question is about the possibilities of innovation and novelty in art as a whole. In a situation where art (and even innovative technological art) has exhausted many of its possibilities, artists are gravitating to adjoining specialities, harvesting ideas and bringing them back and thus refreshing their work. The critical discussion is centred on the result and the question of whether new meanings and discussions arise. If they do, the crossing of various fields and hijacking of ideas has been productive. If not, then it is just a simulation of innovativeness and the emperor is wearing no clothes, as it were.

Heather Dewey-Hagborg's "Stranger Visions" (2013) deals with genetic tracking,[23] which makes no bones about the fact that the portrait generated is vague, conjectural and imprecise. The work raises the question about whether genetic tracking is possible, something we could fall victim to unwittingly.
In the case of Dewey-Hagborg's project, vagueness and conjecture is an overt part of the work. For instance, people could not be ID-d in reality based on their portraits. Her artwork contains social, technological and scientific commentary - essentially that the technology in the future will be better and allow the owner of genetic material to be determined with portrait-like accuracy. She writes: ""Stranger Visions" is meant as a provocation, a confrontation with the viewer containing the possibility that someone can analyze DNA and identity on the basis of a footprint he has unintentionally left."[24]

This example does not hide the fact that the project is limited, insofar as the result – 3D portraits – is vague in spite of the fact that the state of the art technology is used. All of this is completely acceptable when placed in the art context. We could ask whether a "vague" result would be acceptable in science. Likely not, and this would expose the different tolerance in the art and scientific fields have with regard to accuracy and verifiability.

A work by an Austrian artist, Thomas Feuerstein's "Pancreas" (2012, glass, brain cells, steel and technical equipment, measuring 230 x 800 x 200 cm) was executed at the Innsbruck Medical School radiotherapy and oncology radiation department. The author writes that the process-based sculpture "Pancreas" transforms books into sugar (glucose), which feeds people's brain cells.[25] Pancreas is a pataphysical machine that uses biotechnology for translating books into material and flesh.[26]

Feuerstein's project does involve scientific equipment and convincing manipulations, but the goal of the process – feeding a "brain" – is handled as an artwork, sculpture, and installation. This makes the solution playful as a whole, something witty and ironic, but in any event, only a half-realized scientific experiment and moderately interesting artwork, or so it seems to me. The possibility of producing glucose from cellulose might seem novel to a layman, but not to a specialist.

The projects by these three artists – Kac, Dewey-Hagborg and Feuerstein – have in common a use of scientific technology, but the result is vague or half-realized. It is impressive that the projects were executed, but it is not enough for critical observers and those interested in innovation.

Creative distinctiveness and the signature of technological artists

To what extent does an artist's "creative character" and "individual signature" manifest itself in artscience and hybrid art?

We know how the artist's signature was fetishized in 20th century art, which has been critiqued and which artists have attempted to "overcome".

Let us look at examples that can be categorized as artscience and hybrid art.

In his works "Latent Figure Protocol" (2007-09), "Ocular Revision" (2010), and "Suspect Inversion Center" (2011-), Paul Vanouse has consistently pursued an interest DNA analysis themes and has varied them using different ideas and visualizations.[27] In his work "Latent Figure Protocol", he calls the objectivity of DNA tests into question and shows how to create analogous forms using a synthetic plasmid. Critical commentary is related to the risks related to assigning credibility to DNA tests. Other aforementioned works are similar to an experiment installation in the sense of the hardware and software used. Vanouse operates within the bounds of a recognizable "trademark", as an artist DNA tester. With "Latent Figure Protocol", the result is perhaps the most like a traditional artwork, and most accessible to the general public. It deserves to be mentioned that the installations are performative, with a certain time and public participation necessary for execution, the questions and answers thus provide an additional dimension and educating the audience is not just of passing importance.

Dmitry Gelfand and Evelina Domnitch create environments that can be perceived and grasped with the senses, uniting physics, chemistry and computer science with an unusual philosophical practice.[28] The installations are characterized by the dimension of mutability, they are performative.
 "Camera Lucida" (2003) is the quintessence of this

quality,[29] It bombards a gaseous environment with ultrasound waves to create sonoluminscence. The heat of the bubbles that burst in this environment are almost as hot as the Sun. Before the viewers are taken to the installation, they stand in total darkness for five minutes so that their eyes can adjust, as the art is otherwise almost imperceptible. The authors themselves argue that too little attention has been paid to this phenomenon in physics and chemistry, hence their interest in an ephemeral and auditively generated visual environment.

Their works "10000 Peacock Feathers in Foaming Acid" (2006), "Sonolevitation" (2007), "Hydrogeny" (2010) and "Memory Vapor" (2011) all involve delicate physical, chemical and acoustic processes that are reminiscent of a scientific experiment balancing on the border of credibility. To the viewer it sometimes appears like a trick but that makes the effect all the more captivating, and even specialists are convinced.

The authors' fragile experiments is the "signature": science experiment-based and imperceptible, fleeting events; participation in them is a performative ritual that becomes an esoteric performance.

The German artist Julius Popp makes original and creative use of technology to create projects that transcend artscience. He has three project series: bit.series, macro.series and micro.series.

If we take a closer look at the three works bit.code" (2009), "bit.fall" (2001-2006) and "bit.flow" (2008), the first thing we see is the name as a trademark. The works are about the frequency of use of words on the Internet and deal with displaying them through various visualization media. The installations are part of the same family in the visual sense.

In "bit-code" the viewer sees black and white moving plastic strips on the walls, which from time to time form words.[30]
In "bit.flow" we see fluids of different colours being pumped through plastic hose; they occasionally form graphic images - words.[31]
"bit.fall" for its part is a curtain of falling water on a dark background,[32] where a computer-controlled water diffusion system allows drops to fall with perfect timing so that over a fraction of a second, we see the words that appear most often in news sites.[33]

The author calls the work a net-based installation: "The water droplets are like building blocks, like bits that are used to form information. These minute information components are just as ephemeral as time, which our media-centred society needs to grasp, exchange and update information."[34]

No matter how the artist accounts for the work and the critics' reviews, the "bit.fall" installation is a direct hit: it is vivid, captivating and popular. No explanatory texts or analysis must be read to understand it – it works with an immediacy that needs no intellectual filter.

What Popp's installations have in common is that they use words, are controlled by a computer algorithm and feature online text search.

Conclusion

There are other examples from Estonian artists as well – such as Timo Toots's ID card or the document-reader-based installations "Autahvel" ("Hall of Fame") (2009) and "Memopol" (2011).[35] Taavi Suisalu's "Epicenter" (2010) harvests real-time text from 30 news sites and displays it in the form of a minimalist screen installation in conjunction with an audio environment.[36] These projects also demonstrate what I described earlier – web-based text generation and discernible interaction mechanism.

Returning to the assertions I made earlier, such the problem of specialized competence, which we need to perceive technical artworks and creative distinctiveness and the artist's "signature", we see what we could also see earlier, in the 20th century.

The problem of specialized competence does not only exist in technological art but in other art forms where the viewer is expected to be educated and have a more in-depth understanding of the work. The viewer must be aware of games revolving around the materiality of the art, the nature of the work as an object and the ideas that led to the specific artwork – after all, it does not exist in a vacuum, but in a cultural and temporal context.

The examples of artscience detailed in this essay are a critical example of a situation where only specialists – not to say scientists in a very arcane field - are capable of gauging the trueness of the works. The artist generally does not create his or her works for such specialists; they are intended for the layman, who is sometimes hoodwinked. But this situation imposes quite a high competence requirement on the audience and the critic, the need to be an expert not only in the art process but in the field of the specialized science which informed the creation of the work.

The projects by Eduardo Kac, Heather Dewey-Hagborg and Thomas Feuerstein required scientific expertise and readiness on the part of viewers to deal with technologies that are not exactly commonplace. But all of the projects were, in a sense, unfinished, playful, disputable and questionable in the sense of the visual elements. Nevertheless, they received recognition from the conceptual viewpoint.

Creative distinctiveness and artist's signature in technological art are presented here as a provocative question that I have tried to answer briefly through examples of art. Here as well, the artist is bound by the deliberate and intuitive games that work not only in art but in human culture more broadly – to make oneself visible, one has to identify and define oneself with media and topics. We see this in the case of Vanouse, Gelfand and Domnitch, and Popp, who use definite themes, technologies and recognizable rituals in the performative sense. The authors have aspired to a certain style, visual distinctiveness, comprehensiveness or methodological uniformity. As a result, we can describe their projects using words previously used for museum and gallery art. We also see that although the art changes in some respect, recurring universal principles come up, which the artists observe and which also works from the standpoint of the audience.

[1] See catalogue: Harku 1975–1995. Compiled by: Lapin, L., Liivak, A., Meel., R. Tallinna Linnagalerii, 1995

[2] Kelomees, R. Harku 75 tähendusest.(Significance of Harku 75) – Kultuurileht, 12 January 1996.

[3] Lapin, L. Objektiivne kunst. - L. Lapin, Kaks kunsti. (Two arts) "Kunst", Tallinn 1997, p. 51.

[4] *Ibid*, 55

[5] *Ibid*, 58

[6] Conversation with L. Lapin, 10 January 2007.

[7] *Ibid.*

[8] *Ibid.*

[9] Leonhard Lapini objektiivne kunst 30 aastat hiljem, Postimees, 12 January 2006, - http://www.postimees.ee/1520891/leonhard-lapini-objektiivne-kunst-30-aastat-hiljem

[10] *Ibid.*

[11] *Ibid.*

[12] I have treated Meel's art in the subsection on "Rules and procedure in the art of Raul Meel " in the doctoral dissertation "Post-materiality in art. Indeterministic practice and non-material art." Estonian Academy of Arts, Institute of Art Theory 2009, pp. 150–159.

[13] Helme, S. Foreword. –Biotoopia, Catalogue of the third annual exhibtion of the Soros Centre for Contemporary Art. SKKEK Tallinn 1996.

[14] *Ibid.*

[15] *Ibid.*

[16] Salupere, A. (Engelbrech, J., Peterson, P.). The Formation and Interaction of Solitons. - Biotoopia, Sorose Catalogue of the third annual exhibtion of the Soros Centre for Contemporary Art SKKEK, Tallinn 1996

[17] Vilu, R. The Possibility of Life on the Internet. - Biotoopia, Catalogue of the third annual exhibtion of the Soros Centre for Contemporary Art. SKKEK, Tallinn, 1996, pages unnumbered.

[18] Kelomees, R., "Tehnobia" – taaskohtumine tulevikuga. – Sirp, 16 June 2006.

[19] Wet art was coined in the 1990s, in parallel with "vivo art" and "moist media". The last of these has been used by Roy Ascott to desccribe the point where dry pixels and wet molecules converge". See Roy Ascott (2000), Edge-Life: technoetic structures and moist media. In: Ascott, R. (ed) Art, Technology, Consciousness: mind @ large. Bristol: Intellect. pp 2–6.

[20] *Ibid.*

[21] http://whataplantknows.blogspot.com/2012/07/enigmatic-petunia.html

[22] *Ibid.*

[23] http://deweyhagborg.com/strangervisions/about.html

[24] Dewey-Hagborg, H., Stranger Visions. - Total Recall. Evolution of Memory. Ars Electronica 2013 catalogue. Leopoldseder, H., Stocker, G., Schöpf, C., Cantz, H. (Eds) Verlag 2013, p. 93.

[25] http://thomasfeuerstein.net/50_WORKS/75_LABORATORY/72_PANCREAS

[26] *Ibid.*

[27] http://www.paulvanouse.com

[28] http://www.portablepalace.com/ed.html

[29] http://www.portablepalace.com/lucida/index.html

[30] bit.code, http://vimeo.com/22430387

[31] bit.flow, http://juliuspopp.de/html/bitflow.php

[32] bit.fall, http://juliuspopp.de/html/bitfall.php
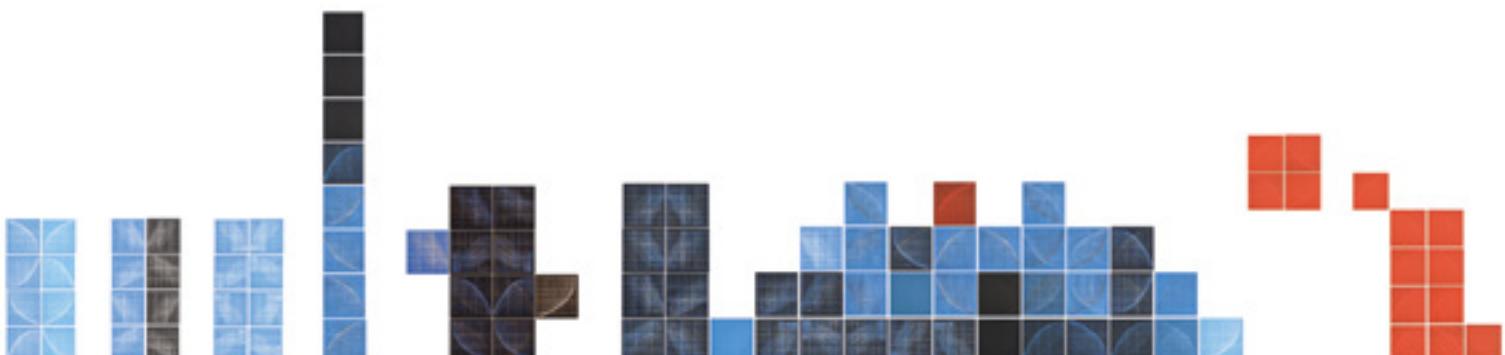
[33] Popp, J. bit.fall. – Gateways. Art and Networked Culture. Himmelsbach, S., Cantz, H. (eds) 2011, p.150.

[34] *Ibid.*

[35] http://prix2012.aec.at/prixwinner/5563/

[36] http://taavisuisalu.com/o/epicentre.html
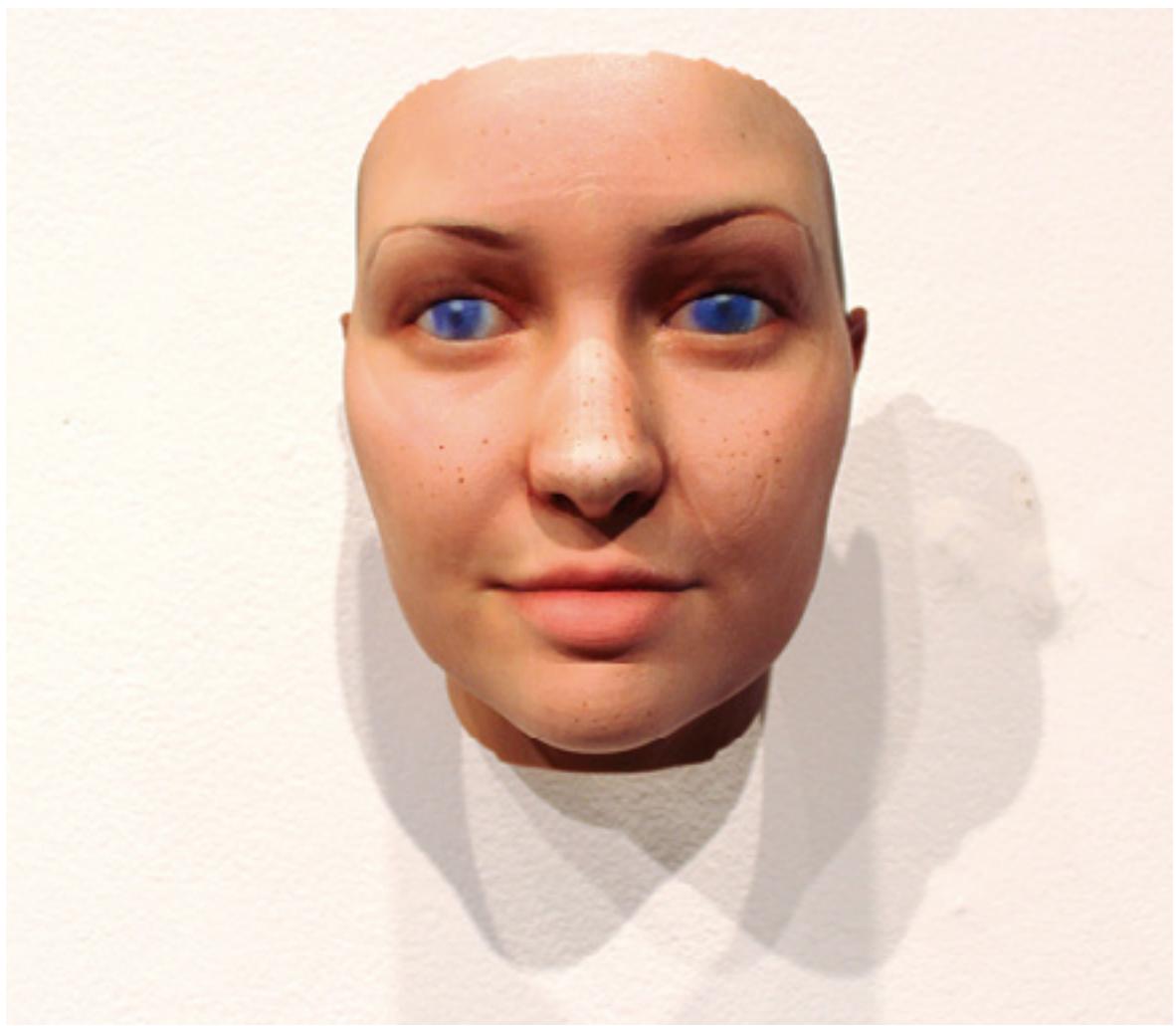
Taeva all. Raul Meel. 1969–1972, 2014

*Self-portrait based on mtDNA, Ancestry Information Markers and
50 trait specific SNPs describing gender, eye color and detail,
hair color/baldness, hair curliness, complexion, skin lightness/
darkness, tendency to be overweight.
Heather Dewey-Hagborg
http://www.deweyhagborg.com*

*PANCREAS, Thomas Feuerstein
glass, brain cells, stainless steel, technical equipment,
230 x 800 x 200 cm.
Biotechnological realisation: Thomas Seppi,
Department of Radiotherapy and Radiooncology,
Medical University of Innsbruck, 2012.
http://thomasfeuerstein.net/50_WORKS/75_
LABORATORY/72_PANCREAS*

Vaataja erikompetents ja tehnokunstniku käekiri:
teaduskunsti ajaloost ja hindamiskriteeriumidest

Lühikokkuvõte Raivo Kelomees

Koostööpõhiste uurimuslike projektide hulk kunstis on viimasel kümnendil märkimisväärselt kasvanud. See on tingitud nii tehnoloogiate muutumisest ja digitaalses suunas liikumisest kui ka institutsionaalsetest arengutest.

Teaduskunsti tõukejõud

Teaduskunst (*ArtScience*) termini kõrvale on tulnud hübriidkunsti (*Hybrid Art*) termin.
Pakuksin välja kaasaegset teaduskunsti, hübriidkunsti määratlevad tõukejõud:

1) kunstiajaloo loogikast tingitud muutused, kunstiajaloo teatava „lõpuni” ja ammendatuseni jõudmine ehk uudsuse puudumisest tekkinud taotlus luua uut vana ümberkombineerimise abil;
2) uue- ja digitaaltehnoloogia kunstivaldkonda sisenemine, mis on loonud uue kunstnikutüübi, kes ratsionaalselt valdab tehnoloogiaid ja oskab neid oma kunstis mitmekesiselt kasutada;
3) institutsionaalne survefaktor ehk õppeasutuse teadustöö nõue on loonud vajaduse kunstipraktikate järele, kus kunstnikud reflekteeriksid isennast ja oma tegevust ning kunstipraktika sisuks saab selle praktika enese vaatlus;
4) keskkonnauuringutest tingitud ebastandartsed probleemid, mille jaoks puuduvad kõlblikud teaduslikud uurimismeetodid ning mille uurimiseks ja esitamiseks osutuvad kunstipraktikad sobivaimateks;
5) performatiivse teaduse (*performative science*) paradigma, kus püütakse ühendada eluteadusi (*life sciences*) ja biotehnoloogiat ning kohalikke kogukondi.

Objektivistlikud, masinlikud ja seriaalsed strateegiad Eesti kunstis

Eesti kunstist rääkides tuleks mainida sündmust „Harku 75” (1975), mis oli noorte teadlaste ja kunstnike koostöösündmus, kuid kujunes siiski kunstnike ja muusikute ühistegevuseks.
Leonhard Lapin rõhutas oma „Harku 75” näitusel esitatud ettekandes „Objektiivne kunst” kunstiteose tegelikkuse osa olekut. Kunstiteos ei ole tegelikkuse peegeldus. Samuti kirjutas ta, et kunstnik ei väljenda, vaid konstrueerib, vastandades end nn lüürilis-romantilisele suunale.
Objektivismi seob Lapin 1920. aastate kunstnike ja Eesti Kunstnikkude Ryhma tegevusega. Selle uueks tõusuajaks peab ta 60ndate aastate keskpaika, mis ilmneb Kaljo Põllu ja Tõnis Vindi tegevuses.
Kommenteerides seriaalsuse ja teaduslikkuse teemat, mainib Lapin Tõnis Vinti ja Ülo Soosterit. Samuti räägib enda seriaalsest lähenemisest: teoseks on tööde seeria, mitte üksikpilt.
Raul Meele kunstis ilmneb seriaalsus selgelt serigraafiaprojektis „Taeva all”.
Kunstnik mängis eelnevalt valemitega, et võimalikke kombinatsioone „teoreetiliselt” läbi proovida.
Meele valemitega töötamine ja visuaalteoste tehnoloogiaeelne läbimängimine enne praktilist teostamist on sarnane „teadusliku metoodikaga” ja teatava „mudeli” loomisega.

Bioloogiline tehnoutoopia

Teiseks oluliseks episoodiks teaduskunsti suhtumise ja sellega suhestumise arengus Eestis oleks 1995. aasta Sorose Kaasaegse Kunsti keskuse 3. aastanäitus „Biotoopia". Selle kuraatorid olid Sirje Helme ja Eha Komissarov, sündmusega oli seotud ka Ando Keskküla. „Biotoopia" tähendas „bioloogia", „tehnoloogia" ja „utoopia" ühendamist. Kataloogi eessõnas määratles Sirje Helme suhtumise kirjutades, et biotoopia konsentreerub kahe maailma, bioloogilise ja küberneetilise kokkusaamisele, mis võib olla kriitiliseks punktiks tuleviku utoopia loomisel.

„Biotoopia" olulisem tähtsus seisnes autorite seltskonna avardamises teadlaste, arstide ja teiste n-ö mittekunstnikega. Margus Punab (androloog), Raik-Hiio Mikelsaar (arstiteadlane ja molekulaarbioloog), Andrus Salupere (tehnikateadlane), Raivo Vilu (biotehnoloog) lisasid näitusele olulise mõõtme.

Tehnobia

Tehnoloogia ja elavaga tegeles 2006. aastal Leonhard Lapini kureeritud „Tehnobia" Tallinna Kunstihoones, mille uuenduslikkus oli looduse, kultuuri ja inimorganismi ühiseks eluvormiks kuulutamine. Lapin väljendas oma jätkuvat huvi tehnoloogia ja inimorganismi ühendamise vastu.

Teaduspõhise biotehnoloogia sekkumine näitusesponaatide loomisesse oli sama teoreetiline kui mitte puudulik nii „Biotoopia" kui „Tehnobia" puhul. Tegu oli tüüpliselt kunstnikuliku metafoorse mänguga ja üldvalitseva tehnomaailma suurema osakaalu tõdemisega. Nn märga[1] kunsti ei olnud endiselt näha.

Kunstniku eksperiment ja teaduseksperiment: kunstiteose "tõestatavus" ja loominguline eristatavus

Hübriidse kunsti kategooria valguses tekivad küsimused kunstiteose „tõestatavuse" ja kontrollitavuse kohta. Kui tõepärane see on, vaatamata sellele, et on kunstiteosena veenev? Probleem on selles, et kunstnikud loovad teoseid, mille keerulisus ja tehniline läbipaistmatus on tõusnud sellise määrani, et teose tehnilist struktuuri ei ole võimalik ilma spetsialisti kompetentsita või tehniliste vahenditeta hinnata.

Analüüsi väärib veel üks parameeter: loominguline eristatavus ja „kaubamärgi" tekitamine. Erikompetentsi nõudvatest teostest kirjutades mainin Eduardo Kaci „Natural History of the Enigma" (2003/08), Heather Dewey-Hagborgi „Stranger Visions" (2013) ja Thomas Feuersteini teost „Pancreas" (2012).

Kui kõnelda loomingulisest eristatavusest ja tehnokunstniku käekirjast, tuleb küsida, mil määral avaldub kunstniku loominguline karakter ja individuaalne käekiri tehnilise ja hübriidkunsti puhul? Kunstniku käekiri on XX sajandi kunstis fetsišeeritud, kunstnikud on püüdnud seda „ületada". Tehnokunstnike „käekirja" näideteks toon Paul Vanouse'i, Dmitry Gelfand'i ja Evelina Domnitchi ning Julius Poppi kunsti. Vanouse on järjekindlalt tegelenud DNA analüüsi ja selle varieerimisega erinevate ideede ja visualiseeringute kaudu.[2] Dmitry Gelfand ja Evelina Domnitch on loonud meeleliselt

tajutavaid ja haaravaid keskkondi, mis ühendavad füüsika, keemia ja arvutiteaduse kummalise filosoofilise praktikaga.[3]
Julius Popp kasutab originaalset ja vaimukat tehnoloogiat teaduskunsti ületavate projektide loomiseks.
Eduaro Kaci, Heather Dewey-Hagborgi ja Thomas Feuersteini projektid nõuavad erialast asjatundlikkust ja vaataja pühendumist mitte just igapäevasesse teadusesse ja tehnoloogiasse. Kõik projektid on omamoodi lõpetamata, mängulised, natuke vaieldavad ja visuaali mõttes küsitavad, kuid need on leidnud tunnustust idee tasandil.
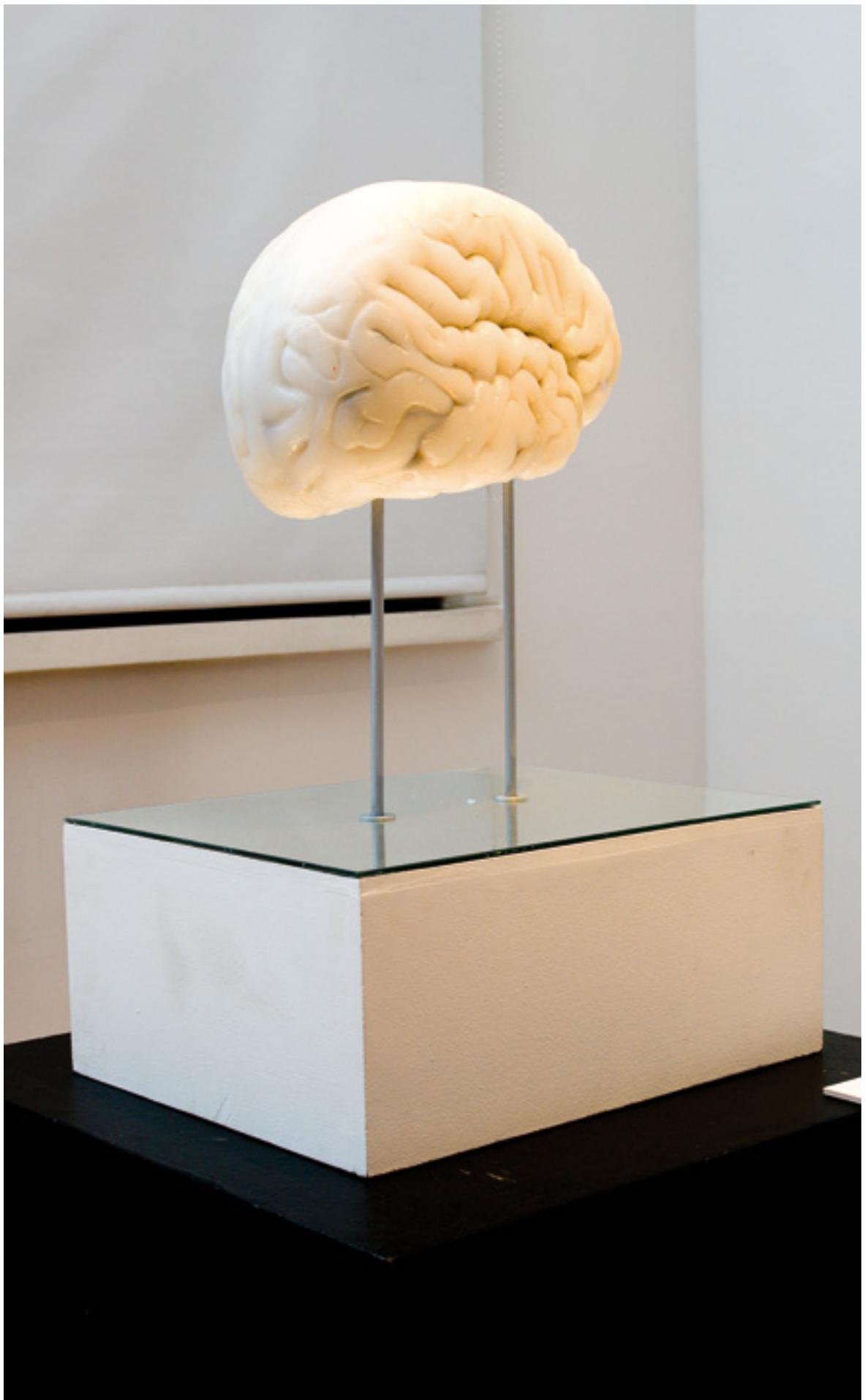
Loomingulise eristatavuse ja kunstniku käekirja küsimus on teaduskunstis ja tehnokunstis laiemalt provokatiivne. Kunstnik allub neile teadlikele ja intuitiivsetele mängudele, mis toimivad inimkultuuris laiemalt: enda nähtavaks muutmiseks tuleb end identifitseerida ja määratleda meediumide või teemadega. Näeme nii Paul Vanouse'i, Dmitry Gelfandi ja Evelina Domnitchi kui ka Julius Poppi puhul, et tegeldud on kindlate teemadega, tehnoloogiatega ja performatiivses mõttes äratuntavate rituaalidega.

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[1] „Märg", „wet art". Väljendit on kasutatud 1990. aastatest, millele on paralleelsed „vivo art", samuti „moist media". Viimast on kasutanud Roy Ascott, mis tähendab „kuivade pikslite ja märgade molekulide konversiooni" (*where dry pixels and wet molecules converge*). Vt Roy Ascott (2000), Edge-Life: technoetic structures and moist media. In: R. Ascott (ed) Art, Technology, Consciousness: mind @ large. Bristol: Intellect. Pp 2–6.

[2] Vt http://www.paulvanouse.com.

[3] http://www.portablepalace.com/ed.html

M Model. Taje Tross, Installation, 2005 © Photo by Stanislav Stepashko

Piibe Piirma is an Estonian media artist. She has been a designer and artist since 2002 and curated various media art exhibitions since 2006.

Her current activities are closely related to her doctorate studies in art and design at the Estonian Academy of Arts. Her thesis examines the philosophical and theoretical backgrounds and practical art genres of interdisciplinary collaboration. Her own art practice is also based on collaboration with various science labs, the most recent personal exhibitions "Hybrid Practices" and "Hybrid Practice - from General to Specific" were held in Tallinn in 2013.

Piibe Piirma is a co-organiser of the international conference "Art & Science – Hybrid Art and Interdisciplinary Research" held in 2014 and the curator of the exhibition titled "Rhizope".

Piibe Piirma on Eestis tegutsev meediakunstnik. Ta on disaineri ja kunstnikuna töötanud aastast 2002 ja erinevaid meediakunsti näitusi kureerinud aastast 2006. Tema praegune tegevus on tihedalt seotud õpingutega Eesti Kunstiakadeemia doktorikoolis kunsti ja disaini erialal. Oma väitekirjas analüüsib ta isiklikke kunstnikukogemusi, mis põhinevad erinevais teadus-laboreis saadud koostöökogemustel.

Piibe Piirma on 2014. aastal toimuva rahvusvahe-lise konverentsi „Kunst ja teadus – hübriidne kunst ja interdistsiplinaarne uurimus" ja sellega seotud näituse „Rhizope" kuraator.

Interdisciplinarity
and Transdisciplinarity in Hybrid Art

Piibe Piirma

Regardless of the prefix that we choose to use to describe the cooperation between various disciplines (*inter-, trans-, multi-, etc.*), we can recognize that the abundance of creative and scientific specialities has significantly expanded our cultural approaches. Just as science poses ever more complicated questions about the world, the approaches of thinkers of the creative fields are influenced by the wealth of possibilities that is characteristic of the modern age. Scientists and artists both see a need for mutual understanding. Creative research – whether confined to disciplinary boundaries, between boundaries or transcending boundaries – is a unique and hybrid phenomenon which requires more careful attention, analysis and continued practice. How should we view interdisciplinarity and transdisciplinarity in cooperative projects where the creative fields have a role, more specifically the fine arts? By examining some well-known works of art, I will attempt to understand and conceptualize interdisciplinarity and transdisciplinarity. I will explain why these approaches are important in the context of modern art and what these forms of cooperation offer for science and society more broadly.

The 19th century can be considered an important era for human culture, a time when philosophy and science as fundamentally divergent specialities grew apart. Human beings themselves had become considerably more self-conscious than before, and more distant from religious principles. The major historical developments in science and technology beginning in the early 17th century also had an impact on the differentiation of various specialities.

The works of Leonardo da Vinci, the multifaceted genius; the chefs-d'oeuvre of Michelangelo and Raphael; Luther's Reformation against the monolithic ideology of the Catholic Church; Columbus's discovery of the New World; Copernicus's heliocentric universe hypothesis; and Machiavelli's pioneering objective analysis of political power are each great achievements in their own right. But even when taken together, all these historically transformative events were, nevertheless, a mere prerequisite and introduction to an even greater cultural explosion. The socio-political and ideological foundations of the agrarian society broke down; in the slow evolution of production, a technological and organizational "readiness" had grown ripe for the launch of the scientific/industrial revolution.[1]

Thus, disciplinary segregation occurred as a result of the increasingly greater specialization of science and culture. Deeper dedication required building immunity against other fields, as well as leaving aside or limiting to superficial consideration religious, political and social influences.

On the one hand, there was nothing wrong with institutionalization and deeper specialization, because in the aforementioned eras such an approach was necessary from the standpoint of the advancement of human knowledge. But it destroyed a certain big picture, which in later centuries we have tried to piece back together. This has become especially topical in light of the significant shifts taking place at present, when societal, economic and aesthetic influences have an important role (*see illustration 1*).

Interdisciplinarity - the creation of shared knowledge between disciplines

Interdisciplinarity as a term originates from education and educational science and signifies a mode of instruction which merges ideas, methods and objectives from different academic fields. The main goal is to cross the boundaries separating different fields in order to provide a more fulfilling and wholesome cognition of the world. Here we could also analyze multidisciplinarity, which is another commonly used term. But multidisciplinary research merely entails posing multifaceted questions and in the end remains within the limits of one's field. In the case of interdisciplinary research, the research questions and objectives of a different field are adapted to one's own field; thus, interdisciplinarity entails an approach which has the potential to create new disciplines. (*See illustration 2*)

Yet when analyzing cooperation between scientists and artists, a critical question arises concerning their seemingly incompatible working methods. Traditionally, there is a common understanding that scientists study objects and artists study subjects; the first take a rational approach to research issues and the latter embrace the irrational. So how can we even presume that these kinds of cooperation can be based on equal cooperation and mutual understanding? The two specialities speak different languages and have completely divergent objectives, with the clear boundaries of scientific research in opposition to the ambiguity of artists. But in reality, the perception of divergent objectives is outdated and the merging of different approaches and research methods brings us closer to presenting and solving the questions that are important today. In seeking common ground in the practical activities of artists and scientists, we can say that their activities are in several respects similar. Taking a step back from the comparison of disciplinary work methods to the "roots", we see that both are engaged with posing questions and investigating subjects; they have ideas, theories and hypotheses which are painstakingly researched and developed, whether in the science lab or in the art studio. When the initial questions are presented or solutions are sought, it is not necessarily important whether the aim of the questions is rational or irrational in nature. "What is the universe made of? How did it start? – thus begins the welcoming message following the title on the website of the European Organization for Nuclear Research, CERN.[2]

With regard to interdisciplinary dialogue and productive cooperation, I have come to understand through my interviews and conversations with scientists and artists that the need to speak each other's language is mutual, although professionally and organizationally it is difficult to evaluate these from a particular discipline's perspective. This means that the problem is not in different work methods and ideas, but in assessment criteria which are subjective and do not consider significant broader contexts – viewpoints inherently lean to one side or another.[3]
It is this deeper understanding that I will attempt to move toward in the following discussion. My goal is to investigate how interdisciplinary cooperation can be approached as something greater than merely an amalgamation of disciplines and to show that it is possible to take a step forward from formal cooperation. Merging art and science allows us to find very specific areas which do not fit into the usual boundaries of scientific research or the artist's practice-based research. Hence, I will move to the next term concerning cooperation between disciplines, namely transdisciplinarity.

Transdisciplinarity – the creation of knowledge which crosses over boundaries

Aside from the abundance of ways of thinking and possible solutions, there is also the important fact that scientific and cultural creativity can incorporate many intuitive "non-scientific" ideas and hitherto unincorporated societal groups. The concept of transdisciplinarity was first introduced by Swiss philosopher and psychologist Jean Piaget (1896-1980) in 1970. It was the idea of research as an all-encompassing system allowing for new directions and unprecedented discoveries, supposedly yielding the "science of science". Whereas the scientists and thinkers were not yet prepared to accept the basic nature of transdisciplinarity: in addition to the words *across* and *between* we are today more likely to use *beyond*, because the space between and across disciplines is full of information which should not go unnoticed.

Transdisciplinarity is a concept which according to the postmodern interpretation should mean limitless cooperation – that is, the unprecedented blending of disciplines, a situation where it is no longer possible to delineate the boundaries between different scientific and creative fields, where it is possible to pursue issues which are outside the limits of particular research areas. (*See figure 1, p. 28*)

American philosopher and religious studies professor Robert Frodeman, who has thoroughly researched interdisciplinarity, finds that transdisciplinarity is a component of the possible interdisciplinary forms of cooperation, equal to cross-, multi-, post- and anti-disciplinarity.[4] (*See figure 2, p.28*)

My goal in this article is to show that it is not possible to take a form-based approach to transdisciplinarity (*Figure 1*) or as one specific part of interdisciplinarity (*Figure 2, p. 28*).

The modern creative practice shows that transdisciplinary research is not about intermixing disciplinary boundaries, unprecedented freedom of thought or total rejection of traditional research methods, but rather about reciprocally complementing different fields by clarifying and approaching issues that cross disciplinary boundaries. Transdisciplinary cooperation is a more a radical activity than interdisciplinary cooperation, yet it is not the opposite of interdisciplinarity or disciplinarity, nor is it a component of these. It is rather an improvement to previous approaches; the next stage of development and deeper immersion into content. In its historical development, the concept of transdisciplinarity is tied to the emergence of biology and bioinformatics, and hence the concept is addressed in many new media and bio-art projects; transdisciplinarity is increasingly the theme of conferences in these fields. This preliminary knowledge would seem to establish clear boundaries for the concept.

I would emphasize, however, that transdisciplinary cooperation does not entail the particular phenomena of new media or bio-art; it is best to consider phenomena of the hybrid arts, which consist of far more fields than merely biology and art.[5]

Romanian physicist and philosopher Basarab Nicolescu (1942) conceptualized cross-border research in 1985, finding that the time was ripe to discuss the reunification of environmental and humanitarian sciences as a single whole. Nicolescu writes:

Modern science was born through a violent break with the ancient vision of the world. It was founded on the idea – surprising and revolutionary for that era – of a total separation between the knowing subject and Reality, which was assumed to be completely independent from the subject who observed it. This break allowed science to develop independently of theology, philosophy and culture. It was a positive act of freedom. But today, the extreme consequences of this break, incarnated by the ideology of scientism, become a potential danger of self-destruction of our species.[6]

Nicolescu states clearly that the previously developed ideology of science will lead us in the direction of self-destruction. Therefore, transdisciplinary cooperation should be understood as a new, previously unconceptualized level, where the goal is not only to learn from each other but also to form a deeper understanding of the close relationship between object and subject. It is essential to take into account that the real world does not consist merely of dichotomies and does not conform to black-or-white simplicity – understanding reality is complicated and requires the consideration of many different aspects.

On crossing boundaries

In the following discussion, I will attempt to explain what transdisciplinary cooperation means in the substantive sense.
American media theoretician, essayist and interdisciplinary thinker Alan Shapiro emphasizes in his interview that today's transdisciplinarity, although naturally transcending limits, is more conscious of these limits than one might think.[7] The question comes in categories: are we dealing with a form or substance-based approach of cooperation; are we trying to find methods merely to carry out our own work; or are we seeking possibilities for cross-boundary problems and solutions? It is very tempting to speak in a "sophisticated" scientific language, but getting rid of categories and a superficial form-based approach can again lead us to postmodern denial of boundaries and generalization, which is not of much use. (*See figure 3*)

As demonstrated by the previous three schemes I have presented, there are numerous potential approaches. The postmodern approach completely gets rid of the boundaries between disciplines, while Robert Frodeman finds that transdisciplinarity is on the same level as other approaches to understanding the relations between the disciplines. Yet Alan Shapiro emphasizes that the evaluation of cooperation between disciplines must take into account that they all have clearly delineated limits – the key is rather in a deeper understanding of

their substance and the re-evaluation of subject-object relations. Research questions may indeed be situated outside the boundaries of a given discipline, but finding solutions requires that all sides thoroughly learn to understand one another's fields.

How should I, as an artist, take this perspective into account in my creative work and how should I align these values? Horst Hörtner also emphasizes that the key to overcoming boundaries is to go deeper:

With regard to practical development, we can see that an increasing number of cooperative formats between art and science are being developed, because different sides have an interest in one another's fields, but this requires mutual immersion in one another's fields in order to initiate critical discussions on a high academic level.[8]

In the case of transdisciplinary immersion, I take into account Nicolescu's three main methodological postulates:[9]

– there are different levels to understanding reality;
– the classical approach rules out the concept of the "middle", but it is not sufficient in creative research to merely contrast the possible with the impossible;
– the discernment of reality has a complex structure, with each level existing in relation to all other levels.

Foremost, this means open knowledge. And it could also mean a certain previously applicable denial of logical thinking, or its reduced significance. On his own behalf, Nicolescu offers a fourth postulate, which takes into account the logic of the middle which lies outside the bounds of classical logic: The passage from one level of Reality to another is insured by the logic of the included middle; (The axiom of the included middle: There exists third term T ("T" from "third") which is at the same time A and non-A.)

Strange indeed, but our way of thinking, whether scientific or not, is based on a classical logic, which often rules out doubt and counterarguments. We think like this even when finding a logical explanation or solution is impossible. But scientific questions need not necessarily have a "yes" or "no" answer, as there is also the possibility of a middle point. In that sense we can no longer understand the world solely on the grounds of logic. With knowledge, there is always a third, fourth or fifth level of understanding and conceptualization; in other words, knowledge is always open. Evaluating the value of this is a separate matter. In order to ensure that transdisciplinarity does not deteriorate into a dogmatic mess and it is not cast aside as an empty dialogue lacking a methodology, we need to find and understand different values of open knowledge.

In my opinion, hybrid arts is appropriate for transdisciplinary research because the word "hybrid" refers to far more than the limits that have so far been set in the field - artistic forms tied to the hard sciences and technology.

It is a unique creative form, whose questions lie outside the research areas and methods of the disciplines which are applied for researching it and allows all aspects to be considered.

Hybrid art?

In the first artistic example in this article (James Turrell, "Roden Crater", 1970) it can be clearly seen that the monumental work comprises many possible idea arcs. This is a project that deals with a number of different disciplines and methods, which offers the visitor an exceedingly powerful experience. I value "Roden Crater" as a transdisciplinary art project due to its potential to raise hitherto untreated issues that transcend disciplines, and to be based on people's sensory abilities, which can place the experience in contexts that cannot be anticipated beforehand.

But what to make of art that crosses boundaries? According to its current definition, hybrid art is related to fields such as, first and foremost, art, sciences and technology. Most examples of art categorized as hybrid art are indeed of the art-science variety. But the fact that the value regarding these criteria can no longer be defined makes hybrid art a transdisciplinary form of investigation. Experiencing the artwork summons forth new questions, connections and further alternatives undefined by any one specific discipline.
The rise of these new, previously undefined questions and the search for answers to them have also prompted research centres to collaborate more closely with artists. One example is the special artist residency at CERN, which was initiated by the ArsElectronica centre in Austria.[10] The first resident was the German artist Julius von Bismarck in 2012, who says the following in a brief comment on the subject: the reason that he is an artist is the same as for being a scientist – the attempt to understand what the world is, and to study how to contribute in the best manner to understanding the world. He finds that art and theoretical physics have astonishingly much in common and the participation of artists in what is to them an unknown environment is certain to open new doors for art itself.[11]
(*See illustration 3, p. 29: Julius von Bismarck, CERN's artist in residence 2012, Versuch unter Kreisen.*)

This artist's investigation is important in several senses. First of all, in terms of form – an artist residing in a big research centre is certainly an impressive trend of the new era. The fact that research centres find conceptual work (and not just the practical skills) on the part of artists important signals an attempt to consider methods and thought trajectories that are important in the sense of the philosophical interpretation of all of society, and is quite different from the goals of primary or applied art forms of the work going on inside the research centre. Secondly, it also allows the research centre's aims to be understood by those who are quite remote from the research being done in a gigantic system, and for whom the artist's poetic interpretation allows them to understand the fundamental basic principles of how Earth formed. It allows them to create important associations with the entire surrounding living environment.
In an interview, one of the initiators of the CERN residency, the media art pioneer and ArsElectronica Futurelab head Horst Hörtner posited the intriguing idea that CERN is far more than a research project.[12]
He laid out an interesting line of thought: CERN could be seen as the world's biggest peace project! Although the outward appearance is that it deals with "high" science,

it in fact draws on scientists from many countries and is funded from state science programmes. This, he says, is a utopian vision of the future, which scientists from even conflict-prone regions are working toward in solidarity. It brings people closer together and the huge investments – which may not be profitable scientifically – to create an unprecedented situations in the sense of cooperation between nations.

Bio-art pioneers Oron Catts, Ionat Zurr and Guy Ben-Ary also deal with broader questions in their work "Pig Wings". *(See illustration 4, p. 29: Oron Catts, Ionat Zurr and Guy Ben-Ary. Pig Wings. 2000–2002 © The Tissue Culture & Art Project.)*[13]

The importance of the work done by Catts and Zurr in the realm of hybrid art and transdisciplinary cooperation over the years should not be underestimated. The initiators of SymbioticA[14] and BiofiliA[15] cooperation labs and many exciting cooperation projects have done immense work to bring us their exciting ideas about the relations between biology and the fine arts, environmental issues and bioethics. Work has also been done to create practical opportunities and environments in which artists have an extraordinary opportunity to study and learn about biology as a field with great potential in the sense of science and technological advances. "Pig Wings" brings out artists' concern about the direction in which biology is heading, it shows clearly the fact that in the current state of transdisciplinary cooperation, artists hold the reins to launch substantive discussions in society. While calling the idea behind the project absurd, they nevertheless are speaking about the most important thing – potential future threats and related risks that impact us all and which people should be aware of. The most important outcome of the work of these artists is discussion – still getting off the ground – of the extremely rapid development of biotechnologies, as this could be one of the most important future keywords in future.

But how to view these art forms, on which it's hard to pin a name due to their hybrid nature? Should we even try to apply a form-based definition to art, try to classify these forms or provide them with a unitary set of terms? In my exchanges with Hörtner and Catts, both expressed the opinion that it is unwise to try to define today's fine art using definite terminology, as they are indefinable and in flux by their very nature. An artificial search for terms would just add to confusion. Alan Shapiro also stressed that artists' theoretical studies should proceed from ideas, not pigeonholing. He cited the example of anthologies of new media art which traditionally list artworks and projects according to their discipline or in chronological order, and said this was an error. In the case of transdisciplinary and hybrid treatments, he says the point of departure should be the ideas, not categories or chronological sequences.
A new world requires new understandings, and the primary goals are a more perfect understanding of the world and a compassionate, caring position with regard to a person's social environment and surroundings. I find that based on the principle of transdisciplinary research and the need to delve deeper into the areas of research in different disciplines, we have to make ourselves better understood on the basis of certain criteria. I.e., to be proficient in languages spoken by the people with whom

we want to start working together. And artists' ability to make themselves be understood is quite unique – it's the ability to find methods and terms for describing/analyzing new situations, discourses or paradigms. Here, above all artists themselves have to be aware of their new role, enter labs to conduct practical experiments and clearly publicly air their findings. They should also highlight new, exciting "hybrid" ideas, the exact terminology or research methods of which may become evident only in the course of the work.

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[1] Kaevats, Ü., *Scientia est potentia*, Tallinn University of Technology public administration institute, 2008 p. 45

[2] CERN's website: http://home.web.cern.ch/about.
I find that the way the question is asked is quite abstract and irrational, considering the possibility of solving it and based on the opinion that cosmological knowledge cannot be forced into lockstep with one theory or formula.

[3] I refer here to making an assessment not within the work process itself, but on interdisciplinary cooperation in general. I find that if interdisciplinary cooperation is well-functioning, it is important that various criteria and methods supplement each other better, encompassing other surrounding knowledge into the cooperation – knowledge about societal, political, economic and environmental developments.

[4] http://www.csid.unt.edu/research/Oxford-Handbook-of-Interdisciplinarity/index.html

[5] Hybrid art tends to be understood as creative forms that deal with science and technology. I will permit myself to expand the definition a bit to take in transdiciplinary approaches.

[6] http://www.scribd.com/doc/17676820/Basarab-Nicolescu-TRANSDISCIPLINARITY-PAST-PRESENT-AND-FUTURE

[7] Alan N. Shapiro proposed the idea that specialists from different fields should, more than ever before, try to understand each other's work. In dealing with form in analyzing the mutual connections between fine art and science, I proceed from the model that holds that the boundaries of disciplines and research areas remain quite clear. As various parties (i.e. artists and scientists in this context) have a greater need to become involved in each other's studios and labs, they have to engage in thorough research area in terms of the content and methods of the fields to understand each other's instruments and goals more thoroughly. (My interview with Alan Shapiro, recorded on 18 November 2012 in Tallinn).

[8] Horst Hörtner, director of Ars Electronica Futurelab, my interview 10 September 2012.

[9] http://www.scribd.com/doc/17676820/Basarab-Nicolescu-TRANSDISCIPLINARITY-PAST-PRESENT-AND-FUTURE

[10] In starting the study of cooperation between artists and scientists, it emerged that above all artists have been the instigators – people representing the humanities. Still, the initiators of newer cooperation projects have in a number of cases been scientific research centres, i.e. interest in practical cooperation has not been a one-way street. It's said that the CERN residency came about stemming from equal interest in cooperation (CERN and ArsElectronica Futurelab).

[11] The fact that CERN has in cooperation with ArsElectronica created a special residency programme for artists, COLLIDE@CERN, attests to the centre's openness. The goal of the residency programme is sharing innovative ideas and interdisciplinary cooperation. See http://arts.web.cern.ch/collide, http://arts.web.cern.ch/collide/digital-arts-residency

[12] Horst Hörtner, Ars Electronica Futurelab director, my interview 10 September 2012

[13] See also http://tcaproject.org/projects/pig-wings

[14] SymbioticA: http://www.symbiotica.uwa.edu.au/

[15] BiofiliA: *http://biofilia.aalto.fi/en/*

Works used:

Catts, O., Zurr, I., Ben-Ary, G. Pig Wings. 2000–2002. © The Tissue Culture & Art Project. http://tcaproject.org/projects/pig-wings

CERN website: http://home.web.cern.ch/about

CERN resident Julius von Bismarck, comment on cooperation (2012) http://arts.web.cern.ch/news/2012/daring-do-final-event-julius-von-bismarck-cerns-first-artist-residence-25th-september-2012

CERN residency: http://arts.web.cern.ch/collide, http://arts.web.cern.ch/collide/digital-arts-residency

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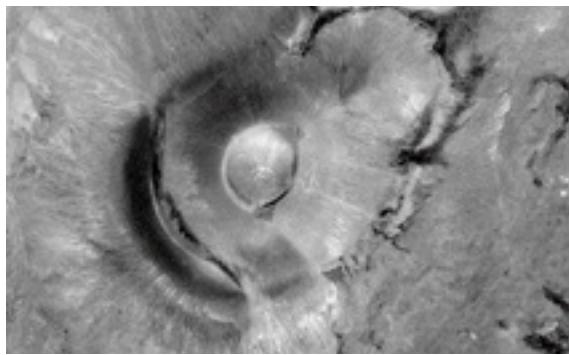
Turrell, J. *Roden Crater* http://rodencrater.com/about

Illustration 1: James Turrell, Roden Crater, 1970–...

Roden Crater is an extinct volcano located in the San Francisco Volcanic Field. About 400,000 years old and 180 metres high, the monumental cone became the basis of American artist James Turrell (born 1943) years-long research. In 1974, Turrell began studying this exciting object, after which, thanks to the project's financers, he succeeded in buying the volcano. He began developing his idea in 1979. Today, a large part of this spectacular installation has been completed, and there are plans to open it to visitors in the coming years.

Roden Crater is one of the most famous works of land art, merging a visual experience important throughout human civilization, with cosmology, geologic time, sensory theories, the "phenomenon of the heavens", and much more. Inspired by various ancient sanctuaries, Turrell began to develop his idea, creating gigantic tunnels in the base of the volcano that connect a network of viewing rooms, allowing visitors of the volcano to experience nature in its fullest, the supreme power of cosmos and the force of the universe. Turrell says it is a project with no end that will last as long as the Earth itself.

The reason I point out this project here is that the roots of modern hybrid arts are deeply entrenched in the land art of the previous century, which emerged from a need to create something new, to step out of the gallery and exhibit ideas which did not fit into the traditional gallery context or a particular genre of art.

See http://rodencrater.com/about,

Turrell, James. Roden Crater http://rodencrater.com/about

Illustration 2: robotic art pioneer Edward Ihnatowicz (1926–1988), The Senster, 1970

Active in 1960–1970, Edward Ihnatowicz (1926–1988) is known in media art history as a "cybernetic sculptor". Transcending the boundaries between his audience and his artwork, the hydraulic robot sculptures, which he first presented in Eindhoven in 1970, were unprecedented in the context of the time, because the interactive movement sensors and the sounds reacting to the public's activity were innovative phenomena. The Senster is also notable for being the first robotic sculpture to be controlled by a computer. Robotic art pioneer Edward Ihnatowicz's work has time and again been approached in the context of being a collaboration
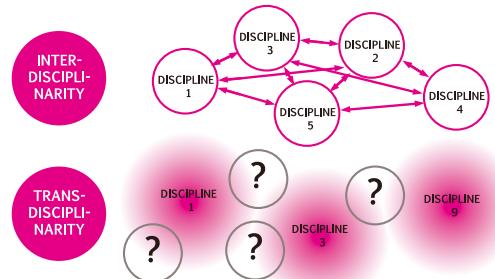
Figure 1: Interdisciplinarity versus Transdisciplinarity – my visual interpretation of the classical postmodern approach

Figure 2: Interdisciplinarity versus Transdisciplinarity by Robert Frodeman (My visual interpretation)
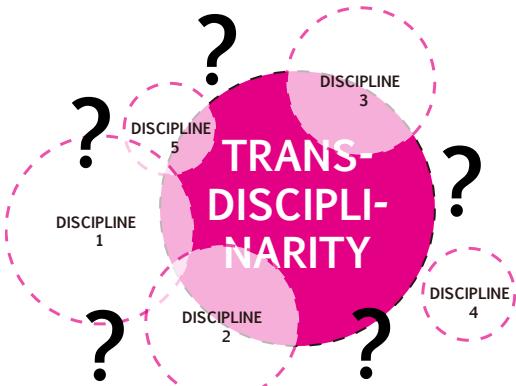
Figure 3. Interdisciplinarity versus Transdisciplinarity by Alan Shapiro (My visual interpretation)

between robotic art and new media art, as well as science and art. His experiments merge a number of important trends, including on the one hand the 1960s artists' optimistic belief in the triumph of science and technology, and on the other hand the development of the avant-garde in the art world. The latter invited artists to broaden their perspectives, to free art from galleries and to glimpse at fields which they had not yet dealt with. In the context this article, the Senster and robotic art are good examples of the emergence of a new field, which in turn significantly influenced modern interactive art.

Image: https://www.pinterest.com/pin/65794844527121812/

During the two months, the first artist in residence, Julius von Bismarck, had an extraordinary opportunity to work in cooperation with theoretical physicist James Wells in creating the kinetic installation "Versuch unter Kreisen" (Experiment among Circles). The installation made of four large disharmoniously swinging lamps is vivid demonstration of how an ostensible disharmony becomes harmony at some point in the course of scientific investigation - a concord that provides the possibility for something "new" to take shape. The circular motion of the lights, not in concert with each other, achieves a level at a certain point in which they are moving in parallel. The artist brings out an interesting idea that the laws of physics have a certain aesthetics that can be conveyed to audiences through art.

http://arts.web.cern.ch/news/2012/daring-do-final-event-julius-von-bismarck-cerns-first-artist-residence-25th-september-2012

Image: http://arts.web.cern.ch/works/versuch-unter-kreisen

Illustration 4: Oron Catts, Ionat Zurr and Guy Ben-Ary. Pig Wings. 2000–2002. © The Tissue Culture & Art Project.
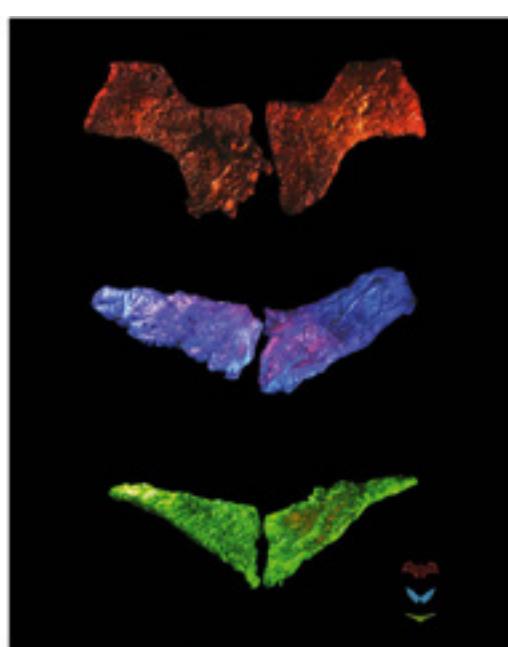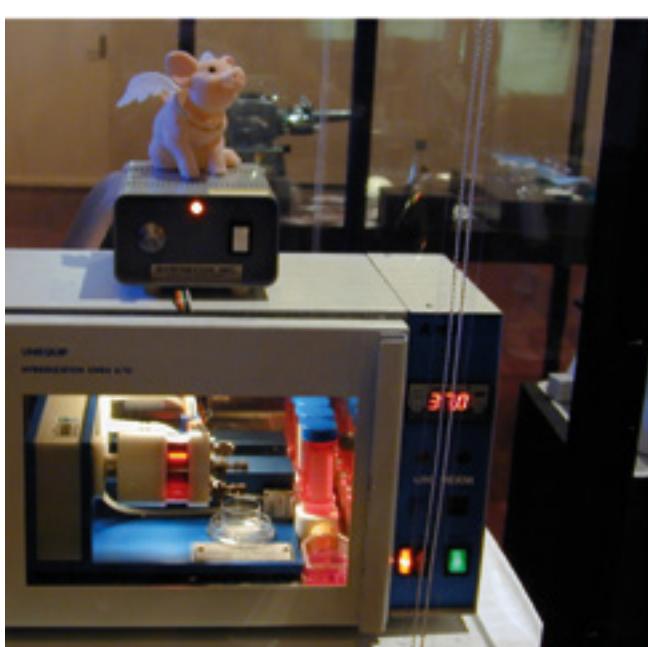
Advances in bio-medical technologies such as tissue engineering, xenotransplantation, and genomics promise to render the living body as a malleable mass. The full effects of these powerful technologies on the body and society have, in most cases, only superficially discussed. The basis for the work is winged bodies (both animal and human) have been used in most cultures and throughout history. They used tissue engineering and stem cell technologies in order to grow pig bone tissue in the shape of these three sets of wings. This absurd work presents some serious ethical questions regarding a near future where semi-living objects (objects which are partly alive and partly constructed) exists and animal organs will be transplanted into human What kind of relationships we will form with such objects? How are we going to treat animals with human DNA? How will we treat humans with animal parts? What will happen when these technologies will be used for purposes other than strictly saving life?

http://tcaproject.org/projects/pig-wings

Images:

http://urbantimes.co/2012/04/interview-with-oron-catts-the-pig-wings/

http://urbantimes.co/2012/02/ethics-of-bioart/gv-art-the-tissue-culture-art-project-pig-wings-print/

INTER- JA TRANSDISTSIPLINAARSUSEST
HÜBRIIDSE KUNSTI VÕTMES

Lühikokkuvõte Piibe Piirma

Nii teaduses kui teistes kultuurivaldkondades püütakse üha enam luua distsipliinidevahelist dialoogi ja diskussiooni, leida uut tüüpi uurimisvorme ja hindamiskriteeriume – see tähendab, et püüeldakse käesoleva maailma kui väga erinevaist aspektidest koosneva terviku laiema mõistmise ja mõtestamise poole.

Mistahes eesliiteid me distsipliinidevahelist koostööd iseloomustavate sõnade ees ei kasuta (inter-, trans-, multi- vms), võime tõdeda, et loome- ja teadussuundade paljusus on oluliselt avardanud meie kultuurikäsitlust. Inter- ja transdistsiplinaarsus on terminid, mida uudsete koostöövormide puhul laialt kasutatakse, kuid siinkohal kerkib küsimus, kuidas neid termineid kunsti võtmes mõista? Kuidas neid hinnata, nii et teaduse ja kunsti töömeetodid oleksid mõistetavad mõlemale poolele, mitte kallutatud kindla distsipliini suunas?

Ajaloolises mõttes toimus filosoofia ja teaduse eraldumine XIX sajandil, kuid selle juured ulatuvad juba XVII sajandisse, mil teaduse ja tehnoloogia arengus toimusid murrangulised muutused maailma objektiivse analüüsi suunas. Neist arenguist tingituna loodi XIX sajandil mitmed teadusinstitutsioonid ja pandi alus teadlase elukutsele. Üksteisest eraldusid erinevad uurimisvaldkonnad, et süveneda oma valdkondlikkesse probleemidesse. Ühelt poolt on selline areng mõistetav, teiselt poolt on see lõhkunud teadusloome olulise tervikpildi,

mida tänapäeval taas kokku püütakse seada.

Interdistsiplinaarsus – valdkondadevahelise ühise teadmise loomine

Interdistsiplinaarsus kui termin pärineb haridusest ja pedagoogikast ning tähistab õpet, milles on ühendatud erinevate akadeemiliste valdkondade ideed, meetodid ja eesmärgid. Traditsiooniliselt levinud arusaama kohaselt on teadus see, mis küsib ratsionaalseid küsimusi ning kunst see, mis küsib irratsionaalseid küsimusi, kuid selline arusaam on aegunud. Vajadus neid valdkondi ühendada on aina ilmsemaks saanud, sest nii teadlaste kui ka kunstnike põhieesmärk on ju sama – maailma ja seeläbi iseenda täiuslikum mõistmine. Otsides kunstniku ja teadlase praktilisest tegevusest ühisjooni, võime öelda, et nende tegevus on mitmes mõttes sarnane. Astudes distsipliinide töömeetodite võrdlusest sammu tagasi „juurte" poole, näeme, et mõlemad tegelevad küsimuste esitamise ja ainese uurimisega, neil on ideed, teooriad ja hüpoteesid, mida uuritakse ja arendatakse nii teaduslaborites kui ka stuudiotes-ateljeedes. Olen teadlaste ja kunstnikega intervjuusid tehes ja vesteldes mõistnud, et vajadus teineteise keelt rääkida on mõlemapoolne, ehkki professionaalselt ja organisatoorselt on neid ühe kindla distsipliini perspektiivist raske hinnata. Vaatenurgad on ikka ühele või teisele poole kallutatud ja koostöö hindamiseks puuduvad objektiivsed kriteeriumid. Kunsti ja teaduse ühendamine lubab leida väga spetsiifilisi teid,

mis ei mahu ei tavapärase teadusliku uurimuse ega ka kunstniku loomingupõhise uurimistöö piiresse. Sestap liigun valdkondadevahelise koostöö käsitlemisel järgmise termini juurde, milleks on transdistsiplinaarsus.

Transdistsiplinaarsus – piirideülese teadmise loomine

Transdistsiplinaarsuse mõiste tõi esmakordselt avalikkuse ette šveitsi filosoof ja psühholoog Jean Piaget aastal 1970. See oli idee uurimisest kui totaalsest süsteemist, mis lubab uusi suundi ja enneolematuid avastusi, millest pidi tulema „teaduste teadus". Seejuures ei olnud teadlased ja mõtlejad veel valmis aktsepteerima transdistsiplinaarsuse põhilist olemust: lisaks sõnadele *across* (ületamine) ja *between* (vahe) kasutatakse tänapäeval transdistsiplinaarsuse puhul sõna *beyond* (üle), sest valdkondade vaheline ja ülene ruum on täis informatsiooni, mida ei tohiks tähelepanuta jätta.

Postmodernistliku tõlgenduse kohaselt tähendab see n-ö piirideta koostööd, valdkondade lahustumist ja piiride ähmastumist. (*Joonis 1, lk. 28.*) Ameerika filosoofia ja religiooniuuringu professor Robert Frodeman, kes on põhjalikult interdistsiplinaarsust uurinud, näitab aga, et transdistsiplinaarsus on osa võimalikest interdistsiplinaarsetest koostöövormidest ja on võrdne rist-, multi-, post- ja antidistsiplinaarsusega. (*Joonis 2, lk. 28.*) Järgnev arutelu, mis põhineb B. Nicolescu ja A. Shapiro mõttekäikudel, näitab, et transdistsiplinaarne koostöö on radikaalsem tegevus kui interdistsiplinaarne koostöö, sealjuures ei ole tegemist interdistsiplinaarsuse või distsiplinaarsuse vastandiga, ega ka osaga sellest. See on pigem eelnevate käsitluste täiendamine, arengu järjekordne ja endisest enam sisusse süüviv etapp.

Piiride ületamisest

Ameerika meediateoreetik, esseist ja interdistsiplinaarne mõtleja Alan Shapiro rõhutab, et tänapäeva transdistsiplinaarsus, mis oma olemuselt on küll piire ületav, tunnetab piire enam, kui arvata võiks. Küsimus on kategooriates: kas tegeleme vormilise või sisulise koostöö käsitlemisega, kas me püüame leida vaid meetodeid omaenese töö läbiviimiseks, või otsime kõiki võimalusi leidmaks piiriüleseid probleeme ja lahendusi.(*Joonis 3, lk. 28.*) Uurimisküsimused võivad küll asetseda väljaspool distsipliinide piire, kuid neile lahenduste leidmiseks tuleb kõigil osapooltel põhjalikult üksteise valdkondi tundma õppida.
Transdistsiplinaarse uurimuse puhul võiks arvesse võtta kolme metodoloogilist postulaati, mida on kirjeldanud rumeenia füüsik ja filosoof Basarab Nicolescu:

– reaalsuse mõistmisel eksisteerivad erinevad tasemed;
– klassikalise käsitluse kohaselt välistatakse „keskmise" mõiste, kuid vaid võimaliku-võimatu vastandamine ei ole loomingulise uurimistöö puhul piisav;
– reaalsustaju on keerulise struktuuriga, mille iga tase eksisteerib seetõttu, et eksisteerivad ka kõik teised tasemed.

Nicolescu lisab oma arutluskäiku neljanda postulaadi, mille kohaselt tuleb arvestada ka klassikalise loogika välist „keskmise-loogikat". Ehkki inimesed on harjunud loogiliselt mõtlema, tuleb arvesse võtta, et teaduslikele küsimustele ei pea ilmtingimata olema „jah/ei" vastuseid, on olemas ka võimalus, mis jääb nende käsitluste

keskele. Teadmise puhul on alati võimalik „kolmas", „neljas" või „viies" mõistmise ja mõtestamise tasand, st teadmine on alati avatud.

Ma leian, et hübriidne kunst on unikaalne loomevorm, mille küsimuseasetus jääb väljaspoole nende distsipliinide uurimisalasid ja meetodeid, mida selle uurimiseks rakendatakse ja võimaldab kõiki aspekte arvesse võtta. See on suund, mida võib transdistsiplinaarse lähenemise puhul välja tuua, sest sõna „hübriidne" viitab kaugelt enamale, kui selle valdkonna puhul senini välja toodud vormilistele piirangutele – reaalteaduste ja tehnoloogiaga seotud kunstivormidele.

Hübriidne kunst?

Kuidas aga siiski mõista kunsti, mis ületab piire? Enamus näiteid, mida hübriidse kunsti mõiste alla paigutatakse, võivad ju vormiliselt tõepoolest olla määratletud kunsti ja reaalteaduste suunaga, kuid asjaolu, et loodav väärtus neis piires enam määratletav ei ole, teeb hübriidsest kunstist transdistsiplinaarse uurimisvormi. Kunstiteose kogemine toob esile aina uusi kindla valdkonna poolt määratlemata küsimusi, seoseid ja edasisi lahendusvõimalusi.

Seni määratlemata uudsete küsimuste tekkimine ja neile vastuste otsimine on ärgitanud ka teaduskeskusi tihedale koostööle kunstnikega. Toon näitena välja kunstnike residentuuri CERNis, mille initsiaatoriks on ArsElectronica keskus. Valdkondadeüleseid küsimusi esitavad ka biokunsti pioneerid Oron Catts, Ionat Zurr ja Guy Ben-Ary oma teoses „Pig Wings". Pool-elusad (*semi-living*) organismid, mida nad loovad ja millest kõnelevad, on biokunsti maailmas ärgitanud väga elavat diskussiooni teaduse eetilisuse ja tulevikuarengute üle. Oron Catts'i ja Ionat Zurr'i eestvõtmisel loodud koostöölaborid SymbioticA (Austraalias) ja BiofiliA (Soomes) on mõeldud nii teadlastele kui ka kunstnikele, nende laborite eesmärgiks on bioloogia ja kujutava kunsti suhete uurimine ja teravate küsimuste esitamine keskkonna ja bioeetika suunal.

Kuidas siiski mõista kunstivorme, millele nende hübriidsuses on keeruline täpset nime anda? Ühelt poolt jääb kõlama praktikute arvamus, et tänapäeva kujutavat kunsti kindlate terminitega määratleda ei ole mõistlik, sest need on oma unikaalsuses määratlematud ja pidevas muutumises. Sellele lisab Alan Shapiro mõtte, et hübriidsete kunstiteoste kategoriseerimise või kronoloogilise järjestamise asemel tuleb lähtuda ideedest. Siiski, püüd end laiemale üldsusele või koostöös osalevatele osapooltele mõistetavaks muuta nõuab teatavate kriteerumide kehtestamist. Selleks peab valdama keelt, mida räägivad need, kellega me soovime koostööd teha ja oskama oma eesmärke sõnastada. Siin on eelkõige kunstnikel endil vaja oma uut rolli teadvustada, astuda praktiliste eksperimentide läbiviimiseks laboreisse ja oma töötulemusi selgesõnaliselt avalikustada. On vaja julgelt esile tuua uued põnevad „hübriidsed" ideed, mille täpsem terminoloogia või uurimismeetodid võivad selguda alles töö käigus.

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Veronika Valk on arhitekt, kes on lõpetanud Eesti Kunstiakadeemia ja õppinud Rhode Islandi disainikoolis USAs. Doktorikraadi kaitses RMIT ülikooli arhitektuuri- ja disainikoolis Melbourne´is (Austraalia) 2013. aastal. Ta on projekteerinud mitmeid era- ja avalikke hooneid, teinud sise- ja maastikuarhitektuuri projekte, võitnud erialastel võistlustel üle 30 preemia ja avaldanud meedias hulgaliselt arhitektuuri- ja urbanismiteemalisi artikleid. Ta töötab arhitektina oma stuudios Zizi&Yoyo ja on Eesti Kunstiakadeemia arhitektuuriteaduskonna teadustöö juht. Aastal 2012 pälvis ta noore arhitekti preemia. Ta on arhitektuuri-, disaini- ja urbanismiveergude toimetaja Eesti kultuurilehtedes Sirp ja Müürileht.

The Rhizopian research – challenge and paradox

Veronika Valk

In short, Rhizopian research is in essence research through hybrid creative practice. As an architect, my background is deeply rooted in "design practice research", yet tackling the aims of this particular event – conference and exhibition "Rhizope" – I realised that there is something extraordinarily specific to the interdisciplinary research through hybrid practice in focus. It could be argued that today's world is a Rhizopian one – a rhizomic topos. The hybrid practices are nurtured by a variety of knowledge and behavioral models where the heuristic – in other words rhizomes – form a multi-dimensional symbiosis. Every artist, designer, architect, engineer, natural scientist or other researcher operates in an individually unique world of interwoven contacts, sources of inspiration, associations, experiences and insights. Why might we need yet another word for "ArtScience"? What could the notion of the "Rhizopian" offer, compared to other definitions of "research" in creative fields? How does, for example, the "Rhizopian" differ from what we know as "artistic research" or "design practice research"? I thus decided to focus in this paper on the core of research that matters to those in the hybrid creative fields, often struggling with not fitting into the emergent frameworks of "practice based research."

I start by references to two leading universities in "design research" – Harvard in the US and RMIT in Australia. Thereupon I point out some valuable key elements of "design practice research" that are useful for the "Rhizopian". I also point out a certain misconception about "artistic research", to arrive at the challenge and paradox of the "Rhizopian" endeavour. I use Estonian-English wordplay and introduce a few bizarre-sounding terms that help to unravel the essence of my points. Diagrams and illustrations accompanying the text are not to be "read" as explanatory visuals but rather as thoughts on their own, in their own right to evoke some further associations. I conclude by some suggestions for the "Rhizopian" future.

Applied or embedded?

According to the Harvard Graduate School of Design (GSD), "… in design, unlike many fields, research exists as an extremely loosely defined term with continuously evolving questions, results, and methodologies. Often, this research does not follow accepted mechanisms for scientific research and validation and in many cases the designed object or system is the result and the design process the methodology."[1] To a greater or lesser extent, Harvard GSD represents the "applied research" paradigm, exploring "… the position, relevancy, and sustainability of applied research in design practice and will attempt to address the aspects of research as practice across design disciplines with examples from contemporary practitioners".[2]

In the Southern Hemisphere, RMIT University School of Architecture and Design seeks out practitioners who have developed a body of work that demonstrates mastery of their field. The school invites them to reflect upon the nature of that mastery within a critical frame-

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work and to speculate through design on the nature of their future practice. It is a research program into what "venturous designers" actually do when they design. Technically, these invited "masters" come together to be part of the Practice Research Symposia (PRS) twice a year, to engage in a long weekend of discussions, interrogated within a group of their peers and challenged by critics. By the very definition, the research is embedded in their practice.

To elaborate on the context of the term "venturous designer" then "venturous practice" is a term originally coined by Richard Blythe and has been used to refer to those practitioners who are adventurous enough to want to step beyond current practice boundaries – in other words, those practitioners whose work will change the practice, the discipline and knowledge.[3] The venturous practitioners are often the venturous researchers among us. In that sense, my views about the design practice research align with the RMIT's direction – the "embedded" not "applied" approach – and focus on research through this kind of practice that changes the way we think about our world and the ways in which we practice designing itself.

Artistic research – and what it is not

Artistic research is NOT about bridging art and research. It could prove disastrous for artists trying to understand and present their practice as "research-based". Instead, they might find it a lot more stimulating to realise that their work might be rather about "radical imagination".[4] Let me return to that later. The perspective of artists who are engaged in a PhD in Fine Art within the various academic environments of the art school is entrenched by the academia itself, often conventional enough to mould "art" into the traditional route of the "scientific". It is therefore in my opinion certainly confusing to refer to "artistic research" as "arts-based research", as some wish to define it.[5]

Artistic research should equally NOT be about clear-cut departure from the taxonomical knowledge, even though the latter is losing its significance: " ... the tree of taxonomical knowledge is now being attacked and undermined to the depth of its metaphysical roots by the encroaching forces of speculative realism, ecosophical activism, object-oriented ontology, elementary politics, and post-humanism. All of these forces seem to be putting a halt to an anthropocentric perspective of instrumental restraint while demanding a different way of thinking related to an egalitarian being-in-the-world."[6] Do not throw (any) knowledge out the window – the hybrid practice needs it all, to complement the intuitive and the tacit (knowledge) in it.

Art can be research – or, art practice can perform like research, an artist can behave like a researcher, conducting research. Yet there are certain requirements for this to happen, to which I will return later. Before that, I have to stress that from a pragmatic point of view, "artistic research" still takes place largely outside the academia, rarely reaching the doctoral level. There is a banal reason to it – the title or a degree is, according to common sense, not something that makes anyone a better practitioner. The "credentials" are, today, a luxury for a real artist. This must change for the benefit of the

"research" bit in the term, and there are glimpses of how the current situation might turn into a two-way street of mutual contribution.

Observing what is happening below the doctoral level, some might ask if the MIT program ACT (Art, Culture, Technology) might be one of the alternatives to the "artistic research". Yet this is not the case – first of all, it must be noted that both art as well as technology belong to the realm of culture, thus the distinction between art, culture and technology as separate domains appears awkward and entirely misleading. The mission statement for ACT stresses the advocacy of "art on a civic scale". It might be argued that perhaps all art emerges on a civic scale, regardless of the circumstances, however the MIT vocabulary for the "artistic research" has a strong affiliation with "artistic production", aiming at "advancing the critical and production practices".[7]

Research through hybrid practice

The Rhizopian research is neither "scientific research" nor "artistic research", but ideally both, simultaneously. According to the RMIT's line of thinking, it should allow for public consideration of the nature of the mastery that the practitioner's peers have recognised in his or her work. Even though art, science, design and engineering designate the four underlying mind frames as pillars of our culture, the above (RMIT discourse) can prove a considerable asset when followed in any of the four. However, it is clear that not all extraordinary ingenious art, science, design or engineering is not (yet) recognised by the peers. Therefore, recognition alone is no certificate of actual mastery of anything other than substantial efficiency in communication of someone's research. However, when we leave the recognition aside, what are we left with? Behaviour and performance.

Indeed, these two can be measured to a certain extent by the efficiency of communication. When I asked Orkan Telhan, a Turkish designer who combines the knowledge about biology in his work and teaches at PennDesign, if the scientists understand what he is after in his creative practice, he responded with a challenge:

Sometimes. I try to speak the language of science. I don't believe in the distinction between the different fields. I'm interested in building an organism that is capable of answering the question of "what is the meaning of life." I'm not optimistic about the current interests of science. They are tied too much with corporate or academic agendas, whereas I have more freedom to think about hard problems while being an outsider. Yet I need to know more about Science's current problems to be able to ask even harder questions. If you can ask the hard questions then you can advance your thinking. That's the best way to learn about one's limits. We need to invent new fields, since I don't think that the current distinction between mathematics, physics, medicine etc helps us to find a cure for cancer, or for free energy, or help us look beyond what we have. We need huge paradigm shifts. The neo-liberal system destroyed our imagination. But I think one can train oneself to be imaginative, which takes courage for taking risks and confidence. I'm not a believer in failures, but we must take risks to take big bites.[8]

Research as behaviour

Research as behaviour is the range of actions and "mannerisms" made by all of us – artists, scientists, designers, engineers –, our official institutional (local, national, regional level) or casual social networks, or established entities such as academia in conjunction with their living environment, which includes the other systems or "behavers" around as well as the physical environment. Research as behaviour is the cultural response to various stimuli, whether internal or external, conscious or subconscious, overt or covert, and voluntary or involuntary. There are many ways to discuss the correlation between research behaviour and the cultural-environmental stimuli – here, I will focus on two that in my opinion point to the future.

The first term I use here has an Estonian touch to it, even though it is not (yet) a "real" word in Estonian language.[9] "Synkroom" speaks about the particular shared space for synchronised communication, needed for hybrid initiatives and specialist projects to emerge and to develop. The other term, "many-body" reminds that the research is shared by many or all of us in that space.

synkroom

For example, the work of PLATOON is hybrid.[10] I asked Christoph Frank, one of the founders of PLATOON, what are the benefits of joint hybrid practice in their specific case?

PLATOON is ... is also a hybrid of art, commerce, culture, communication, science and lifestyle. The clear benefit of this is that all these things influence each other. As we collect radical inspirations from all these aspects simultaneously we can produce a "new knowledge" that has the potential for a much stronger creative influence in each field, so that each is inspired by the others.[11]

It is clear that PLATOON is extremely successful in two types of communication – first, within its hybrid community of practitioners, and secondly, in engaging with the interested public. Perhaps I am mistaken, but what might be missing here is the actual profoundly professional discourse that would advance a specific field, drilling into the experimental. Hence I give you another example of an entirely different communication environment – meet Tor Inge Hjemdal, an architect and chief editor of CONDITIONS architecture magazine in Norway. I was curious, why is it so complicated to communicate the issues of architecture and urban design to the broader public? His answer reveals a common paradox:

... we are trying to align to the language of others. For instance, that we try to talk the language of the economist or the engineer and so forth. The problem with this is that we are not really good at it. What we need to do is to be better at communicating our knowledge, communicating what we know. I am not saying that we should become even more introvert and communicate increasingly only amongst ourselves, just with a fellow architect, but that we should find ways to communicate architecture by talking about, and focusing on, architecture.

The question that I posed to Hjemdal is probably relevant for almost any other discipline, just like Hjemdal's answer might be the ubiquitous universal cure. While PLATOON is a "space of synchronisation" between the various hybrid fields of art and science, then

CONDITIONS is a luxurious niche for advancement of a specific discipline – it is about the specific knowledge of venturous practices in a specific field.
Both are needed – PLATOON and CONDITIONS – for the "Rhizopian" to advance, first and foremost because both of them provide us the environment of professional communication: one for the outward hybridisation, the other for the inner diversity of any given discipline.

The paradox here is that we are not able to communicate the complexity of our profession (and the complexity grows in correlation with our increasing knowledge) to the broader public without the actual research – in other words, we must specialise in order to popularise the knowledge, and this is where I see the "Rhizopian" potential. The dual mode of "synkroom" as discussed above is an environmental prerequisite, needed to nurture this potential. Linked to this is another environmental prerequisite – diversity (as in biodiversity) – as elemental condition for a hybrid practice to emerge. I call it the "many-body" context that the current creative practice is situated in.

many-body

The "many-body problem" could in our case be used as a metaphor for local systems (such as neighbourhoods or communities) made of a large number of interacting "particles", in our case people – practitioners, researchers – person is a carrier of research. In such a "quantum" networked system, the exchange of knowledge between the researchers create interdependence. As a consequence, the collective research behaviour increases in complexity as the research community grows in liberal conditions – that is to say is free to expand its knowledge towards infinite degree of variety. That, on the other hand, usually makes exact or analytical forecasts impractical.

Tackling such diversity, one must be careful with generalisations. And the diversity exists already – even though not (yet) necessarily labelled as "research". Quite like "many-body theoretical physics", Rhizopian research can only rely on a set of "approximations" specific to the problem at hand. I asked designer Orkan Telhan (who, by coincidence, has a PhD degree from MIT), to explain his experimental and hybrid approach and I refer to his answer here as he mentioned the term "approximation" in his lecture in Tallinn at the Estonian Academy of Arts Faculty of Architecture guest speaker series in December, 2012. How does he evolve his ideas? What is his method to develop his design concepts?

I design approximations. I have borrowed this term from a well-known synthetic chemical biologist Luigi Luisi who considers most research on artificial life—such as human-made equivalents of DNAs, ribosomes, protocells—as synthetic "approximations" of life. By calling something an approximation one often assumes that it is about mimicking what living things "naturally" do. Biological design is about mimicking the "real" thing – the synthetic cell tries to mimic the real cell and so on. Some branches of science might be focused on replicating nature, but design can be about imagining what lies beyond the natural life if certain realities are suspended or re-interpreted. I think of design as a way of knowing. Design for me is a pathway to knowledge—again not to explain how things are but rather how else they can be considered.[12]

"Designing approximations" as creative behaviour enables the practitioner to delve into the particular knowledge (assembled by the many-body) yet to take a critical stance and to observe the broader picture (the many-body in its entirety, or at least parts of it, up to our capabilities) at the same time.

Research as performance

The word "performance" is often used as output-indicator, thus having to do with kind of "production" or even "productivity". We live in a world of Feasibility Studies. Think of KPI "Key Performance Indicators" and how the concept of measuring the output of a particular process or procedure, then modifying the process or procedure to increase the output, increase efficiency, or increase the effectiveness of the process or procedure is ruling our lives. What is even worse, the concept of "performance improvement" can be applied to either individual performance such as an athlete or organizational performance such as a racing team or a commercial enterprise.

Some might say that indeed, today's culture is highly competitive where almost everything is measured by the rate and efficiency of innovation, digital fabrication and rapid prototyping. What does PLATOON think about the "innovation imperative"? It is as if the whole society is inside a perpetually accelerating wheel of innovation—innovate, show your innovation, innovate again, show again, and so on. How can initiatives such as PLATOON both act as catalysts in this "innovation imperative", and to resist it. The answer was that For PLATOON, the creative process is never about an individual person, artist or innovator:

Innovations are always created by a group of people simultaneously and often worldwide. Therefore, this kind of "innovation imperative" does not influence our work. Since we are inspired by a huge and ever changing creative network, the movement and process of development itself is allowed and even expected to change. … PLATOON is a network, a platform and a catalyst of these movements. It is not only about presenting something to an audience. It is also about bringing people together to develop certain creations and about finding ways to make these creations relevant for the audience, via either communication, branding-projects or simple realisation.[13]

In other words, this kind of research through hybrid creative practice, by its very nature, might have very little (or even nothing in particular) in common with racing or ever-increasing economic turnover. The performance of Rhizopian research is probably about something entirely different. To better understand it, we can look at what are the environments that enable, support and guide such research performance. I hereby suggest two conditions which are complementary to one another but can equally be regarded autonomously. The two terms I use here, substraat and mutoskoop, have – again – an Estonian touch to them, even though the second one is not (yet) a "real" word in the Estonian language.[14]

substraat

The key to my own architecture practice, its "substrate", is adherence to versatility – one might say it is the opposite of specialisation. Yet versatility here is not meant to replace the knowledge embedded in specialist skills,

but to understand the mechanisms that practice has developed over time, and to understand what we can then use these mechanisms for. Versatility, not understood as a position, but as an approach – is for me the multimodal substrate of the practice itself, its underlying character and at the same time its natural environment, thus the generator of design process.

Observing my own design practice – a multimodal field of action in designing, curating and communicating (journalistic activities) – I started to wonder whether such features might also be common to the "substrate" of some of my fellow practitioners. If this "substrate" is the same as the "identity" of a practice, is there perhaps more to it? Indeed, the "substrate" encompasses the actual mechanics, the metabolism, the behavioural patterns as well as the performative output of the practice. For instance, in an interview with Microclimax architects Carolyn Wittendal and Benjamin Jacquemet, they explained:

The architect, due to responsibilities towards the community, has to synthesise a variety of multiple data: the commission brief or program, the physical, social, legal, economical etc contexts, the political will, the individual and collective needs, the technological environment, the philosophical or creative intentions and so forth. The subjective creation operates in this synthesis, and that is why there is enormous potential for new knowledge to develop in the profession.[xv]

I believe that the same is valid for any hybrid creative practice. Concentrating on the design practice, here are some further articulations on the performative aspects of a versatile hybrid practice:

The urban regeneration needs incorporation of multiplicity of skills and variety of knowledge, as well as the coordination of the symbiosis of this knowledge during the implementation of the project. Architects tend to know a little bit, yet sufficiently enough, about everything – they know who to contact and which skills to outsource for the project's success. In that sense, architects are good project managers, to conduct environmental investments. We are trained for this, trained to think and act in such a way.[16]

In Finnish architect Kivi Sotamaa's words: "Collaboration requires coordination, a band conducting, and architects – by their very nature – manage such conducting very well."[17] The substrate of the practice is, nevertheless, also itself in constant (r)evolution. Just like the environment around it. And this brings us to "mutoskoop". The historic Mutoscope was originally an early motion picture device, patented by Herman Casler on November 21, 1894. It worked on the same principle as the "flip book": here I use the term "mutoskoop" to designate the multiplicity of scopes – as if pages in a flip book which do not necessarily make sense alone as single pages but collectively – within which the hybrid practice operates.

mutoskoop

While both designers and artists as well as scientists and engineers are able to benefit from hybrid practice by diversifying the substrate of the practice itself – "by multiplying interdisciplinarity in projects, and integrating it in the assignment"[18] – then how to deal with the

complexity of publicness? The feedback from the public, the response from the environment can often be shocking to the author – the probability of a shock increases with the degree of venturousness. Fabio Gramazio once explained about a project on Christmas decorations:

... the project had a social effect that we couldn't control any more (although it was essentially not about controlling it). Traditional architecture would never have been able to provoke such heated reactions.

How to distinguish beneficial stimuli in the "mutoskoop" around us? Above its unlimited range of elements, it might be that the "scope of change" is by far the most valuable for the hybrid creative practice:

The context is also "a moment", it is a living element, always in transformation. Evolution of the modes of life, innovation of the material, tools, mutation of the environment – all these constitute the many factors that make architecture an ever evolving practice, transforming itself to adapt every situation.[19]

The element of time is seen by some practitioners as something beneficial:

... all good architecture reflects its time in some ways. ... if you use good materials, a building can just become more beautiful with time. ... Architecture has great potential to activate a place.[20]

On a more playful note, when asked about confronting the complexity of publicness, Multiplicity architects Sioux Clark and Tim O'Sullivan responded: "We know that life is serious and architecture is serious but we like that there'd be also a bit of humour. We enjoy laughing, we enjoy life. And that has a natural effect on our architecture."[21] To be honest, our entanglement with "mutoskoop" is often a funny one, in the best sense of the word. Just like Clark and O'Sullivan value joy, Jenny Sabin points to another observation:

In biology, adaptation is the key. Biology presents interesting models for us to consider in architecture. Yet those biological systems are not necessarily always efficient in their adaptation. They're not always going down the most efficient route. And maybe there's something to that.[22]

The Rhizopian future

Altogether, I am arguing that research through hybrid creative practice gains momentum when it is built on versatile profile and multi-modal substrate, discovering the joyful, while attending the microclimate. The Rhizopian research can be disruptive or take a form of a political intervention or even provocation, but it should never fail to face publicness. The key is how – the way in which – we face it. For instance, Oron Catts – an artist who uses biology in his work – has, over and over again, articulated his concerns over the predominant engineering mindset in how we regard "progress":

If we allow the engineers to take over, then the human future is actually in quite a big trouble. The engineering logic is single-minded and narrow, dealing with control. To look at a cell, for example, as a set of simple biochemical reactions, is dangerous. The ambition to engineer and control matter using nanotechnology – the more we talk

to nanotechnologists then we understand that this is not really the case – is dangerous. What's going on in the heads of synthetic biologists goes in a similar direction yet they've started to use a much more careful language, aware of how complex biology is. I'm talking about the language of control. The scariest is what we are starting to hear from neuroengineering, as there's more and more rhetoric about controlling our thoughts, our minds, how someone thinks. For you, coming from a background of a very totalitarian regime, it is easy to imagine how seductive it might be for the leaders and politicians to control how people operate ... For example, it's ridiculous how in Israel they are doing research on implementing ways to immunise soldiers from post-traumatic disorder. They're aiming to use systems of biofeedback and neurofeedback to teach the soldiers how to turn off areas of the brain that might be damaged once they've been to the battle. In essence, they're turning people into psychopaths. Because by shutting down the biological mechanisms of the brain which tell us that what we do is wrong and dangerous then those people might not have a trauma afterwards but they'll be turned into psychopaths. It's the type of engineering logic that's creeping into ways how the society functions. Quite a lot of my work is about saying that the hype around the technology is not what we've been told, that it's not valid to de-contextualise life. As artists it's our role to point out where things are going wrong. I believe in the uselessness of art – art is provocative, forcing people outside of their comfort zone. Art shouldn't be didactic, it shouldn't be involved in warfare and those kinds of things. Art should be subversive and operate in a different way.[23]

When asked, that perhaps evolution comes through conflict rather than consensus, Catts responded:

According to Lynn Margulis, the biggest leaps in evolution are about joining the forces, about collaboration rather than conflict. It doesn't fit the capitalist thinking, the power play of market forces.[24]

One way of taking this statement further through the Rhizopian research is to cultivate imagination about the alternatives to capitalism and the neo-liberal system. I mentioned earlier that the artistic research might prove extremely valuable when we think about it as cultivating "radical imagination".[25] The long-serving director of Copenhagen Institute of Futures Studies, Johan Peter Paludan, said in the introduction to his lecture: "The future: megatrends, paradigms and wildcards" in Tallinn that the future does not exist – it is hence hard to "study", yet that we must, however, try because decisions have to be made in the present but work in the future. In the discussion with Toomas Tammis, the current dean of architecture and Jüri Soolep, the former dean of architecture at the Estonian Academy of Arts, Paludan noted:

Capitalism cannot be left alone. One of the basic reasons for the crises is that capitalism is in deep shit, as it should be. If you take the current condition seriously, the precondition for efficiency is competition. Capitalism has not had any kind of competition for the last twenty years when socialism died. Competition went out and capitalism was the sole survivor, even though some might say that socialism isn't dead but sick. Yet before that, there was at least an idea of an alternative system – a postulate of an alternative way. This has gone.[26]

In that sense, one hope for the Rhizopian research is that it investigates the future possibilities and potential of certain parallel societal systems which are able to offer the current prevailing (capitalist) system serious competition. The institutes of futures studies are, in fact, supposed to study such potential alternatives for the future. However, what we see happening to a large extent – and the Copenhagen institute might be an exception, confirming the rule – that these future studies are largely based on the current economic, social etc data. Yet relying on the existing statistics in order to forecast the future might prove extremely shortsighted.

If the whole of human cognition is based upon imagination – that is, nothing that is perceived is purely observation but all is a morph between sense and imagination – then the future of mankind largely depends on our imaginative capabilities. We tend not to be able to build or create what we cannot imagine, except when we experiment and are open-minded and curious to observe, to explore and study the results of such ventures. Our imagination is expanded by the experimental, venturous practice. Altogether, the Rhizopian research holds the promise to expand our imagination through hybrid venturous practice – potent in cultivating the (radical) imagination.

[1] http://www.gsd.harvard.edu/#/events/convergence-research-as-practice.html

[2] *Ibid.*

[3] Blythe, R. 2011, 'Glide: design, indeterminacy and the specificity of the contingent', *Journal of Artistic Research* [Online]. Available at: http://www.researchcatalogue.net/view/?weave=1077. See 0:02:11. 'Venturous practice' builds on 'venturous Australia', a phrase coined by Terry Cutler in 2008.

[4] Gothenburg Biennial "Play! Recapturing the Radical Imagination" in November, 2013.

[5] The Academy of Fine Arts Vienna conference "Not Now! Now!" in October, 2013 introduction.

[6] Introduction to the symposium "A Counter Order of Things" by the Finnish Academy of Fine Arts/University of the Arts Helsinki in Venice, in October 2013, www.artresearch.eu.

[7] http://act.mit.edu/about-act/research/

[8] Interview with Orkan Telhan by Veronika Valk.

[9] 'Synkroom' is a combination of 'sünkroon' or 'synchronous' and 'room' – a space. In other words, it designates a space for synchronisation.

[10] PLATOON is a formation where creatives of different areas and from all around the globe can form interactive squads for working on projects together, sharing insights and ideas, and presenting themselves and their projects to a community of likeminded. It is a network of hand-picked professionals that also has an artist in residency program, called 'artist lab'. www.platoon.org.

[11] Interview with Christoph Frank by Veronika Valk.

[12] Interview with Orkan Telhan by Veronika Valk.

[13] Interview with PLATOON founder Christoph Frank by Veronika Valk.

[14] 'Substraat' would be translated into English as 'substrate', and 'mutoskoop' as 'mutoscope'.

[15] Interview with Microclimax architects Carolyn Wittendal and Benjamin Jacquemet by Veronika Valk.

[16] Interview with 3RW partner and architect Haakon Rasmussen by Veronika Valk.

[17] Interview with Kivi Sotamaa by Veronika Valk.

[18] Interview with Microclimax architects Carolyn Wittendal and Benjamin Jacquemet by Veronika Valk.

[19] *Ibid.*

[20] Interview with Atelier Oslo partner and architect Jonas Norsted by Veronika Valk.

[21] Interview with Multiplicity architects Sioux Clark and Tim O'Sullivan by Veronika Valk.

[22] Interview with Jenny Sabin by Veronika Valk.

[23] Interview with Oron Catts by Veronika Valk.

[24] *Ibid.*

[25] http://www.theguardian.com/commentisfree/cifamerica/2011/sep/25/occupy-wall-street-protest.

[26] Interview with Johan Peter Paludan by Toomas Tammis and Jüri Soolep.

The Light Dome installation by Veronika Valk and Yoko Alender (Zizi&Yoyo), Winy Maas (MVRDV) and Rogier van der Heide (Arup Lighting) had the ambition to experiment with architectural 'light-therapy' in public space. Location: Town Hall square in Tallinn (Estonia). February 2005.
© Video still by Rein Kotov

Montage of the Urban Flora installation for Tallinn's Vanalinnapäevad (Old-Town Days) Festival, by Veronika Valk in collaboration with Kavakava architects. The installation featured a 12m-high steel flower, propelled by wind. The reflective fabric of the flower blossoms was woven from recycled black-market CDs that had been collected during police raids. Location: Town Hall square in Tallinn (Estonia). June 2003.
© Photo by Veronika Valk

Tomás Saraceno, "14 Billions (Working Title)". Taidehalli, Helsinki 2012 © Photo by Veronika Valk

Risoopne uurimus –
väljakutse ja paradoks

Lühikokkuvõte Veronika Valk

Olen hariduselt arhitekt ja enamjaolt tuttav just arhitektuuri puudutava loomingulisel praktikal põhineva uurimusega, kuid risoopne uurimus tähendab minu jaoks midagi laiemat. Risoopne uurimus kujutab endast põhimõtteliselt söakat (*venturous*) hübriidset loovpraktikat. Võib ka väita, et tänane maailm ongi risoopne – risoomne *topos*. Hübriidseid loovad toimimismehhanismid ammutavad nii teadmisi kui käitumisviise erinevatest allikatest, mille osad — tinglikult risoomid — on omavahel mitmemõõtmelises seoses. Igal kunstnikul, disaineril, arhitektil, inseneril, loodusteadlasel või teisel uurijal on oma ainulaadne risoopselt põimuvate kontaktide, inspiratsiooniallikate, seoste, kogemuste ja teadmiste maailm. Nii võib küsida, kuidas erineb risoopne uurimus muust loomingulisel praktikal põhinevast teadustööst? Võtame appi kahe disainiülikooli (Harvard/USA ja RMIT/Austraalia) kogemused. Järgnevalt toon välja disainipraktika teatud võtmeelemendid, samuti kasutan käesolevas artiklis eesti-inglise sõnamängu, eesmärgiga tõstatada küsimusi, mis puudutavad hübriidse praktika teaduspoolt.

Rakenduslik või olemuslik?

Disainis ja arhitektuuris on uurimistöö hüpotees sageli seotud praktiseerija positsiooni määratlemise, uurimistöö (projekti) relevantsuse ja jätkusuutlikkusega rakendusuuringutes. Harvardi disainikool (Harvard GSD) ongi võtnud just rakendusliku suuna. Seevastu RMIT ülikooli arhitektuuri- ja disainikool on keskendunud tegevarhitektidele ja -disaineritele – söakatele praktikutele –, kes oma igapäevase töö käigus teostavad ka uurimistöid. Teisisõnu, RMIT mudelis on arhitektuuri- ja disainivaldkonna teadustöö olemuslikult seotud loojate igapäevapraktikaga. Väljendid nagu söakad disainerid ja söakas praktika pärinevad Richard Blythe'i sulest ja tähistavad eksperimentaalset, uurimuslikku laadi loometööd, millel on enamjaolt ka reaalne väljund. Just RMIT suund teadustöö ja loometöö olemusliku sidususe esiletõstmisel on minu jaoks veenev risoopne tulevikutee.

Kunstiuurimusest – ja sellest, mida see ei ole

Kunstiuurimus pole kindlasti kunsti ja teaduse kui omaette nähtuste üksühele liitmine, samuti pole tegu taksonoomilise teadmise täieliku kõrvalejätmisega – ühtki teadmist, mis meil täna kasutada on, ei tohiks mõtlematult üle parda visata. Kunstiuurimus tekib suures osas väljaspool akadeemilist ringkonda ning põhjus on üsna lihtne: doktorikraad ei tee uurijat paremaks praktikuks ehk paremaks kunstnikuks.

Uurimus läbi hübriidse praktika

Risoopne uurimus pole ainult teaduslik uurimus ega kunstiuurimus, vaid ideaalis mõlemad korraga, paralleelselt. Kultuuriruumis, kus domineerivad kunsti, teaduse, disaini ja inseneria mõttesuunad, võib küsida, kuidas risoopset uurimist tuvastada või mõõta? Käitumise ja toimimise kaudu. Neid saab teatud määral mõõta ka kommunikatsiooni tõhusust vaadates. PennDesignis õppejõuna töötav Türgi disainer Orkan Telhan kasutab oma loomingus biotehnoloogia vahendeid. Küsimusele, kas teadlased saavad aru, mis on nende tegevuse eesmärk, vastab ta, et püüd rääkida teadlastega teaduse keeles, ei vii tegelikult edasi. Teadlased on liiga kinni akadeemilistes distsipliinides, temal on aga kunstniku ja disainerina võimalus mõelda tõeliselt vabalt, piireületavalt. Telhan tõdeb, et vajame paradigmamuutusi, et oma kujutlusvõimet arendada ja julgeda esitada uusi küsimusi.

Uurimus kui käitumisviis

Uurimus kui käitumisviis koosneb reast maneeridest, mis on omased nii kunstnikele, teadlastele, disaineritele kui inseneridele ja mis on mõjutatud institutsionaalsetest, ühiskondlikest ja füüsilise keskkonna teguritest. Toon kahe termini – *sünkroom* ja *many-body* abil välja kaks põhijoont, mis viitavad risoopse uurimuse võimalikule tulevikule.

sünkroom

Platoon kui platvorm ja loominguline kooslus on oma olemuselt hübriidne tegevusvorm, mis kätkeb endas kultuuri laiemalt, sh kunsti, kommertstegevust, teadust, disaini ja elustiili. Christoph Frank ütleb, et selle laiemaks eesmärgiks on uue teadmise loomine. Platooni tegevus liidab erinevate valdkondade praktikuid ja haarab ka laiemat publikut.

Platoon on tõhus kommunikeerija, samas on sügavamaid erialaseid probleeme – nt arhitektuuri ja linnaplaneerimise vallas – jätkuvalt keeruline laiemale publikule selgitada.

Ajakirja Conditions peatoimetaja Tor Inge Hjemdali arvates püüame (arhitektuuri)maailma selgitada sageli läbi majandus- ja inseneriteaduse keele, selmet keskenduda omaenese, arhitektide keelele, ja püüda end seeläbi paremini mõistetavaks muuta. Nii on tihti ka teiste valdkondade puhul ja Platoon ning Conditions viitavad siin ühele võimalikule väljapääsule. Platoon suhtleb väljapoole ja loob seeläbi eri valdkondade vahel sidusat uut teadmist, Conditions on erialasisene suhtlusplatvorm, mille abil valdkonnasisest arutelu rikastada.

Paradoks on aga selles, et ühe eriala keerukust polegi võimalik laiemale avalikkusele kommunikeerida, kui sel puudub uurimuslik pool. Et teadmist populariseerida, peab see teadmine põhinema uurimusel ja siin näengi risoopse uurimuse tõelist potentsiaali.

Kui sünkroom tähistab sünkroniseeritud kommunikatsiooniruumi, siis järgnev termin many-body viitab kontekstile, milles tänapäeva loovpraktika aset leiab.

many-body

Väljend *many-body* on kui lokaalse ühiskondliku süsteemi metafoor, mis koosneb tillukestest osakestest, üksikindiviididest, see tähendab inimestest, kes viivad läbi uurimust. Sellises kvantvõrgustikus on uurijad vastastikuses sõltuvuses. Kollektiivne käitumine tõstab uurimistegevuse komplekssust – neoliberaalses maailmas on teadmiste ekspansiivne avardumine ja rikastumine pea lõpmatu. Säärase rikkalikkuse puhul tuleb üldistamisega ettevaatlik olla, ometi ei saa me läbi teatud abstraktsioonita või nagu Telhan nimetab – aproksimatsioonita, ligilähedaste (mõtte)mudelite loomiseta. Telhan võtabki teaduse ja kunsti vallas tegutsemisel oma praktikas appi just aproksimatsioonid.

Uurimus kui sooritus

Soorituse all peetakse enamjaolt silmas millegi väljundit, ka tõhususe indikaatorit. Elame soorituse-keskses maailmas, kus vastav suhtumine kandub üle kõigele, individuaalsest (nt sprotlikust) soorituset kuni kommertsreklaamini välja. Kui tänapäeva ühiskond on innovatsioonirattas ja võistlev, siis nõuab innovatsioon ka katalüsaatoreid. Platooni näidet appi võttes näeme, et olulisimaks faktoriks pole üksikisik, vaid kollektiiv. Platooni-laadse loova võrgustiku sooritus ei väljendu ainult uute ideede, projektide, loomingu esitlemises, vaid publiku kaasamises. Sellisel hübriidsel kollektiivselt looval käitumismudelil pole seega eriti palju ühist võistlusspordi või majanduslikule tulule orienteeritud turumehhanismidega. Risoopne uurimus käitub teistsuguste põhimõtete järgi, mida selgitan järgnevalt terminite substraat ja mutoskoop abil.

substraat

Minu enda arhitektuuripraktika subtsraat on selle mitmekesisus – tegevus arhitektuuri, disaini, kureerimise ja kommunikeerimise kultuuriajakirjanduse valdkondades lubab mul erinevaid kogemusi oma loomingus kasutada. Carolyn Wittendal ja Benjamin Jacquemet (arhitektuuribüroo Microclimax) on mulle intervjuus öelnud, et arhitektidel lasub vastutus ühiskonna ees, seega peavad nad mõistma erinevaid vajadusi ning sünteesima väga mitmetahulisi andmeid – individuaalseid, kollektiivseid, poliitilisi, füüsikalisi, majanduslikke jne. Hübriidses loomingus kohtuvad erialased oskused-teadmised ja arusaamad üldistest vajadustest. Kivi Sotamaa täheldab siin kuraatori või projekti läbiviija rolli olulisust: koostöö vajab koordineerimist ja arhitektid on dirigentidena üsna head.

mutoskoop

Kuidas paremini kompleksse avalikkusega suhelda? Arhitekt Fabio Gramazio kirjeldab ühele konkreetsele Gramazio&Kohler projektile avalikkuselt saadud tagasisidet. Hetk, mil sündmus või teos vaatajani jõuab, vallandab protsessi, millel on potentsiaal avada koht avalikkuse jaoks teatud (uues) kontekstis. Multiplicity arhitektid Sioux Clark ja Tim O'Sullivan märgivad, et rõõm ja huumor mängivad avalikkusega suhtlemisel olulist rolli – nii läheb edastatav sõnum enam korda. Arhitekt Jenny Sabini arvates   on meil kihk bioloogia mudeleid arhitektuuris rakendada nagu näiteks bioloogias oluline kohanemine. Samas pole bioloogilised toimimismudelid alati n-ö tõhusad, mistõttu peaksime ka arhitektuuris olema tõhususele orienteerituse suhtes kriitilised.

Risoopne tulevik

Hübriidsel loovpraktikal põhinev uurimistöö on jõuline siis, kui sel on mitmekesine profiil, kui see põhineb multimodaalsel substraadil ning võtab arvesse konteksti mikrokliimat – poliitilisi, ühiskondlikke ja sotsiaal-majanduslikke aspekte, samal ajal avalikkust unustamata. Oluline on viis, kuidas sõnumit edastame. Bioloogia vahendeid oma loomingus kasutav kunstnik Oron Catts on mures valdavaks muutunud insenerliku ja progressile orienteeritud mõtteviisi pärast. Kontrolliv retoorika ja teaduslike vahenditega läbi viidav ajupesu on ohtlik. Seetõttu on kunsti provokatiivne jõud inimeste nende mugavustsoonist välja toomisel ülitähtis.

Risoopse uurimuse potentsiaal ilmneb tänu selle hübriidsele olemusele nii kunstnike, disainerite, teadlaste kui inseneride kujutlusvõime avardamise kaudu. Kogu inimlik tunnetus põhineb suures osas kujutlusvõimel (taju on segu meeleaistingutest ja kujuteldavast) ja me ei suuda midagi ehitada ilma seda eelnevalt ette kujutamata, kui me just ei eksperimenteeri söakalt ega võta katsetamisel riske. Niisiis on kujutlusvõime arendamine just söakal eksperimentaalsel hübriidsel ja looval – risoopsel – praktikal põhineva uurimistöö pärusmaa.

Basílica i Temple Expiatori de la Sagrada Família. Construction commenced in 1882, architect Antoni Gaudí became involved in 1883. At the time of his death at age 73 in 1926 less than a quarter of the project was complete. Anticipated completion date is 2026, the centenary of Gaudí's death. © Photo by Veronika Valk, 2012

Daphnia magna is a water flea that can be found living among
zooplankton in practically every body of water.
© Lennart Lennuk, 2012

Lennart Lennuk is a marine biologist by profession. In his work as a scientist, he studies the ecology of zooplankton. In addition to work as a scientist, Lennuk has been active in the visual arts and has played in several bands. He is currently in the progressive music ensemble TNVVNÜM. Lennuk works in the Estonian Museum of Natural History as a zoologist and is a doctoral candidate at University of Tartu.

Lennart Lennuk on erialalt merebioloog, teadlasena uurib ta zooplanktoni ehk loomhõljumi ökoloogiat. Lisaks teadustööle on Lennuk juba varasest noorusest tegelenud kujutava kunstiga ning mänginud mitmetes bändides. Hetkel on ta progressiivset muusikat viljeleva ansambli TNVVNÜM liige. Põhikohaga töötab Lennuk Eesti Loodusmuuseumis zooloogina ja on Tartu Ülikooli doktorant.
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On the borderland of art and science – the amazing language of music in nature

Lennart Lennuk

The primary allure of integrating art and science lies in the prospect of raising human sensibility to a new level.[1] I will give various examples to show how art and science have complemented each other by introducing new dimensions or allowing new connections to be discovered. I will mainly focus on the world of sound, where music stems from rhythms, melody and harmony from various sources and creates diverse compositions, some of which may even be inaudible to the human ear. The partnership between science and art has aided the recognition and explication of such compositions.

We are surrounded by things which, if we understand them, can be beneficial to our own survival as well as that of other life forms and objects. Through a better knowledge of the things that surround us, we can make better decisions, respond more appropriately and be in harmony with our environment.

Integrating science and art increases the breadth and the depth of our understanding of our surroundings. Unaided, people see and hear only on certain wavelengths and frequencies. Everything outside that narrow band is silence; we're no more able to interface with it as a radio can pick up radio waves when switched off. At the same time the myriad signals add up to noise – an incredible cacophony of various impulses, as a detuned radio. Thus people describe themselves through a narrow visual and auditory slit, the boundaries we see only thanks to interpretation or transformation. Cooperation between science and art helps us accomplish the latter.

I should note right at the beginning that when I discuss nature and communication via whales, birds, aboriginal peoples, micro-organisms, light and sound, it should be remembered that the reader and I are able to interpret this only through ourselves, through the filter of being a person. But perhaps music is able to dissolve at least part of that filter.

Music – universal language?

Could there be a universal language between species, or are what might seem like melodies a case of misunderstanding? For instance, a woman might stand at her window, listening to birds singing and be inspired by a lovely snippet of melody – but the bird might actually be trying to provoke her using the filthiest language known to birds. That is a comical situation, but there's a grain of truth in it. The discipline known as biosemiotics deals with such problems, the central conundrum being the functioning of a system of signs between different components of nature. Silver Rattassepp has a good explanation of biosemiotics:

Every living creature depends in its perceptions and actions on precisely its own kind, which it uses to connect to its surroundings, and organs used to communicate with what it perceives. Thus it's as if all living creatures are living inside a bubble, consisting of influence and perception signs with which they are capable of connecting: while people use all five senses to perceive and are capable of manipulating their own world skilfully, the deer tick is able to perceive and act only by sensing the lactic acid emitted as a waste product by warm-blooded mammals, dropping on to the animal's back and them looking for a place to feed. The tick's umwelt[2] is made up solely of the influences that prompt it to act. "No animal is able to develop a relationship with a thing as such," writes (Baltic German biologist) Uexküll, "but only with parts of the environment that have significance for it."[3]

What Jakob Johann von Uexküll states applies to humans as well. One of the methodological problems of biosemiotics is precisely the human observer – she is able to interpret everything only through him- or herself and cannot really know what is going on in another creature's mind, something Thomas Nagel describes well in the article "What Is It Like To Be a Bat?":

Our own experience provides the basic material for our imagination, whose range is therefore limited. It will not help to try to imagine that one has webbing on one's arms, which enables one to fly around at dusk and dawn catching insects in one's mouth; that one has very poor vision, and perceives the surrounding world by a system of reflected high-frequency sound signals; and that one spends the day hanging upside down by one's feet in an attic. In so far as I can imagine this (which is not very far), it tells me only what it would be like for me to behave as a bat behaves. But that is not the question. I want to know what it is like for a bat to be a bat.[4]

Thus some biosemioticians look for a universal language that would work between all living things. One universal phenomenon in the animal kingdom is music. It isn't possible to communicate with other living organisms verbally, but music – rhythmic and melodic sounds – are seen in many animal societies and play a significant role. That's the case with whales. The philosopher and musician David Rothenberg has studied their musical world, and found a way to communicate with the animals that is music-based.

One of Rothenberg's best-known attempts to contact nature took place off the coast of Maui. Rothenberg stood in a boat, wearing headphones, listening to the singing of humpback whales, converted to a frequency that can be perceived by the human era). He played the clarinet, in an attempt to start an underwater musical dialogue – the sounds were transmitted through underwater speakers at frequencies the whales can hear.

It's hard to conclude whether he succeeded in communicating with them, but spectrographic analysis of the whale song and clarinet do suggest there was mutual influence.[5] Rothenberg's article notes that humpbacks can learn snippets of melody in a short period and that this plays a role in their sexual behaviour. Subjectively, people clearly identify whales' singing as music. For instance, Dario Martinelli conducted a listening experiment where he let 50 people listen to four audio clips and state whether they felt each one was music. The findings were: 100 % for Mussorgsky's Pictures at an Exhibition, 82 % in the case of humpback whales' song, 76 % for Brian Eno's "The Shutov Assembly" and only 6 % for Pink Floyd's "Alan's Psychedelic Breakfast." 80 % of listeners ranked humpback whales second-most music-like.[6]

Birdsong can also be considered music, and it has been the source of inspiration for many musicians. Among people, musical forms are in daily use. For instance, the Seto people of south-eastern Estonia practice singing as a routine activity, with the words of the songs reflecting the culture of the past days. The practical value of music certainly lives on among shamans who enter a trance state, which they achieve by beating drums. Music therapy has also gained popularity, and has a recognized role in Occidental culture.

Human speech is also melodic. Even if a message is verbally transmitted, the melodic and rhythmic aspects are important. Canadian multi-instrumentalist Charles Spearin demonstrates this on his album *Happiness*

Project. Spearin used musical instruments to imitate the most emotional and meaningful components of human speech. The concept of the record lies in blurring the lines between singing and speaking – intertwining life and art and perhaps also science and art. We ourselves and our everyday language resonates music.

Music in the microscopic world

But music can also be heard on other levels, such as the cellular level. Bio-artist and scientist Joe Davis has helped Western culture get to the micro level in the field of music thanks to his invention of the audiomicroscope. The story has a distant beginning– Ecuador. A medical student doing the research in the deep rainforests meets a local *brujo*, who tells the student that a given species of plant in the mountains sings a different song than the same species of plant in the valley. The student asks: Can one listen to plant cells? He sought out Joe Davis, who came up with the audio microscope.

The audio microscope operates on a simple but faultless principle. All acoustic phenomena are based on mechanical movement within or upon physical objects. These objects may be water, a log, a smith's forge and so on. In what we call "sound", the movement of physical objects takes place at close to audio frequency so that the resulting waves pass through an acoustic medium at audio frequency. When these waves reach the human audible spectrum, the human brain can sense it. We could say that sound is any oscillating signal, but we, humans, define what we hear as sound. In the macroscopic world, analogies to how sound is formed can be found in the rustle of the forest, pattering rain or a howling blizzard.

If we put a living cell under the audio microscope, the light signal emitted from it at a certain frequency is detected by the microscope. Thanks to a special filter, only the light reflecting back from the cell surface is allowed in. The light signal transmits information on the cell's structure, which a detector captures and converts the photon stream into electromagnetic waves which are then transformed into sound through amplifiers.

Thanks to the novel approach, Davis became aware of the sounds of the microscopic world and found that every species has its own sound. Paramecia – unicellular animal – can conjure up an ambient style background, while the trumpet-shaped elementary creature Stentor howls like a gale. As Davis writes, every plant can be assumed to sing one "song" regardless of where it is located. That is, unless the Ecuadorean medicine man knows of some exception that has not been studied with an audio microscope. But perhaps this is not such an important question as how the shaman is able listens to plants in the first place.

Inter-species communication via biophotons

French anthropologist Jeremy Narby has his own theory about the foregoing. His ideas stemmed from the Peruvian rainforest where he had gone to conduct research. Talking to medicine men there, he realized that shamans could become attuned to the cellular level. For instance, in his first book, The Cosmic Serpent: DNA and the Origins of Knowledge, he argues awareness of DNA existed long before it was discovered by Western science. He found many DNA-like structures in the native art of Australia, Tibet, Nepal, Ancient Egypt, Africa and North and South America. One of the bulwarks of his theory is that DNA sends out an extremely weak signal consisting

of biophotons.

It is through these particles, says Narby, that the interaction with other living organisms takes place – we all have DNA and thus radiate biophotons. That is who the Ecuadorean brujo might have heard plants singing – if he was attuned to a level that allowed him to pick up that very weak signal. Ultimately the biophoton stream is nothing more than a form of light that is transmitted in oscillations, much like music.

During my readings, I learned with astonishment that the wavelength at which DNA emits these photons corresponds exactly to the narrow band of visible light. Yet this did not constitute proof that the light emitted by DNA was what shamans saw in their visions. Furthermore, there was a fundamental aspect of this photon emission that I could not grasp. According to the researchers who measured it, its weakness is such that it corresponds "to the intensity of a candle at a distance of about 10 kilometres", but it has "a surprisingly high degree of coherence, as compared to that of technical fields (laser)". How could an ultra-weak signal be highly coherent? How could a distant candle be compared to a "laser"? I came to understand that in a coherent source of light, the quantity of photons emitted may vary, but the emission intervals remain constant. DNA emits photons with such regularity that researchers compare the phenomenon to an "ultra-weak laser".

I could understand that much, but still could not see what it implied for my investigation. I turned to my scientific journalist friend, who explained it immediately: "A coherent source of light, like a laser, gives the sensation of bright colours, a luminescence, and an impression of holographic depth." My friend's explanation provided me with an essential element.[7]

The biophoton theory may be at odds with traditional biology, and that makes the topic an ambitious and risky research area. That doesn't deter the handful of researchers from believing that scientific truths are there to be refined further and even more precise discoveries to be made. When Einstein was asked how to make scientific discoveries, he is reputed to have responded: "Everyone knows that something is impossible; but then someone who doesn't know that comes along and makes the discovery." Fortunately such people are in supply even today. It was thanks to this fact that the first scientific discoveries regarding bio-photons were made.

Here is an example of one animal group within my area of research - swarms of animals a certain freshwater water flea (*Daphnia magna*) is about the size of the grain of rice, and gathers in swarms. This behaviour is a question for many scientists who have studied animal behaviour and was first described 100 years ago. But the mechanism that determines the size and density of a swarm of evolutionary significance is a puzzle to this day. The bio-cybernetic scholar Michael Galle and colleagues showed that the intensity of the light radiated by the animal corresponds to their body size, and this why scientists believe the light determines the density of the swarm.[8]

Bio-photons certainly have their role to play in the social sphere, in making up a group of tiny animals suspended in a cloud that functions as one super-organism. The mechanism whereby these patterns develop in time and space are related to the general laws governing the location and evolution of organisms, pertaining to ecological systems and likely the nature of all matter. In another paper, Galle argues that in addition to coordinated activity among the water fleas, biophotons have been seen to have an organizing effect on human or rat cells.[9]

Besides that, he also believes that the same interaction of biophotons from a distance, where body size is correlated with photons, is a phenomenon seen generally in animal groups. Why couldn't this way of interaction also take place between different species – after all, the DNA has the same structure. Thus it isn't impossible for shamans to be able to receive "messages" from plants if they are attuned on certain levels. All life forms work on the same principle and have DNA. If we go by biophoton theory, the interaction between plants and animals is universal and DNA connects all of life. The agent of our heredity is so flexible that it can work both in a carrot and a person. It is one and the same system – with the same principles, the same DNA, the same biophotons, on the same planet, the same universe.

A common language

Considering life on earth is made up of the same building blocks, it might be possible for science and art to find a common language. We can presume close interconnections; indeed the two areas were closer to each other during Leonardo Da Vinci's time. But today, there is a lack of aesthetics in science. When we hear presentations on ethics, we can note a conflict between science and values, which German philosopher Jürgen Mittelstraß refers to in recalling that in ancient Athens,[10] science and values were symbiotically related, one balancing the other. Today it's common for scientific knowledge and values to diverge and not inter-relate all that much. A rift is and has developed.

Values have not just changed; they have become distorted – primarily due to industrial society with its ego-based attitude and emphasis on material benefits. One of the central theories of modern science – evolution – has been interpreted in too one-sided a manner. Most people understand evolution through the principle of the survival of the fittest. Kalevi Kull, however, brings up Lynn Margulis's endosymbiosis theory, whereby evolution is possible only thanks to co-existence. Back around 1970, he notes:

All biology textbooks attributed divergence in the evolutionary tree to competition. But shortly thereafter a hypothesis was developed that symbiosis was a much better explanation for many phenomena. For example, eukaryotes are all compound organisms made up of cells with other cells living inside of them (symbiosis that started several billion years ago between various bacteria), but symbiosis is not confined to the cellular level, they are also the basis for the self-regulation in the ecosystem and the entire biosphere. There is much similar in the paradigm advanced by biosemiotics and endosymbiosis. Indeed, symbiosis is semiosis. Semiosis is a process of signs on which communication is based. Symbiotic co-existence stems from interaction between organisms. Biological communities are consortiums where organisms that live near one another communicate using signs and spin an ecological web, a very enduring one. Symbiotic relations are the origin of evolutionary innovations, the creation of life.[11]

The primary shortcoming of modern society – too little empathy; too much individualist ambition – can also be boiled down to the same principle. Economists and politicians and in fact all individuals could have much to learn from symbiosis. Pure values must reach people's consciousness and this will take time. Old habits will need to change and new generations replace the older ones. The rapid advances in science and technology are changing people's understandings of nature and life itself. Many of the points where we have gone astray from values are due to the fact that we are no longer in touch with nature. The solution is to restore people's sensibility for nature and understanding of what goes on around them. This is where the symbiosis between art and science comes in. By intertwining each other's benefits, nature can be brought closer to humans again and made more understandable. Music in the broad sense is one way of interpretation and art as well as science can be of assistance in this regard.

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[1] The word sensibility is seen in this essay as an ability to appreciate and apprehend the inner nature of things, not to be confused with the process of learning through the senses.

[2] In the semiotic theories of Jakob von Uexküll and Thomas A. Sebeok, umwelt is a self-centered world of organism, the world as it is experienced by a particular organism.

[3] Rattassepp, S. "Poeetiline loom paiskab lahti akna," (A poetic animal threw open the window) Sirp, September 9, 2011.

[4] Nagel, T. "What is it like to be a bat?" The philosophical review 83, 1974 : 435-450.

[5] Rothenberg, D. "Whale Music: Anatomy of an Interspecies Duet," Leonardo Music Journal 18, 2008 : 47-53.

[6] Martinelli, D. "How Musical Is a Whale? Towards a Theory of Zoomusicology," *Acta Semiotica Fennica XIII*, Approaches to Musical Semiotics 3, 2002 *:* 331.
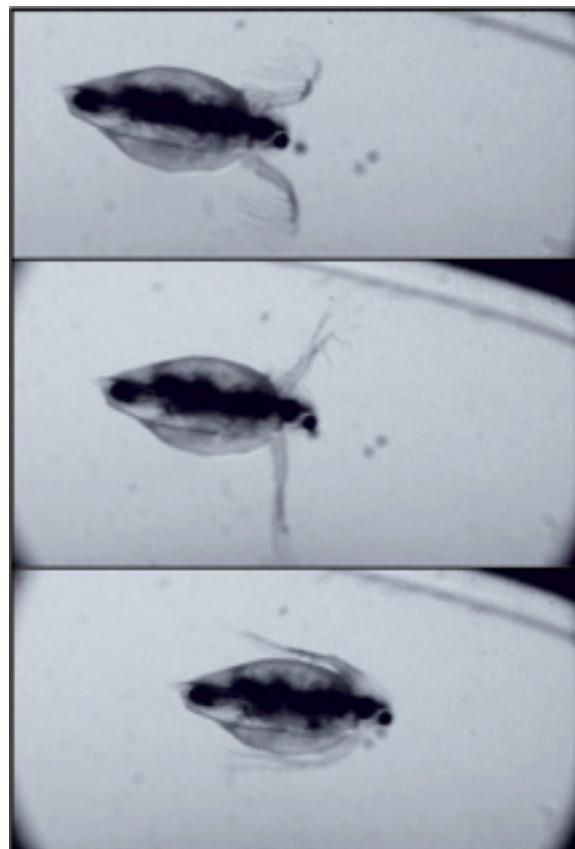
[7] Narby, J. The Cosmic Serpent: DNA and the Origins of Knowledge. New York: Penguin Group, 1999.

[8] Galle, M., Neurohr, R., Altmann, G., Popp, F.-A. , Nagl, W. "Biophoton emission from Daphnia magna: A possible factor in the self-regulation of swarming," Cellular and Molecular Life Sciences 47, 1991 : 457-460.

[9] Galle, M. "Population Density-dependence of Biophoton Emission from Daphnia." In Recent Advances in Biophoton Research and its Applications, ed. Fritz-Albert Popp et al. (Singapore: World Scientific Publishing, 1992), 345-354.

[10] Mittelstraß, J. "Das ethische Maß der Wissenschaft," Rechtshistorisches Journal 7, 1988 : 193-210.

[11] Kull, K. "Sümbioos on meid loonud, mitte võitlus," (We were created by symbiosis, not competition) Sirp, December 1, 2011.

Daphnia magna's movements are so rapid that they can be captured by a camera only in slow-motion camera.
© Lennart Lennuk 2013

Every cell in a living being contains DNA, which radiates biophotons.
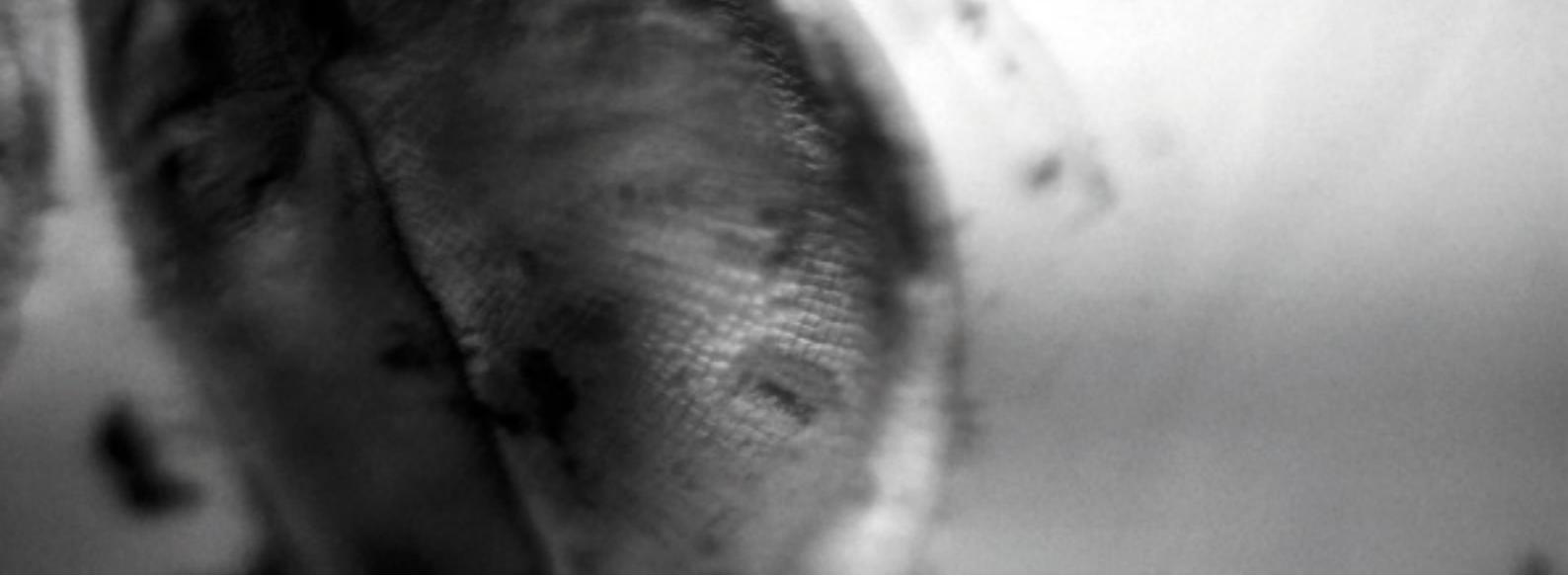*Pictured: cells from a Daphnia magna exoskeleton. © Lennart Lennuk 2013*

Kunsti ja teaduse piirimail –
muusika imeline keel looduses

Lühikokkuvõte Lennart Lennuk

Kunsti ja loodusteaduse sidumise peamiseks võluks pean ma inimese tunnetuslikkuse tõstmist uutele tasanditele. Sõna tunnetuslikkus all mõistan ma käesolevas artiklis asjade seesmise olemuse tabamist, kaemust, intuitsiooni jms, kuid mitte teada saamise protsessi ehk kognitsiooni tähenduses nagu seda on kombeks filosoofias mõista. Käesolevas artiklis vaatan erinevate näidete najal, kuidas on kunst ja loodusteadus teineteist täiendanud uute mõõdete lisamisega või seoste leidmisega. Peamiselt keskendun helide maailmale, kus muusika tekib eri allikatest pärit rütmist, meloodiast ja harmooniast ning loob meie ümber eripalgelisi ja vahest inimesele kuulmatuid kompositsioone. Nende kompositsioonide märkamisele ja lahtiseletamisele on kaasa aidanud loodusteaduste ja kunsti koostöö.

Meie ümber on asju, mille mõistmisest oleks kasu nii meile, inimestele, kui ka teistele elusolenditele ja asjade kestmisele. Ümbritsevat paremini tundes, suudame vastu võtta paremaid otsuseid, reageerida õigesti ning olla keskkonnaga kooskõlas.

Inimene kirjeldab end ümbritsevat vaid teatud nägemis- ja kuulmissagedustel, mille piire tajume ja ületame tänu tõlgendamisele või transformeerimisele. Viimast aitab meil teha loodusteaduse ja kunsti koostöö. Nende sidumine aitab ümbritsevat laiemalt ja sügavuti mõista ning mõtestada.

Muusika – universaalne keel?

Ühe tõlgendamise võimaluse pakub muusika esinemine looduses. Selle uurimisel tekivad mitmed küsimused.

Kas tegemist võib olla universaalse keelega eri liikide vahel või esineb ka meloodilises arusaamises vastuolu? Taolise probleemiga tegeleb biosemiootika - teadusharu, mille keskseks mõistatuseks on märgisüsteemi talitus looduse erinevate osade vahel.

Biosemiootika otsib universaalset keelt, mis töötab üheselt mõistetavana kõigi elusolendite vahelises suhtluses. Üheks universaalseks nähtuseks loomariigis on muusika. Kui ei ole võimalik suhelda teiste elusorganismidega verbaalses keeles, siis muusika oma erinevate rütmiliste ja meloodiliste nüansidega esineb paljude olevuste maailmas ning on seal tähtsal kohal.

Näiteks on muusikalist kontakti teiste loomadega proovinud leida filosoof ja muusik dr. David Rothenberg. Ta on mänginud klarnetit paljude liikide esindajatele, sealhulgas ka küürselgvaaladele, kasutades selleks veealuseid seadeldisi. Seda, kas ta ka tegeliku kontakti on loonud, on raske otsustada, kuid spektrograafilised analüüsid vaalade laulu ja Davidi mängitud klarneti meloodiate kattumise vahel lubavad seda oletada.

Ka inimkõne on meloodiline. Isegi kui sõnum on verbaalselt edastatud, on oluline osa meloodilisel ja rütmilisel poolel. Seda nähtust on andekalt illustreerinud Kanada multiinstrumentalist Charles Spearin oma albumis „The Happiness Project". Spearin on muusikainstrumentidega imiteerinud eelnevalt lindistatud inimese kõne emotsionaalsemaid ja tähendusrikkamaid nähtusi. Plaadi kontseptsioon on rääkimise ja laulmise piiride hägustumises – elu ja kunsti, sealhulgas loodusteaduse ja kunsti läbipõimumises. Muusika kõlab meis enestes ja meie igapäevases keeles.

Muusika mikromaailmas

Muusika võib kõlada ka teistel tasanditel, näiteks rakutasandil. Mikromaailma muusikasse on aidanud läänekultuuril jõuda biokunstnik ja teadlane Joe Davis, kes leiutas audiomikroskoobi. Audiomikroskoop töötab küllaltki lihtsal, kuid laitmatul põhimõttel. Kogu akustiline fenomen tekib mehhaanilisel liikumisel füüsiliste objektide vahel või peal. Heli tekkimisel satub füüsikaliste objektide liikumise sagedus häälsagedusele ning võimaldab lainetel või lainetemustritel liikuda läbi meediumi, mis kannab heli edasi. Kui need häälsageduse lained jäävad inimese kuulamissageduse piiridesse, on inimese aju võimeline seda heli kinni püüdma. Ehk siis võiks öelda, et heli on ükskõik milline võnkuv signaal, kuid heliks defineerime meie, inimesed, seda, mida kõrvadega tajume.

Audiomikroskoop loob ka kõige väiksemast elutasandist, rakust, meile kuuldava heli. Asetades audiomikroskoobi alla elusa raku, peegeldub sellelt teatud sagedusega valgussignaal otse mikroskoopi. Seejuures, tänu spetsiaalsetele filtritele, lastakse sisse ainult raku pinnalt tagasi peegeldunud valgus. Valgussignaal edastab raku struktuuri infot, mille püüab kinni andur ning muudab valgusvoo elektrilaineteks, mis omakorda muudetakse läbi võimendite heliks. Audiomikroskoobi loomiseni jõuti tänu šamaanile, kes jutustas laulvatest taimedest.

Siinkohal jääb küsimus, kuidas šamaan taimede poolt tekitatud heli kuulda võis?

Liikidevaheline suhtlus läbi biofootonite

Prantsuse antropoloogist kirjanikul dr Jeremy Narby'l on eelneva küsimuse kohta oma teooria. Üheks teooria tugipostiks loeb antropoloog asjaolu, et osade teadusuuringute väitel kiirgab DNA ülinõrka signaali, mille voog koosneb biofootonitest.

Just läbi biofootonite, arvab Narby, võibki toimuda suhtlus kõigi elusorganismide vahel, sest me kõik omame DNAd ja seega kiirgame biofootoneid. Just nii võib šamaan kuulda taimede laulu, olles häälestunud tasandile, mis võimaldab ülinõrka signaali kinni püüda. Lõppude lõpuks ei ole ka biofootonite poolt tekitatav voog midagi muud kui signaal, mis kandub edasi võngetena nagu seda teeb muusika.

Toon näite enda uurimisorbiidis olevast loomarühmast – loomhõljumist. Vesikirbuliste hulka kuuluval riisitera suurustel kiivrikel (Daphnia magna) on kombeks koguneda parvedesse. Parves käitumise uurimine on üheks oluliseks teemaks paljude loomade käitumist uurivate teadlaste seas ning sai esmalt kirjeldatud juba sajand tagasi. Kuid evolutsioonilise ja ökoloogilise tähtsusega populatsiooni suuruse ja tiheduse mustrite mehhanism on siiani mõistetamatu. Bioküberneetik dr. Michael Galle tõestas koos teiste teadlastega, et kiivriku poolt kiiratud biofootonite hulk vastab nende kehasuurusele. Seepärast usuvad uurimustes osalenud teadlased, et see kiirgus määrab iseregleerudes parve tiheduse.

Seeläbi on biofootonitel kindlasti oma osa sotsiaalses sfääris, moodustades hõljuvatest pisiloomadest üheselt toimiva super-organismi kärje. Taoliste mustrite tekkimise mehhanism ajas ja ruumis on seotud organismide paiknemise ja evolutsiooni üleüldise reeglistikuga ning puudutab elussüsteemide ja tõenäoliselt ka kogu mateeria olemust. Ühes teises uurimustöös väidab Galle, et lisaks kooskõlastatud tegutsemisele kiivrikute hulgas,

on biofootonite korraldava toime nähte tuvastatud ka inimese või roti rakkude vahel.

Galle usub, et sedamoodi biofootonite kaudu suhtlemine distantsilt, kus kehasuurus korreleerub footonite kiirgusega, on loomagruppide seas üldlevinud fenomen. Ja miks ei võiks selline suhtlusviis toimida ka liikidevaheliselt – tegemist on ju ühe ja sama DNA struktuuriga. Seega pole võimatu, et šamaanid suudavad teatud tasandile häälestudes taimedelt sõnumeid kinni püüda. Kõik elusorganismid toimivad samadel alustel ja sisaldavad DNAd. Kui uskuda biofootonite teooriat, siis toimub suhtlus taimede ja loomade vahel kõikjal ja DNA ühendab kogu elu. Meie pärilikkusaine on nii paindlik, et suudab ühel ajal toimida nii porgandis kui inimeses. See on üks ja seesama süsteem – samade alustega, sama DNAga, samade biofootonitega, samal planeedil, samas universumis.
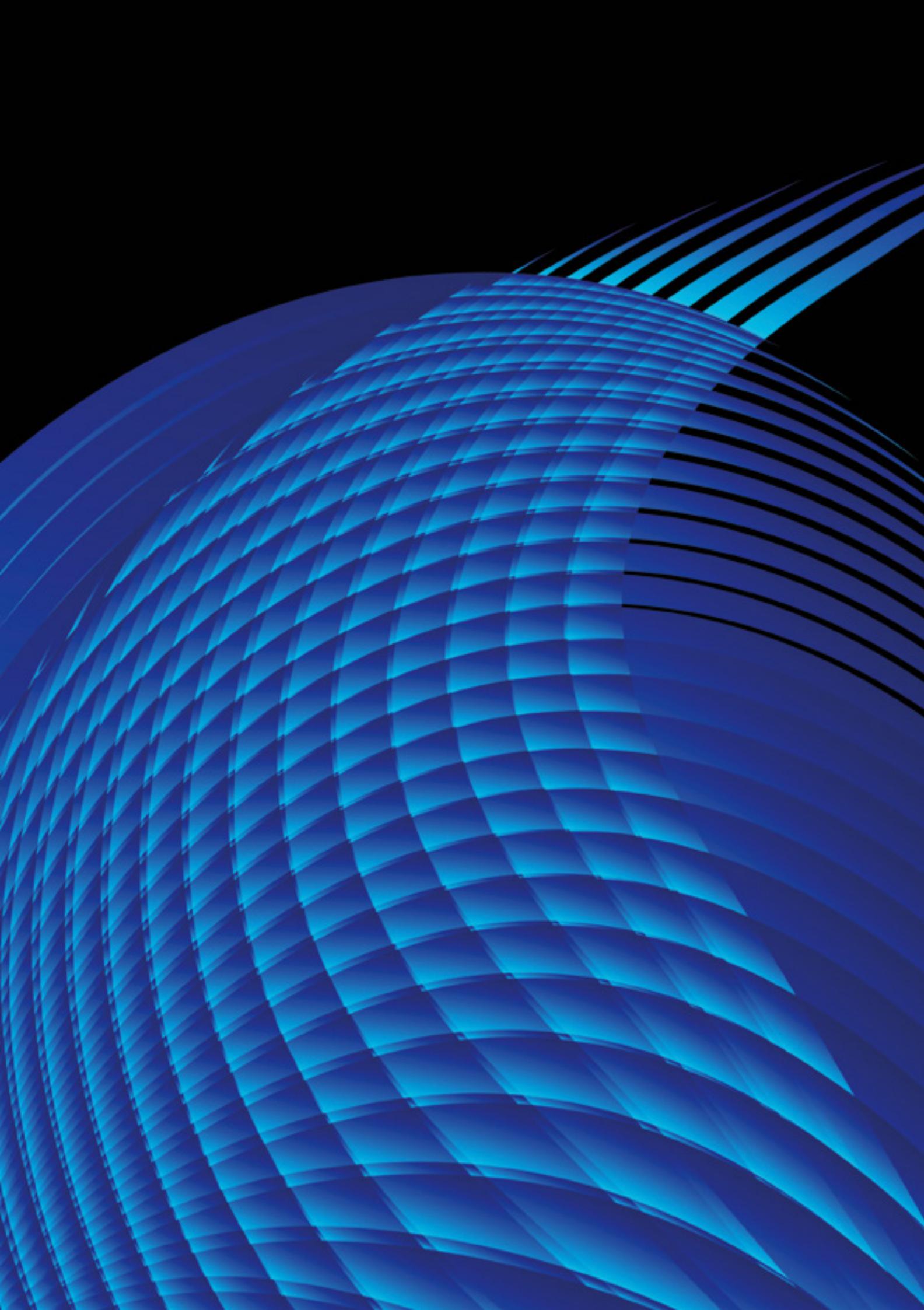
Ühine keel

Kui kogu elu maal koosneb samadest ehituskividest, võiks ka loodusteadus ja kunst leida ühise keele. Usutavasti on nende vahel tihe seos ja ilmselt Leonardo Da Vinci ajal olidki need kaks ala üksteisele tunduvalt lähemal. Tänapäeval aga napib teaduses esteetikast. Ka eetikapõhistes sõnavõttudes kõlab teaduse ja väärtushinnangute konflikt, millele viitab saksa filosoof Jürgen Mittelstraß. Ta tuletab meelde, et Ateena aegadel olid teadus ja väärtushinnangud sümbioosis, kus üks tasakaalustas teist. Tänapäeval on valdav situatsioon, kus teaduslikud teadmised ja väärtushinnangud ükstei-sest lahku kasvavad ega suhestu kuigi palju omavahel. Seetõttu tekib teaduse ja väärtushinnangute vahele lõhe.

Väärtushinnangud ei ole mitte ainult muutunud, vaid ka väärastunud ja seda peamiselt tänu industriaalsele ühiskonnale, kus kehtib egopõhine suhtumine ning ennekõike loeb materiaalne kasu. Siin mängib suurt rolli tänapäeva loodusteaduse ühe keskse teooria, evolutsiooniteooria, liialt ühepalgeline tõlgendus. Nimelt samastab suur osa inimkonnast evolutsiooni tugevam-jääb-ellu suhtumisega. Kalevi Kull pöörab meie tähelepanu aga Lynn Margulise endosümbioosi teooriale, mis näitab, kuidas evolutsioon on olnud võimalik ainult tänu koostoimimisele.

Samale põhimõttele annab taandada ka meie ühiskonna peamise puuduse – vähe on üksteise mõistmist, kuid palju on individualistlikku pürgimist. Majandusteadlastel ja poliitikutel, tegelikult igal indiviidil, oleks sümbioosist palju õppida. Puhtad väärtushinnangud peavad jõudma inimeste teadvusse, aga see võtab aega ning nõuab vanade harjumuste muutmist ja uute põlvkondade peale tulemist. Tormilised arengud teaduses ja tehnoloogias mõjutavad inimese arusaama loodusest ja elust enesest üha rohkem. Paljud nihked väärtushinnangutes on põhjustatud looduskaugest elust. Lahenduseks on tuua inimesed tagasi loodustunnetuse ja end ümbritseva mõistmise juurde. Just siin saabki sekkuda kunsti ja loodusteaduse sümbioos. Üksteise hüvesid põimides suudavad need looduse inimesele taas lähemale tuua ja mõistetavamaks teha. Muusika laiemas mõttes on üks viis tõlgendusteks ja selle tõlgendusviisi laiemale kasutuselele saavad kaasa aidata nii kunst kui loodusteadus.

Illustration entitled "Biophotons" © Lennart Lennuk 2014

CONFERENCE
KONVERENTS

The overarching goal of the conference "Art and Science – Hybrid Art and Interdisciplinary Research" is to discover, examine and analyze new and exciting directions taking place in the research world – activities in which both art and science are components.

The English language makes a clear distinction between science, research and scholarship, but the Estonian word "teadus" can refer to all of these and more. It can also denote all of the other, "softer" fields included under academic research. Preparing for the conference and the Rhizope exhibition was a long and exciting process that started with a "spring academy" held for members of the Graduate School of the Cultural Studies and Arts to map possible directions to be considered in deciding on conceptual approaches. Our aim was also to get doctoral students to collaborate more. The next key event was a two-day autumn symposium held the same year at the Estonian Academy of Arts, during which we continued our work in discussing these issues, with some of the initial conceptual approaches taking on clearer outlines. Among the presenters at the symposium were internationally acclaimed theoreticians and practitioners: Alan N. Shapiro, Marina Gržinić, David Rothenberg, Erich Berger, Benjamin Jacquemet-Boutes, Carolyn Wittendal and Michael Weinstock.

Another very important conceptual approach was tied to the Estonian context. In our country, given its complicated history and period behind the Iron Curtain, artists were always interested in scientific development and what was happening on the other side of the wall. An important milestone was Biotoopia, held in 1995 at the Soros-funded Centre for Contemporary Art, curated by Sirje Helme and Eha Komissarov. This exhibition, which was quite ahead of its time, brought a number of fascinating artists and researchers to Estonia, who all interpreted art-science integration themes in a very groundbreaking manner. This exhibition can be seen as a starting push for our own event.

Still, the present and future interests us as well as the past. The new exciting creative practices, hybrid art forms and interdisciplinary studies are so diverse that it would be complicated to agree on definitions for categorizing them or to find suitable terminology. For one thing, scientific advances and transdisciplinary cooperation develop very rapidly, and hybrid creative forms are so unique that it takes time for the terminology and evaluation criteria to catch up. Some areas that could be highlighted are bio art, robotics, network(ed) culture,

music, architecture, design and urbanistics. Scholars from disciplines such as history. philosophy and social sciences will also present at the conference.
Besides the Estonian Academy of Arts Doctoral School, the academy's Faculty of Architecture also provided organizational support for the conference. This represents very important intramural cooperation, not just in the formal and organizational sense but in terms of the content. In the course of the conference, we will investigate the relationship between the contemporary fine arts and the applied arts.

One very pointed question is about the artist's position in the academic world. How to realize the potential of scientific inquiry based on the creative process and how to overcome traditional barriers that up to now have kept artists away from it? We will hear from artists themselves on this subject on the third day of the conference at a session held at the Estonian Museum of Applied Art and Design.

Questions we will be asking at the conference:

1. What is artscience? How should we see cross-disciplinary and trans-disciplinary phenomena?
2. How does new knowledge come about through hybrid, art-science forms of cooperation? How to expand the dialogue between science and art and how might artists position themselves in this process?
3. How does scientific knowledge spread in society? How to find a scientific *lingua franca* that would meet the cultural expectations of our society?
4. What common practices exist?

I'd like to express special gratitude to our conference keynote speakers Simon Penny and Theodore Spyropoulos and conference co-moderators Veronika Valk and Carl-Dag Lige.
In addition, thanks go out to curator Dmitry Bulatov from Kaliningrad, who will present our conference's film programme at the Estonian Academy of Music and Theatre, "Evolution Haute Couture. Art and Science in the post-biological age" .

Piibe Piirma

Konverentsi „Kunst ja teadus – hübriidne kunst ja interdistsiplinaarne uurimus" põhieesmärgiks on üles leida, vaadelda ja analüüsida uusi põnevaid uurimissuundi, mille üheks osaks on kunst, teiseks aga teadus.

Kui inglisekeelne termin „science" viitab üsna otseselt reaal- ja loodusteadustele, siis eesti keeles on sõnal „teadus" märksa laiem tähendus. Selle termini all võime mõista ka kõiki teisi akadeemilise uurimuse alla kuuluvaid n-ö pehmemaid valdkondi. Meie jaoks on konverentsi ja sellega seotud näituse „Rhizope" ettevalmistamine olnud pikk ja põnev protsess, mille algusjärgus 2012. aasta alguses korraldasime Kultuuriteaduste ja Kunstide doktorikooli (KTKDK) liikmetele kevadkooli kaardistamaks võimalikke suundi, mida oma mõtteliinide paikapanemisel arvestada. Meie sooviks oli ka doktorantide ühise tegevuse arendamine. Järgmine oluline sündmus oli samal aastal toimunud kahepäevane sügissümpoosion Eesti Kunstiakadeemias, kus jätkasime aruteluga, mille käigus mitmed edasised mõtteliinid said selgemad piirid. Esinejaiks olid rahvusvaheliselt tunnustatud teoreetikud ja praktikud Alan N. Shapiro, Marina Gržinić, David Rothenberg, Erich Berger, Benjamin Jacquemet-Boutes, Carolyn Wittendal ja Michael Weinstock.

Teine väga oluline mõtteliin on samuti seotud Eesti kontekstiga. Meie keerulise ajalooga riigis on ka suletud riigipiiride sees tegutsenud kunstnikud alati olnud huvitatud teaduse arengust ja sellest, mis sünnib teisel pool „raudset eesriiet". Üheks oluliseks verstapostiks võime pidada juba vabas Eestis 1995. aastal toimunud Sorose Kaasaaegse Kunsti Keskuse näitust Biotoopia, mille kuraatoriks olid Sirje Helme ja Eha Komissarov. See näitus, mis mõnevõrra oma ajast ees oli, tõi kokku hulga põnevaid kunstnikke ja teadlasi, kes kõik teaduse ja kunsti ühendamise teemasid väga põneval moel interpreteerisid. Seda näitust võib kaudselt lugeda üheks meie sündmuse korraldamise algtõukeks, sest nägime selgelt, et selleteemaline arutelu meil Eestis ei ole sündinud tühjalt kohalt.

Siiski, ajaloo kõrval huvitab meid ka olevik ja tulevik. Uued põnevad loovpraktikad, hübriidsed kunstivormid ja valdkondlikke piire ületavad uurimused on nii mitmekesised, et nende kirjeldamiseks või kategoriseerimiseks piire seada ja sobivaid termineid leida on keeruline. Ühelt poolt on teaduse ja valdkondlikke piire ületava koostöö arengud väga kiired, teisalt on tekkivad hübriidsed loomevormid

sedavõrd unikaalsed, et vastava terminoloogia ja hindamiskriteeriumide tekkimine võtab aega. Kui siiski mõned suunad välja tuua, võiks nimetada biokunsti, robootikat, võrgukultuuri, helikunsti, arhitektuuri, disaini ja urbanistikat. Esinemas on aga ka ajaloo, filosoofia ja sotsiaalteaduste valdkonnast pärit uurijad. Konverentsi korraldamisel on lisaks Eesti Kunstiakadeemia doktorikoolile oma õla alla pannud ka Eesti Kunstiakadeemia Arhitektuuriteaduskond. See on väga oluline ülikoolisisene koostöö mitte üksnes vormiline ja organisatoorses, vaid ka sisulises mõttes. Konverentsi käigus püüame läbi hübriidsete teaduskunsti näidete käsitleda ka kaasaegse kujutava kunsti ja rakenduskunsti valdkondade omavahelist suhet.

Oluline küsimus puudutab ka kunstniku positsiooni akadeemilises maailmas. Kuidas tulevikus paremini hinnata loomingul põhinevat uurimust ja kuidas ületada traditsioonilisi piire, mis kunstnikke sellest seni eemal on hoidnud? Seda püüame läbi kunstnike omavaheliste kõneluste uurida konverentsi kolmandal päeval, Eesti Tarbekunsti- ja Disainimuuseumis toimuval kohtumisel kunstnikega.
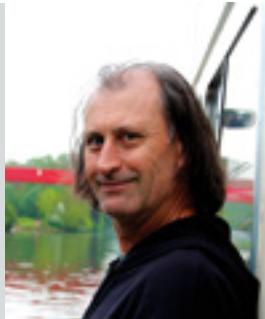
Küsimused, mida konverentsil esitame, on järgmised:

1. Mis on teaduskunst? Kuidas mõista valdkondadevahelisi ja -üleseid nähtusi?
2. Kuidas sünnib teaduse ja kunsti hübriidsete koostöövormide abil uus teadmine? Kuidas avardada teaduse ja kunsti vahelist dialoogi ja kuidas võiksid kunstnikud end selles protsessis positsioneerida?
3. Kuidas levivad ühiskonnas teaduslikud teadmised? Kuidas leida ühist teaduskeelt, mis vastaks ka meie ühiskonna kultuurilistele ootustele?
4. Millised on levinud praktikad?

Konverentsi korraldajate eriline tänu kuulub meie konverentsi peaesinejatele Simon Pennyle ja Theodore Spyropoulosele ning konverentsi kaasmoderaatoritele Veronika Valgule, Toomas Tammisele ja Carl-Dag Ligele!

Suur tänu ka Kaliningradist pärit kuraatorile Dmitry Bulatovile, kes esitab meie konverentsil toimuval videoõhtul Eesti Muusika- ja Teatriakadeemias filmiprogrammi „Evolution Haute Couture. Art and Science in the post-biological age" (vt lk 105–109).

Piibe Piirma

Simon Penny's work addresses critical issues arising at the intersection of culture and technology, informed by traditions of practice in the arts including sculpture, video-art, installation and performance; and by theoretical research in enactive and embodied cognition, neurology, phenomenology, human-computer interaction, ubiquitous computing, robotics, critical theory, cultural and science and technology studies. Informed by these sources, he designs and builds artworks utilising custom sensor and effector technologies, including the autonomous robotic artwork Petit Mal (1995), the machine vision based interactive Fugitive (ZKM 1997); Traces, a 3D machine vision driven CAVE immersive interactive, (Ars Electronica 1999); Fugitive Two (Australian Center for the Moving Image, 2004) and his current project Phatus.

His practice includes artistic practice, technical research, theoretical writing, pedagogy and institution building. He was director of Digital Arts and Culture conference 2009 (DAC09). He curated Machine Culture (arguably the first international survey of interactive art) at SIGGRAPH 93 and edited the associated catalog and anthology. He edited the anthology Critical Issues in Electronic Media (SUNY Press 1995). He is professor of Art at UCI and was architect and founding director of the interdisciplinary graduate program in Arts, Computation and Engineering (ACE). He was Associate Professor of Art and Robotics at Carnegie Mellon University (a joint appointment between the College of Fine Arts and the Robotics Institute) 1993-2001. He was a guest professor in the Interdisciplinary Master in Cognitive Systems and Interactive Media at Universitat Pompeu Fabra, Barcelona 2007-2013 and ran the Synergies workshop on interdisciplinary research at Hangar.org 2013. He was Labex International Professor at Paris8 and ENSAD in spring 2014. He has served on juries, boards and review committees for the National Research Council of the National Academies, the Rockefeller Foundation, Daniel Langlois Foundation for Science and Art, the VIDA Art and Artifical Life Award (Telefonica Foundation), the Banff New Media Institute, the international board of ISEA and other bodies.
Simonpenny.net

Simon Penny tööd iseloomustab kriitiliste küsimuste esitamine, mis puudutab kultuuri ja tehnoloogia kokkupuutepunkte. Skulptuuri, video-, installatsiooni ja *performance*-kunsti valdkondadesse liigituvad teosed on seotud ka põhjaliku tunnetusteooriate, neuroloogia, fenomenoloogia, inimese ja arvuti suhte, andmetöötluse, robootika jpt valdkondade uurimisega. Ta loob sensorsüsteemidel põhinevaid tehnoloogilisi teoseid: robotikunsti valdkonda kuuluv Petit Mal (1995), masinaesteetikast inspireeritud interaktiivne installatsioon Fugitive (ZKM,1997); Traces – 3D interaktiivne keskkond (CAVE - Ars Electronica, 1999); Fugitive Two (Australian Center for the Moving Image, 2004) ja värskeim projekt Phatus.

Simon Penny tegevus hõlmab kunstnikutööd, tehnoloogilisi uurimusi, kirjutamist, pedagoogikat ja institutsionaalseid ettevõtmisi. Ta oli aastal 2009 konverentsi "Digital Arts and Culture conference" (DAC09) juht. Märkimisväärne on, et ta oli juba 1993. aastal SIGGRAPH festivali raames toimunud rahvusvahelise näituse Machine Culture kuraator. Ta koostas antoloogia Critical Issues in Electronic Media (SUNY Press 1995). Ta on California ülikooli (UCI) kunstiprofessor ja interdistsiplinaarse kraadiõppe programmi looja kunsti, arvuti ja inseneeria erialal. Samuti on Simon Penny töötanud kunsti ja robootika professorina aastail 1993–2013 Carnegie Mellon University juures robootikainstituudi ja kunstikolledži koostööprogrammi raames, külalisprofessorina aastail 2007–2013 Hispaanias (Universitat Pompeu Fabra, Barcelona) ja töötubade juhendajana aastal 2013 Kataloonia Visuaalkunsti Assosatsiooni poolt loodud kunsti tootmis- ja teaduskeskuses Angaar (Hangar.org, 2013). Aastal 2014 oli Simon Penny professorina tööl Pariisis (ENSAD – École nationale supérieure des Arts Décoratifs).
Simon Penny on kuulunud mitmetesse rahvus-vahelistesse žüriidesse ja hindamiskomisjonidesse (National Research Council of the National Academies, the Rockefeller Foundation, Daniel Langlois Foundation for Science and Art, the VIDA Art and Artifical Life Award (Telefonica Foundation), the Banff New Media Institute, the international board of ISEA jne.)
Simonpenny.net

Nice in a Variety of Ways:
"Phatus" as a Case Study in Multimodal Interdisciplinary Art and Science Practice

Simon Penny

There are significant differences between art practice and science practice. Scientific research tends to focus on specified phenomena guided by a specific disciplinary methodology. There can be interdisciplinary science, but almost always it is undergirded by shared positivist assumptions and axioms. Art practice, on the other hand, often combines heterogenous motivations, objects and methodologies. Subjectivity and even quirkiness are expected. In science, such qualities are considered negative.

When asked 'why did you choose to pursue this project", I found the answer was surprisingly difficult and complex. Committing to a long research and development project is not a small thing, and one does not want to discover that one's efforts are ultimately trivial. How do you know if the project is "hot"? What are the criteria? Much of this, for me, comes down to experience – it had the right "smell". What do I mean by that? I mean, I suppose, that it met certain quality thresholds in a range of dimensions of the project which are themselves quite orthogonal and incommensurable to each other. These include viability, intellectual interest, theoretical coherence, technical challenge, and an irreverent sense of the absurd.

Dimensions of the project include:
- research in the history of science and technology,
- research in phonology, robotics, biomedical engineering and other fields,
- research in ethnomusicology,
- the deployment of engineering-like technical constraints,
- combining artisanal practice and institutional research methods,
- reflection on humans, prosthetics and machines,
- scientific epistemology,
- performative status of the devices produced,
- the use of humor.

It pleases me that I might spend a substantial amount of skill, effort and time producing a machine that makes farting noises. What pleases me, on a superficial level is that it amuses people. That is simply good. But the perversity of the project is that underlying that absurd and mildly scatological superficial presentation is an inquiry which is deeply serious on a number of levels. I am not unfamiliar with this territory, much of my work has deployed humor quite intentionally as a kind of fly-trap, to draw viewers into a critical consideration.

The question of viability also has an autobiographical aspect. Through the 90s, like many "media artists" I took it upon myself to develop technologies, because what some artists imagined should be possible was often technically impossible. As a result, many artists, including myself, engaged in technical research and development in parallel with their art practice. This was considered normal, but it created a weird new hybrid identity of artists pretending to be software and hardware engineers, but seldom with appropriate training, resources and funding. This can get very tiring. After nearly 20 years of playing this game, I am tired of it. So one of the viability criteria for "Phatus" is that I can do it all myself, and I can combine a wide range of skills accumulated over the years. There is some satisfaction in this.

At this point in my career, I have more or less abandoned identifying myself as an artist in the sense that I find the idea of conducting myself as a stereotypical artist, having exhibitions, etc, rather tedious. Not so much the making, but the culture of the art exhibition. As an undergraduate, I recall the dismay of some of my teachers when I asserted that I had no interest in "producing cultural widgets for the gentry". Even as an undergraduate, (I now think rather naively and presumptuously) I regarded my art practice as 'philosophy by other means'.

The "Phatus" Project

"Phatus" seeks to develop technology which inverts the conventional privileging of semantics over affect in voice synthesis, creating machines which simulate or synthesise vocal affect and partially or completely erase semantic content. The project involves material simulation of the human lungs and vocal tract, employing flesh and muscle-like materials of organic and synthetic origins, with attendant linkages, electro-mechanical components and enclosing structures. Working models of lungs, larynx and vocal tract (throat, mouth and lips) will be built. These will be articulated by embedded microcontrollers driving various electro-mechanical and electro-pneumatic actuators. They will mix hardware and software in unconventional ways, destabilising conventional software/hardware hierarchy. Consistent with most of my work, Phatus is/are crafted artifact(s) which are motivated by specific critical debates and specific historico-cultural moments. The design and making process, the choice of materials and techniques is all constantly informed by the need to voice this critique. They function as a material intervention into relevant discourses. They are performative, they 'behave' their argument rather than simply describe/ declaim, render or represent.

Theoretical Discussion

As computational technologies and the value systems reified within them penetrate across culture, certain shocks are experienced which the makers of the technology trivialize or find incomprehensible. The lack of affect on computer voice synthesis is a case in point. "Phatus" provokes a discussion of such issues by presenting a counter example : a working technology which inverts the conventional priorities.

This project concretises a long concern with techniques of voice synthesis and specifically a critique of the erasure of affect, which is seen as symptomatic of a mode of technical research and development informed by the traditions of technical abstraction and reductivism, and its inherent Cartesianism. The 'analogicity' of this type of research - duplicating or simulating existing biological mechanisms - is counterposed with the drive to abstraction found increasingly in the work of other researchers and which characterized electronic and digital voice synthesis. The drive to abstraction and generality which characterizes the mathematico-symbolic sciences to which Computer Science is heir (and starkly, the discourses of traditional Artificial Intelligence, which still have some power in the popular imagination if not in the academy); are here counterposed with the traditions of sensorial and bodily knowledge normal to many of the traditions of the arts and culture generally, not to mention certain sciences such as ethology and aspects of sociology and anthropology. Similarly, the non-textuality and sensorial immediacy of the research products asserts the validity and difference of an ontology of the performative, or, to use other terms of reference, of techné as opposed to episteme.

The project is emblematic of a radical interdisciplinarity which I have pursued for many years, involving the combination of humanisitic (Science and Technology Studies, Art History and History of Science and Technology), artistic (sculpture, sound, performance) and scientifico-technical practices. Work like this not only seeks a negotiation between humanistic and scientifico-technical discourses, but between representational and performative modes, ie not a simply on an epistemological but an ontological level.

"Phatus" -prelinguistic vocal sound and discursive social space

Research on the "Phatus" project suggests that phatic noises are neurologically and evolutionarily pre-linguistic. The sensori-motor capacity for vocal (spoken) language is distinctly human. The physiological structuring of the muscles of the mouth and face, motor control as well as auditory feedback for speech control are evolutionary latecomers and are related to the development of the enlarged frontal lobes characteristic of *homo sapiens*.

Phatic noises are instigated largely by thoracic muscular convulsion. They are evolutionarily older, primate or mammalian, and are necessarily associated with more ancient neutral pathways. Phatic (vocal) sounds thus occupy a quite different socio-cultural space from linguistic vocal sounds. They are, we might assert, prelinguistic. That does not mean they do not carry meaning, but we might say that 'mean' according to a prelinguistic logic. Note that sounds of pain and pleasure (ie orgasm) are often indistinguishable. Similarly laughing and crying, heard out of context, can be confused. Groaning, moaning, grunting, panting, and sighing likewise mean in rich and subtle ways.

"Phatus2 proposes to emulate these preliguistic sounds by mechanical means. But importantly, when these machines are located in richly discursive socio-cultural spaces (ie museums) the sounds they produce necessarily become part of a linguistic milieu. When a baby cries, it is 'automatic' for the baby – such phatic sound is non-consciously generated. The baby does not contrive to cry, or to cry 'that way'. The cry is motivated by circuits which are unconscious. But when heard, the cry is interpreted (by adults) within and via language. Likewise the phatic sounds of Phatus machines emulate prelinguistic vocal sound but are interpreted within a language-laden cultural environment.

Manifestation

A kind of Artaudian theatre of flabby wheezing machines is envisaged. In response to their environment and the movement of visitors, these devices will grunt and howl and moan and yelp - sounds which may be reminiscent of the charming gurgling of the pre-linguistic infant, the lusty gutterality of lovers, the anguished wailing of the bereaved, and the disquieting hooting of the autistic, the deaf and the insane. The "Phatus" project is an intervention into engineering-computational discourses and digital-cultural discourses, manifested as sculptural-computational artifacts – several electro-pneumatico-mechanical "voice synthesizer machines" which, in opposition to conventional voice synthesis technology, manifest only affect, with no semantic content.

General remarks about interdisciplinary research, and art/science work in particular

My general approach to these matters is summarised up in a series of quotations I have collected over the years:

In order to do interdisciplinary work, it is not enough to take a 'subject' (a theme) and to arrange two or three sciences around it. Interdisciplinary study consists of creating a new object, which belongs to no one.
Roland Barthes, The Rustle of Language

The main point to realise is that all knowledge presents itself within a conceptual framework adapted to account for previous experience and that any such frame may prove too narrow to comprehend new experiences.
Niels Bohr

It is more important to ask the right question than to get the right answer. Anonymous

If we knew what it was we were doing, it would not be called research, would it?
Albert Einstein

To a man with a hammer, everything looks like a nail.
Anonymous

As an AI practitioner already well immersed in the literature, I had incorporated the field's taste for technical formalization so thoroughly into my own cognitive style that I literally could not read the literatures of nontechnical fields at anything beyond a popular level. The problem was not exactly that I could not understand the vocabulary, but that I insisted on trying to read everything as a narration of the workings of a mechanism.
Philip Agre, Lessons Learned in Trying to Reform AI.

Even the most commonplace aspects of thinking in Western culture, as natural as they may seem, are historically contingent. Edwin Hutchins

All the art projects I have worked on have at least one thing in common: from an engineers' point of view, they are ridiculous. Billy Klüver

The difference between theory and practice is greater in practice than in theory. Anonymous

A delicate combination of joy, desperation, and nonchalance is the essence of successful eel handling. Life itself is a succession of eels.
Text of a cartoon by Michael Leunig

© All photos: Simon Penny, 2010-2012

Erinevad võimalused:
Phatus kui üks näide multimodaalse interdistsiplinaarse kunsti ja teaduse praktikas

Simon Penny
Lühikokkuvõte Piibe Piirma

Kunsti ja teaduse praktiseerimise vahel on suur erinevus. Teadusliku uurimuse puhul keskendutakse väga kindlatele nähtustele vastavalt valdkondlikele piiridele ja nende eripäradele. On olemas ka nn interdistsiplinaarne teadus, mis toetub jagatud positivistlikele eeldustele ja aksioomidele. Kunsti loomise seisukohast võime interdistsiplinaarse suhtumise puhul näha väga erinevaid eesmärke, metodoloogiaid ja tulemeid (objekte). Sellises käsitluses on kindel koht ka subjektiivsusel ja kummalistel veidrusel. Teaduses on need omadused taunitavad.

Küsimusele, miks ma soovisin sellist projekti ellu viia, oli üllatavalt keeruline vastust leida. Pikaajaline pühendumine teema uurimisele ja arendamisele on väga suur ettevõtmine ja selle triviaalsus võib paraku selguda alles töö lõpus. Millised kriteeriumid siiski näitavad, et minu tegevusel on mõtet, et see projekt on „kuum"? Ma olen alati lähtunud isiklikust tunnetusest ja kogemusest, n-ö õigest lõhnast. Vahel on intellektuaalne huvi, teoreetiline teadmine ja projekti praktiline rakedatavus omavahel tugevas vastuolus. Sellele lisandub ka lugupidamatus „teadusliku" teemakäsitluse vastu, absurditunnetus.

Kunstiprojekti puhul võime rääkida väga erinevatest tasanditest, mis hõlmavad lisaks teaduse ja tehnoloogia ajaloo uurimisele erinevaid valdkondi, biomeditsiinist, robootikast, inseneeriast ja paljude eri valdkondade uurimismetoodikate kombineerimisest kuni humoristlike käsitlusteni välja.

Minu enda viimane kunstiprojekt on seni mulle kõige enam naudingut pakkunud - märkimisväärset osa oma teadmistest ja ajast olen ma kasutanud üsna absurdse eesmärgi nimel, meelelahutusliku peeretava masina loomiseks. Üsna perversse idee taga on hulk tõsist uurimistööd. Soovin selle kaudu öelda, et huumoril on omapärane võime vaatajates kriitilist mõtlemist esile kutsuda.

Nagu mitmed teisedki meediakunstnikud, otsustasin ka mina 90-ndatel hakata arendama tehnoloogiaid, mida peeti tehniliselt teostamatuteks. Mõnedki kunstnikud tegelesid lisaks kunstiloomele ka tehnoloogia katsetamise ja arendamisega. See tõi ühtpidi omakorda kaasa veidra nähtuse, rea n-ö hübriidkunstnikke, kes tegelesid tarkvara ja riistvara arendamisega, omamata selleks sobivat haridust või materiaalseid ressursse. Teiselt poolt oli selline mitmesuunaline tegevus väga väsitav ja ma võin öelda, et 20- aastase kunstnikupraktika jooksul olen ma sellest tüdinenud. Projekti „Phatus" puhul pakub mulle siiski rahuldust asjaolu, et ma saan kõiki protsesse isiklikult hallata, ise teha, kombineerides aastatega kogunenud laialdasi teadmisi ja oskusi.

Ma olen tänaseks loobunud suuremal või vähemal määral end kunstnikuks nimetamast, kuna pean kunstniku stereotüüpset kuvandit üsna igavaks. Mitte seepärast, et loomine oleks igav, vaid igavaks on osutund n-ö ametlik kunstnäituste kultuur. Üliõpilasena kutsusin õppejõududes tihti esile kohkumust, kuna ma ei soovinud toota kunstiobjekte aristokraatidele. Ma pidasin oma loomingut pigem teatavaks filosoofiaks, millel on teistsugused vahendid.

„Phatus"

„Phatuse" loomise eesmärgiks sai aparaadi ehitamine, mis simuleerib inimese kopsu ja häaletorude ehitust ja häalt, muutes hääle tekitamise semantilist tähendust. Ehk teisiõnu looduslikke ning tehislikke liha ja lihaseid meenutavaid materjale kasutades soovin simuleerida inimkopsu ning häalekulgla ehitust, koos kõige sellega kaasnevaga. Installatsiooni osad pannakse liikuma peidetud mikrokontrollerite abil. Oluline mõte seejuures on, et tark- ja riistvara kasutatakse ebatavalisel moel, lüües paigast nende tavapärase hierarhia.
Nagu suurem osa minu eelnevates teostest, koosneb ka „Phatus" kindlat tähendust omavatest osadest ja käsitöölikest esemetest, mille kasutamine põhineb teatud kriitilistel vaadetel ja ajaloolis-kultuurilistel momentidel, st loomise protsessis olen ma püüdnud arvestada ka oma loomingu sisulist kriitikat.

Teoreetiline diskussioon

Kultuuri ja arvutitehnoloogia arengu ühistes väärtussüsteemides kogetakse teatud šokke, mida tehnoloogia loojad peavad tähtsusetuks. Heaks näiteks, mida ma ka „Phatuse" puhul välja toon, on häalesünteesimise tehnoloogia ja selle mõjude hindamine - lükkan oma töös ümber konventsionaalsed arusaamad töötavast tehnoloogiast ja tavapärased tehnoloogiate loomisele omased prioriteedid.

Hääle sünteesimise puhul on pikka aega olnud üheks oluliseks küsimuseks hääle puhastamine. See ilmestab tehnoloogilisele uurimusele omast suhtumist - abstraheerimist ja üldistamist, mille aluseks on omakorda kartesiaanlik mõtteviis. Bioloogiliste mehhanismide simuleerimine ja dublikeerimine, või tehisintellekti otsingud on tasakaalustatud kultuuriuurijate käsitlustega kehast kui tunnetussüsteemist. Seda n-ö pehmema poole uurimist omistatakse kunstile ja kultuuriteadustele.
Kuna minu projektis kohtuvad nii humanistlikud vaated ja kunstniku mõtteviis kui ka teaduslik-tehniline käsitlus, pean ma seda üsna radikaalselt interdistsiplinaarseks.

„Phatus" – prelingvistline hääle kõla ning diskursiivne sotsiaalne ruum

Käesolevas uuringus olen vaatluse alla võtnud faatilised häälitsused, mis eelnesid keelele. Näo- ja suulihaste füsioloogiline struktuur ja lihasmotoorika kontrollimine on evolutsiooniliselt suhteliselt hilised nähtused ning on seotud suurenenud eessagarate arenguga, mis on iseloomulik homo sapiensile. Primaatide või imetajate häälte tekitamine on evolutsioonilises mõttes palju vanem ja lihtsam viis häalt teha, need on suuresti tingitud rindkerelihaste kokkutõmmetest.

Häälitsustest üldisemalt - tihti ei eristata valu ja mõnu hääli (nt orgasm), samuti võivad segadust tekitada kontekstivälised naer ja nutt. Ägamise, ohkamise, oigamise, ähkimise ning röhkimise skaala on väga lai ja rikkalik kõigis oma peentes nüanssides.
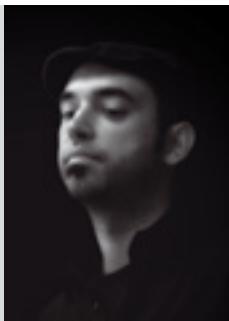
„Phatus" püüab neid häälitsusi matkida mehaaniliste ja tehnoloogiliste vahenditega. Üks väga oluline mõte seejuures on, et meie sotsiaal-kultuurilises ruumis (näiteks muuseumis) saavad nende seadmete poolt loodavad hääled osaks miljööst. See on justkui lapse nutt, automaatne ja alateadlik, mida täiskasvanud tõlgendavad läbi keele ja väljakujunenud arusaamiste.

Manifest

Lodevate masinate sürrealistlik teater (viide Antonin Artaud'le ja julmuse teatrile, ing k „Theatre of Cruelty") - nii nimetan ma oma tööd. Masinad oigavad, uluvad ja klähvivad vastavalt näitusekülastajate liikumisele. Nad matkivad hääli, mis meenutavad lapse korisemist, armastajate meelelisi häälitsusi, meeleheitlikku ulgumist, autisti, kurdi või hullumeelse ärevusttekitavat huiget. See on kommentaar nii arvuti-inseneeria kui ka digitaalkultuuri valdkondadele ja see kommentaar kehastub elektro-pneumaatlis-mehhaanilistes masinates, mis vastupidiselt tavaarusaamale hääle sünteesimisest ainult jäljendavad häälitsusi, häälistustele semantilist sisu omistamata.

" ... I contrived a wooden mouth with lips of soft leather, and with a vale back part of it for nostrils, both which could be quickly opened or closed by the pressure of the fingers, the vocality was given by a silk ribbon about an inch long and a quarter of an inch wide stretched between two bits of smooth wood a little hollowed; so that when a gentle current of air from bellows was blown on the edge of the ribbon, it gave an agreeable tone, as it vibrated between the wooden sides, much like a human voice. This head pronounced the p, b, m, and the vowel a, with so great nicety as to deceive all who heard it unseen, when it pronounced the words mama, papa, map, pam; and had a most plaintive tone, when the lips were gradually closed. My other occupations prevented me from proceeding in the further construction of this machine; which might have required but 13 movements, as shown in the above analysis, unless some variety of musical note was to be added to the vocality produced in the larynx; all of which movements might communicate with the keys of a harpsichord or forte piano, and perform the song as well as the accompaniment; or which if built in a gigantic form, might speak so loud as to command an army or instruct a crowd. "

– Erasmus Darwin Temple of Nature, published posthumously in 1803
pp. 119-120

Theodore Spyropoulos is an architect and educator. He is the Director of the Architectural Association's innovative team-based M.Arch program the Design Research Lab (DRL) in London. He has been a visiting Research Fellow at MIT's Center for Advanced Visual Studies working with the Interrogative Design Group and co-founded the New Media Research Initiative at the Architectural Association. He has taught in the graduate school of the University of Pennsylvania and the Royal College of Art, Innovation Design Engineering Department. Spyropoulos directs the experimental architecture and design practice Minimaforms. The work of Minimaforms has been acquired by the FRAC Centre (France), the Signum Foundation (Poland) and the Archigram Archive (UK), and has exhibited at the Musueum of Modern Art in New York, Detroit Institute of Arts, ICA (London), Futura Gallery (Prague), Slovak National Gallery (Bratislava), Architecture Foundation (UK), amongst others.Spyropoulos has previously worked as a project architect for the offices of Peter Eisenman and Zaha Hadid Architects. He studied at the AA, Bartlett School of Architecture and the New Jersey Institute of Technology.
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Theodore Spyropoulos on arhitekt ja õppejõud. Ta on Londonis tegutseva arhitektuuriühingu arhitektuurikooli (AA) disaini teaduslabori (DRL) direktor. Ta on varem õpetanud nii Pennsylvania ülikoolis kui ka kuningliku kunstikolledži disaini-innovatsiooni inseneeriaosakonnas. Spyropoulus juhatab ka oma eksperimentaalset arhitektuuri- ja disainibürood Minimaforms, mille loomingut on ostetud nii FRAC keskuse (Prantsusmaa), Signum fondi (Poola) kui Archigram arhiivi (Suurbritannia) kogudesse. Minimaformsi loomingut on näidatud ka New Yorgi moodsa kunsti muuseumis MoMa, Detroidi kunstiinstituudis, nüüdiskunsti instituudis Londonis (ICA), Futura galeriis Prahas, Slovakkia rahvusgaleriis Bratislavas kui mitmel pool mujal. Spyropoulos on varem töötanud ka Peter Eisenmani ja Zaha Hadidi juures. Ta õppis AAs, Bartletti arhitektuurikoolis ning New Jersey tehnoloogiainstituudis.
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http://minimaforms.com

Constructing Adaptive Ecologies:
Towards a Behavioral Model for Architecture

Theodore Spyropoulos

Living systems are units of interaction; they exist in ambience. Humberto Maturana[1]

I shall consider the physical environment as an evolving organism as opposed to a designed artefact. In particular, I shall consider an evolution aided by a specific class of machines. Warren McCulloch calls them ethical robots; in the context of architecture I shall call them architecture machines. Nicholas Negroponte[2]

György Kepes once proclaimed, "In our new conceptual models of nature, the stable, solid world of substance, which in the past was considered permanent and preordained, is understood as widely dispersed fields of dynamic energies. Matter – the tangible, visible, stable substance in the old image of the physical world – is recast today as an invisible web of nuclear events with orbiting electrons jumping from orbit to orbit."[3] The fixed and finite tendencies that once served to categorise the natural and the man-made worlds have been rendered obsolete. Today the intersections of information, life and matter display complexities that suggest the possibility of a much deeper synthesis. Within this context, however, architecture is being forced to radically refactor its response to new social and cultural challenges and an accelerated process of urbanisation. All over the world, cities are emerging in the kind of timeframe that buildings are usually developed in, and outdated practices dictate that these cities are generic, unable to adapt to the ever-changing needs of the built environment. To counter this, architecture today must participate in and engage with the information-rich environments that are shaping our lives by constructing computational frameworks that will allow for change, embracing a demand for adaptive models for living. Our approach to addressing these challenges explores

a systemic form of interaction that engages behavioural features that are polyscalar, allowing biodiverse networks to operate between urban contexts, buildings and materials. An intimate correlation of material and computational interaction allows for the emergence of a generative time-based behavioural model of living, where the interplay of local agency and environmental stimulus constructs collective orders. Environmental stimulus gives rise to structures of elaborate complexity, as these systems are able to continuously adapt to local and global signalling. Unlike most man-made structures, the architectures of these structures are not embedded in a blueprint, but rather are correlated operations governed through emerging collective interaction.

Technology is the answer-but what was the question? Cedric Price[4]

A Cybernetic Approach

In September 1969 a landmark issue of Architectural Design, guest-edited by Roy Landau, brought issues of interaction and digital computation into mainstream architectural media for the first time. Alongside articles by Nicholas Negroponte, Cedric Price and Warren Brody, the issue featured an essay by the cybernetician Gordon Pask, who introduced the idea that "architects are first and foremost system designers who have been forced to take an increasing interest in the organisational system properties of development, communication and control."[5] Architecture, Pask argued, had no theory to cope with the pressing complexities of the time, and it was only through a cybernetic understanding of systemic processes that the discipline would evolve. Central to Pask's argument was an understanding of the world through the pursuit of "communication and control"

and the elucidation of what he termed "aesthetically potent environments" – external spaces designed to foster pleasurable interactions. These interactions were to be framed through a commitment to novelty. "Man," he wrote, "is prone to seek novelty in his environment and, having found a novel situation, to learn how to control it."[6]

In his foreword to John Frazer's seminal book An Evolutionary Architecture (1980), Pask presents a fundamental cybernetic thesis that "architecture is a living, evolving thing. In a way this is evident. Our culture's striving towards civilisation is manifested in the places, houses and cities that it creates. As well as providing a protective carapace, these structures also carry symbolic value, and can been seen as being continuous with and emerging from the life of those who inhabit the built environment. It is appropriate to stress an important cybernetic feature of the work; namely that unity is not uniformity, but is coherence and diversity admixed in collusion."[7] In the work of Gordon Pask and other artists and scientists, the use of cybernetic methods resulted in new experiential forms of practice.[8] As telematic artist Roy Ascott notes, cybernetics has transformed our world by "presenting us with qualities of experience and modes of perception which radically alter our conception of it."[9] In addition, second order cybernetician Ranulph Glanville has argued that cybernetics constructs a new way of thinking about the material world: "the knowledge we previously had from science was all about trying to remove the observer so we could talk about an artefactual world full of things, but it is very difficult to argue about a world that exists without our sensing it."[10] Glanville emphasises the role of the active observer and the distinctions to be made between science and design. In design he sees a cybernetic process at work – a form of conversational interaction. For Glanville designers "are not observers of the world, but observers in the world."[11] Therefore, design as an activity should not limit itself solely to descriptive forms but rather use casual and circular relationships to identify generative qualities that will continuously redefine and evolve the design system itself. This is a process of continual formation rather than a state of fixed form.

Behavioural Machines: Singular vs Collective Agency

The dynamic and adaptive approach advocated by this publication is not one of form but of correlated formations – a model of collective living that addresses the spatial complexities of the city. A synthesis of material and computational interaction constructs a generative organisation of space and structure that explores a behaviour-based model of living through patterns found in nature.

Many of the most striking (pattern) examples that we encounter around us are evidently the products of human hands and minds – they are patterns shaped with intelligence and purpose, constructed by design.
Phillip Ball[12]

System-to-system interactions identified through simple rule-based protocols can collectively exhibit complex non-linear behaviour. The magnitude of these interactions is explored across varied scales to test the potential of self-structuring orders constructed

through the interplay of local agency and environmental stimulus. Early analogue cybernetic experiments – such as Gordon Pask's Colloquy of Mobiles (ICA London 1968) – address the significance of parameters dealing with the observer in order to understand our tendency to attribute life-like properties through simple, relational agent interaction.

As a result, embodied patterns emerge through goal-oriented systems that exhibit life-like characteristics. These social orders allow a synthetic interplay to construct a new breed of proto-animalistic architectures that evolve through negotiated interactions, creating a fusion of digital and analogue computation that draws on the pioneering work of the renowned neurophysiologist William Grey Walter. An interest in cognitive operations and biological systems led Walter to develop his machinae speculatrices (machines that watch) –autonomous robots that could demonstrate how simple organisms exhibit non-linear interactions. The first of these were named Elsie and Elmer, and they took the form of phototropic tortoises inspired by a character in Lewis Carroll's Alice in Wonderland. Designed with a primitive nervous system, the tortoises constructed social action and self-organisational patterns that were characteristic of animal behaviour and ritual. Walter's genius lay in his ability to recognise complex adaptive behaviours in simple interconnected systems that focused on goal orientation and adaptation through learning. This allowed the robots to be free-ranging autodidacts that built up intelligence through interaction.

After completing his experiments with the tortoises, Walter wrote in The Living Brain (1953) that there was a "well-defined difference between the magical and the scientific imitation of life. The former copies external appearances; the latter is concerned with performance and behaviour. Until the scientific era, what seemed most alive to people was what most looked like a living being. The vitality accorded to an object was a function primarily of its form." Through a fusion of synthetic and natural systems, architecture can construct machines that are generative, evolving relationships that couple new forms of spatial organisation with fabrication. The ability to shift preoccupations from object to system allows our built environment to play an active and participatory role in the construction of adaptive forms through feedback.

From Object to System

György Kepes states in his introduction to The Nature and Art of Motion (1965) that "to structure our chaotic physical and social environment as well as our knowledge and values, we have to accept the conditions of the new scale and learn to use the tools that have grown from it."[13] New sensibilities have evolved in relation to communication through mediated and remote interaction, which are now critical to a research that explores the role of space and in particular the ways that the physical and public environment can communicate as an active agent. As Kepes's Bauhaus mentor and colleague László Moholy-Nagy once observed, "design is not a profession but an attitude … thinking in complex relationships."[14] Today, the role of science and technology offers architecture some of the most radical and thought-provoking scenarios if approached in a manner that enables participatory and collective emergence.

In a 1964 article titled "The Construction of Change," Roy Ascott attempted to outline the terms for engaging art as a system based on the interrelations between artist, audience and environment.[15] His proposal stemmed from his belief that "cybernetics was the science of behaviour and art was essentially behaviourist." Through the interaction of these constituents, one could construct an environment in which new models of practice foreground participation, allowing aspects of play to evolve and thus creating new forms of knowledge. Ascott elaborated this idea further in his 1967 manifesto, Behaviourables and Futuribles, noting "when art is a form of behaviour, software predominates over hardware in the creative sphere. Process replaces product in importance, just as system supersedes structure." He went on to reinforce this sentiment by emphasising the importance of the societal and cultural: "for a culture to survive it needs internal acrimony (irritation), reciprocity (feedbacks) and variety (change)." In this way, the coupling of design and technology could bring about a discourse that was social and optimistic, buoyed by the shared belief that, through innovation, new channels of communication would emerge that would interconnect previously self-contained and isolated fields. Art and design was therefore seen as a tool enabling active collaboration with cultural and scientific disciplines.

We can communicate – that is, combine and reinforce our knowledge with that of other men – by stimulating the circulation of ideas and feelings, finding channels of communication that can interconnect our disciplines and enable us to see our world as a connective whole.
György Kepes[16]

Architecture Must Participate

György Kepes once wrote: "The dynamic unity of constancy and change has a fundamental role in our intellectual growth. Our clearest understanding of the nature of these complementary opposites has been reached through grasp of the principle of self-regulating systems." Similarly, our own systemic approach seeks to evolve research into new forms of living and the structuring of human environments. Experimenting through explicit models of interactions, observable patterns and proto-animalistic agency, our work explores the capacity for design systems to evolve architectural elements with the capacity to self-structure, respond and evolve. In the process, and beyond deterministic methods of structuring space, issues of duration and populations evolve into a new language of assemblies as collective structures.

Today, with greater opportunities and easier access to information, comes the challenge to re-evaluate the conception and production of architecture. These enabled communication networks have fostered the possibilities for a shared and collective project – one that is not only available to all, but affords a deeper understanding of the world and our participation in it. In engaging with this shared project, it is important to recognise early experiments within this domain, such as those explored by Nicholas Negroponte and the Architecture Machine Group at MIT, which dealt with the intimate association of man and machine within architecture, and of Cedric Price, who in collaboration with Joan Littlewood and Gordon Pask designed a Fun Palace that would operate as a time-based architectural machine adapting and evolving through its everyday use. These

projects provided a model for the coupling of design and technology while calling for a discourse that is both social and optimistic. Taken together, architecture and design can be seen as a tool that enables an active collaboration within cultural and scientific disciplines. Though not a new pursuit in architecture, it should be recognised that we have greater access to a collective understanding than ever before.

Design should be progressive and challenge people. We should be enabling a diverse set of questions about how we live and the role that architecture can play in our everyday lives. As John Frazer has reminded us, "perhaps computing without computers is the most important lesson to be learned by designing these tools. The real benefits are found in having to rethink explicitly and clearly the way in which we habitually do things." Architecture today can serve as an emergent framework that displays a new nature, combining the biological, social and computational in an adaptive and evolving organism, reasserting Karl Friedrich Schinkel's belief that "architecture is the continuation of nature in her constructive activity."

[1] Maturana, H. R. Biology of Cognition. Biological Computer Laboratory Research Report BCL 9.0 (Urbana, IL: University of Illinois, 1970).

[2] Negroponte, N. The Architecture Machine: Toward a More Human Environment (Cambridge, MA: MIT Press, 1970).

[3] Kepes, G. The Nature and Art of Motion (New York: George Braziller, 1965), 2.

[4] Quoted in Paul Brown et al eds, White Heat Cold Logic: British Computer Art 1960–1980 (Cambridge, MA: MIT Press, 2008), 37–51.

[5] Pask, G. "The Architectural Relevance of Cybernetics", Architectural Design, September 1969, 494.

[6] Pask, G. "A Comment, a Case History and a Plan" (1970) reprinted in J Reichardt ed, Cybernetic Art and Ideas (London: Studio Vista, 1971), 77.

[7] Frazer, J. An Evolutionary Architecture (London: Architectural Association Publications, 1995).

[8] Ascott and Pask worked together as part of the Cybernetics Sub-Committee, a consultancy of interdisciplinary minds organised by Pask to assist in the development of Cedric Price's Fun Palace.

[9] Ascott, op cit note 1.

[10] Stephanie Bunbury, "It's time to learn to love your Dalek", 10 May 2005, retrieved 10 September 2007 from http://www.theage.com.au/articles/2005/05/09/1115584883777.html

[11] Glanville, R. "Try again. Fail again. Fail better: The Cybernetics in Design and the Design in Cybernetics", Kybernetes 36: 9/10 (2007), 1199.
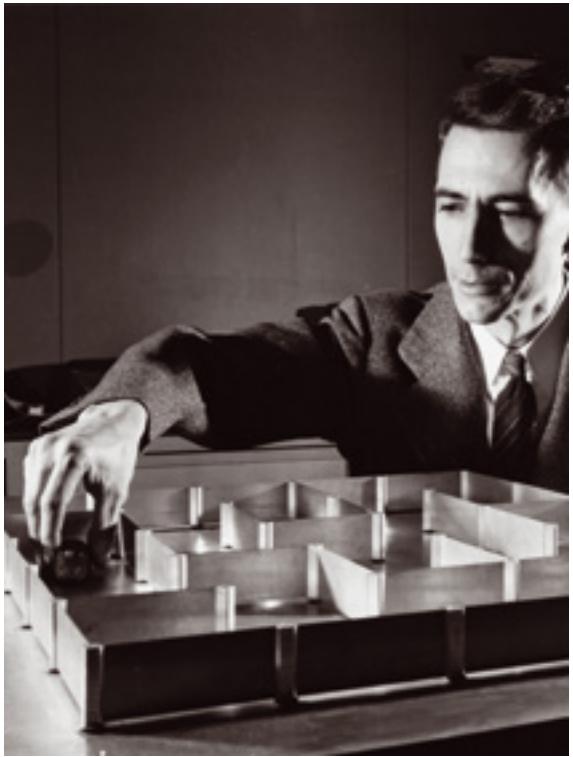
[12] Ball, P. Shapes (Oxford: Oxford University Press, 2009).

[13] Kepes, The Nature and Art of Motion, 6.

[14] Moholy-Nagy, L. Vision in Motion (Chicago, P Theobald, 1947), 42.

[15] Reprinted in Noah Wardrip-Fruin and Nick Montfort, eds, The New Media Reader (Cambridge, MA: MIT Press, 2003), 128–32.

[16] Kepes, G. The Nature and Art of Motion, 6.

Claude Shannon and experimental mouse maze constructed to demonstrate machine learning,
© 1952 Courtesy the Computer History Museum, Mountain View, CA.

Nicholas Negroponte (AMG),
Seek at the Jewish Museum in New York, 1970
The Architecture Machine Group led by Nicholas Negroponte produced Seek, a computer-controlled environment inhabited by gerbils as part of Jack Burnham's 1970 'Software' show in New York.
SEEK, © Nicholas Negroponte, Soft Architecture Machines
Seek is potentially the most radical of all proposals developed by the AMG, as it constructs an environment that embeds live agents (gerbils), scanning arm systems and building blocks in a evolving fitness landscape. The experiment is set in motion when the gerbils are placed in the container and begin the process of appropriating their new environment. The gerbils' activities continually reorganize the initial block deployment, pushing and pulling blocks into new configurations. After a period of inhabitation the container becomes a display of the negotiated space of interaction through its newly formed configuration. The gerbils, blocks and scanning arm have reached a balanced negotiation through the allowance of a co-evolutionary process of becoming.

Team Egloo
AADRL Tutor: Theodore Spyropoulos
Students: Pankaj Chaudhary, Jwalant Mahadevwala, Mateo Riestra, Drago Vodanovic

Surface Tension / Hele–Shaw Cell
Examining properties of the cohesive forces of surface tension, viscous fluids are placed between two pressurized parallel plates demonstrating properties of connective micro-flows.
Egloo proposes a decentralized connective neighbor hood model developed through the interplay and trans-coding of material and digital computation. © AA DRL / Team Egloo
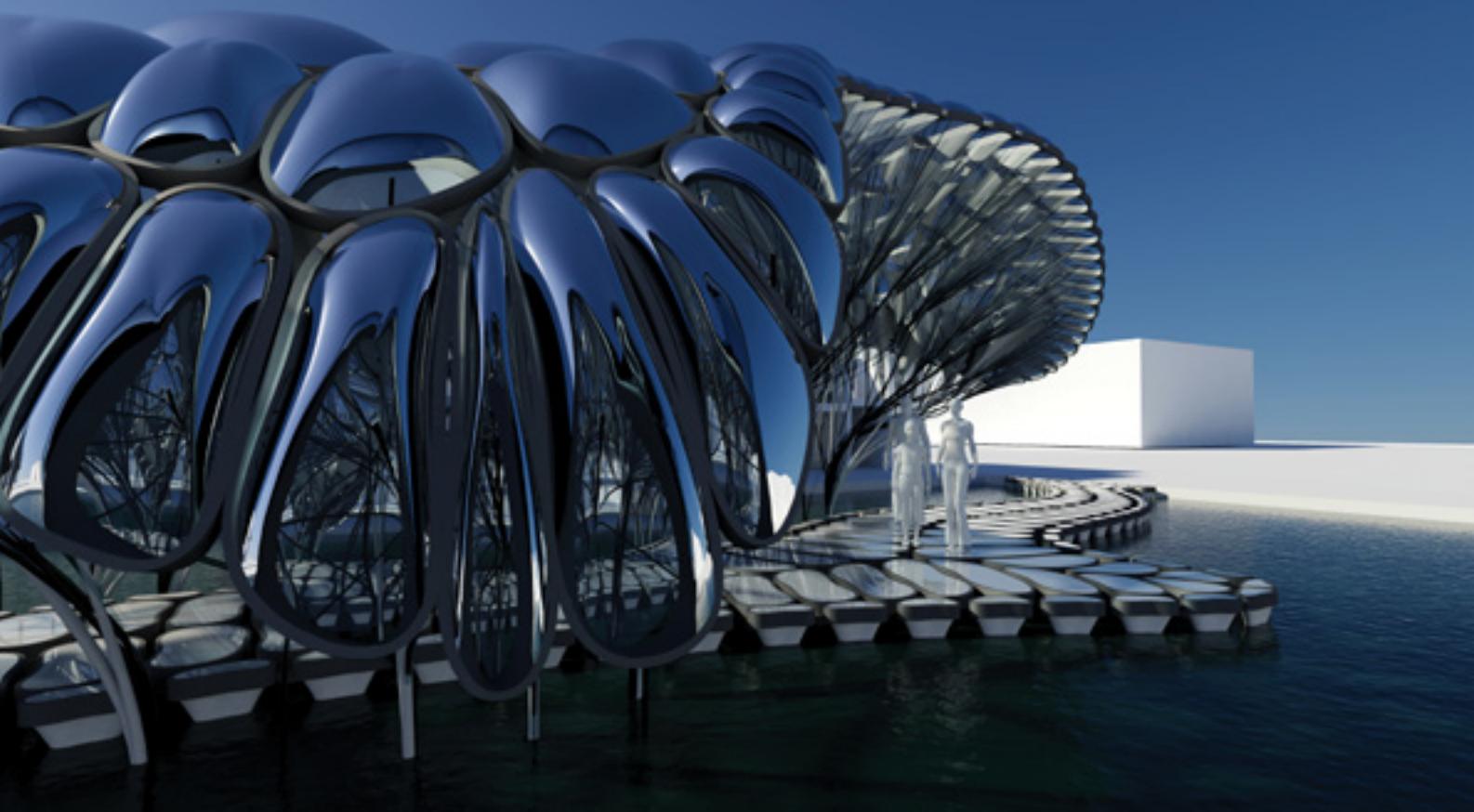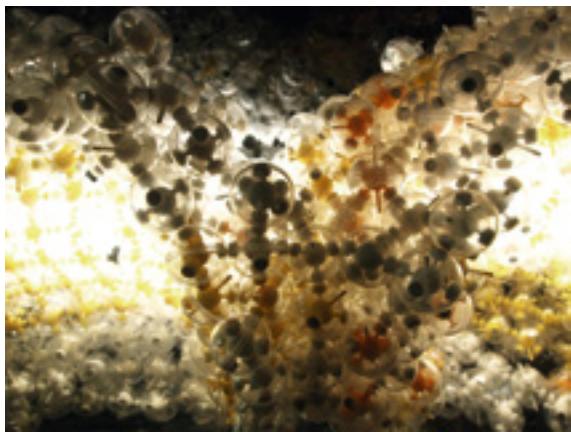

Team Farm
AADRL: Tutor: Theodore Spyropoulos
Students: Marga Busquets, Sebastien Delagrange, Iain Maxwell Stigmergic behaviour is demonstrated in eusocial creatures that construct their complex habitations through simple decentralised rule sets. A network of complex relations built up through the use of pheromones creates an adaptive model of agent-based communication
© AA DRL / Team Farm

FARM's research explores stigmergy as pheromone based interaction ecology of agents created to generate highly differentiated and interconnected architectural typologies. Image of prototypical section developed for the Hudson Yards West Development in New York © Minimaforms

Minimaforms' Gateway proposal conceives a threshold space
suspended above an existing reflection pool as an exterior room
and sanctuary. This structure is an open-cell system that operates
as a perceptual framing device. Deployed through an open-cell
network are a series of operable convex and concave lenses,
amplifying and collapsing the experiential relationships between
users and their context. Developed through a parametrically
controlled cellular deployment system, these lenses are distributed
with both optical and structural parameters at play. The
underbellies of these lenses extend as part of a three-dimensional
fibre-field in which structural fibres and optic hairs are set out.
The access plane hovering over the water surface of the reflection
pool is constructed as a series of walkable lily pads that enable
users to experience a complete sensorial displacement as one
moves through this architecture of interface.

Kohanevate ökoloogiate konstrueerimine: arhitektuuri käitumusliku mudeli poole

Theodore Spyropoulos
Lühikokkuvõte Veronika Valk

Looduslikkuse ja tehislikkuse seni paika pandud ja lõplikud kategooriad on kaotanud tänaseks oma tähenduse. Täna on informatsiooni, elu ja mateeria lõikumised sedavõrd komplekssed, et pakuvad palju sügavama sünteesi võimalust. Antud kontekstis tuleb ka arhitektuuri valdkonnas radikaalselt ümber mõelda, kuidas uutele sotsiaalsetele ja kultuurilistele väljakutsetele ning üha kiirenevale linnastumisele omalt poolt vastata. Linnad arenevad üleilmselt tempoga, mis varem kehtis hoonetele. Et sellega ja kohanemisvõimeliste elumudelite nõudlusega toime tulla, peab nüüdisarhitektuur arvutuspõhiste raamistike abil hõlmama infoküllaseid keskkondi, mis kujundavad meie elu.

Meid huvitab süsteemipõhine interaktsiooni vorm, mis seob linliku mõõtme, hooned ja materjalid. Tulemusena tekib generatiivne ajapõhine käitumuslik elumudel, kus kohaspetsiifilised tegurid ja keskkonnastiimulid konstrueerivad kollektiivse korra. Saadud struktuuride arhitektuur ei põhine joonistel, vaid vastastikuses suhtes operatsioonidel, mis juhinduvad kollektiivsest interaktsioonist.

Küberneetiline lähenemine

Küberneetik Gordon Pask tõi ajakirja Architectural Design 1969. aasta numbris meieni mõtte sellest, et arhitektid on süsteemikujundajad, kes on sunnitud järjest enam huvi tundma organisatsiooniliste süsteemi omaduste suhtes, milleks on areng, kommunikatsioon ja kontroll. Paski järgi suudab arhitektuur areneda vaid tänu küberneetika mõistmisele. Kommunikatsiooni ja kontrolli otsingud pidid Paski arvates viima parema maailmamõistmiseni, vähetähtis polnud ka 'esteetiliselt mõjus keskkond', mis toetab mõnupakkuvat interaktsiooni, mis omakorda pidi keskenduma uudsusele. Gordon Paski jt kunstnike ning teadlaste poolt kasutusele võetud nn küberneetiline meetod viis uute kogemuslike praktikavormideni. Telemaatikakunstniku Roy Ascotti sõnul on küberneetika muutnud meie maailma. Küberneetik Ranulph Glanville on väitnud, et küberneetika konstrueerib uue viisi, kuidas materiaalsest maailmast mõelda. Glanville rõhutab aktiivse vaatleja rolli tähtsust ning märgib, et disaini ja teaduse vahel tuleb

teha vahet. Disainis toimib tema sõnul küberneetiline protsess kui vestluslik interaktsioon – disainerid pole maailma vaatlejad. Disain pole kirjeldav tegevusvorm, vaid generatiivne suhtlustsükkel, et jätkuvalt disainisüsteemi ennast arendada. Tegu on pideva formeerumisega, mitte fikseeritud vormi olekuga.

Käitumuslikud masinad: singulaarne *versus* kollektiivne tegevusseisund

Dünaamilise ja kohaneva lähenemisviisi keskmes pole vorm, vaid korreleeritud vormumine – kollektiivne elumudel, mis saab hakkama linna komplekssusega. Mateeria ja arvutuspõhise interaktsiooni kooslus pakub meile nii ruumi kui ka eluslooduse mustreid järgiva struktureeritud käitumusliku elumudeli. Süsteemidevaheliste interaktsioonide suurusjärku (mõju ja ulatust) on uuritud ja katsetatud ka Paski poolt.

Proto-animalistliku arhitektuuri teke on seotud tuntud neurofüsioloogi William Grey Walteri teedrajava tööga. Tema *machinae speculatrices* (masinad, mis jälgivad) ehk autonoomsed robotid Elsie ja Elmer olid inspireeritud ühtaegu eluslooduset kui Lewis Carrolli teosest „Alice imedemaal". Walter oskas lihtsate omavahel ühendatud süsteemide juures ära tunda keerulist kohanevat käitumist – tema robotid olid autodidaktid, mille intelligents kasvas tänu interaktsioonile.

Sünteetiliste ja loodussüsteemide segunemise tõttu suudab arhitektuur ehitada masinaid, mis on generatiivsed ja mis arendavad suhteid, kus uued ruumi organiseerimise vormid käivad käsikäes tootmisega. Kui tähelepanu nihkub vormilt süsteemile, mängib ehitatav keskkond aktiivset ja kaasavat rolli tagasisidepõhiste kohanevate vormide loomisel.

Objektist süsteemini

Kaudse ja vahendatud kommunikatsiooni tõttu on tekkinud nn uus tundlikkus. László Moholy-Nagy sõnul pole disain amet, vaid suhtumine, keerulistes suhetes mõtlemine. Tänapäevane teadus ja tehnoloogia pakub arhitektuurile radikaalseid mõtlemapanevaid stsenaariume, kui läheneda asjale kaasava ja kollektiivse 'tekkelisuse' pilguga.

Keskkonnaloome, kus uued praktikavormid seavad esiplaanile osaluse, lubab mängu aspektil areneda, mistõttu tekivad uued teadmised. Oma 1967. aasta manifestis täheldab Roy Ascott, et kui kunst on käitumisviis, domineerib loovas sfääris tarkvara riistvara üle. Protsess on tähtsam kui toode, nii nagu süsteem on tähtsam kui struktuur. Veelgi enam, kultuuril on ellujäämiseks vaja sisemist nn torkijat, tagasisidet ja mitmekesisust ehk muutust.

Disaini ja tehnoloogia kooslust peetakse sotsiaalse ja optimistliku diskursuse toojaks – kunst ja disain on töövahendid, mis aitaksid kaasa kultuuri ja teaduse distsipliinide aktiivsele koostööle.
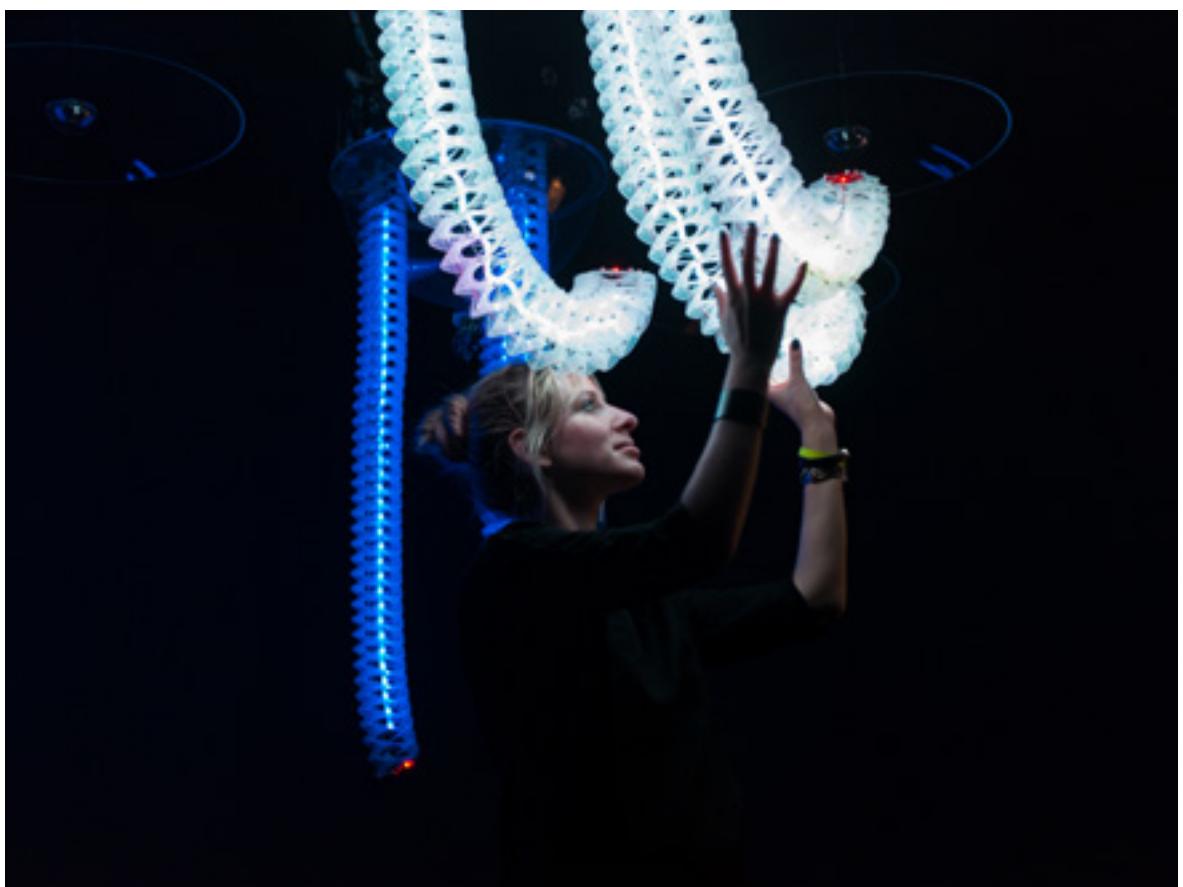
Arhitektuur peab osalema

György Kepes'i sõnade kohaselt mängib järjepidevuse ja muutuse dünaamiline ühtsus meie intellektuaalses kasvus põhirolli. Meie süsteemikeskne lähenemisviis otsib võimalust, kuidas edendada uurimistööd, mille fookuses on uued elumudelid ja inimkeskkonna struktureerimine. Meid huvitab disainisüsteemide võimekus töötada välja arhitektuurielemente, mis suudavad ise struktureeruda, reageerida ja areneda.

Arhitektuuri kontseptsioon ja loomine tuleb ümber hinnata. Võrgustunud kommunikatsiooni tingimustes on tegu jagatud ja kollektiivse ettevõtmisega, mis on kõigile kättesaadav ning aitab maailma ja selles osalemist paremini mõista. Arhitektuur ja disain aitavad kaasa kultuuri ja teaduse distsipliinide aktiivsele koostööle.

Disain peab olema progressiivne ja esitama inimestele väljakutse. Tuleb seada küsimuse alla see, kuidas elame ja mis rolli mängib arhitektuur meie igapäevaelus. John Frazer on meenutanud, kui palju kasu võib olla oma harjumustes selgusele jõudmisest. Arhitektuur võib pakkuda raamistikku nn uuele loodusele, mis ühendab kohaneva ja areneva organismina bioloogilise, sotsiaalse ja arvutusliku külje. See taaskinnitab Karl Friedrich Schinkeli usku, et arhitektuur on looduse jätk selle konstruktiivses vormis.

Petting Zoo is speculative life-like robotic environment that raises questions of how future environments could actively enable new forms of communication with the everyday. Artificial intelligent creatures have been designed with the capacity to learn and explore behaviors through interaction with participants. Within this immersive installation interaction with the pets foster human curiosity, play, forging intimate exchanges that are emotive and evolving over time. Beyond technology the project explores new forms of enabled communication between people and their environment © Minimaforms

Justina Klingaite is a first-year PhD student in Tallinn University, Estonian Institute of Humanities (EHI). Her research focuses on the philosophy of technology, philosophy of art, Martin Heidegger. She graduated from Vytautas Magnus University (Lithuania), Practical philosophy in 2012. She has also studied in Poland, Finland and Iceland. Her master's thesis was on the late philosophy of Heidegger, specifically researching Heidegger's Question Concerning Technology.

Justina Klingaite on Tallinna Ülikooli Eesti Humanitaar-instituudi (EHI) doktorant. Ta pühendub oma uurimistöös põhjalikult tehnoloogia ja kunsti seostele ja neid ühendavale kunstifilosoofiale (M. Heidegger). Justina Klingaite omandas magistrikraadi praktilises filosoofias Vytautas Magnuse Ülikoolis Leedus aastal 2012. Lisaks on ta õppinud Poolas, Soomes ja Islandil. Oma magistritöös käsitles ta Heideggeri hilisemaid uurimusi, keskendudes Heideggeri teosele „Question Concerning Technology".

Is Dialogue Between Art, Contemporary Technologies and Science Still Possible?

Justina Klingaite

What I propose, therefore, is very simple: it is nothing more than to think what we are doing.
Hannah Arendt, The Prologue of The Human Condition

We live in times where the majority of calamities happening around the world are received by us at the same time and place. We are fully aware that in some parts of the world wars are waged for land and oil, while in some other parts – people are starving. The list of such events taking place all over the globe at this very moment can carry on indefinitely. These events are made accessible to millions of people around the world through ever newer technologies (Internet, social networks, mass media etc.)

Some worries caused by these technological changes are quite familiar. The unmeasurable amount of information we deal with today makes us, in one way or another, forget the nearness of our loved ones. Due to the rapid growth of technologies in the so called post-modern era we lose touch with our presence. The virtual world, the "virtual being" – the Internet –occupies most of our daytime hours. What still today makes us wonder, I wonder? Perhaps only cat videos posted in Youtube? Is there anything at all still remaining that catches our wonder or amazement? Large parts of our societies are already addicted to technologies (smartphones, computers etc.)? Without having realized it, we are slaves to newer and ever emerging technologies.

In short, I want to question and reflect upon the contemporary human condition in technological age. As Damon Isherwood observes:

We live in an unparalleled technological age – it seems our smartphones are out of date within weeks, websites are measured in "hits" and the population decides what is hot and what is not through "likes", "tags", "links" and "pins". A trip to an Apple store is like stepping onto George Lucas's Death Star, complete with its own uniform, language and hierarchy. Via the Internet we can search for information on any topic at any time. The effects of such an intense environment of instant connectivity and immediate information are slowly emerging. Isherwood 2013[1]

The problem is not whether technologies gives us good or bad experiences. The problem is, as an Australian biologist Jeremy Griffith suggests, "that human psychological alienation is the real threat facing humanity and the Internet is presently only serving to accelerate this threat… The Internet is the ultimate communication technology, but it is currently being used to spread and increase alienation, not knowledge." (Griffith 2009, Book 1:7:5)

My article discusses these worldly issues more deeply. I will talk about the change/the shift that happened in our century when computer technologies appeared. Scientific and technological innovations have impoverished art. Lasers can cut the walls, robots can take care of the old people, and, nevertheless, computers can make the art looking even better than the fine art. Needless to say, that in late 1960–70s with the advent of computers, Hubert Dreyfus in his book *What Computers Still Can't Do…* explains that human beings are not at all like computers. Humans do not "apply abstract, context-free rules to compute how to act when we engage in skilled behavior"… Instead, Dreyfus argued, "the fundamental

thing about humans is that we are embodied beings living in a shared world of social practices and equipment. In the end, it is our skillful mastery and our shared practices that not only distinguish us from machines but allow us to assume meaningful identities." (Dreyfus 1992, 147-184)

In front of our very eyes, there manifests a prevalent tendency and alienation from our Being and lived-world. The early Heidegger of *Being and Time* was much more optimistic about these developments than the later Heidegger of *Question Concerning Technology*[2]. In Being and Time Heidegger elaborated about the simple and average everyday being in the world, where one's being is surrounded by things. But as the world's technological progress became more eminent, Heidegger's worries and concerns about our understanding of Being deepened as well. The worry was caused by the appearance of new technologies. He thought that the introduction of new technologies in our daily lives was rapidly transforming our Being. Heidegger himself witnessed the appearance of television and radio and how it slowly but surely came to occupy the everyday life of the peasants. Today, our lives are even more preoccupied by the enormous amount of all kinds of technological "wonders" (computers, smart-phones, Internet, electronic book readers, etc.). We are drawn into the virtual more than ever; everywhere we go, we see people drowning in the screens of their smart devices rather than into the faces of friends and loved ones. The utter forgetfulness of the nearness and closeness of the surrounding world cannot be denied anymore.

Despite what was just said, I am attempting to build a positive relationship to technology. Like Heidegger I believe that a skill of *balancing* and *knowing*,[3] when it is appropriate to allow one revealing or another, is needed. Human beings have access to different possibilities of revealing, whether it is technological, poetical or artistic, etc. It is probably not a coincidence that the later thought of Heidegger had mainly to do with art and poetry as the powers that can save us from the technological mode of being. He thought that we can rely on the simplicity of revealing that art and poetry offers. Art provides a momentary click that wakes us from the technological slumber. In addition, art and poetry remain present in relation to human beings. Art and poetry are closer than anything else to the order and placement of technological thinking, and are, like no other, totally different from the latter kind. Placing art and poetry is essentially different from that of technology. It does not fix in place or challenge-forth like it happens with modern technology, but it shows and lets it to be seen. Altogether with marginal practices, as Dreyfus assumes in his writings, art and poetry become that which saves us and brings about a more meaningful nearness of being-in-the-world.

Heidegger is not a technophobian. He does not advocate the unrealistic idea of returning to the pre-technological world. Heidegger is definitely aware, that the humankind has probably never been entirely free from technologies. For example, at the very moment I am using my computer, because I want to write the paper for the "Rhizope" conference. The efficiency of my computer ensures me that I will finally finish writing and will give in my paper on time. In this simple sense, the inevitability of technology is obvious.

In addition, Heidegger shows that things in the world are interconnected or interrelated (e.g. I need a computer in order to write the abstract concerning contemporary technologies and art, for the sake of presenting my research at the Rhizope conference). This example of a sequence shows that things indeed exist in relations, that is, one cannot exist without the other. Things not only connect the world but without things there would not be connections. Through these connections – interconnections – humans belong to the world. To put it more simply, for Heidegger being-in-the-world is characterized by the relationships of the surrounding world and the human being and vice versa. And, human being, as being-there (*Dasein*, speaking strictly in Heideggerian terms), refers to the awareness and potential to bring things of the world forth in their shining (either it is art, poetry, music, etc.). The relationship of human beings to these things is built up in *concern* and *care* (for instance, I am concerned about writing my abstract and giving it in on time). This is what in Being and Time Heidegger calls concernful dealings within the world. But since the appearance of modern technologies in our word, late Heidegger claims that, our understanding of being has changed and therefore our relationship with being has altered too. Things in the world are now optimized, exploited, transmitted, etc.

The question whether it is still possible to find and engage in alternative ways of being concerns our lives in a very fundamental way. Only few examples for consideration: we forgot how to write a real letter, because we type on a keyboard now; we engage with people in social networks rather than in the real world; we focus on the air conditioning systems rather than the air itself; we are guided by GPS rather than by our own mind and maps.

While various technologies have amazing potential to add value to our daily lives, they also have an ability to distract us from fundamental and beautiful experiences. Along with Hannah Arendt, we can ask where is this human condition leading to? Is art still relevant in the age of science and never stopping to develop technologies? Did not art become just an ordinary culture industry (as Adorno critically claimed)? "Culture today is infecting everything with sameness. Film, radio and magazines form a system. Each branch of culture is unanimous within itself and all are unanimous together." (Adorno & Horkheimer 2002, 92) For Adorno and Horkheimer, rebellion and protest has become no longer possible. But still, it is necessary to ask can art, poetry, music be the phenomena provoking more meaningful engagement with our lives?

Dreyfus and Sean Kelly on their commonly written book All Things Shining... claim that "today, gentle, nurturing poiesis is a dying art. In part this is the result of our own success: advances in technology have diminished the importance of specialized skills in contemporary life. Indeed, perhaps the central goal of modern technology is to make every domain accessible to everyone, no matter what his or her level of skill. "Even a child can do it!" is the mantra of the technological age. To cook a meal is to press a button, to travel across the country is to step on a plane. To navigate an unfamiliar terrain is to turn left or right whenever the Global Positioning System (GPS) says. Technology improves our lives by making hard things easier. That is a basic axiom of the contemporary world." (Dreyfus, Kelly 2011, 179).

Nevertheless, this reveals that the nature of technology is ambiguous. It can appear as poiesis and techne. It is evident that today our poetic, creative skills are diminishing thanks to computer technology.

Technological innovations and improvements do not necessarily bring goodness to the world. It rather erases a possibility to be a skillful human being engaging with the world in many different meaningful ways. Dreyfus and Kelly elaborate further. "But the improvements of technology are impoverishments as well. The GPS covers over the meaningful distinctions that the art of skilled navigation revealed. To the extent that technology strips away the need for skill, it strips away the possibility of meaning as well. To have a skill is to know what counts or is worthwhile in a certain domain. Skills reveal meaningful differences to us and cultivate in us a sense of responsibility to bring these out at their best. To the extent that it takes away the need for skill, technology flattens out human life." (*Ibid*)

And so, last but not least, Heidegger tells us that, not at all – the industrial and technological understanding of the world is not the only way to build our relationship to the world. Heidegger proposes that instead of the technological way of being, we should grasp the possibility of *alternative ways* of thinking and dwelling on earth. This means to declare the unified self and the unified world as mutually related notions, since there cannot be one without the other. We must give our future generations the chance of experiencing meaningful human relationships and by revealing the world in alternative ways through the artistic practices like art, music and poetry.

To gain a more free and critical relation to technologies should concern our society more than ever. An infamous quote of Friedrich Hölderlin's suggests that "where the danger is, grows the saving power also." The dangers of our technocratic being in the world are evident. Yet, the danger is the promise. It depends entirely on us how we engage with the world and reveal its meanings in the future. As professor of literature John David Zuffrin suggests in his lectures notes, "we should not interpret Heidegger to be suggesting that we all go out and become artists, but rather that we incorporate more of the artist's and poet's vision into our own view of the world. By doing so, we can guard against the dangers of enframing, and enter into a "free" – constantly critical, constantly questioning – relationship with the technology that is constantly making new incursions into our lives." What I claim, therefore, is rather simple, it is just caring what we are doing. THINKING DIFFERENT as Apple once offered.[4]

[1] Isherwood, D. "The Future Of Technology, The Internet And The Human Condition" in Urban Times, accessed via Internet: http://urbantimes.co/2013/08/the-future-of-technology-the-internet-and-the-humancondition.

[2] The main idea of Heidegger in Question Concerning Technologies is that technology "enframes" and "sets upon an order" to a human being. According to Heidegger, "the essence of technology is nothing technological, because the revealing that holds sway in modern technology is enframing (gestell). Enframing allows only one type of revealing which is challenging. The challenging revealing sets upon man to order not only the world but man himself." (Heidegger, 1977, 20)

[3] Italic added by me. If not stated otherwise, in the rest of text, Italic remains added by the author.

[4] "Think different" was an advertising slogan for Apple company in 1997 created by one Los Angeles advertising agency. The slogan was used in a television commercial, several print advertisements and a number of TV promos for Apple products. Apple's use of the slogan was discontinued in 2002 when the advertising campaign has taken place.

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Kas dialoog kunsti, nüüdis-tehnoloogia ja teaduse vahel on siiski võimalik?

Justina Klingaite
Lühikokkuvõte Piibe Piirma

Suur osa maailmas toimuvatest traagilistest sündmustest jõuavad meieni vahetult nende toimumise hetkel. Oleme teadlikud, et kusagil peetakse sõdu maa ja kütuse pärast, teistes paikades nälgitakse. Õnnetuste nimekiri on pikk, info levik tänu infotehnoloogiale väga kiire ja hõlbus.

Probleemid, mis on seotud tehnoloogia arenguga, on meile üsna tuttavad. Informatsiooni üleküllus paneb meid moel või teisel unustama isiklikke lähedasi suhteid, postmodernistliku ajastu tehnoloogilise progressi tulemus on iseenda kaotamine. Interneti virtuaalne maailm hõlmab suurema osa meie ajaressursist. Kas võiks olla veel midagi, mis meid tänapäeval imestama paneb? Kas see võib olla näiteks Youtube'i postitatud kassivideo? Kuna suur osa ümbritsevast keskkonnast on hõlmatud tehnoloogilistest nutividinatest, oleme märkamatult muutunud järjest uueneva tehnoloogia orjadeks.

Soovin arutleda kaasaegse inimese olemuse üle käesoleval tehnoloogiaajastul. Damon Isherwood märgib, et me elame võrratul tehnoloogilisel ajastul – meie nutitelefonid vananevad nädalatega, veebilehitsejaid mõõdetakse hitti-dega ning üldsus otsustab, mis on populaarne läbi *like*'de, *tag*'ide, *link*'ide ning *pin*'ide. Pideva võrgusolemise ja vahetult kättesaadava informatsiooni mõjud on ühildumas.

Minu soov on neid teemasid, mis on seotud võrgustumise ja informatsiooni levikuga, sügavuti käsitleda. Mõnes mõttes võib väita, et teaduslikud ja tehnoloogilised arengud on kunstile mõjunud pärssivalt. Laserid suudavad lõigata või lõhkuda seinu, robotid suudavad hoolitseda vanurite eest. Seetõttu võib näida, et tehnoloogia abil on võimalik luua paremat tulemust kui kunst seda suudab. Meie silme all toimub pidev kaugenemine tegelikust maailmast. Saksa filosoof Martin Heidegger uuris asjadest ümbritsetud ja tehnoloogia arenguga seotud igapäevaelu muutumist. Võrreldes oma hilisemate kirjutistega, oli ta alguses üsna optimistlik tehnoloogiliste arengute osas. Ta oli oma eluajal tunnistajaks televisiooni ning raadio arengule ning sellele, kuidas see aeglaselt, kuid kindlalt hõivas lihtinimeste igapäevaelu.

Täna oleme me tulenevalt tehnoloogia kiirest arengust veelgi enam hõivatud tehnoloogiliste „imedega" ning tõmmatud virtuaalmaailma. Inimesed on rohkem huvitatud nutiseadmete jälgimisest kui vahetust suhtlemisest lähedastega.

Minu eesmärk on siiski väljendada oma positiivset suhtumist tehnoloogiasse. Toetudes Heideggerile, usun ma, et põhiline on meie oskus tasakaalustada suhteid tehnoloogia kasutamise ja igapäevaelu teiste oluliste nüansside vahel.

Meie kasutuses on erinevad enese väljendamise võimalused: tehnoloogiline, poeetiline, kunstiline jne. Ilmselt ei ole juhuslik, et Heidegger jõudis oma hilisemates arutlustes kunsti ja poeesiani, millel on võime päästa meid tehnoloogilisest olemisest.

Tema hinnangul saame me usaldada kunsti ja luule

väljenduse lihtsust, ning need jäävad alati inimesega lähisuhetesse. Kunst ja luule on mingis mõttes küll üsna lähedal tehnoloogilisele mõtlemisele, kuid samas ka täiesti erinevad. Dreyfusi hinnangul saab kunstist ja poeesiast see miski, mis meid päästab ning lähendab selles maailmas.

Heidegger ei ole tehnofoob, ta ei toeta mõtet tagasi-pöördumisest tehnoloogia-eelsesse maailma. Ta on kahtlemata teadlik, et inimkond ei ole kunagi olnud päris tehnoloogiavaba ning et tehnoloogilised vahendid ja inimeste vajadused on omavahel seotud (näiteks vajan ka mina arvutit antud artikli kirjutamiseks). Tänu sellele, et inimene on maailma asjadega tihedalt seotud, ka tehnoloogiaga, teebki inimesest maailma osa. Heidegger rõhutab inimese ja teda ümbritseva maailma suhet, mis on üles ehitatud hoolitsusele ja hoolele („Olemine ja Aeg").

Väga fundamentaalne on meie jaoks küsimus sellest, kas olemisel on veel võimalikke alternatiivseid teid. Näiteks trükkides klaviatuuril, unustame me kirjutamise, maakaardi ja mälu asemel kasutame GPSi jne. Kuigi erinevatel tehnoloogiatel on suur potentsiaal tuua lisaväärtust meie igapäevasesse ellu, on neil võime ka meid ilma jätta imelistest kogemustest. Koos Hannah Arendtiga võime küsida, kuhu see meid viib? Kas kunst tehnoteaduste ajastul on veel üldse asjakohane? Kas kunstist ei ole äkki saanud tavapärane tööstusharu – n-ö kultuuritööstus? Adorno ja Horkheimeri jaoks ei ole protest ja mäss sellise arengu vastu enam võimalikud, seda näitavad film, raadio ja ajakirjandus, mis on saanud nii koos kui eraldi võetuna kultuuritööstuse osadeks. Siiski peame küsima, kas kunst, poeesia ja muusika võivad olla aluseks sisulisemale suhtlemisele meie elus?

Meie isiklikud oskused on osaliselt tänu tehnoloogia arengule vähenemas. Tehnoloogilise ajastu mantra kõlab „isegi laps suudab seda". Söögitegemine võib toimuda nupule vajutamise abil, tundmatul maastikul sõitmine õnnestub GPSi toel. Tehnoloogia lihtsustab oluliselt meie toimetulemist rasketes situatsioonides, ees on meie ajastu peamine aksioom (Dreyfus, Kelly, 2011). Sellest hoolimata on tehnoloogia olemus ebaselge.

Tehnoloogilised arengud ja parendused ei tee maailma tingimata paremaks. See pigem vähendab võimalust olla osav inimene. Dreyfus ja Kelly arendavad seda mõtet edasi: tehnoloogilised uuendused võivad tähendada ühtlasi ka vaesemaks jäämist. Mitte ainult seetõttu, et tehnoloogia pealetung vähendab vajadust osata, aga see vähendab ka asjade otstarvet. Omada oskust tähendab ka omada teadmist, mis on oluline kindlates valdkondades töötamiseks. Oskustes avalduvad meie sisulised erinevused, need arendavad meis vastutustunnet ja toovad esile meie parimad võimed. Seega võib öelda, et tehnoloogia muudab inimese elu üksluisemaks.

Lõpetuseks

Heideggeri väitel ei ole tööstuslik ja tehnoloogiline mõtteviis ainus võimalus maailmaga suhestuda. Selle asemel peaksime leidma alternatiivseid viise mõtlemiseks ning elamiseks maakeral. Kuna maailm ei saa eksisteerida ilma meieta, peame teadvustama, et mina ja maailm oleme omavahel seotud. Me peame andma tulevastele põlvedele võimaluse kogeda tähendusrikkaid inimsuhteid ning avastada maailma alternatiivsel moel läbi kunsti, muusika ja poeesia. Meie ühiskonda peaks rohkem kui kunagi varem huvitama vaba ja kriitiline suhtumine tehnoloogiasse. Friedrich Hörderlin ütleb oma kurikuulsas mõttes, et ohu ilmnedes kasvab ka kaitse jõud. Meie olemise ohud tehnokraatses ilmas on ilmselged. Meist endist sõltub, kuidas me suhestume maailmaga ja mõtestame seda tulevikus.

Kirjandusprofessor John David Zuffrini sõnul ei peaks me võtma Heideggeri sõna-sõnalt, vaid kaasama oma maailmavaatesse kunstnike ja poeetide visioone. Nii saame me end kaitsta raamistamise ohtude eest ning siseneda vabasse suhtesse tehnoloogiaga. Sellest mõttest lähtuvalt arvan ma, et selline ongi hoolimine. Nagu kõlas kunagi Apple´i tunnuslause: mõtleme teisiti! **THINKING DIFFERENT!**

Iranian composer and conductor **Arash Yazdani** has studied at Tehran superior conservatory (University of Applied Science and Technology), Royal College of Music in Stockholm, Hochschule für Musik Basel and the Estonian Academy of Music and Theatre (EMTA), earning degrees in piano, double bass, orchestral conducting and composition specialties. In 2012 he started a PhD research in composition at EMTA on "Multiphonics on strings of piano". Some of his previous research papers are awaiting publication ("Music study of the future", a futuristic guideline to improve the current system of music education; "Acoustics and Psychoacoustics on works of Horatiu Radulescu" and "An acoustical approach toward composition").

Yazdani's music is recognized for its emphasis on acoustical phenomena and creating unique auditory experience through the use of instruments.

Arash Yazdani on iraani päritolu helilooja ja dirigent, kes on õppinud Iraani Kõrgemas Rakendusteaduste ja Tehnoloogia Ülikoolis Teheranis (University of Applied Science and Technology), Kuninglikus Muusikakõrgkoolis Stockholmis (The Royal College of Music in Stockholm), Baseli Muusikaülikoolis (Hochschule für Musik Basel) ja Eesti Muusika- ja Teatriakadeemias (EMTA). Aastal 2012 alustas ta EMTAs heliloomingu alast doktoritööd. Ta on peatselt avaldamas mitmeid teadusalaseid artikleid.

Tema loomingut iseloomustab akustilise fenomeni rõhutamine ja instrumentide kasutamisega seotud unikaalse kuulamiskogemuse loomine.

New Music,
Art or Science

Arash Yazdani

It is not uncommon knowledge that the earliest documentation of music, at least the ones that have reached us, was done by scientists. Moreover, no one could deny the fact that music has been studied and defined by mathematicians and academics since very ancient times. Looking at history from Greek antiquity till today it has not usually been the artist who investigated and studied his artwork, and this is probably with good reason. As much as these studies have been crucial and useful, they've proven to be somewhat confusing or in some cases even controversial.

The separated work steps of artist and theorists/scientists have eventually benefited both. This approach greatly affected the conception, understanding and the framework of art – even philosophy.

In the modern days, with new technologies and accessibility of books and written documents, those older documentation became source of study for artists. Thus the way we understand and perceive the music is greatly shaped by the ways mathematicians/scientists or theorists had defined and documented it.

The advances of technology and new science brought about new ideas for composers and artists as well. The physical understanding of acoustical processes advanced rapidly during and after the Scientific Revolution. Galileo Galilei (1564–1642) independently, discovered the complete laws of vibrating strings (completing what Pythagoras and Pythagoreans had started 2,000 years earlier). New knowledge gave a quick and huge impact on redefining the very two foundations of music, intonation and instruments; the birth of a new era, paving the way for invention and improvements of keyboard instruments (harpsichord and piano) that changed the way the music would be for the centuries to come.

The eighteenth century saw major advances in acoustics as mathematicians applied the new techniques of calculus to elaborate theories of sound wave propagation. Alongside providing better equipment, perhaps the first major breakthrough in modern time were the works of Joseph Fourier (1768–1830) and later Hermann von Helmholtz (1821–1894).

The core foundations of what we now call New Music (Neuemusik) is in direct relation with technology, science, mathematics and art. They affect our philosophy of everything, including art. We now are able to think the thoughts that we weren't able to do so, had we not have the science/technology for even imagining them. And vice versa, many artists/composers have provoked advancements in particular fields of science/technology by pushing the boundaries and demanding new means of knowledge in order to define their artworks. In some ways one would say new music is the combination of art and science. Science and technology don't only provide us the tools, they give us new visions and horizons. This paper aims to demonstrate and describe the ways in which science has nourished the art; giving examples of pieces of art that have only been possible with the help of science and examples of how the artistic demands have created new technology or scientific advancements.

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Casa Milà "La Pedrera" ("The Quarry"), 1906-1910. Architect Antoni Gaudí. @ Photo by Veronika Valk 2012

Uus muusika,
kunst või teadus
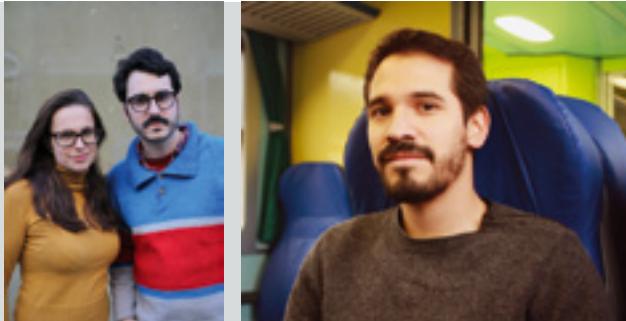
Arash Yazdani
Lühikokkuvõte Piibe Piirma

Kõige varasemad teated muusikast, mis meieni on jõudnud, on loodud teadlaste poolt. Vanade aegade muusikat uurisid ja defineerisid matemaatikud ja akadeemikud, jälgides ajalugu antiikajastust tänapäevani. Seega võime öelda, et kunstnikud ise ei ole väga tihti olnud oma loomingu uurijaiks. Näeme, et kunstnike ja teoreetikute/teadlaste töö on üksteise suhtes olnud eraldatud, ehkki mõlemad pooled on sellesse rohkelt panustanud. See lähenemine on suurelt jaolt põhjustatud kunsti ja filosoofia arenemisest suunas, mis on teadusest eemale liikunud. Tänapäeval on uued tehnoloogiad oluliselt hõlbustanud ligipääsu raamatutele, teadustekstidele, sealjuures ka väga vanadele teaduslikele dokumentidele. Nii on neist allikaist saanud üks uurimisalasid ka kunstnikele, sest viis, kuidas me mõistame ja tajume muusikat, on suurepäraselt kirjeldatud matemaatikute/teadlaste/teoreetikute uurimisdokumentides.

Tehnoloogia ja uue teaduse areng on mõjutanud kunstnike ja heliloojate tegevust ning huvipiire. Teadusrevolutsiooni järgselt arenesid füüsikalised teadmised akustilistest protsessidest. Galileo Galilei (1564–1642) avastas vibreerivate keelte seaduspärad (uurimus, mida Phytagoras oli alustanud juba 2000 aastat varem). See uus teaduslik teadmine lubas ümber defineerida kaks muusika põhialust - intonatsioonid ja instrumendid. See lubas sündida uutel klaviatuuripõhistel pillidel nagu klavessiin ja klaver, mis tulid, et jääda püsima kõigiks järgnevaiks sajandeiks.

XIX sajand on määrava tähtsusega helilainete uurimise ajaloos. Uusi arvutustehnikaid kasutusele võttes uuriti põhjalikult heli levimise seaduspärasid, kuulsaimad uurijad on **Joseph Fourier** (1768–1830) ja hiljem **Hermann von Helmholtz** (1821–1894).

Põhialusteks sellele, mida me tänapäeval nimetame uueks muusikaks (Neuemusik), on tehnoloogia, teadus, matemaatika ja kunst. Need on tegelikud alused, mis mõjutavad meie filosoofiat ja laiemat suhtumist kõigesse ümbritsevasse. Tänu neile suundadele, eriti teadusele ja tehnoloogiale, oleme võimelised mõtlema teistmoodi kui varasematel aegadel. Ka kunstnikud ja heliloojad püüavad neid piire kompida, laiendada ja ületada, et defineerida oma loometegevust või leida uusi unikaalseid suundi. Võib öelda, et uus muusika on kunsti ja teaduse kombinatsioon ja see kombinatsioon ei paku meile mitte üksnes uusi vahendeid, vaid ka uudseid visioone ja horisonte.

Ma esitan oma konverentsikõnes rea näiteid, kuidas teadus ja kunst, sh helilooming on vastasikku üksteist mõjutanud. Toon välja teosed, mis poleks saanud sündida ilma teaduse mõjuta, ja vastupidi - näitan, kuidas loojate püüded on viinud uute tehnoloogiate ja avastusteni.

Varvara Guljajeva & Mar Canet Sola have been working together as an artist duo since 2009. They have exhibited their art pieces in a number of international shows and festivals. The artists were selected for the residencies at IAMAS (Japan), EMARE (FACT, Liverpool), Crida (Palma de Mallorca, Spain), MU gallery (Eindhoven, the Netherlands), Verbeke Foundation (Belgium), Marginalia+Lab (Belo Horizonte, Brazil), Seoul Art Space Geumcheon (South Korea) and more. The artist duo is concerned about the new forms of art. Thus they use and challenge technology in order to explore novel concepts in art. The artists use to embed research into their artistic practice. Varvara and Mar have presented their research at Amber Conference in Istanbul, Enter5 Symposium in Prague, ISEA 2011, Open Knowledge Festival in Helsinki and more.

Varvara is originally from Estonia, gained her master degree in digital media and art from ISNM (International School of New Media in the University of Lübeck) in Germany and currently is a PhD candidate at the Estonian Academy of Arts.

Mar (born in Barcelona) has two degrees: in art and design from ESDI (The School of Design ESDI Barcelona) in Barcelona and in computer game development from University Central Lancashire in UK. In addition to that, Mar is finalizing his master at Interface Cultures in Art and Design University of Linz in Austria. He used to work at Futurelab in Ars Electronica Museum and is a co-founder of Derivart and Lummo.

http://varvarag.info, http://www.mcanet.info.

Sebastián Mealla C holds a BS in audiovisual communication and a MS in cognitive systems and interactive media (CSIM). He is a PhD candidate in the Music Technology Group (MTG) of Pompeu Fabra University (UPF) in Barcelona, and member of the Musical and Advanced Interaction team (MTG-UPF) where the Reactable, a tabletop musical instrument which has gained wide popularity since its presentation in 2005, was developed. Mealla's research focuses on Human-Computer Interaction and Physiological Computing, publishing articles and conducting workshops in Europe and the Americas. In 2008, he received the MAEC- AECID scholarship to pursue his research on neuroscience and HCI at UPF and, since then, has obtained the support of the Ministry of Science and Innovation of Spain (TEC2010) and of Starlab Living Science for the development of Brain-Computer Interfaces for multimodal interaction.

As curator, he has coordinated projects for several institutions, such as the Spanish Agency for International Cooperation (AECID), UNESCO and the University of Girona, The Centre de Cultura Contemporànea de Barcelona (CCCB), Telefónica Fundation, Sonar Festival, among others. Mealla has also collaborated in the organization of several academic and dissemination events, such as the 7th International Conference on Tangible, Embedded and Embodied Interaction (TEI) in Barcelona, the Barcelona Music Hack Day, and the National Short Film Festival "Cortópolis" (Argentina).

Varvara Guljajeva ja **Mar Canet Sola** on kunstnikeduona koos töötanud alates aastast 2009. Nende töid on esitatud rahvusvahelistel näitusel ja festivalidel. Nad on residentidena töötanud väga mitmel pool üle maailma: IAMAS (Jaapan), EMARE (FACT, Liverpool), Crida (Palma de Mallorca, Hispaania), MU gallery (Eindhoven, Holland), Verbeke Foundation (Belgia), Marginalia+Lab (Belo Horizonte, Brasiilia), Seoul Art Space Geumcheon (Lõuna-Korea) jm.

Kunstnikeduo eriline huvi puudutab uusi kunstivorme, nad kasutavad tehnoloogilisi võimalusi leidmaks uusi kunstikontseptsioone. Teaduslikud uurimused on nende loometöö kindel osa..

Varvara ja Mari uurimustöid on esitletud mitmetel üritustel: Amber konverentsil Istanbulis, Enter5 sümpoosionil Prahas, rahvusvahelisel elektroonilise kunsti sümpoosionil ISEA 2011, festivalil Open Knowledge Helsingis jm.

Varvara on pärit Eestist, magistrikraadi kaitses ta Saksamaal rahvusvahelises uue meedia koolis (International School of New Media, University of Lübeck), käesoleval ajal on ta seotud doktriõpingutega Eesti Kunstiakadeemias.

Mar, kes on pärit Barcelonast Hispaaniast, omab ühtaegu nii kunsti ja disainialast (The School of Design ESDI Barcelona) kui arvutimängude arendaja haridust (University Central Lancashire, Inglismaa). Lisaks sellele on ta lõpetamas magistritööd kunsti- ja disainiülikoolis Linzis, Austrias. Ta töötab Futurelabis Ars Electronica muuseumi juures ja on kunstigrupeeringute Derivart ja Lummo kaasasutaja.

Vt http://varvarag.info, http://www.mcanet.info.

Sebastián Mealla C on õppinud audiovisuaalset kommunikatsiooni ja interaktiivset meediat. Ta on Universitat Pompeu Fabra, Barcelona Music Technology Group (MTG) doktorant. Ta kuulub kollektiivi Musical and Advanced Interaction Team (MTG-UPF), kes lõid instrumendi Reactable, mis on alates selle esmaesitlusest 2005. aastal aina enam tuntust kogunud. Mealla uurimistöö keskendub inimese ja arvuti vahelisele kommunikatsioonile ja füsioloogilisele arvutitöötlusele. Nendel teemadel avaldab ta artikleid ning viib läbi töötubasid Euroopas ning Põhja- ja Lõuna-Ameerikas. 2008. aastal pälvis ta neuroteaduse ja arvutikommunikatsioonialase uurimuse läbiviimiseks MAEC-AECID stipendiumi. Alates aastast 2008 arendab Maella Hispaania Teaduse ja Innovatsiooni Ministeeriumi (Ministry of Science and Innovation of Spain) (TEC2010) ja Starlab Living Science toel aju-uuringute tehnoloogilisi liideseid. Ta on kuraatorina juhtinud projekte mitmete institutsioonide juures, nagu näiteks Hispaania Rahvusvahelise Koostöö Agentuur (AECID), UNESCO, Girona Ülikool (Universitat de Girona), Barcelona Kaasaegse Kultuuri Keskus (CCCB), Telefónica Fundation ja Sonar Festival. Mealla on teinud koostööd organisatsiooniga Scinetific Association for Telecommunications Hungary (THE) ja osalenud mitmetel konverentsidel ja festivalidel (7th International Conference on Tangible; Embedded and Embodied Interaction (TEI), Barcelona; Barcelona Music Hack Day; Argentiina riiklik lühifilmifestival „Cortópolis").

NeuroKnitting. First Steps Toward Neuro-Fabrication

Varvara Guljajeva
Co-authors: Mar Canet Sola, Sebastian Mealla Cincuegrani

Abstract

This paper introduces possible implications of physio-logical computing in the field of digital fabrication. To be more specific, the main aim is to describe a new field of digital fabrication that we call neurofabrication.The claims are drawn from the art project NeuroKnitting,[1] which also can be seen as a scientific experiment. Hence we mainly draw from the case study, which is a collaborative project between an artist duo and a scientist (the authors of the paper).

Introduction

When it comes to computer-aided manufacturing (CAM), the recent advances in digital fabrication have promoted low-cost, high-speed and high quality production of physical objects, empowering end-users and non-expert communities.[2] As digital fabrication gets more popular and widespread, a wide new range of services for designing and distribution is emerging, as in the case of the online digital object database Thingiverse.[3] This scenario accounts for new possibilities of manufacturing, making and disseminating objects, where the phenomena that Lipson and Kurman called a factory at home and one-person industries is no longer a vision of the future but a fact.[4] Nevertheless, the production of new content and new fabrication patterns did not advance at the same pace, as most creations are still based on the replication of pre-existent objects.

Our aim is to explore the use of physiological computing as a source of information to create substantially different fabrication patterns, with a concrete focus on Electroencephalography (EEG).[5] This approach, namely neuro-fabrication, presents techniques to process EEG data with the aim of creating personalized, meaningful objects based on the user's brain response to a given experience.

To test this approach, we introduce NeuroKnitting, a first neuro-fabrication implementation that generates garments according to the users' affective responses estimated from EEG measures. Two cases studies are presented, both based on musical stimuli but applying different pattern generation strategies. In addition to music, space as an additional stimulus was applied in the last experiment.

NeuroKnitting

Describing the project, we have plotted brainwave activity into a knitted pattern. Using a wearable, non-invasive EEG headset, we recorded users' affective states while listening to Bach's Goldberg Variations, concretely the aria and its first seven variations in our first experiment. The audio was about 10 minutes long and we down sampled each second of the signal coming from the 14 channels of the EEG device. Three main features were measured: relaxation, excitement, and cognitive load. After recording, those features were converted into a knitting pattern. Hence, every stitch of a pattern corresponded to a unique brain state stimulated by the act of listening. It means the user's affective response to music is captured every second and memorised in the knitted garment pattern.

Concerning the reason for applying music as a stimulus, it is one of the most powerful mood inducers, provoking immediate affective reactions that can be deduced by looking at human physiology, as in the case of brain cortical activity[6]. These affective states, that are implicit to every human being, can be measured through EEG technology. By applying this technique, it was possible to create unique patterns coming from a unique human's traits. It other words, the result was a personalized and implicit knitting with context and message.

In the second experiment we used music by Mozart and also live music input, like jazz improvisation and rap music. During the second session of the project besides musical input we experimented with space, too. The intention was to figure out whether a new factor could somehow have an effect on the brain state.

The EEG correlate of relaxation, engagement and cognitive load was recorded while the users were listening to the musical pieces. This information was later sent to the Knitic framework to create a bicolour pattern for knitting[7].

The knitted garments picture the listener's affective and cognitive states during the experiment. It is a way of making tangible the implicit the states of users and visualizing them in an original way as a large and personal data footprint.

Conclusion

NeuroKnitting represents a novel way of personal, generative design and fabrication. An approach that brings together affective computing and digital crafts. It shown to be capable of adapting knitting patterns according to three high-level EEG features: relaxation, excitement and cognitive load. We have tested this framework using musical stimuli, which came to be a powerful source of affective evocation, and an excellent candidate to carry on EEG recordings out of the lab. Thus, it offers new applications and creative thinking to both areas. Moreover, NeuroFabrication is quite a unique approach towards CAM because it talks about application of physiological data for design purposes rather than for the purpose of technique or machines.

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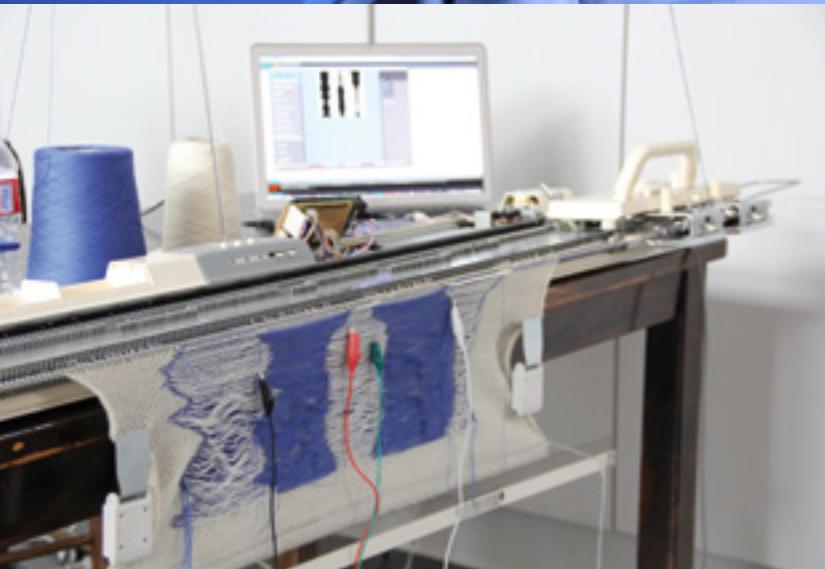
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NeuroKnitting[1] © Photo by Sytse Wierenga, 2013

NeuroKnitting
Esimesed sammud neurotootmise suunas

Varvara Guljajeva
Co-authors: Mar Canet Sola, Sebastian Mealla Cincuegrani
Lühikokkuvõte Piibe Piirma

Sissejuhatus

Kui rääkida arvutipõhisest tootmisest (*computer-aided manufacturing,* CAM), siis on tänapäeva märksõnadeks tootmise kiirus, odavus ja lõppresultaadi kõrge kvaliteet. Digitaalne 3D-printimine on aina laienev tootmisviis, mis lubab toodete lõppkasutajail, sh mitteprofessionaalidel tootmise protsessis ja hüvede loomisel ise osaleda (vt lisaks digitaalsete objektide andmebaasi http://www.thingiverse.com). H. Lipson ja N. Kurman kutsuvad seda tootmisviisi „koduvabrikuks" või „ühe-mehe-tootmistehaseks" ja see ei ole sugugi mitte kauge tulevik, vaid meie faktiline olevik.

Siiski, uue ideestiku või uute objektide loomine ning tootmismehhanismid ei arene võrdse kiirusega, sest suur osa loodavast põhineb olemasolevate objektide taastootmisel. Autorite idee on uurida füsioloogilist arvutitöötlust, mis on senise tootmise põhimõtetest erinev ja keskendub teadusharule, mille nimeks on elektroentsefalograafia (Electroencephalography, EEG).

Uurimus, mida autorid nimetavad neurotootmiseks, esitleb EEG-tehnoloogiat, mille abil võiks luua isikustatud objekte, mis põhinevad kasutaja ajuimpulssidel. „NeuroKnitting" projekti sisuks on rõivaste dekoreerimine mustritega vastavalt kasutajalt saadud informatsioonile. Kaks näidet põhinevad muusikaliste stiimulite esitamisel, kummalgi juhul on objektide loomise strateegiad pisut erinevad. Viimases eksperimendis on väga oluline roll ka ümbritseval ruumil.

„NeuroKnitting"

Kunstiprojekti loomisel kasutatakse spetsiaalset aju-uuringuteks loodud EEG peakomplekti – ajulainete graafikud joonistatakse ümber nii, et jooniseid saab kasutada mustri kudumiseks. Inimesele, kes seda peakomplekti kannab, esitatakse Johann Sebastian Bachi muusikat („Goldbergi variatsioonid"). Tulemused, mida mõõdetakse, on lõõgastumise ja põnevuse tase ning üldisem kognitiivne koormus. Iga aju aktiivsuse hetk salvestatakse kootavasse mustrisse.

Miks kasutada inimese ajukoore aktiviseerimiseks muusikat? Sest see on üks kõige võimsamaid impulsiivse meeleolu esilekutsumise võimalusi – muusika tekitab vahetuid reaktsioone, mis tulenevad inimese füsioloogiast ja ajukoore aktiivsusest. EEG-tehnoloogia abil on võimalik saavutada unikaalseid jooniseid, mis on ainuomased ühele kindlale isikule, kootud tulemus kannab seetõttu väga isiklikku sõnumit.

Teise eksperimendi puhul on lisaks Mozarti muusikale kasutatud nüüdismuusika vorme: jazzi ja räppmuusikat. Siin lisati muusikale aga ka ümbritsevast ruumist saadavad impulsid, sest sooviti teada saada, kas lisainfol on aju olekutele lisamõju.

Kokkuvõtteks

„NeuroKnitting" tõlgendab personaalse info kasutamist disainis ja tootmises uutmoodi. See on uurimus, mis toob omal moel kokku tunnete ja meeleoludega seotud neuroloogilised uuringud ja digitaalsed loomeprotsessid. Projekti eesmärk on mõõta EEG-tehnoloogia abil inimese lõõgastumise ja põnevuse taset ning üldisemat kognitiivset koormust. Katsealuse isiku ajukoore aktiivsuse stimuleerimisel kasutavad loojad muusikat, mis on nende arvates inimese meeleolumuutuse üheks olulisemaks stiimuliks.

Neurotootmine pakub autorite hinnangul mitmeid erinevaid suundi nii kunsti kui ka teaduse vallas. See on samm edasi arvutipõhise tootmise (CAM) valdkonnas, sest siin ei saa rääkida üknes tehnoloogiast või masinast, vaid süvenemisest inimese füsioloogiasse ja isiklikku olemusse.

Ulrich Gehmann (Dipl Biol. et lic. oec. HSG et MA history, studied biology, business administration and history, receiving an education in the humanities. He worked in industry and international consulting, the latter covered enterprise reorganization and institutional cooperations, many of them funded by international donor agencies (IMF, World Bank, etc), in former GUS, Central Asia and the Middle East. Director in charge for management consulting in Bucharest, Romania. Lecturer at Wuppertal University, Germany, for business administration. Founder of the research group formatting of social spaces, and of the journal New Frontiers in Spatial Concepts, University of Karlsruhe (KIT), Germany. Publications on occidental mythology and its impact on recent sociocultural reality, spatial issues, and virtual worlds, inter alia at Oxford University Press. Museum projects. Lecturer at Karlshochschule International University, (cultural issues of organizations); partner in a German consulting firm active in the EU and European Commission, founding member of the Subformat Research Group.

Ulrich Gehmann on õppinud bioloogiat, ärijuhtimist ja ajalugu. Ta on töötanud rahvusvahelise ja ärialase nõustamise alal ning on olnud suure rahvusvahelise konsultatsioonigrupi direktor Rumeenias. Tema pädevusse kuulus institutsionaalne koostöö, ärijuhtimine ning regionaalareng, seda peamiselt Ida-Euroopas, Venemaal, Põhja-Aafrikas ja Kesk-Aasias. Alates aastast 1996 on ta partner konsultatsioonifirmas, mis töötab Euroopa Komisjoni heaks.

Ulrich Gehmann on rahvusvahelise juhtimiskooli õppejõud ning töötab ühtlasi Karslruhe ülikoolis. Ta juhib kultuuriuuringute töögruppi Karsruhe ülikooli ajaloo osakonnas ja on ruumi küsimustega tegeleva ajakirja peatoimetaja. Ta on juhtinud veel mitmeid erinevaid uuringuid, näiteks projekti, mis tegeles evolutsiooni kui protsessiga ja mida toetas Baden-Würtembergi teadus- ja kultuuriministeerium.

World Mountain Machine,
and the Role of History

Ulrich Gehmann

Today, we have lost our faith in the power of history. Although we still tend to believe that we are the result of something that happened earlier, before us, and happened somehow, leading to our present state of being, we firmly believe that we became more or less independent from it. We accept we are the product of history, of course, but feel we somehow managed to escape it, by relying on our own achievements – that we outperformed all what has been before, in particular with regard to achievements of a technological nature? That we have today become truly independent from history's chains, in having the possibility of being really individualistic, i.e. self-destined? Compared to earlier epochs, the impact of history seems to have weakened today, is not as relevant for us as it was for the epochs before us. This is one of our basic assumptions prevalent today, in the context of a present which resembles histories' on-going course.

On top of that, we know that history does not exist but is a construction, that is, finally dependent on its individual observers and investigators. *The* history does not exist, only its interpretations. Thus, history becomes a cultural good, an artefact which is specifically moulded for, and inside certain epochs of history again: 'the' history looked different for people in the 19th century than it does for us, seemed to be driven by other forces than ours is. It led to another present basic assumption about history, namely that it is an *open* history, a matter of contingency and not of clearly visible lines of development. Nevertheless, we have to interpret history (whatever it might be) in terms of such lines, because otherwise, we would lack orientation. As a cultural good, history generates meaning, first of all via orientation: in order to understand ourselves, we have to draw a line

of development that helps to *distinguish* ourselves from that what has been so far. We want to comprehend what makes us unique, in comparison to former times. At the same time, history also means the future. This again presupposes some lines of development to be drawn, based on our present state: what will happen in which directions *if* our present state can be characterized as … ? And again, such a process of prolongation – which history is: from the past to the present, to the future – needs some assumptions on the base of which we can do so.

All in all, we are confronted with lines of development, making up history as a process; and alongside with it, with sets of assumptions that we interpret as characteristic for certain historical epochs. And the very notion of an 'epoch' presumes some patterns (or lines) of development because otherwise, we couldn't speak of epochs at all – of distinctive evolutionary levels, one could say, making up a certain culture, life style, way of being. So, what is history as a process when at the same time, it is the sole subject of (a finally) individual interpretation? Very important in these regards are not only basic assumptions upon which such interpretations rest, but also **symbols**, adopting the shape of lead metaphors and -artefacts which act (not merely *serve*) as guiding images of how to conceive, and at the same time, of how to position ourselves inside history. Due to their imaginative and explanatory power, those symbols mostly possess a mythological character, leading our perceptions of the historical, in all of the three dimensions any 'history' has – past, present, and future. In themselves, they are powerful patterns of interpretation – e.g., interpreting a Sumerian ziggurat as a symbol for the world mountain, i.e. the cosmos – as well as they embody the products of a historical development.

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Symbolic Space. Laon Cathedral, interior
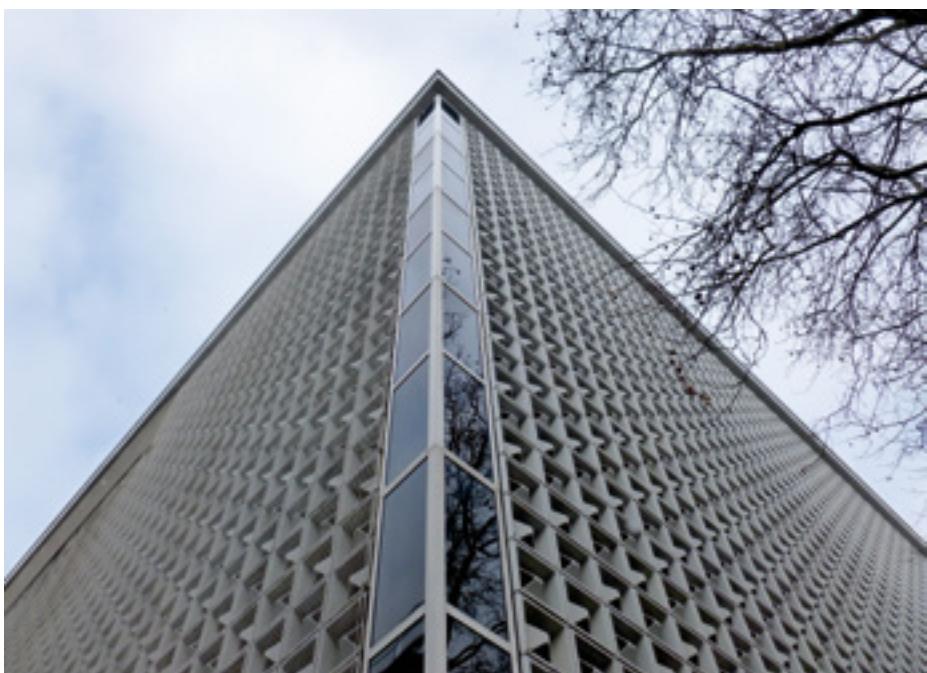*© Photo by Ulrich Gehmann*

Gestalt and Identity. Santa Maria Maggiore, Rome, floor mosaic.
© Photo by Ulrich Gehmann

World Mountain as Teleological Cosmic Order.
Reims Cathedral, main facade.
© Photo by Ulrich Gehmann

Gestalten and Forms: Facade of a shopping center with tree, Pforzheim, Germany © Photo by Ulrich Gehmann

„Maailmamäemasin"
ja ajaloo roll

Ulrich Gehmann
Lühikokkuvõte Piibe Piirma

Oleme tänapäeval kaotanud usu ajaloo jõudu. Isegi kui me usume, et meie olemine on varem toimunu tulemus, siis peame oma olemist sellest üsna sõltumatuks. Kas me võime sellise individualistliku suhtumise üheks põhjuseks pidada teaduslikke ja tehnoloogilisi saavutusi? Võrreldes eelevate ajalooeppohhide ja nende mõjuga on side ajalooga tänapäeval oluliselt nõrgenenud.

Väga levinud on suhtumine, et ajalugu on konstruktsioon, mis on loodud vaatlejate ja uurijate interpretatsioonide põhjal. Nõnda saab ajaloost subjektiivne kultuurihüve ja see juhib meid järgmise arvamuse juurde, mille kohaselt ajalugu on avatud, olles sõltuv juhustest ja tõenäosustest, milles on raske kindlaid arenguliine jälgida. Leian, et teatud liinide jälgimine on oluline orientiiride säilimise seisukohalt. Selle läbi suudame mõista ka oma unikaalset olemust, mis meid eelnevatest aegadest eristab.
Teisalt tähendab ajalugu ka tulevikku ja see eeldab samuti teatud piirjoonte arendamist, mida me saame teha vastavalt meie käesolevatele teadmistele ajast ja ajaloost.

Seetõttu oleme silmitsi ajaloo kui protsessi käsitlusega, milles me peame ka võimaliku tuleviku kaardistamise teatavaid ajalooliste etappide iseloomulikke jooni ja evolutsioonilisi arenguid silmas pidama.

Kuidas ajalugu kui protsessi käsitleda nii, et see ei oleks pelgalt subjektiivne individuaalne tõlgendus olnust? Olulised ei ole mitte üksnes eeldused ja lähtekohad, vaid ka sümbolid, metafoorid ja artefaktid, mis annavad meile vastuseid, kuidas end ajaloos positsioneerida. Sümbolite kujutluslik ja seletav jõud on ühelt poolt küll mütoloogiline, teisalt annab meile kätte „võimsad mustrid" tõlgendamaks minevikku, olevikku ja ka tulevikku. Olgu näitena välja toodud sumerite tsikuraat, mis võiks olla maailma mäe üheks sümboliks, ja ka kosmos, mis võiks meie ajaloolist arengut kõige laiemalt iseloomustada.

Vaata ka kunstiteose „World Mountain Machine" kirjeldust lk 145. Autorid Martin Reiche ja Ulrich Gehmann.

Natalie Tyler received her MFA from California College of the Arts. She is a sculptor and international curator. As the Artist-in-Residence at Cornell University, 2011-2012, she was awarded the Cornell Council of the Arts grant to curate LUX-Art and Science Exhibition. Her work has exhibited in New York, California, Ireland, London.

Natalie Tyler omandas kunstimagistri hariduse Kalifornia kunstikolledžis (*California College of the Arts*). Ta tegutseb skulpori ja rahvusvahelise kuraatorina. Aastail 2011–2012 töötas ta residendina Cornelli Ülikoolis Ameerikas (*Cornell University, New York*), kus ta ülikooli kunstistipendiumi toel korraldas rahvusvahelise näituse LUX – Art and Science Exhibition.
Tema teoseid on esitatud väga mitmes paigas maailmas: Ameerikas (New York, Kalifornia), Iirimaal, Inglismaal (London).

Metamorphosis
of the Art and Science Exchange

Natalie Tyler

Nature has always been fascinating to me, and not just from an aesthetic perspective, but also from my curiosity about how nature works. Simply put, if art is about how it looks, science would be about why it works, and engineering would be about how to make it work.

My initial inspiration for creating Diapause - the interactive installation of cocoons, was to explore of the power of transformation. The cocoon is a metaphor for the internal metamorphosis we, as human beings, experience during life-stage changes. I wanted to create a living environment that breathes, reacting to the viewers' moment of perception. After several years of experimentation using different materials to make the cocoons, I found that using natural materials was the most successful. After discovering this, I knew that I would be able to make the cocoons look the way I had envisioned, but I still had a challenge: how could I make the cocoons DO what I wanted? The cocoons needed to be lit and interactive with the viewer without feeling mechanical. I would need to collaborate with a lighting engineer to achieve the desired effect, someone with the know-how to create interactive lighting systems.

The creation of this project thus taught me several things: as an artist, I have vision, the potential to see what something looks like before it is created; as a sculptor, I have the ability to use my hands to make my visions a reality. I discovered, though, that being able to take my work to the "next level" would involve a different knowledge, than I had learned at art school or from art books, or even other artists. I realized I needed to leave the comfort of the art discipline, and discover the potential of collaboration across disciplines. I began to wonder, what if you put a group of scientists, artists and engineers together in a room – what would they talk about? If you exposed scientists to contemporary visual art, what would they think of it? If artists saw some of the discoveries scientists are currently making, how might this influence their art?
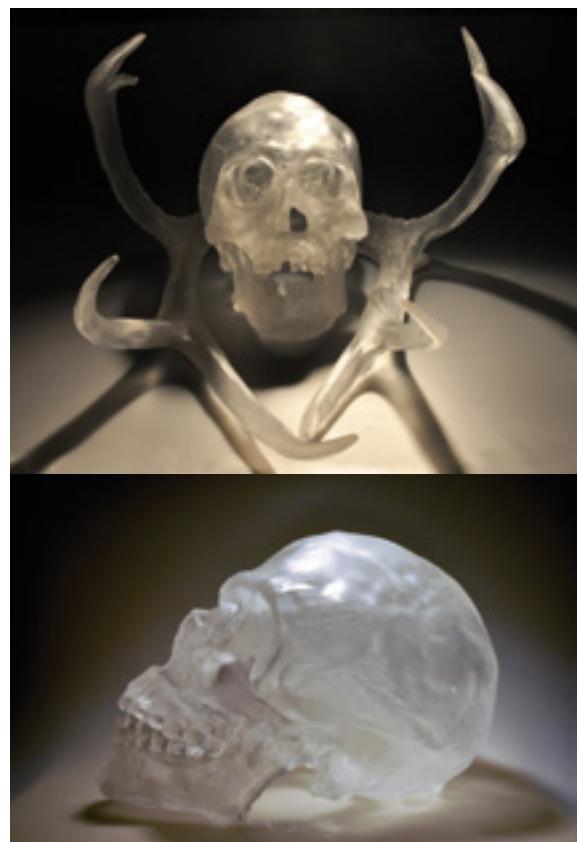
These questions became the basis for the exhibition and symposium I created while I was artist-in-residence at Cornell. I was awarded a grant to curate a major art and science exhibition at Cornell exploring innovations in light called "LUX". The exhibition provided me the opportunity to organize a symposium that became a platform for seven of Cornell's top scientists to present their innovations in light, and for seven international artists to exhibit their light installations. My symposium featured a Nobel Prize winning chemist and a computer engineer who had won the MacArthur Award. The artists were from Ireland, Japan, Italy, Denmark and the US. Beatrice Pediconi, a participating artist from Italy, explores video and photographic images. Pediconi's art explores paint moving through water, recreating what happens to mass in a weightless environment such as the deep sea or in the universe. When Professor James Morin who studies the mechanisms of bioluminescence in marine organisms, saw Pediconi's digital prints, he found one of the images to be remarkably related to a deep sea bioluminescent organism he had researched.

Before the LUX event, Cornell's art department had decreased from fourteen full-time faculty to nine; after LUX, the chemists were asking for drawing classes,

and one of the biologists is planning to teach a course called "Vision and Art: the Biology of Seeing". The interdisciplinary interface that resulted from LUX confirmed my early sense of the potential connection inherent in science, visual art and engineering.

Scientists seek to find ways to communicate their discoveries to the public; artists search to create art that demonstrates significance and depth. We know that Da Vinci, for example, was a polymath (from the Greek: "having learned much"), an individual "whose expertise spans a number of varied subject areas, a person who draws on complex bodies of knowledge to solve specific problems". Da Vinci was that individual–a painter, sculptor, architect, musician, mathematician, engineer, inventor, anatomist, geologist, cartographer, botanist, and writer.

When artists enter their studios it is similar to scientists entering their labs. Both go in with intentions–the artist to create and the scientist to prove, by experiments, innovations, and discoveries. The disciplines in education and in life have been compartmentalized for a long time. Originally, universities were set up to allow students to receive well-rounded educations, and only then to specialize in a discipline. There is a pressing need now in education for specialists to begin exchanging their knowledge and collaborating. Establishing dynamic exchange among art, science, technology and other disciplines can create limitless and unimagined possibilities.

© Natalie Tyler, 2014

Diapause Installation © Natalie Tyler, 2010

Kunsti ja teaduse vaheline metamorfoos

Natalie Tyler
Lühikokkuvõte Piibe Piirma

Loodus on mind alati paelunud, mitte üksnes selle esteetiline olemus, vaid ka looduse toimemehhanismid. Lihtsustatult võib öelda, et kunst näitab, kuidas loodus välja näeb. Teadus uurib, miks need mehhanismid toimivad ja inseneeria näitab, kuidas need töötavad.

Minu algne inspiratsioon interaktiivse installatsiooni Diapause loomiseks tuli soovist uurida ümberkujunemise võimet looduses. Kookon oli minu jaoks kui metafoor muutumisele, moondumisele, mis toimub meie, inimestega, meie elu jooksul. Ma soovisin luua elusorganismi, mis hingab ja reageerib näitusekülastajate liikumisele.

Mõne aasta jooksul kookoneid luues ja materjalieksperimente tehes sai selgeks, et naturaalsete materjalide kasutamine oli selleks parim. Samuti sai mulle selgeks, et oma esialgseid visioone ma täide viia ei suuda, kuid mind huvitas, kuidas luua kookoneid, mis oleksid valgustatud ja interaktiivsed, nägemata välja liiga mehhaanilised. Pidin leidma valgusinseneri, kes aitaks teostada minu eesmärki, aitaks mul luua interaktiivset valgussüsteemi.

Selle projekti loomine nõudis minult kui kunstnikult visiooni objektist, mida ma looma hakkan, ja minult kui skulptorilt võimet realiseerida oma visiooni materjalis. Avastasin sealjuures, et oma töö järgmisse etappi viimiseks pidin kasutama ka täiesti uusi ja senisest erinevaid teadmisi, mida ma ei olnud õppinud ei kunstikoolis ega ka teistelt kunstnikelt. Pidin kunstniku mugavustsoonist väljuma ja uurima erinevate valdkondade võimalusi. Mind hakkas huvitama mõte, mis juhtub siis, kui ma kutsun ühte ruumi kokku grupi teadlasi, kunstnikke ja insenere. Millest nad võiksid vestelda? Kui teadlastele näidata kaasaegset kunsti, mida nad sellest arvavad? Kuidas mõjutavad teadlaste avastused kunstnike tegevust?

Need küsimused said aluseks näitusele ja sümpoosionile, mille ma korraldasin Cornelli instituudis Ameerikas (2011–2012). „LUX" oli näitus valgusest ja teadusest, selle sündmusega kaasnes sümpoosion, kus astusid üles seitse juht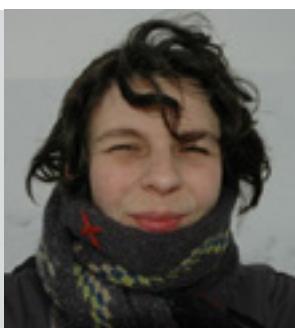ivat teadlast ja seitse kunstnikku. Teiste hulgas osalesid ka Nobeli preemia saanud keemik ja kõrge MacArthuri autasu võitnud insener.

Osavõtjaid oli Iirimaalt, Jaapanist, Itaaliast, Taanist ja Ameerikast. Näiteks itaalia kunstnik Beatrice Pediconi, kes läbi video ja fotograafia uuris värvi liikumist vees, püüdes ilmestada mõtet massi liikumisest kaaluta keskkonnas sügaval vees või universumis. Professor James Morin, kelle erialaks on bioluminestsentsi uurimine mereorganismides, märkis, et mõned Pediconi loodud digitaalsed fotod sarnanevad tema vetesügavustest leitud organismidega.

Enne „LUX" sümpoosiumi ja näituse toimumist elas Cornelli ülikool läbi üsna valuliku osakondade koondamise. Nüüd tekkinud elav teadlastepoolne huvi kunsti suunal ja vajadus interdistsiplinaarse õppe järele kinnitas minu varasemat veendumust, et teadlaste, inseneride ja kunstnike koostöös on potentsiaali.

Teadlased otsivaid teid, kuidas oma teadustööd ja avastusi laiemale publikule edastada; kunstnikud otsivad teemasid, mis näitaks nende pühendumist ja sügavat mõtlemisvõimet. Me teame, et Leonardo Da Vinci oli mitmekülgne õpetlane ja teadlane. Tal oli teadmisi väga mitmest valdkonnast. Ta oli inimene, kes toetus konkreetsete probleemide lahendamisel oma laialdastele teadmistele. Ta oli maalija, skulptor, arhitekt, muusik, matemaatik, insener, leiutaja, anatoom, geoloog, kartograaf, botaanik ja kirjutaja ühes isikus.

Kui kunstnik astub oma ateljeesse, sarnaneb see teadlase sisenemisega laboratooriumi. Neil mõlemal on kindlad eesmärgid - esimesel loomine, teisel eksperimenteerimine, tõestamine, uue avastamine. Hariduses ja elus on erinevad valdkonnad olnud pikka aega eraldatud. Ülikoolides on olnud eesmärgiks tudengitele anda haridus ja spetsialiseerumine teatud valdkondlikke piire jälgides. Tänapäeval püütakse aina enam leida võimalusi teadmiste jagamiseks ja koostööks. Dünaamiline teadmiste vahetamine teaduse, kunsti, tehnoloogia ja teiste valdkondade vahel annab meile piiritud ja kujuteldamatud uued võimalused ja suunad.

Rosanne van Klaveren, Master of Fine Arts, Master in Cultural Studies, PhD-student, Media, Arts and Design Faculty, KU Leuven, Belgium. Supported by ADAPT-r program.

As a media artist, **Rosanne van Klaveren** focuses on participatory practices and circumpolar cultures since she graduated in Autonomous Art (HKA, NL 1999) and Photography (Post-St.Joost, NL 2001). She started her doctoral research and became a Marie Curie Research Fellow within the ADAPT-r program at EAA (EE) after she graduated magna cum laude in Cultural Studies (KU Leuven, BE 2009). Since 2007 she lectures at the MAD-Faculty (BE) where she is a member of the Social Spaces Research Group.

Rosanne van Klaveren's focus is on the possibilities of artistry, creativity and new media to create a temporary feeling of togetherness during participatory practices. During many years of community art practice van Klaveren frequently experienced the burden of distance when working in communities as an outsider. Such distance is not beneficial to the collaboration, or to the end results. She therefore researches how shared media use can build a metaphorical bridge in between the "us" and "them", as a creative space for expression. Because the us-and-them dichotomy is much clearer among indigenous communities, van Klaveren has conducted this research mainly through the realization of two projects which concern the Arctic people: an online platform with a focus on Arctic food, and an interactive roadmovie.
http://www.foodrelated.org
http://www.nivatonenets.org
http://adapt-r.eu

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Rosanne von Klaveren keskendub oma töös osaluspraktikatele ja polaaralade kultuuri uurimisele. Ta on õppinud kunsti ja fotograafiat Hollandis ning kultuuriuuringuid Belgias Leuweni ülikoolis. Praegusel hetkel teeb ta doktoritööd Marie Curie uurimisprogrammi teadurina ADAPT-r programmi toel Eesti Kunstiakadeemias. Ta loeb loenguid Belgias (*MAD-Faculty*) ja on sotsiaalruumi uuringute grupi liige (*Social Spaces Research Group*).

Rosanne van Klavereni huvitab see, kuidas kunsti, loovuse ja uusmeedia abil jõuda koosolemise ja ühisloomeni. Ta on aastaid katsetanud kollektiivse või kogukondliku loome vorme ja sageli kohanud võõristamist, töötades mõnes kauges asupaigas külalisena, võõrana, väljastpoolt tulijana. Eemaloleku tunne ei soodusta koostööd ega tule tulemustele ilmtingimata kasuks. Nii on ta asunud otsima viise, kuidas nn jagatud meedia abil ehitada mõttelisi sildu „meie" ja „nende" vahel. Tema eesmärgiks on luua sildu kui loova väljenduse ruumi. „Meie" ja "nende" lahknevus on eriti ilmne põlisrahvaste seas. Klaveren on käsitlenud seda teemat oma kahes Arktika projektis: arktilise toidu veebiplatvormi ja interaktiivse *roadmovie* kaudu.
Vt www.foodrelated.org; www.nivatonenets.org; http://adapt-r.eu.

Wolf Within
Should artists conducting academic research wear sheep' clothing?

Rosanne van Klaveren

In recent years, many universities have opened their doors to artistic research and invited artists to conduct doctoral research. As I combine my art practice with a teaching job at the LUCA School of Arts in Belgium, associated with University of Leuven, I was asked to step into one of these pioneering programs too. With great enthusiasm, because new challenges and possibilities to gain knowledge have always attracted me, I became a part-time doctoral student in 2009. Today, almost one year before my PhD defense, I am looking back at a fascinating but sometimes also troubling adventure. In this short paper I am sharing some of my challenges, in order to inspire reflection on adaptations an artist should or should not endure when conducting academic research. Through the allegorical idiom of a wolf in sheep's clothing I am questioning to which extent artists should adjust to the prevailing academic traditions.

The wolf, as a species, departs from strong intuitive intelligence and is not afraid to experience and expose raw energy. Wolves are capable of maintaining a high amount of individuality within social ties, and always long for freedom. In these characteristics I recognize aspects of my own persona, or at least it reflects how I wish to see myself. In particular the young loner that has left its pack to explore new territories, possibly to form a new pack, feeds my imagination. As an artist I have often felt attracted to fields beyond the ones that are common in art. For example circumpolar cultures, technology and biology have inspired me greatly and influenced my art

practice positively.[1] Thus, when our university's doctoral program was introduced to the teachers of my faculty, I was easily excited. My motivation to enter the program was not driven by thoughts of grass being greener elsewhere, but by a wish to explore new fields. These new territories, situated in a world called academia, seemed suitable for some projects that I wished to work on for a couple of years already. Once enrolled, I focused my research on the position of artists working with participatory practices, with two projects as case studies. As an outsider to the communities I am working for and with, I am very interested in how creative practices, often combined with media use, can create a temporary feeling of togetherness. During participatory practices, the act of expression and shared activity can build a metaphorical bridge where people can meet in the middle: in the between. My desire to build bridges and my search for artist' positions, within the structures of doctoral research, brings me back to wolves. Although I am aware of the fact that many people consider wolves to be vicious predators, and even use this allegorical image to nickname over-ambitious and egocentric colleagues, I choose wolves to visualize and illustrate some of my experiences as an artist in academia. I realize that this metaphor can sometimes be a bit provocative, but I never aimed to complain, blame or offend. Although comparisons are in general never waterproof, they can get closer to the essence. Just like storytelling, metaphors can reach a truth more creatively or even artistically. Which is, as I believe, more appealing to and for artists.

In my romantic imagination, wolves symbolize independent artists. Consider a highly sensitive creature with a strong urge to follow its instinct. Consider its natural habitat, the wilderness. Wolves can survive in zoos and wild parks, even breed with dogs, but "the heart of the wolf and the heart of wilderness can never be managed" (Busch, 1995). I imagine that the knowledge of wolves, not about wolves, is wild and hard to manage too, because it derives from intuition. Just like artistic knowledge, in its core, it is not easy to be put into words or schemes. Skills can be taught in practice, by trail and error and by watching others. But the visualizing of either the catch of prey or the creation of an artwork is something else. When Tim Ingold compared artists with hunters, he paralleled their capability of dreaming before encountering. It is all about "capturing the insights of an imagination always inclined to shoot off into the distance, and on bringing them back into the immediacy of material engagement" (Ingold, 2013-73). Also Heonik Kwon underpins the hunting parallel. When endeavoring to turn his students into good hunters, he taught them to "follow the movements of beings and things, and in turn to respond to them with judgement and precision. They would discover that the path to wisdom lay in this correspondence, not in an escape into the self-referential domain of academic texts" (Ingold, 2013-11).

In contrast with the intuitive, dreamlike essence of artistic knowledge, we can consider contemporary western scientific knowledge to be a domesticated kind of knowledge. The academic world breeds its own professors and harvests its own knowledge that grows from them. This knowledge is farmed in a protected environment, in and around the universities of academia. Unlike the wilderness, protected places always come with rules and restrictions. Academic knowledge is therefore very structured and needs to follow certain standards in order to fit in. This often makes it strict and exclusive. Although intuition and dreams can benefit scientists, the act of conducting academic research is usually cognitive and objective. The more we understand academia's need for borders and regulations, the more revolutionary we can consider the fact that many universities have opened their doors to artistic research. Besides some pressure from the Bologna Declarations, motivation can be found in the value of exchange and interdisciplinarity for generating and extending (new) knowledge. Inclusion of artistic knowledge within the current rules and regulations, however, can be troublesome. The relationship between artistic research and academia is yet uneasy and far from settled (Borgdorf, 2012). This brings me back to wolves, wilderness, and the domesticated.

There once was a time that wolf populations flourished in Western Europe, without forming a real threat to the livestock of farmers. But the approach towards wolves and also their habitat changed during the middle ages, when human populations were growing and Christianity started to flourish. Since then, the habitat of wolves was considered the anti-pole of the domesticated. From Christianity, the notion of wilderness derived, being a threatening evil opposite of the divine (Pluskowski, 2006). Wilderness was either destroyed, conquered, or –in the best cases – neglected, just like the pagans or heathens. Wolves were portraited as evil beasts, stigmatizing the species as an allegory for the Devil himself, as we can read in this Medieval Bestiary entry:
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"The wolf represents the Devil because he continuously watches Mankind with an evil eye and circles the sheepfold of faithful Christians, seeking to corrupt and destroy their souls. ... The fact that the wolf's strength lies in its forequarters rather than hindquarters also signifies the Devil, formerly an angel in heaven, now an apostate in hell. The wolf's eyes shine in the night like lamps because the Devil's works seem beautiful and wholesome to blind and foolish men. The she-wolf catches food for her cubs far from her lair because the Devil provides those whom he is certain will suffer punishment in hell with worldly goods. ... The fact that he cannot turn his neck without turning his whole body signifies that the Devil never turns towards correction through penitence."
Aberdeen Univ. Lib. MS 24, ff16v-18r

This is how Christianity approached and stigmatized wolves – an image of fear that is nowadays still common. Another image comes from Little Red Riding Hood, a fairy tale in which both the Big Bad Wolf and the wilderness symbolize luring danger. Probably the earliest version was told by French peasants in the 10th century (Berlioz, 2005-63). In some 14th century versions the story ends when the wolf eats the little girl, after she gets into bed with him (Darnton, 1985). The fairy tale may also serve as a metaphor for sexual awakening, as in Angela Carter's version "The Company of Wolves", in which the red hood symbolizes menstruation. In her version of the world-famous story, Carter writes:
"Those slavering jaws, the lolling tongue; the rime of salvia on the grizzled chops – of all the teeming perils of the nights and the forest, ghosts, hobgoblins, ogres that grill babies upon gridirons, witches that fatten their captives in cages for cannibal tales, the wolf is worst for he cannot listen to reason" (Carter, 1995-110).

Many other European stories formed propaganda against wolves. Competition partly explains this ancient hatred, because a pack of wolves can kill over a hundred sheep in one hour (Micklethwait, 2012). Being hunted and raided intensely, wolves disappeared in Western Europe around 1900 (Mech & Boitani 2003), but today they are on their return. Despite the ancient hatred and negative propaganda, many people cherish the recent comeback. Reintroduction programs of wolves in the United States taught us that wolves have a positive impact on their environment in keeping the populations of prey animals strong while creating conditions for more diversity (Maughan, 2006). But in Western Europe, where wolves are returning naturally, it seems to be another reflection on wolves that forms the surplus. The common attitudes to nature moved from utilitarian to romantic, and as representers of the lost wilderness wolves became the antithesis to civilization (Micklethwait, 2012).

With interest I have been following discussions related to this comeback, with all its pros and contras, and to my great amusement I see some similarities in discussions about the option for artists to conduct doctoral research. For example, I once sensed similar fear among a group of academians. They were worried. If practice based PhDs become a common thing, they argued, their own academic grade will remain less valuable. They obviously feared for their own position, and expressed doubt on the weight of a practice based thesis – which they could hardly take seriously. But also within groups of artists I sensed concern, often also

defiance. Their threats contained demolishment of the essence of art, which in their opinion is not academic in character. Artists conducting academic research were even considered "less" artist, or not "true artists". In comparison to the comeback of wolves, can we perhaps speak of a comeback of arts towards science, as it was previously more merged, for example before and during the Renaissance? To which extent is the "wildness" of art then a threat or a romantic surplus to the domesticated world of academia? And to which extent is a merge with science a threat to the "wildness" of art itself?

Although we can find many similarities between artists and scientists, the kinds of knowledge and practices in which artists are usually engaged, often differ greatly. It are mainly these differences that create challenges. For example, artistic knowledge is not limited to mental and intellectual activities, while academic writing structures lack flexibility for creative expressions. Artistic research, although it is also categorized as research, may include practices or methodologies that are not necessarily academic. Artists obviously have always conducted research, for example in gaining knowledge about their materials, tools, techniques, or subjects. These kinds of knowledge, however, only become academic when it is gained and structured in a certain way – the western scientific way – a way that has dominated our knowledge system for so many years already. The strict rules and inflexible frameworks of academic tradition can oppose artists. For example, one often should have sufficient publications in A-level journals before one can apply for research funding, whereas the scientific journal ranking hardly contains journals on artistic research. Prestigious exhibitions or other artistic realizations are usually not validated at all. This lack of funding opportunities illustrates how on a more fundamental level, the academic world is not ready yet to include artists. If we wish to comprehend the relationship between art and science, a broader base of knowledge is required (Masini, 1996-21). In the meantime, artistic researchers are handicapped by the claims to deliver academic writing while reliable epistemologies that connect such writing with their art are absent (Schwab & Borgdorff, 2014-11).

In my own practice, I often experience how it is indeed the academic writing that keeps me away from the artistic. Although I like writing as a method to share and express reflections, I often experience the traditions and restrictions of academic writing as a burden. For example, the continues need to deliver academic evidence and references often brings a halt to my flow, while continuation of flow is one of the essentials to stay inspired. As an artist, I need more freedom of expression and possibilities to step across the conventional, in order to share my knowledge. Because above all, the intuitive, sensitive aspects of artistic knowledge are often too specific, too personal, too intertwined, too dreamy, too spontaneous, or simply too indescribable to put into words. I therefore value Schwab & Borgdorff's saying that art is on the one hand "self-determined and suffers when it is told what to do", while it on the other hand "challenges existing forms of practice" (2014:13). Also artistic research, when embedded in academia, challenges existing traditions. Adaptations towards artists are usually slow, and in response it is often the artist who is asked to adapt. While conducting my research, I sometimes encounter misunderstanding

and even mistrust, comparable to the general approach towards wolves. In order to be accepted, I occasionally feel a tendency to mimic outward appearance. So although we are invited, like protected wolves in reintroduction programs, we are not always welcome. And once we are there, we are (at least in my case) often asked to behave just like the academics. That brings me to the question wheater artists conducting academic research should conform to western scientific traditions, or not. Should we hide our true nature and pretend to be something else? Should a wolf wear sheep's clothing?

First mentioned in the bible by Matthias and later narrated in various parables, the idiom of a wolf wearing sheep's clothing again portrays wolves as wild monsters threatening the domesticated. In the bible, the idiom warns in only one phrase for false prophets and recommends genuine behavior. In some fable versions, the earliest known from the 12th century, the disguised wolf is fenced by the fooled shepherd and killed for supper (f.e. Basilakis, see: Walz, 1832-427). In other versions, from the 15th century or later, the shepherd notices the disguise and hangs the unfortunate wolf in a tree as a warning for other shepherds (f.e. Abstemius). If I would write my own version to illustrate the dilemma of artists in academia, it would go as follows:

"There once was a lone wolf who wanted to remain in the domestic fields of Academia. After observing customs and regulations, she understood that she needed to adapt to certain standards in order to fit in. She also noticed that although her wildness was attractive to some, it was a threat to others. Therefore she considered getting dressed in sheep's clothing and behave just like the rest, but she was very much in doubt. Because if she did, she would deny her true nature. But if she didn't, she would not be allowed to stay."

It is up to each individual artist to decide for herself how to deal with this dilemma. In my case I have tried to adapt as much as possible, but believe that more adaptation is not always better. Therefore, I want to plead with artists conducting research not to loose their wolf-like features in order to fit in. Our differences make the exchange and interdisciplinarity between art and science meaningful. If we conform to strongly to academic traditions, we even risk becoming the underdog. So if I would to finish my version of the sheep's clothes fable, it would end like this:

"The she-wolf solved this dilemma by trying out some wool. Wool can be confortable, she discovered, but sometimes also itsy. If it was curling back her wolfy hair, she needed to wear it at different places. And if she was not wearing too much, she – and others – could still recognize her wolveness. Without pretending to be someone else, she was accepted easier. For some it took more time, but in the end they all learned to appreciate her true fur as well. So in the end, happily ever after, she could decide for herself how much wool to wear."

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[1] See, for example, the Braintec project (**www.braintec.info**) or the Food Related project (**www.foodrelated.org**).

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Kunstniku uurimus:
hunt lambanahas?

Rosanne van Klaveren
Lühikokkuvõte Piibe Piirma

Viimastel aastatel on paljud ülikoolid avanud oma uksed kunstnikele ja loonud võimaluse kunstnikel doktoritasemel uurimistöid läbi viia. Valdkondadevaheline koostöösoov on kahtlemata positiivne areng uue teadmise loomisel ja laiendamisel. Teisalt on kunstniku uurimuse ja akadeemiliste institutsioonide omavaheline suhe endiselt segane. Isegi kui me näeme kunstnike ja teadlaste tegevuses mitmeid ühisjooni, on teaduse praktiseerimise viisid siiski väga erinevad. Ühelt poolt ei piiritle kunstniku tegevust vaid vaimne ja intellektuaalne tegevus, teisalt ei luba akadeemilise kirjutamise struktuur kasutada väga laia ja paindlikku loomingulise väljendamise skaalat. Kindlad reeglid ja akadeemilise uurimuse piirid näikse kunstnike tegevusega vastuolus olevat. Olukorra muudab eriti keeruliseks ka asjaolu, et toetuse saamiseks peab uurija avaldama teatud hulga artikleid nn A-taseme teadusajakirjades, kuid teisalt ei soovi seesugused ajakirjad kunstnike uurimusi kuigi meelsasti avaldada. Samuti ei väärtustata kunstnike esinemisi teadustegevuse rahastamise mõttes prestiižikatel näitustel. Toetussüsteemide puudumine ilmestab elavalt fakti, et akadeemiline maailm ei ole valmis siiski kunstnikke teadusloomesse kaasama. Selleks puudub laiem teadmiste hindamise süsteem. Ka kunsti uurijad ei suuda välja töötada ja kirja panna usaldusväärset epistemoloogilist süsteemi, mis ühendaks kunsti ja sellest kirjutamist.

Kuidas peaks kunstnik end teadlaste ringkonnas positsioneerima ja kuhu ta akadeemilise traditsiooni mõttes asetuks? Kas peaks ta püüdma peita oma tegelikku olemust ja esitama kedagi teist? Kas hunt peaks end katma lambanahaga? Piiblis Matteuse evangeeliumis kirjeldatud lugu, mida hiljem mitmete narratiivide läbi on korduvalt esile toodud, hoiatab valeprohvetite eest, rõhutades loomulikku käitumist ja iseendaks jäämist. Kirjeldatud allegooria sobib ilmestama arutelu sellest, millega kunstnik võiks nõustuda või mitte nõustuda akadeemilisse ringkonda sisenemisel.

Meediakunsti uuriva doktorandina inspireerib mind hundi metafoorne tegelaskuju, kes on kõigist sotsiaalsetest sidemetest hoolimata võimeline säilitama individuaalsust, kel on tugev intuitiivne intelligents ja kes ei pelga kasutada toorest jõudu oma vabaduse säilitamiseks. Oma uurimust läbi viies olen ma kogenud mittemõistmist ja usaldamatust. Vajadus olla aktsepteeritud viib kohati väliste parameetrite jäljendamiseni. Kuigi mulle meeldib kirjutamise kaudu oma tegevust kirjeldada, kogen ma sageli, et selle traditsioonid ja piirangud muutuvad koormavaks. Kunstnikuna vajan ma enam väljendusvabadust ja võimalust konventsioone ületada. Ühelt poolt olen nõus, et kunstniku uurimus vajab reegleid, mis ütleksid, mida teha, teisalt esitab kunstniku uurimus väljakutse olemasolevatele tavadele.

Soovin rõhutada, et kunstnikud ei tohiks loobuda oma „hundi" rollist, püüdmaks vägisi sobituda raamidesse, kuhu nad ei mahu. Sest nende eriomadused annavad teaduse ja kunsti vahelisele koostööle mõtte. Kui me lepime akadeemiliste traditsioonidega, riskime alistumisega.

Dmitry Bulatov is an artist, curator and art theorist. His research focuses on different aspects of interdisciplinary art media, as well as on submediality aesthetics. Bulatov is the author of many articles on contemporary art and new technologies published in Russia and abroad. Books and anthologies include BioMediale: Contemporary Society and Genomic Culture (Kaliningrad, 2004), Evolution Haute Couture: Art and Science in the Postbiological Age (I volume, Kaliningrad, 2009), Evolution Haute Couture: Art and Science in the Postbiological Age (II volume, Kaliningrad, 2013). His artworks have been presented internationally, including 49th and 50th Venice Biennale (2001, 2003), Ars Electronica Festival (ORF, 2002) and many others. Bulatov has taken part in international contemporary art conferences in Russia, USA, Canada, Germany, Mexico, Singapore and Hong Kong. In 2007 his artwork was selected by Wired magazine as one of the world's 10 top innovations. He has curated about more than twenty major exhibitions in Russia and abroad, including "SOFT CONTROL: Art, Science and the Technological Unconscious" as part of the Maribor – European Capital of Culture 2012 programme. Since 1998 Bulatov is the curator at the Baltic Branch of the National Centre for Contemporary Arts and the leading expert at the Innovation Park of the Baltic Federal University (Kaliningrad, Russia).

Dmitry Bulatov on kunstnik, kuraator ja teoreetik, kes keskendub oma töös kunsti interdistsiplinaarsetele vormidele ja submediaalsele esteetikale. Bulatov on mitmete nüüdiskunsti probleemistikku käsitlevate artiklite, antoloogiate ja raamatute autor.
Mõned näited tema suurematest töödest: *BioMediale: Contemporary Society and Genomic Culture* (Kaliningrad, 2004); *Evolution Haute Couture: Art and Science in the Postbiological Age* (*I volume,* Kaliningrad, 2009); *Evolution Haute Couture: Art and Science in the Postbiological Age* (*II volume,* Kaliningrad, 2013).
Tema kunstiteoseid on esitatud 49. ja 50. Veneetsia Bienaalil (2001, 2003), Ars Electronica festivalil (2002) ja mujal. Ta on esinenud rohketel nüüdiskunsti konverentsidel Venemaal, Ameerikas, Kanadas, Saksamaal, Mehhikos, Singapuris ja Hong Kongis.
2007. aastal valiti üks tema töö ajakirja Wired poolt aasta 10 innovaatilisema teose hulka. Ta on kureerinud enam kui 20 näitust Venemaal ja välismaal, nende hulgas *SOFT CONTROL: Art, Science and the Technological Unconscious* (kultuuriprogrammis *Maribor – European Capital of Culture 2012*).
Alates aastast 1998 töötab Dmitry Bulatov Kaasaegse Kunsti Rahvusliku Keskuse Balti filiaali kuraatorina (*Baltic Branch of the National Centre for Contemporary Arts*).

Evolution Haute Couture Art and Science in the Post-biological Age

Screening program

Project curator: Dmitry Bulatov, curator at the Baltic Branch of the National Centre for Contemporary Arts and the leading expert at the Innovation Park of the Baltic Federal University (Kaliningrad, Russia)

Techno-biological art is a direction of contemporary art in which living matter is the means for creating an artwork, and the newest biomedical and informational technologies are the method used. Techno-biological artworks as a rule are generated in laboratories and frequently in collaboration with scientific research institutes. The works themselves are also alive or "semi-living" and that's why the only proof of a form's existence that survives with time is the project's documentation. This artificial life created by artists is as fragile and short-lived as natural life, but the existence is forever fixed and thus written into the history of the Earth's evolution.

The appearance of such an ambivalent art form is in the critics' view caused by phenomenal progress and expansion of contemporary technologies. Non-professionals know very little of what's happening in science, of the change in the world view and the concepts of man and nature in the last few years, of the enormous opportunities that have opened for the science world. The body has become an object for programming and a base for trying out new technological ideas; it can now be changed almost to the point of a living being losing its initial image. All the scientific experiments of this kind are at the same time unique, interesting and frightening. They were interpreted by artists as an object of art exploration and scholarly research. To what degree is this research ethical; moreover, is it necessary and

permissible in a world populated by living beings and not yet by bio robots? What are the prospects of widespread advanced technologies and what will the world become like after they spread – these are the questions discussed in the field of artistic techno-bio creativity.

Technobiological art today is a proving ground for various artistic innovations. For it not to remain an obscure exotic curiosity to the wide public, the National Centre of Contemporary Arts (Baltic Branch, Russia) presents within the frameworks of international exhibition Evolution Haute Couture a collection of documentaries about the most prominent art projects recently created using the latest 21st century technologies: ALife, robotics and biological and genetic engineering. We hope that this project will give substantial insight into the present development stage of contemporary art and contribute to creative dialogue of the artists from different countries, as well as to awakening the public to understanding of a specific language of new technologies.

The National Center for Contemporary Arts (Baltic Branch, Russia) presents a collection of documentary films about artworks recently created using the latest 21st century technologies: IT, robotics, and biomedicine. The medium in these artworks is living or lifelike matter, and the properties of living organisms and technologically reproduced artefacts are combined

to produce the method. Art created under these new conditions of postbiology – that is, under conditions of artificially generated life – cannot avoid making this artificiality its explicit theme. We are thus again confronted with the question of the relationship between art and life in a completely new context defined by biological and abiological creations, works, and beings. This collection is the first comprehensive overview of the current stage of contemporary techno-biological art. It provides a panorama of artistic strategies for granting and withdrawing the gift of authenticity. The analysis of these strategies opens up new possibilities for creative production and cultural commentary.

The collection was premiered in the framework of the IX MediaForum – one of the official programs of the XXX Moscow International Film Festival (MIFF). The Evolution Haute Couture project had its international premiere at the program of special projects of the Third Moscow Biennial of Contemporary Art (Moscow, Russia). In 2012 the Evolution Haute Couture project was presented in the framework of the program of Maribor – European Capital of Culture 2012.

International Coordination Council:
Dmitry Bulatov, Council Coordinator, National Centre for Contemporary Arts, Kaliningrad, Russia; Roy Ascott, Professor of Technoetic Art, University of Plymouth, United Kingdom; Oron Catts, Director, SymbioticA, University of Western Australia, Perth, Australia, Ken Rinaldo, Professor of Art and Technology, Ohio State University, Columbus, Ohio, USA, Stephen Wilson, Professor of Art and Technology, San Francisco State University, USA.

Sections of the collection:
- Artificial but Actual (Artificial Life)
- Limits of Modeling (Evolutionary Design)
- Shining Prostheses (Robotics)
- Body as Technology (Technobody Modification)
- More than a Copy, Less than Nothingness (Bio and Genetic Engineering)
- Semi-Living (Tissue and Stem Cells Engineering).

Participating artists:
Paula Gaetano Adi (AR), James Auger & Jimmy Loizeau (GB), Brandon Ballengee (US), Laura Beloff (FI), BioKino Group: Tanya Visosevic and Guy Ben-Ary (AU), David Bowen (US), Adrian David Cheok (SG), Carlos Corpa & Ana García-Serrano (ES), Critical Art Ensemble (US), Joe Davis (US), Marta de Menezes (PT), Louis-Philippe Demers (CA), Erwin Driessens & Maria Verstappen (NL), Tagny Duff (CA), Arthur Elsenaar & Remko Scha (NL), Julie Freeman (GB), George Gessert (US), Ken Goldberg (US), Isa Gordon (US), Andy Gracie (GB), Paul Granjon (FR), Mateusz Herczka (SE), Floris Kaayk (NL), Verena Kaminiarz (CA), Leonel Moura (PT), Orlan (FR), Plancton Art Studio: Mauro Annunziato & Piero Pierucci (IT), Nicolas Reeves (CA), Julia Reodica (US), Ken Rinaldo (US), Marcel·lí Antúnez Roca (ES), Kathleen Rogers (GB), Philip Ross (US), SymbioticA Research Group (AU) & The Potter Lab (US), Stelarc (AU), The Tissue Culture & Art Project (TC&A): Oron Catts and Ionat Zurr (AU), Paul Thomas (AU), Bill Vorn, Emma Howes & Jonathan Villeneuve (CA), Natasha Vita-More (US), Adam Zaretsky (US).
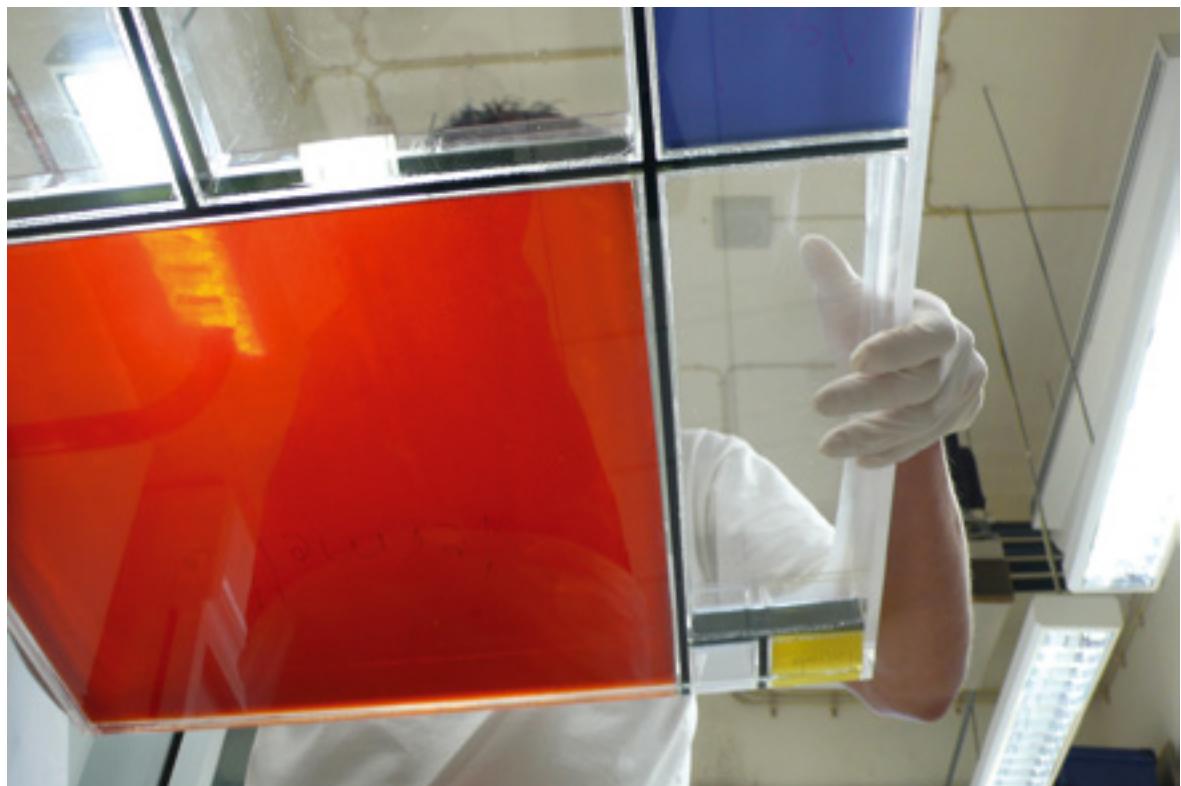

Stelarc (Australia). Extra Ear: Ear on Arm, 2006, London, Los Angeles, Melbourne. Video documentary film, 5'36"
© Photo by Nina Sellars, 2006

Tagny Duff (Canada). Moist Media Archives: Living Viral Tattoos, 2008. Video documentary film, 5'50"
@ Photo by Tagny Duff, 2008

SymbioticA Research Group (Australia) and The Potter Lab (USA). MEART – The Semi-Living Artist, ongoing since 2000.
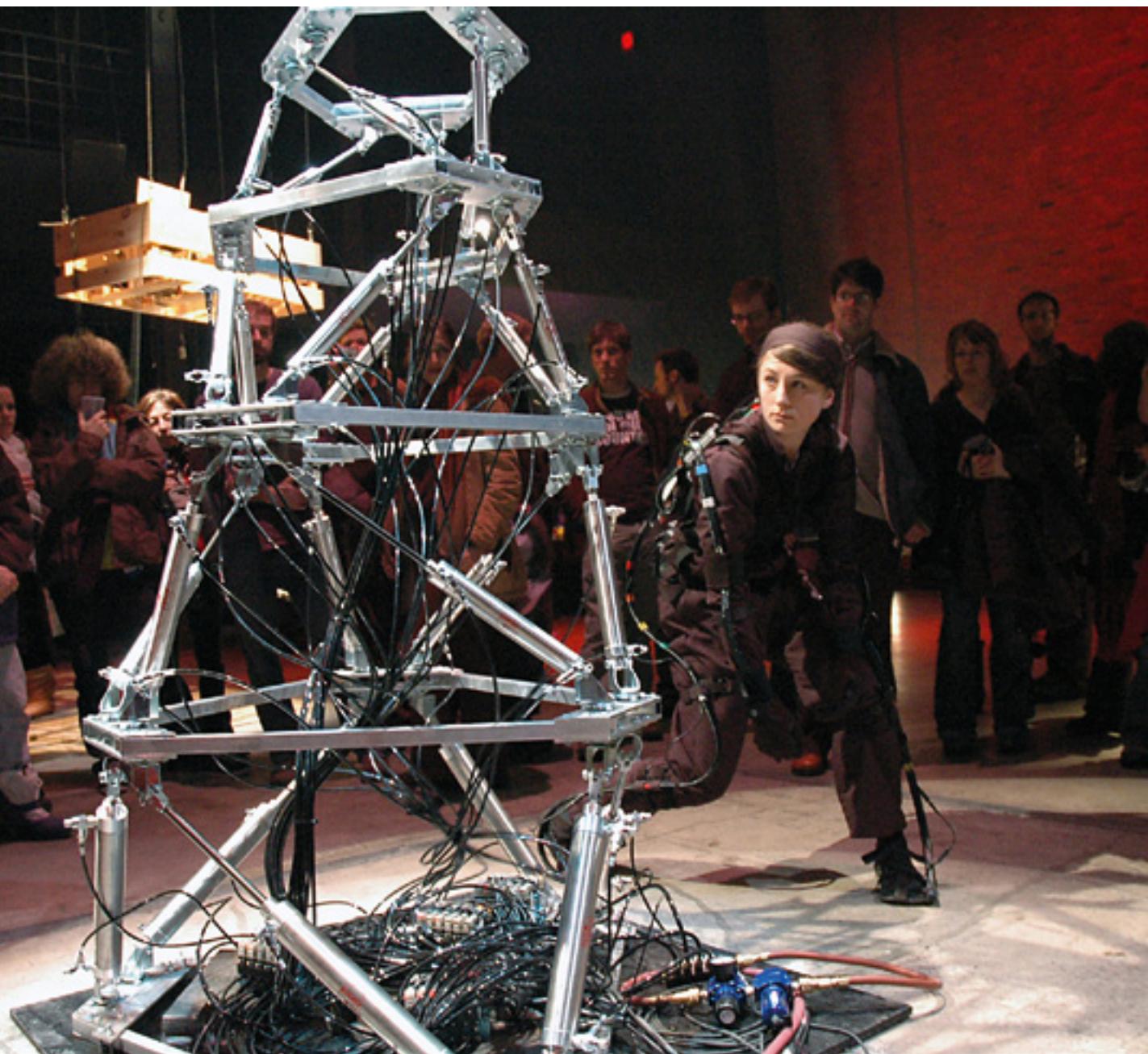*Video documentary film, 7'53" @ Photo by Phil Gamblen, 2004*

Marta de Menezes (Portugal). DECON, 2007. Video documentary film, 7'22" © Photo by Marta de Menezes, 2007

Arthur Elsenaar and Remko Scha (The Netherlands).
Morphology / Face Shift, 2005. Video performance, 10'16"
@ Photo by Arthur Elsenaar and Remko Scha, 2005

Bill Vorn, Emma Howes and Jonathan Villeneuve (Canada). Grace State Machines, 2007. Video documentary film, 8'05"
@ Photo by Bill Vorn, 2007

Evolution haute couture.
Post-bioloogilise ajastu kunst ja teadus

Videoprogramm
Projekti kuraator: Dmitry Bulatov
Lühikokkuvõte Piibe Piirma

Tehnobioloogiline kunst on kaasaegse kunsti suund, mille puhul elus materjal annab kunstile kontseptsiooni ja uusim biomeditsiini ja informatsioonitehnoloogia on oluliseks töömeetodiks. Tehnobioloogiline kunst sünnib reeglina laborites ja sageli teaduslike uurimisinstitutsioonide koostöö tulemusena. Tööd on elusad või pool-elusad (*semi-living*), seetõttu säilivad nad väga lühikest aega ja tulemusi dokumenteeritakse tihti laboris enne, kui need eluvormid hukkuvad.
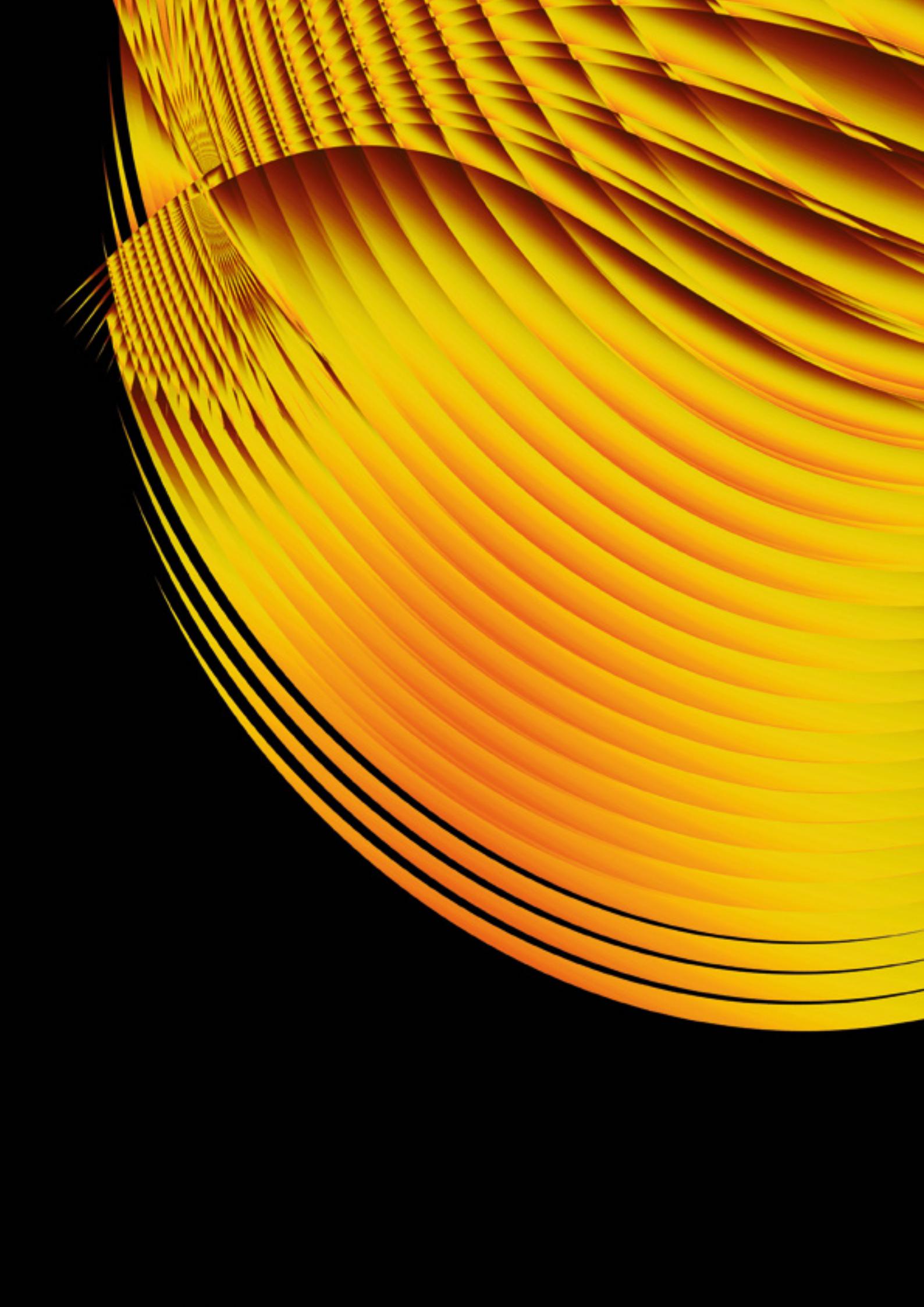
Kriitikute hinnangul on selline ambivalentne kunstivorm tekkinud kaasaegsete tehnoloogiate progressi ja laienemise fenomeni tulemusel. Mitte-professionaalid teavad väga vähe, mis toimub teaduses, mis on viimastel aastatel muutunud inimese ja looduse suhetes, tohutuist võimalustest, mis on teadusmaailma jaoks avanenud. Inimkehast on saanud tehnoloogilise katsetamise objekt, elusolend on kaotamas oma algset sisulist olemust. Teaduseksperimendid on ühtaegu unikaalsed, põnevad ja hirmutavad. Kunstnikele on need eksperimendid inspiratsiooniks kunstiobjektide loomisel, aga ka laiemaks akadeemiliseks uurimiseks.
Millise punktini on selline uurimine eetiline? Või üldisemalt – kas maailma peaksid asustama elusolendid või biorobotid? Sellised on laialt levinud küsimused, mida põhjalikult arutatakse tehnobioloogiliste kunstnike ringkondades.

Tänane tehnobioloogiline kunst pakub uusi uurimissuundi. Ühelt poolt on tõukeks huvi „eksootilise" teema vastu, teisalt laiema publiku teavitamine. Need on ka olulised suunad, mida Kaasaegse Kunsti Rahvusliku Keskuse Balti filiaal läbi Evolution Haute Couture näituse tarbeks kogutud dokumentaalvideode kollektsiooni pakkuda püüab. Hiljuti loodud tööd käsitlevad uusimaid XXI sajandi tehnoloogiaid: tehiselu, robootika, bio- ja geneetilist inseneeriat. Läbi selle projekti on võimalik pilku heita kaasaegse kunsti ühele arenguetapile, erinevate riikide kunstnike koostööle ja uute tehnoloogiate arengule laiemalt.

Esitame dokumentaalfilmide kollektsiooni, mis kirjeldavad lähiaegade tehnoloogiate kasutamist kunstnike poolt. Kunstnike poolt kasutatavaks meediumiks on elus või elusa sarnane materjal, milles on tihti vastavalt eesmärgile kombineeritud elusorganisme ja tehiselu. Tänapäeva teaduse arengut silmas pidades, ei saa tehiselu eitada. Bioloogilise, abioloogilise või postbioloogilise arengu kontekstis tuleb ka kunsti ja teaduse suhet hinnata täiesti uuest vaatenurgast. Esitatav videokollektsioon on esimene põhjalikum tehnobioloogilise kunsti kollektsioon, mis annab panoraamse ülevaate kunstnike strateegiaist, teoste autentsusest või viimase puudumisest. Nende strateegiate analüüsimine annab meile võimaluse nii uueks loomeks kui ka laiemaks hinnangute andmiseks uuele kultuurile.

Videokollektsiooni esitleti esmakordselt XXX Moskva Rahvusvahelisel filmifestivalil IX meediafoorumil (MIFF, 2008), samuti ka III Moskva Kaasaegse Kunsti Biennaalil (2009).
Aastal 2012 esitleti videokollektsiooni Maribori kultuuriprogrammi raames (Maribor – European Capital of Culture 2012).
Programmi näidatakse Eestis esmakordselt aastal 2014.

EXHIBITION
NÄITUS

We're standing on the crossroads of unique innovation and traditions, global thinking and national identity. Whether we're talking about various forms of visual art, design or other tangible or intangible creations, we see ourselves surrounded by cultural forms that broaden our imagination and knowledge about the possible ways of artistic expression. Rhizope is an exhibition that presents distinctive art projects created by talented artists and researchers: in these works, the fine arts and applied art intertwines with biotech and computer technology, network culture, robotics, music, social sciences, history and many other fields.

While conventional wisdom holds that people from the humanities show interest in cutting-edge science, not vice versa, I saw clearly in putting together this exhibition that this is not the case. A marine biologist, sociologist or historian putting effort into an artwork – these are just three exciting examples. It's a pleasure to see that quite a few of the works exhibited had their seed in the topics discussed at the autumn symposium we held – "Art and Science – Hybrid Art and Interdisciplinary Research.". Thus I can say that it is an experiment in a number of ways – for our doctoral students, a larger international creative group as well as the organizers themselves. First of all, it will gauge how much we are able to get people to think with us on art and science topics, and also it will generate unexpected paths and outputs.

Based on its definition, hybrid art is associated with science and thus an important field in this exhibition is biology and the related bio-art. But we expand on the definition, as the word "hybrid" may refer to very diverse areas that may not be all that closely connected to biology. To say nothing of the fact that bio-art itself has gone through a major change of direction, from gene manipulations and treatment of biological material to broader environmental problems. But as critical voices, the artists featured at the exhibitions raise many questions – even questions that are not limited by any criterion or methodology in a given field. In other words, some of the ideas are far out of the box, making them trans-disciplinary in the best sense. After all, there are many questions that can't be accommodated under one subject heading but offer great inspiration and brainstorming opportunities.

One problematic question is to what point is this an art exhibition and where does it become a scientific expo? How will art audiences see the works and science experiments and what context will come from the surrounding environment – the Estonian Museum of Applied Art and Design? Or how will visitors be able to orientate at all in the sea of complicated artistic and scientific ideas? Will visitors be prepared to read difficult science texts, or is there the threat that an important message is too vague as it is too much and it requires a proper in-depth study?

I believe the exhibition is hybrid in the broadest sense – including with regard to creating meanings.
In other words, the exhibition goer, through reading the text or cursory observation, will form a personal understanding based on his or her interest and broader background knowledge This, too, is one aspect that we must understand in our world full of opportunities. The world is moving in directions that we can't foresee and it is full of very many individuals who create personal meanings themselves. What we want to do is enrich these thought arcs, convey new visions and make sense of the latest development areas, whether they are cross-disciplinary or trans-disciplinary phenomena.

I'd like to thank our generous supporters from the Estonian Museum of Applied Art and Design:
Kai Lobjakas ja Ketli Tiitsar.

Participants:
Sara Robinson (US), Paul Wiersbinski (DE),
Angelika Böck (DE), Peter Flemming (CA),
Juan Manuel Castro (CO/JP), Yolanda Uliz Elizalde (NL),
Martin Howse (DE/UK), Diana Rivera (US),
Amanda de Luis Balart (ES), Varvara Guljajeva (EE),
Mar Canet Sola (EE/ ES), Piibe Piirma (EE),
Terje Toomistu (EE), Kiwa (EE), Lennart Lennuk (EE),
Kaisu Koski (FI/NL), Christian Fischer (EE/DE),
Reiner Maria Matysik (DE), Polina Tšerkassova (EE),
Eldar Jakubov (EE), Maria Tjader-Knight (FI/UK), Ulrich Gehmann (DE), Martin Reiche (DE), Natalie Tyler (US),
Sharyn O'Mara (US).

Piibe Piirma

Asume omapärasel innovaatika ja traditsioonide, globaalse mõtlemise ja rahvuslike eripärade ristteel. Olgu tegu visuaalse kunsti eri vormide, disaini või muu materiaalse-mittemateriaalse loomega, näeme enda ümber kultuurivorme, mis avardavad meie kujutlusvõimet ja teadmisi kunsti võimalikest väljendusvahenditest. Näitusel „Rhizope" esitletakse andekate kunstnike-uurijate eriilmelisi kunstiprojekte: kujutav ja rakenduskunst põimub neis bio- ja arvutitehnoloogiaga, võrgukultuuri, robootika, helikunsti, sotsiaalteaduste, ajaloo ja teiste valdkondadega.

Levinud arusaama kohaselt jäävat alati initsiatiiv pisut ühepoolseks, kui tippteaduse vastu ilmutavad huvi humanitaarteaduste esindajad. Käesolevat näitust koostades kogesin ma selgelt, et see ei ole nii. Põnevad näited sellest, kuidas merebioloog, sotsiaalteadlane või ajaloolane kunstiteose nimel tööd teevad, on vaid kolm esmalt meenuvat. Samuti on heameel tõdeda, et mõnigi esitatavatest teostest on algtõuke saanud meie poolt korraldatud sügissümpoosionil „Kunst ja teadus - hübriidne kunst ja interdistsiplinaarne uurimus 2012" arutluse all olnud teemadest. Seega võin öelda, et eksperiment on see mitmes mõttes - nii meie doktorantidele, laiemale rahvusvahelisele loomegrupile, kui ka korraldajaile endile. Kõigepealt selles mõttes, kuipalju suudame teaduse ja kunsti teemadel ärgitada kaasa mõtlema ja tegutsema, teisalt, ka ootamatute suundade ja väljundite esilekerkimise osas.

Hübriidset kunsti selle definitsiooni kohaselt seostatakse loodusteadustega ja seetõttu on näitusel üheks oluliseks valdkonnaks bioloogia ja sellega seotud biokunst. Kuid me võtame julguse seda mõistet laiendada, sest sõna „hübriid" võib viidata väga erinevatele suundadele, mis ei pruugi bioloogiaga väga tihedas suhtes olla. Rääkimata sellest, et biokunst ise on teinud läbi üsna põhjaliku suunamuutuse, liikudes geenimanipulatsioonide ja kitsa bioloogilise materjali käsitlemiselt laiemate keskkonnaprobleemide uurimise suunas. Kriitiliste küsijatena tõstatavad näitusel esinevad kunstnikud rohkelt küsimusi kõige kohta, ka selliseid, mida ei piira ükski valdkondlik kriteerium või metodoloogia. See tähendab, et on ka ideid, mis väljuvad kaugelt kõikidest piiridest ja on seetõttu transdistsiplinaarsed ehk valdkondadeülesed kõige paremas mõttes.

On rohkelt küsimusi, mis ühegi teema alla ei mahu, kuid pakuvad rohkelt inspiratsiooni ja on väärt kaasa mõtlemist.

Problemaatiline on küsimus, kuhu maani on käesoleval juhul tegemist kunstinäitusega ja kust algab n-ö teadusnäitus? Kuidas mõistab esitletavaid teoseid ja teaduseksperimente kunstipublik ja millise konteksti annab esitatavatele projektidele ümbritsev keskkond ehk Eesti Tarbekunsti- ja Disainimuuseumi saal? Või kuidas on esitletavate keeruliste loominguliste ja teaduslike ideede virvarris külastajal üldse võimalik orienteeruda? Kas näituse külastaja on valmis keerulisi teadustekste lugema, või ähvardab oluline sõnum jääda ähmaseks, sest kõike on liiga palju ja see nõuab tõhusat sisulist süvenemist.

Olen arvamusel, et näitus on hübriidne selle kõige laiemas mõttes – ka tähenduste loomise mõttes. Näitusekülastaja loob kas tekste lugedes või teoste pealiskaudsemal vaatlemisel siiski isikliku arusaama vastavalt oma huvile ja laiematele taustateadmistele. Ka see on üks aspekt, mida me kirjus võimalusterohkes maailmas mõistma peame. Maailm liigub suundades, mida me ette ennustada ei suuda, ja selles on väga palju üksikindiviide, kes loovad personaalseid tähendusi ise. Meie soov on neid mõttesuundi rikastada, edastada uusi nägemusi ja mõtestada värskeimaid arengusuundi, olgu tegemist siis valdkondadevaheliste või -üleste nähtustega.

Näituse koostajana soovin eriliselt tänada meie lahkeid toetajaid ja abistajaid Eesti Tarbekunsti- ja Disainimuuseumist - Kai Lobjakas ja Ketli Tiitsar!

Näitusel osalevad:
Sara Robinson (US), Paul Wiersbinski (DE), Angelika Böck (DE), Peter Flemming (CA), Juan Manuel Castro (CO/JP), Yolanda Uliz Elizalde (NL), Martin Howse (DE/UK), Diana Rivera (US), Amanda de Luis Balart (ES), Varvara Guljajeva (EE), Mar Canet Sola (EE/ ES), Piibe Piirma (EE), Terje Toomistu (EE), Kiwa (EE), Lennart Lennuk (EE), Kaisu Koski (FI/NL), Christian Fischer (EE/DE), Reiner Maria Matysik (DE), Polina Tšerkassova (EE), Eldar Jakubov (EE), Maria Tjader-Knight (FI/UK), Ulrich Gehmann (DE), Martin Reiche (DE), Natalie Tyler (US), Sharyn O'Mara (US).

Piibe Piirma

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@ Photo by Sara C. Robinson, 2003

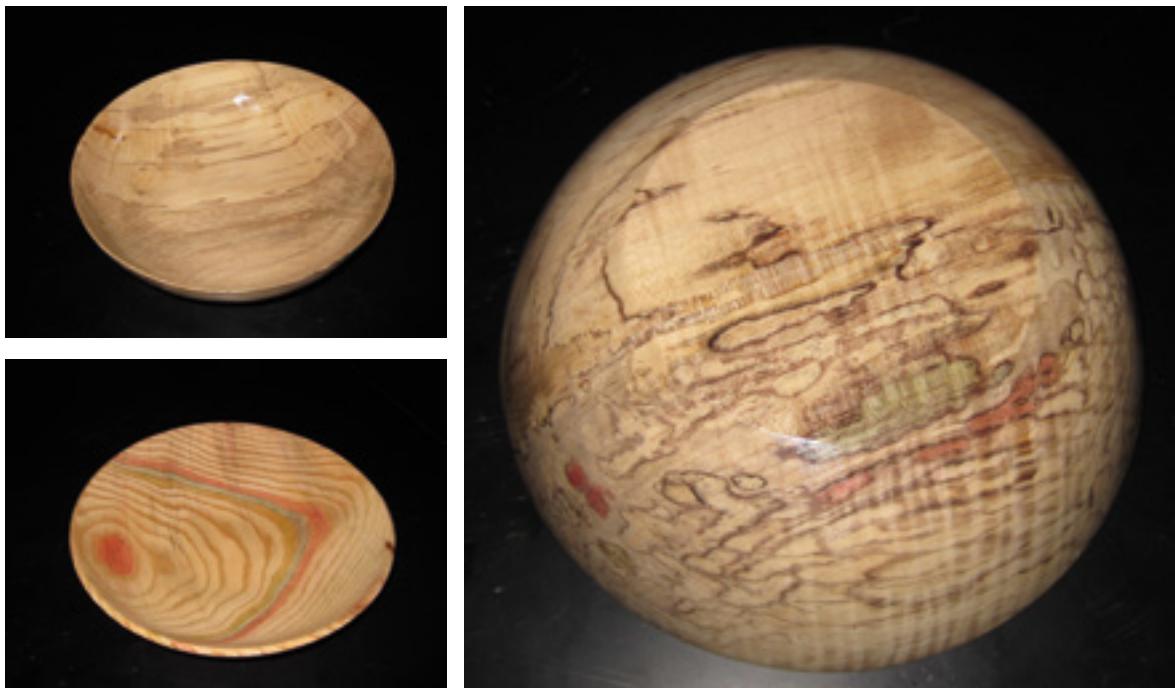@ Photo by Sara C. Robinson, 2010

@ Photo by Sara C. Robinson, 2010

© Sara C. Robinson, 2013

Sara C. Robinson focuses on the intersection of art and science specifically within the field of woodcraft, utilizing naturally occurring fungal pigments to promote a return to natural ornamentation techniques on functional wood. She is currently an assistant professor at Oregon State University in the anatomy of renewable materials.

Sara C. Robinson keskendub kunsti ja teaduse kokkupuutepunktidele puitkäsitöö vallas, kasutades looduslikke seenepigmente, et jõuaksime tagasi looduslike ornamentatsioonitehnikate juurde puidu otstarbekohasel kasutamisel. Ta töötab Oregoni osariigi ülikoolis (*Oregon State University,* US) abiprofessorina taaskasutatavate materjalide alal.

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What is 'natural'?
Mis on *looduslik*?

Sara C. Robinson

What is 'natural'? Spalted wood, wood colored by the extracellular pigments of some fungi, has a long history of uses in wood art. As demand for spalted wood increases, industry across the world is seeing the economic benefit of inducing spalting in their low-value timbers to gain a commercial advantage. This has lead to extensive laboratory research into the conditions under which spalting can be induced in clear wood. However artists and other consumers of spalted wood are now faced with the question of what constitutes spalted wood and whether natural pigmentation, no matter how it occurs, is still preferable over the synthetic alternatives.

This work invites viewers to review the three most common methods of generating spalted wood and decide for themselves which are 'natural': the pure decay and light staining commonly found in hardwoods on the forest floor, often too punky to work with and of little commercial value; the laboratory induced fungal growth which prevents decay but cannot directly influence where the pigments form; or extraction and reapplication, where pigments are extracted from fungi grown on Petri plates and applied directly to the wood in the fashion of the artist's choosing**.**

Mis on *looduslik*? Seente abil puidu värvimine, kus rakuväliste pigmentidega puitu toonitakse, on puidukunstis pika ajalooga. Sedamööda, kuidas kasvab nõudlus nn seenvärvitud puidu järele, näeb ka tööstus seenvärvimises üha suuremat majandustulu, mille abil tõsta väheväärtuslikuma puidu ärilist väärtust. See on viinud laialdase laboratoorse uurimistööni, selgitamaks, millistel tingimustel on võimalik puhast puitu seente abil värvida. Kunstnikud ja ka tavatarbijad on nüüd aga seatud vastakuti küsimusega, milles seenvärvimine seisneb. Esitatakse küsimus, kas looduslike pigmentide, sõltumata sellest, kuidas nad on tekkinud, kasutamisel on sünteetiliste ees eeliseid.

Teos kutsub vaatajat seentega värvitud puidu kolme tavameetodit ümber mõtestama ja otsustama ise, mis on *looduslik*. Esimese viisina lehtpuude pehkinud ja pleekinud osad metsa all, millega on sageli tülikas tööd teha ja millel pole ärilist väärtust. Teise alternatiivina laboratoorselt tekitatud seenkasv, mis takistab pehkimist, kuid ei suuda otseselt mõjutada seda, kuhu pigment koguneb. Kolmanda võimalusena eraldamine ja taasrakendamine, kus pigmendid eraldatakse petri tassil kasvatatud seentest, misjärel puitu nendega töödeldakse vastavalt kunstniku soovile.
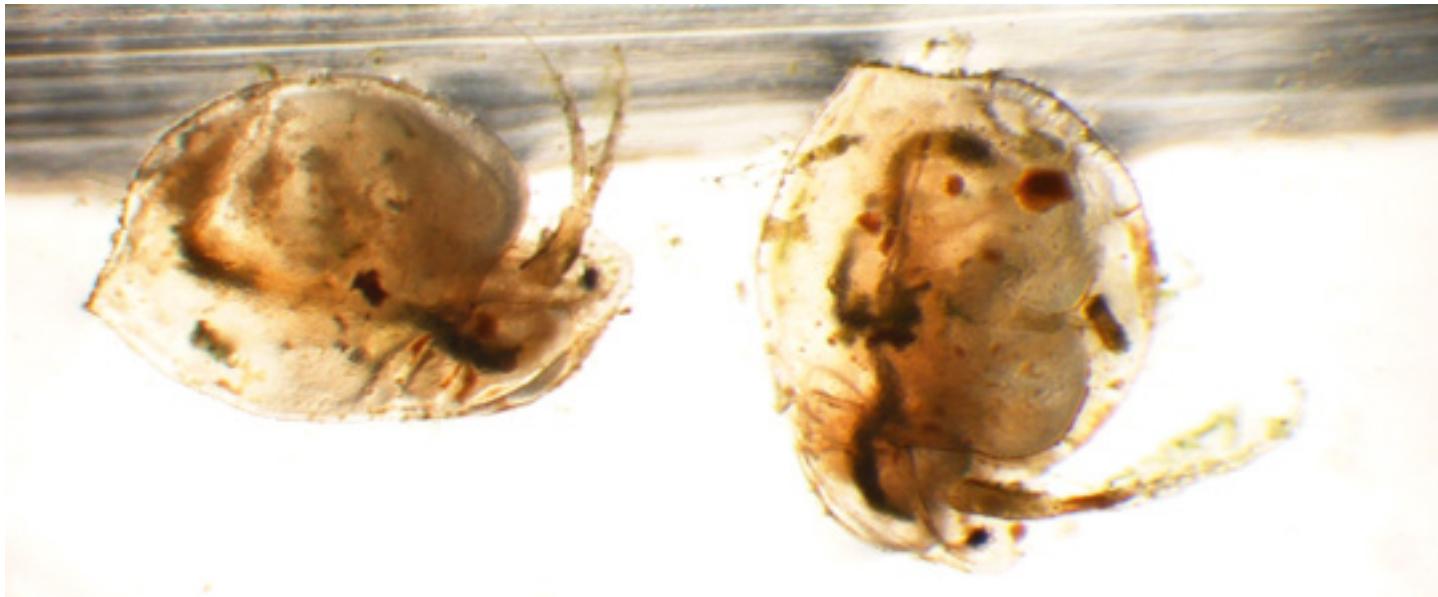
Lennart Lennuk is a marine biologist by profession. In his work as a scientist, he studies the ecology of zooplankton. In addition to work as a scientist, Lennuk has been active in the visual arts and has played in several bands. He is currently in the progressive music ensemble TNVVNÜM. Lennuk works in the Estonian Museum of Natural History as a zoologist and is a doctoral candidate at University of Tartu.

Lennart Lennuk on erialalt merebioloog, teadlasena uurib ta zooplanktoni ehk loomhõljumi ökoloogiat. Lisaks teadustööle on Lennuk juba varasest noorusest tegelenud kujutava kunstiga ning mänginud mitmetes bändides. Hetkel on ta progressiivset muusikat viljeleva ansambli TNVVNÜM liige. Põhikohaga töötab Lennuk Eesti Loodusmuuseumis zooloogina ja on Tartu Ülikooli doktorant.
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Plankton music / Planktonimuusika

Lennart Lennuk

This installation is about interpreting water flea behaviour into music. Water fleas make music by moving, their motion being influenced by switching on and off a light. Light and light rhythms play a major role for living creatures. People, too, are more active by day than by night. In today's society, where we are able to artificially create light at any time and place, we are more independent than ever from sunlight, but very heavily influenced by artificial light.

Scientifically, Plankton Music focuses on the behavioural patterns of aquatic life forms. I interpret the scientific data into an aural idiom that the exhibition goer can enjoy, making it possible to realistically experience the behaviour of tiny organisms. Sonification is a well-known technique in science. We have approached the topic aesthetically and created a self-functioning, long-playing work that is created in situ with always unique patterns of sound.

Programming and technical solutions – **Taivo Lints**
Musical design – **Ekke Västrik**
Heartfelt thanks to **Shawn Pinchbeck** and **Reimo Võsa-Tangsoo** for the inspiration.
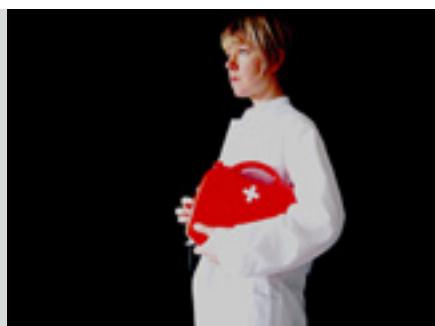
Käesoleva installatsiooni puhul on tegemist vesikirpude käitumise tõlgendamisega muusika kaudu. Vesikirbud loovad muusikat läbi liikumise, mida omakorda mõjutab valguse sisse-välja lülitamine. Valgus ja selle rütmid mängivad elusorganismide seas suurt rolli. Ka inimene on päeval aktiivsem kui öösel. Tänases ühiskonnas, kus suudame valgust kunstlikult luua mistahes ajal ja kohas, oleme päikesevalgusest sõltumatumad kui varem, aga väga mõjutatud kunstvalgusest.

Teaduslikult on Planktonimuusika puhul olulised eksperimendist saadavad veeorganismide käitumise mustrid. Teaduslik teave on näitusekülastaja jaoks tõlgitud nauditavasse helikeelde, misläbi on võimalik tillukeste organismide käitumist ka reaalselt kogeda. Sonifikatsioon ehk info kuuldavaks tegemine (*sonification*) on teaduses küllaltki levinud võte. Käesolevas intallatsioonis on lähenetud teemale esteetiliselt ja loodud isetoimiv ja kauamängiv teos, mis sünnib kohapeal ja loob kordumatuid helimustreid.

Programmeerimine ja tehnilised lahendused – **Taivo Lints**. Muusikaline kujundus – **Ekke Västrik**. Suured tänud ka **Shawn Pinchbeckile** ja **Reimo Võsa-Tangsoole**, kes andsid autorile inspiratsiooni.

Performance Formula © Photo by Joris Weijdom, 2010

© *Kaisu Koski 2009*

Kaisu Koski is a Finnish artist-researcher based in the Netherlands. She graduated from the University of Lapland and the Amsterdam School of the Arts, receiving training in media and performance art. In 2007 Kaisu earned her doctoral degree with a dissertation on interactive performances. Her art practice is intertwined with academic research, focusing on the art–medicine dialogue, and the arts-based research methodology. Kaisu Koski is currently affiliated with the HKU University of the Arts Utrecht.

Kaisu Koski on soome kunstnik-teadur, kes tegutseb Hollandis. Ta on lõpetanud Lapimaa ülikooli ja Amsterdami kunstikooli, kus õppis meediat ja *performance*-kunsti. Ta kaitses interaktiivse *performance*'i alal ka 2007. aastal doktoritöö. Tema looming on põimunud akadeemilise teadustööga ja keskendub kunsti ja meditsiini dialoogile ning kunstipõhise uurimistöö metoodikale. Hetkel on Kaisu Koski seotud Utrechti HKU kunstiülikooliga.

Video still from Canvass Mise-en-scene © *Kaisu Koski, 2014*

Video still from Not to scale at all © *Kaisu Koski, 2014*

Living anatomy
Elav anatoomia

Kaisu Koski

Living anatomy includes a series of self-portraits that explore teaching of anatomy and the various models representing aspects of the human body, and their relationship with a living body. It results from a field trip to Plymouth University Peninsula Schools of Medicine and Dentistry and observation of the anatomy and clinical skills education.
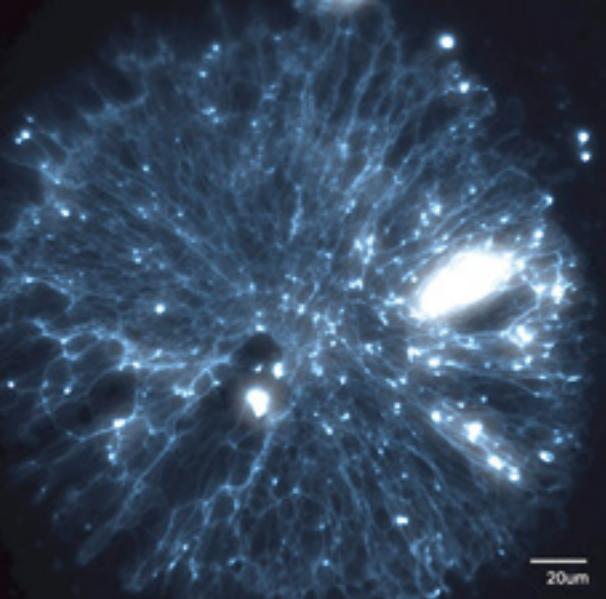
The video piece *Canvass mise-en-scene* reveals the making process of the photo Canvass, as it displays an improvisation session in an empty anatomy classroom. As a soundtrack one hears reflections by the medical and dental students and teachers.

The animation *Not to scale at all* explores the first year medical students' drawings of the female reproductive system. It reflects the visual culture of the medical education, and the emotional and cultural values projected on the female body. The piece also rethinks the relationship between the data analysis and dissemination in arts-based research projects, by introducing a dialogic way to examine the drawing data.

„Elav anatoomia" on autoportreede sari, mis uurib anatoomia õpetamist ja inimkeha aspektide esitlemise viise ning nende suhet elusa kehaga. Töö valmis Plymouthi ülikooli Peninsula meditsiini- ja hambaravikolledži õppereisi ja anatoomia ning kliiniliste oskuste õpetamise osas tehtud tähelepanekute tulemusena.

„Canvass" videolavastus toob meieni foto uurimise protsessi tühjas anatoomiaklassis toimuva improvisatsioonisessiooni kaudu. Helitaust koosneb meditsiini- ja hambaravi tudengite ja õppejõudude mõtisklustest.

Animatsioon „Not to scale at all" uurib meditsiini esmakursuslaste joonistusi naise suguorganitest. Teos peegeldab meditsiinihariduse visuaalkultuuri ning naise kehale omistatavaid emotsionaalseid ja kultuurilisi väärtusi. Töö mõtestab ümber ka andmeanalüüsi ja selle taasesituse kunstipõhises uurimistöös, kuivõrd kasutab dialoogi vormi joonistel nähtuvate andmete uurimisel.

© Photos by Juan M. Castro, 2013

Juan Manuel Castro is an artist and researcher involved in interdisciplinary work practices between the fields of media art, microbiology and biochemistry. He was born in Bogota (Colombia) and is currently based in Tokyo (Japan). In 2008, he founded Biodynamic geometries, a research unit for experimental creative projects and scientific exploration about life and organic intelligence. Since its inception, he has been presenting his projects internationally in museums and at art festivals and scientific meetings.

Juan Manuel Castro on kunstnik ja teadur, kelle valdkondadevaheline looming piirneb meediakunsti, mikrobioloogia ja biokeemiaga. Ta sündis Bogotás (Kolumbia) ja tegutseb praegu Tokyos (Jaapan). 2008. aastal asutas ta uurimisgrupi *Biodynamic geometries*, kus käsil eksperimentaalsed loomeprojektid ja teadustöö elu ja orgaanilise intelligentsi vallas. Asutamisest saadik on sealset tööd esitletud rahvusvaheliselt nii muuseumites, kunstifestivalidel kui teaduskohtumistel.

Fat between two worlds
Rasv kahe maailma vahel

Juan Manuel Castro
Scientific advisor / Teadustöö juhendaja: Taro Toyota

This work explores the spontaneous transformation of fat into organic structures at the cellular level. Phospholipids and cholesterol are grown in an aqueous medium to create unusual membranous structures with the potential to encapsulate materials and incite biochemical reactions. These micro-sites, akin to living cells but with distinctive shapes and patterns, seek to expose the intriguing vitality of fat and the plausible morphologies of future life.

Carbon based-life, as we know it today, could not have developed without membranes. All living cells are enclosed by a selective permeable barrier: the plasma membrane. For the past 20 years, linking the methods of the life and chemical sciences, various research groups have been constructing cell-sized systems using artificial membranes. Currently, as a techno-scientific artefact, the membrane forces us not only to evaluate the consequences of protocell technology, but also to confront our views about life and its creation. Consequently, the questions arising now are how should we reflect about the possibility of synthesizing new forms of life? Can we gain insight by looking at membranes of the past and future?

Teos uurib rasva spontaanset muundumist orgaanilisteks struktuurideks rakutasandil. Fosfolipiide ja kolesterooli hoitakse veepõhises keskkonnas, nii et tekivad ebatavalised membraanstruktuurid, mis suudavad materjale siduda ja biokeemilisi reaktsioone käivitada. Need n-ö mikro-kohad, mis sarnanevad elusrakkudega, kuid omavad eristuvaid vorme ja mustreid, püüavad meieni tuua rasva õrritavat vitaalsust ja tulevikuelu arvatavaid morfoloogiaid.

Süsinikupõhine elu, nii nagu seda teame, poleks suutnud areneda ilma membraanideta. Kõiki elusrakke ümbritseb selektiivne läbistatv piire ehk plasmamembraan. Viimase 20 aasta jooksul on loodus- ja keemiateaduste kokkupuutes mitmed uurimisgrupid ehitanud rakusuuruseid süsteeme, kasutades selleks kunstlikke membraane. Täna on tehnoteaduslikud tehismembraanid sundinud meid ümber hindama mitte ainult protorakutehnoloogia arengu võimalikke tagajärgi, vaid ka silmitsi seisma eri vaatenurkadega elule ja selle loomisele. Seetõttu on esile kerkinud küsimus, kuidas mõelda uute eluvormide sünteesi võimalikkuse üle. Kas saame targemaks, kui vaatame mineviku ja tuleviku membraane?

© Photos by Reiner Maria Matysik, 2011

© Delia Keller

Reiner Maria Matysik lives in Berlin, studied fine arts at the Hochschule für Bildende Künste Braunschweig and at the Ateliers Arnhem. 2004 he directed the artistic development project "Institute of biological sculpture" at the Hochschule für Bildende Künste Braunschweig. He is a lecturer at the Institute of Visual Arts at the Faculty of Architecture of the Technical University Braunschweig; and from 2008–2009 visiting professor of sculpture at the Fachhochschule Kunst Arnstadt. He has exhibited his artworks in institutions such as the Centre Pasquart, Biel, Switzerland; Neue Gesellschaft für Bildende Kunst, Berlin; Projektraum Deutscher Künstlerbund, Laboratoria Moskau; Museum Koenig, Bonn; Georg Kolbe Museum and Künstlerhaus Bethanien, Berlin; Staatliche Kunsthalle Baden-Baden; Fondación Cesar Manrique, Lanzarote; Kunstverein Hannover; Martin-Gropius-Bau, Berlin; Kunsthalle Bern, Switzerland. At Documenta (13) he presented a video and books at "The Worldly House", a Donna Haraway Archive d13.documenta/the-worldly-house.

Reiner Maria Matysik elab Berliinis. Ta õppis kunsti Ateliers Arnhemis ja Braunschweigi kõrgemas kujutava kunsti koolis, kus 2004. aastal juhatas kunstiprojekti „Bioloogilise skulptuuri instituut". Ta on Braunschweigi Tehnikaülikooli arhitektuuriteaduskonna visuaalkunsti osakonna õppejõud, 2008-2009 oli ta skultpuuri eriala külalisprofessor Arnstadti Kunstikoolis. Tema loomingut on esitletud mitmel pool üle Euroopa: Pasquart´ keskus Bielis; Neue Gesellschaft für Bildende Kunst Berliinis; Deutscher Künstlerbund projektiruumi Laboratoria Moskau; Koenig muuseum Bonnis; Georg Kolbe muuseum ja Bethanien kunstihoone Berliinis; Baden-Badeni riiklik kunstihoone; Fondación Cesar Manrique Lanzarote'l; Kunstverein Hannover; Martin-Gropius-Bau Berliinis; Berni kunstihoones jpt. Näitusel dOCUMENTA(13) esitles ta videot ja raamatuid „The worldly house", Donna Haraway arhiiv d13.documenta/the-worldly-house.
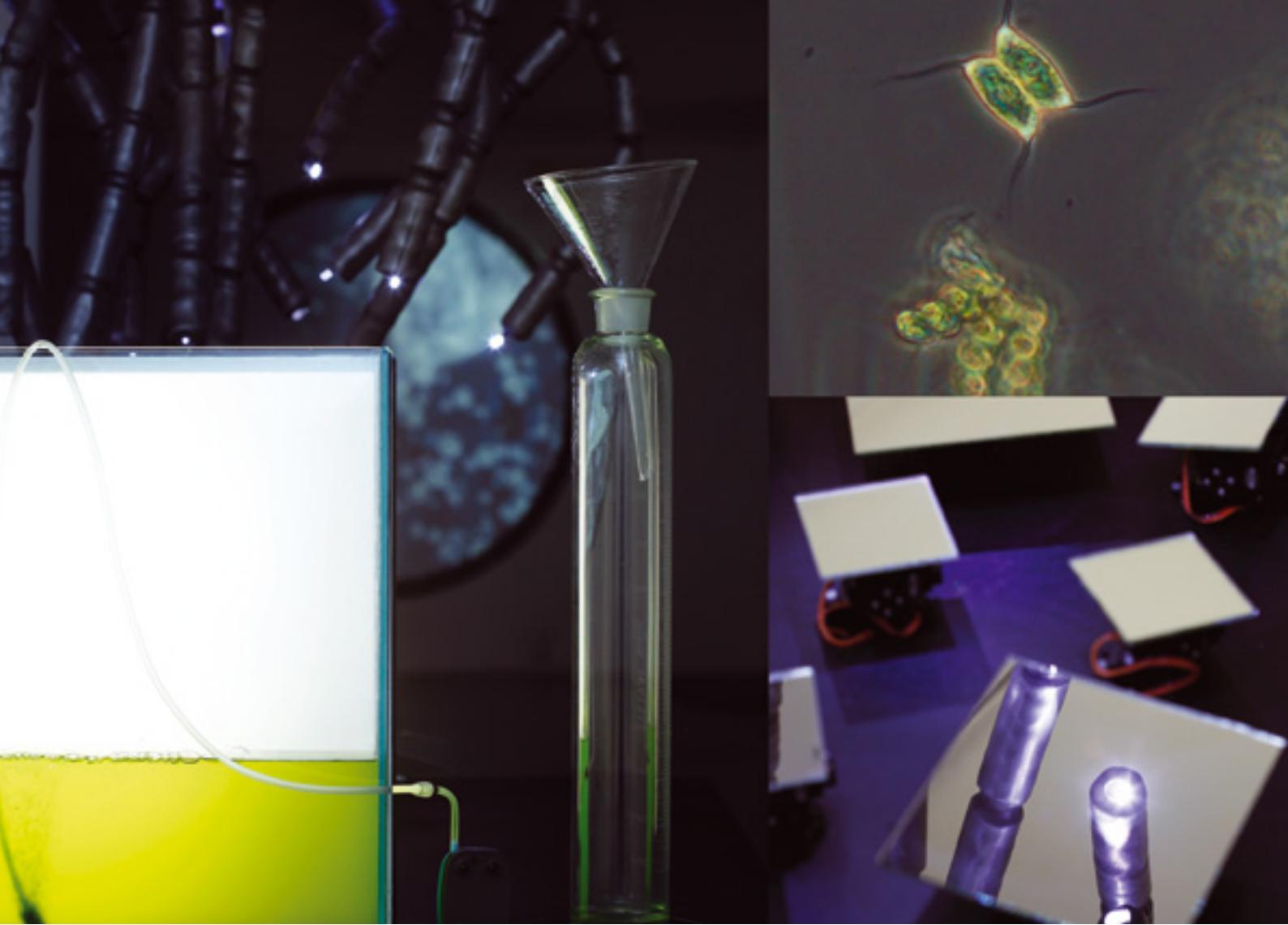
Beyond Humans: Organ-Like Organism Made Of Human Cells

Teisel pool inimest: inimrakkudest loodud organilaadne organism

Reiner Maria Matysik

1. Surgery: I was having a surgery. Tissue of my body was removed. 2. Reproduction of epidermal cells: epidermal cells were isolated from the removed tissue. They were reproduced in test tubes outside the human body. The isolated cells were used for the production of keratinocyte grafts grown and reproduced in specific cultures. The cell growth is then stimulated by a nutrient solution. The keratinocytes attach themselves to the bottom of cell culture dishes and then begin with their growth phase. During longer culturing periods, islands of epidermal cells continue to grow and expand, ultimately uniting to form a closed cell layer of epidermal membrane – the keratinocyte sheet. This epidermal membrane consists of a united cell structure with multiple cell layers. 3. Forming a living entity: I used these structures to form a sculpture of my own cells and transformed this into a a wet specimen. This is the first step of an ongoing project. The aim is to build a living entity completely consisting of human cells. 4. Material: human tissue / agarose gel / 100 % alcohol / glass envelope / documentary video

1. Operatsioon. Mulle tehti operatsioon. Minu kehast eemaldati kude. 2. Naharakkude paljunemine. Naharakud isoleeriti eraldatud koest. Neid paljundati katseklaasis, inimkehast väljaspool. Isoleeritud rakke kasutati omaette kasvatatud ja paljundatud keratinotsüüdi siirde tegemiseks. Raku kasvu stimuleerisid toitained. Keratinotsüüdid kinnitasid end rakukultuuri tassi põhja külge ja alustasid kasvamist. Inkubatsiooniperioodi vältel jätkasid naharakusaared kasvu ja laienemist, nii et nad lõpuks ühinesid ja moodustasid epidermilise membraani suletud rakukihi – keratinotsüüdilehe. See epidermiline membraan koosneb ühtsest mitmekihilisest rakustruktuurist.
3. Elusa üksuse moodustamine. Kasutasin saadud struktuure oma rakkudest skulptuuri loomiseks ja muutsin selle laborieksemplariks. Tegu on jätkuva projekti esimese sammuga. Eesmärgiks on ehitada elus üksus, mis koosneks ainuüksi inimrakkudest.
4. Materjal. Inimkude, agaroosi geel, 100-protsendiline alkohol, klaas, videodokumentatsioon.

Piibe Piirma is an Estonian media artist. She has been a designer and artist since 2002 and curated various media art exhibitions since 2006.

Her current activities are closely related to her doctorate studies in art and design at the Estonian Academy of Arts. Her thesis examines the philosophical and theoretical backgrounds and practical art genres of interdisciplinary collaboration. Her own art practice is also based on collaboration with various science labs, the most recent personal exhibitions "Hybrid Practices" and "Hybrid Practice - from General to Specific" were held in Tallinn in 2013.

Piibe Piirma is a co-organiser of the international conference "Art & Science – Hybrid Art and Interdisciplinary Research" held in 2014 and the curator of the exhibition titled "Rhizope".

Piibe Piirma on Eestis tegutsev meediakunstnik. Ta on disaineri ja kunstnikuna töötanud alates 2002. ja erinevaid meediakunsti näitusi kureerinud alates 2006. a. Tema praegune tegevus on tihedalt seotud õpingutega Eesti Kunstiakadeemia doktorikoolis kunsti ja disaini erialal. Oma väitekirjas analüüsib ta isiklikke kunstnikukogemusi, mis põhinevad erinevais teadus-laboreis saadud koostöökogemustel.

Piibe Piirma on 2014. aastal aset leidnud rahvusvahelise konverentsi „Kunst ja teadus – hübriidne kunst ja interdistsiplinaarne uurimus" ja sellega seotud näituse „Rhizope" kuraator.

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ROBOAUTOTROPHS
ROBOAUTOTROOFID

Piibe Piirma

What if we stopped following the binary system consisting of 0s and 1s established by Alan Turing in our way of thinking? What if our computer world were ruled by biological and chemical supercomputers? What if humankind could create databases based on artificial protocells? What if such a technology could supply itself with energy and replenish itself? What if biological resources could make us quit for good expensive production methods, heavy metal, vast cable arrangements and diagrams?

The word "roboautotroph" is the combination of two words – robots and photoautotrophs, it is my mental image of the amalgamation of the artificial and natural world. Photoautotrophs – microorganisms obtaining energy from the sun and from CO_2 and using it for biosynthesis and photosynthesis are a huge source of natural energy and thus useful in many ways to humankind in light of future research. The production of biofuel is not anything new, neither are ideas about increasing future food resources but a more tempting idea is synthetic biology, the possibility of connecting life and artificial life. How to understand and resolve the dilemma between two methods of data communication – digital and material-based or chemical communication if Turing's binary system becomes exhausted? The scientific idea of a material-based communication is based on chemical reactions and vastly expands our future opportunities.

I will start from the simplest and study the habitat living in the aquarium and try to translate the information received from it to a digital language that robots can understand. The system of simple measurement instruments and basic robotic movements in turn reflect my complex questions that could be important for all of us – how can life and digital life coexist better and more effectively without destroying each other? And are we also ethically prepared for such coexisting?

This installation was developed thanks to a productive collaboration with the TUT Marine Systems Institute. Special thanks to: Inga Lips, Karin Ojamäe and Madis Listak

Mis oleks, kui lakkaksime mõtlemast Alan Turingi poolt kehtestatud 0-dest ja 1-dest koosneva binaarsüsteemi loogika järgi? Mis oleks, kui meie arvutimaailma valitseks bioloogilised ja keemilised superarvutid? Mis oleks, kui inimkond suudaks luua tehislikel proto-rakkudel baseeruvaid andmebaase? Kui säärane tehnoloogia suudaks ise end energiaga varustada ja taastoota? Mis oleks, kui bioloogilised ressursid suudaksid panna meid lõplikult lahti ütlema kallitest tootmisviisidest, raskest metallist, tohututest juhtmejadadest ja skeemidest?

Sõna „roboautotroof" on kokku liidetud kahest sõnast – robotid ja fotoautotroofid. Tegemist on minu kujutluspildiga tehis- ja elusmaailma liitmisest.
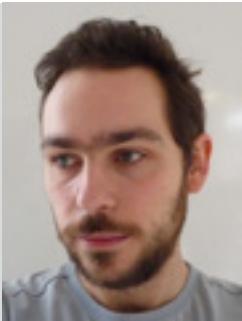
Fotoautotroofid – need on mikroorganismid, kes ammutavad oma energiat päikesest ja CO2st ning kasutavad seda bio- ja fotosünteesiks, on suureks looduslikuks energiaressursiks ja seega tulevikuteaduse valguses inimkonnale mitmes mõttes kasulikud. Biokütuse tootmine ei ole uudis, samuti ideed tuleviku toiduressursside suurendamisest, kuid ahvatlevam mõte peitub sünteetilises bioloogias, elu ja tehiselu ühendamise võimalikkuses.Kuidas mõista ja lahendada dilemmat kahe andmeside viisi – digitaalse ja materjalil põhineva ehk keemilise andmeside vahel, kui Turingi binaarsüsteem osutub ammendunuks? Teaduslik mõte materjalile põhinevast andmesidest baseerub keemilistel reaktsioonidel ja laiendab tohutult meie võimalusi tulevikus.

Alustan kõige lihtsamast, uurin akvaariumis elavat keskkonda ja püüan sellest saadavat informatsiooni tõlkida robotitele arusaadavasse digitaalsesse keelde. Lihtsate mõõteriistade ja algeliste robotliikumiste süsteem annab edasi aga minu keerulisi küsimusi, mis meie kõigi jaoks võiksid olulised olla. Kuidas saavad elu ja tehiselu ilma üksteist hävitamata paremini ja tõhusamalt koos eksisteerida? Kas me oleme selleks kooseksisteerimiseks ka eetiliselt valmis?

Minu koostööprojekt "Roboautotroofid" on sündinud koostöös TTÜ Meresüsteemide Instituudi Mereökoloogia labori teadlastega: Inga Lips, Karin Ojamäe ja Madis Listak.

@ TAHETER UNKST, 2010

© Paul Wiersbinski, 2013

Paul Wiersbinski´s interdisciplinary work has been featured in the following exhibitions: "RECORD > AGAIN!", ZKM Karlsruhe (2009); "Encore", Museum of Modern Art Zollamt, Frankfurt am Main (2011); "The Indifference of Wisdom", NURTUREart New York City (2013); "Risk Society", MOCA Taipei (2013), as well as lectures and publications: "Electronic Visualization and the Arts," British Computer Society in London (2011); Palais de Tokyo, Paris (2013); Club Transmediale Berlin (2014).

Paul Wiersbinski valdkondadevahelist loomingut on esitletud mitmetel näitustel: „RECORD > AGAIN!", ZKM (Karlsruhe, 2009); „Encore", Museum of Modern Art Zollamt (Frankfurt am Main, 2011); „The indifference of Wisdom", NURTUREart (New York City, 2013); „Risk Society", MOCA (Taipei, 2013) . Samuti „Electronic Visualization and the Arts", British Computer Society in London (2011), Palais de Tokyo (Paris, 2013), Club Transmediale (Berlin, 2014) loengutel ja publikatsioonides.

TOYs – Interactive
AV Performance Installation
TOYs – interaktiivne audiovisuaalne *performance*-installatsioon

Paul Wiersbinski / TAHETER UNKST

The project "TOYs" creates a hybrid space that merges concepts of sci-fi films, where real actors can be "controlled" by the audience, with the direct notion of play. The participants can access this scenario through a live-AV connection from the viewer to the performers, who are acting in the actual gallery space, using a wireless webcam and microphone. After the first call the viewer can decide what happens in the performance space. This area features several stages of a toyshop. The performance is 30 minutes and can be repeated several times an evening.
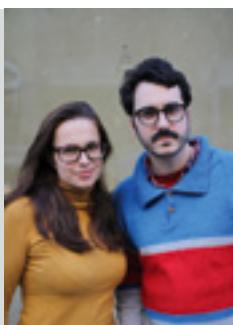
The project was not designed in order to transmit a certain moral or meaning but rather worked as an open scientific experiment and social investigation. It investigated how people use technical devices, in order to hide their true identity or reveal personal details to a stranger. Sometimes it forced the performances into an uncomfortable situation or other people just enjoyed the unusual interactive setup. In this way classic theatre, live performance and the tradition of video art are connected to the interactive possibilities of contemporary gaming.

„TOYs" projekt loob hübriidse ruumi, kus kohtuvad ulmefilmide kontseptsioonid, mille kaudu publik võib päris näitlejaid „kontrollida", sõna otseses mõttes ja mänguliselt. Osalejad pääsevad toimuvale ligi vaataja AV-ühenduse abil reaalajas: kes jälgib esinejaid, kes mängivad tegelikus galeriiruumis, kasutades juhtmeta veebikaamerat ja mikrofoni. Esimese märguande järel on vaataja otsustada, mis toimub etenduskohas edasi. Etenduse toimumise ruum on üles ehitatud nagu mänguasjapood. Performance kestab 30 minutit ja see kordub õhtu jooksul mitmeid kordi.

Projekti eesmärk pole olla moraliseeriv või tähendusi pakkuv, vaid vaadata avatud teadusliku katse ja sotsiaalse uurimuse abil, kuidas inimesed tehnilisi abivahendeid kasutavad, et varjata oma tegelikku identiteeti, avaldada isiklikku informatsiooni võõrale, suunata etenduse käiku ebamugavatele radadele või tunda mõnu interaktiivsuse ebatavalisest ülesehitusest. Nii on klassikaline teater, *live*-performance ja videokunsti traditsioon siin seotud tänapäevaste mänguliste ja interaktiivsete võimalustega.

© Rhytm of Cities, *Varvara Guljajeva, 2012*

© *Paco Puentes*

Varvara Guljajeva & Mar Canet Sola have been working together as an artist duo since 2009. They have exhibited their art pieces in a number of international shows and festivals. The artists were selected for the residencies at IAMAS (Japan), EMARE (FACT, Liverpool), Crida (Palma de Mallorca, Spain), MU gallery (Eindhoven, the Netherlands), Verbeke Foundation (Belgium), Marginalia+Lab (Belo Horizonte, Brazil), Seoul Art Space Geumcheon (South Korea) and more. The artist duo is concerned about the new forms of art. Thus, they use and challenge technology in order to explore novel concepts in art. The artists use to embed research into their artistic practice. Varvara and Mar have presented their research at Amber Conference in Istanbul, Enter5 Symposium in Prague, ISEA 2011, Open Knowledge Festival in Helsinki and more.

Varvara is originally from Estonia, she gained her master degree in digital media and art from ISNM (International School of New Media in the University of Lübeck) in Germany and is currently a PhD candidate at the Estonian Academy of Arts.

Mar (born in Barcelona) has two degrees: in art and design from ESDI School of Design in Barcelona and in computer game development from University Central Lancashire in UK. In addition to that, Mar is finalizing his master at Interface Cultures in Art and Design University of Linz in Austria. He used to work at Futurelab in ArsElectronica Museum and is a co-founder of Derivart and Lummo.

http://varvarag.info, **http://www.mcanet.info.**

Varvara Guljajeva ja **Mar Canet Sola** on kunstnikeduona koos töötanud alates 2009. a. Nende töid on esitatud rahvusvahelistel näitusel ja festivalidel. Nad on olnud residentuuris mitmel pool üle maailma: IAMAS (Jaapan), EMARE (FACT, Liverpool), Crida (Palma de Mallorca, Hispaania), MU gallery (Eindhoven, Holland), Verbeke Foundation (Belgia), Marginalia+Lab (Belo Horizonte, Brasiilia), Seoul Art Space Geumcheon (Lõuna-Korea) jm. Kunstnikeduo eriline huvi puudutab uusi kunstivorme, nad kasutavad tehnoloogilisi võimalusi leidmaks uusi kunstikontseptsioone. Teaduslikud uurimused on nende loometöö kindel osa.

Varvara ja Mari uurimustöid on esitletud mitmetel üritustel: Amber konverentsil Istanbulis, Enter5 sümpoosionil Prahas, rahvusvahelisel elektroonilise kunsti sümpoosionil ISEA 2011, festivalil Open Knowledge Helsingis jm.

Varvara on pärit Eestist, magistrikraadi kaitses Saksamaal rahvusvahelises uue meedia koolis (International School of New Media in the University of Lübeck), täna on ta Eesti Kunstiakadeemia doktorant.

Maril, kes on pärit Barcelonast Hispaaniast, on ühtaegu nii kunsti ja disainialane (The School of Design ESDI Barcelona) kui ka arvutimängude arendaja haridus (University Central Lancashire, Inglismaa). Lisaks sellele on ta lõpetamas magistritööd kunsti ja disainiülikoolis Linzis, Austrias. Ta töötab Futurelabis ArsElectronica muuseumi juures ja on kunstigrupeeringute Derivart ja Lummo kaasasutaja.

Vaata ka **http://varvarag.info; http://www.mcanet.info.**
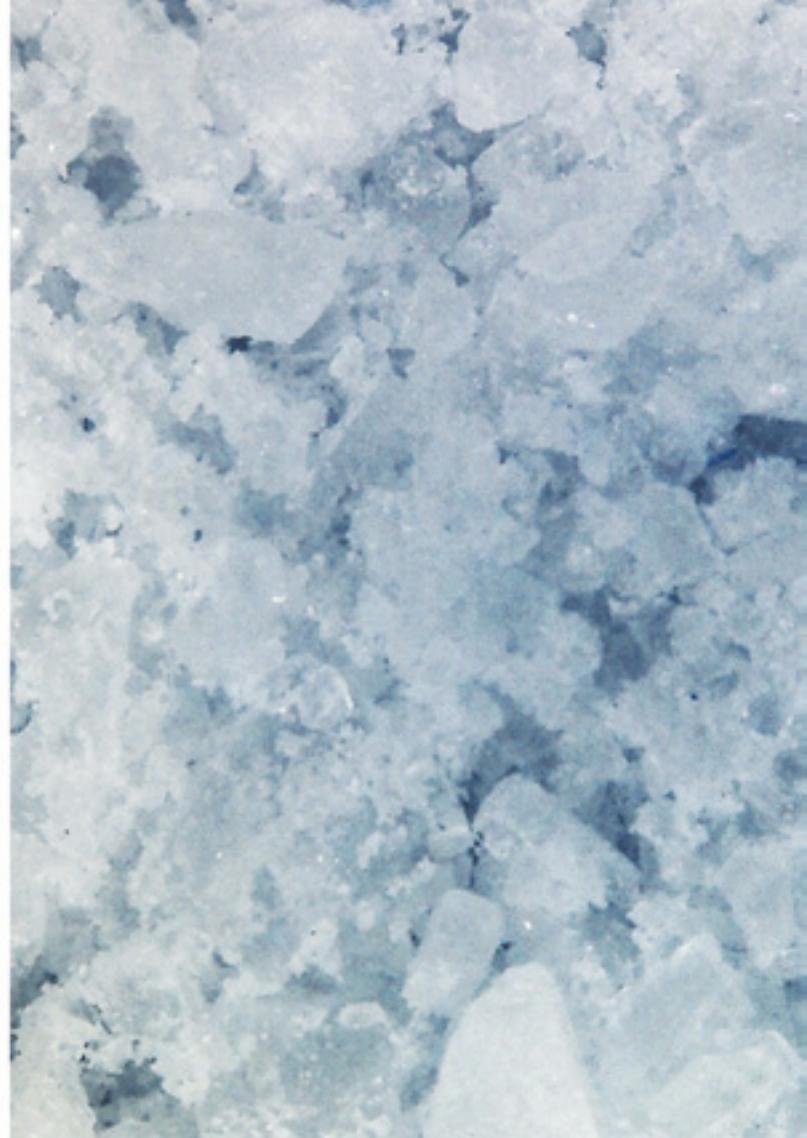
The Rhythm of City
Linnarütm

Varvara Guljajeva and Mar Canet Sola

The Rhythm of City is an art piece that points out an innovative and artistic way for applying geo-located social data as a score. At the same time, the data represents a city's pace of life. The goal is to metaphorically describe locations by extracting geo-tagged Twitter, Flickr and Youtube content and translating it into the rhythm of a physical metronome in real time. In short, a metronome represents a city.

The installation consists of 10 modified metronomes whose rhythms correspond to the selected cities' digital pace of life. The audience is given a chance to discover and experience an alternative way of perceiving different locations through a continuous performance of the 10 metronomes. Our concerns are about the malleability of the digital world to the physical one, and the interpretation of social data for artistic purposes. The installation is a sonic and visual interface for perceiving the urban life and culture of different locations. Moreover, it gives an alternative meaning and purpose to the location-specific invisible online data.

„Linnarütm" on kunstiteos, milles kasutatakse asukohapõhist sotsiaal-andmestikku. See andmestik peegeldab linna elurütmi. Eesmärgiks on Twitterist, Flickrist ja Youtube'ist saadud asukohapõhise sisu eraldamise ja sellega kohandatud metronoomide rütmi „tõlkimise" teel metafoorselt paiku kirjeldada. Installatsioon koosneb kümnest metronoomist, mille rütm vastab valitud linnade digitaalsele elurütmile. Publikul avaneb metronoomide pideva „tiksumise" abil võimalus avastada ja kogeda kohti teistmoodi. Meid huvitab digitaalse maailma mõju füüsilisele maailmale ning sotsiaalse andmestiku tõlgendusvõimalused kunstilistel eesmärkidel.

Audiovisuaalne installatsioon on kui liides, mille abil saada aimu erinevate linnade elust ja kultuurist. See annab kohaspetsiifilistele nähtamatutele *online*-andmetele uutmoodi tähenduse ja otstarbe.

Wood/salt detail image © Photos by Christian M. Fischer, 2014

After finishing his studies in media design and electro-acoustic composition in Weimar in 2007, **Christian M. Fischer** taught at FH Schwäbisch Hall and was head of media design department at German University in Cairo, Egypt. His works were performed and exhibited in Europe, Egypt and South Korea. He was a guest professor at the GUC campus in Berlin and taught at the Estonian Academy of Arts and the Estonian Academy of Music and Theatre, where he is currently working on his PhD in the composition department.

Peale meediadisaini ja elektroakustilise kompositsiooni õpingute lõppu 2007. aastal Weimaris asus **Christian M. Fischer** õpetama FH Schwäbisch Halli. Temast sai meediadisaini osakonna juht Saksa ülikoolis Kairos (Egiptus). Fischeri loomingut on esitatud Euroopas, Egiptuses ja Lõuna-Koreas. Ta on olnud GUC kampuse külalisprofessor Berliinis ja õpetanud nii Eesti Kunstiakadeemias kui ka Eesti Teatri- ja Muusikaakadeemias, kus ta praegu lõpetab oma doktoritööd kompositsiooni osakonnas.

Intrinsic Sonics
Olemuslik heli

Christian M. Fischer

When we have to deal with different materials that surround us in our environment, we usually use our tactile and visual sense: we see things and touch them. To explore the consistency of material, the auditory sense is hardly used.

Two very different materials that we deal with every day are salt and wood. They are also important regarding the history of trading here in Tallinn. But how do they sound? Metal (if thin enough) vibrates and therefore sounds in its very special way when hit. And we all know how paper sounds when ripped. But what about other substances that do not vibrate so easily? Is there a sonic life inside salt or wood?

The installation approaches the two materials from a sonic point of view. People can listen to and interact with the materials and manipulate sounds depending on how they shake cubes filled with either salt or wood and equipped with a microphone. Thereby user and cubes become part of a closed spatial acoustic 'eco' system and explore the sound characteristics of the material. On a meta level, questions regarding sound ecology and our behavior shaping our sonic environment are raised.
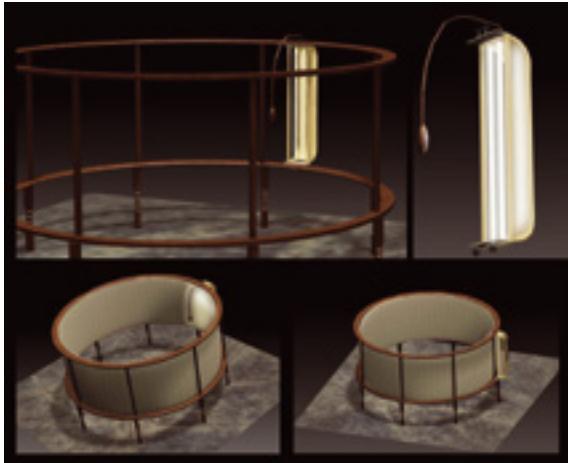
Et toime tulla meid keskkonnas ümbritsevate erinevate materjalidega, kasutame tavaliselt kompamis- ja nägemismeelt. Me näeme asju ja me katsume neid. Kuulmismeelt kasutatakse materjali terviklikkuse uurimiseks harvem.

Kaks väga erinevat materjali, mida kasutame iga päev, on sool ja puit. Nad on ka Tallinna ajaloo ja kaubavahetuse seisukohast olulised. Aga kuidas nad heliliselt kõlavad? Metall (piisavalt õhukesena) vibreerib ja kõlab seetõttu eriliselt, kui seda lüüa. Me kõik teame, kuidas kõlab paberi käristamine. Aga kuidas on teiste materjalidega, mis ei vibreeri nii hõlpsalt? Kas soola või puidu sees on peidus helikeelne elu?

Installatsioon läheneb neile materjalidele heli vaatenurgast. Inimesed võivad materjale kuulata ja nendega „suhelda", manipuleerida helidega vastavalt sellele, kuidas nad raputavad soola või puidu kuubikuid, mis on varustatud mikrofonidega. Külastaja ja kuubikud moodustavad n-ö suletud helilise ökosüsteemi, kus uurida materjali heliomadusi. Metatasandil kerkivad küsimused heliökoloogiast ja käitumisest, mis vormivad meie helikeskkonda.

Polina Tšerkassova is an anthropologist, musician and a PhD candidate in the department of Social and Cultural Anthropology in Tallinn University. In 2013-2014 she did fieldwork in Turkey. Her research concentrates on collaborative intimacy of sonic and kinetic spaces of Sufi whirling and music practices.

Eldar Jakubov is a sculptor and MA student at the Estonian Academy of Arts. He has also studied in Finland and Germany and organized international workshops. He uses recycled and natural materials in his works and he likes to question the conditions of modern society. His works have been shown in city spaces, galleries and festivals in Estonia, Finland, Germany and Norway.

Polina Tšerkassova on antropoloog, muusik ja Tallinna Ülikooli sotsiaal- ja kultuuriantropoloogia doktorant. 2013-2014 tegi ta uurimisretke Türki. Tema töö keskendub heliliste ja kineetiliste ruumide koostööpõhisele lähedusele sufi traditsioonides ja muusikas.

Eldar Jakubov on Eesti Kunstiakadeemia magistrant, kes varem õppinud skulptuuri. Ta on täiendanud end Soomes, Saksamaal ja Hollandis. Loomingus kasutab ta skulptuuri, animatsiooni ja eksperimentaalse graafika vahendeid. Tema töid on näidatud nii linnaruumis kui ka galeriides ja festivalidel Eestis, Soomes, Saksamaal ja Norras.

Meshk – the traces of collaborative intimacy in the whirling practices of Sufism
Meshk – Kollektiivse läheduse jäljed sufistlikes keerlevates praktikates

Polina Tšerkassova and Eldar Jakubov

"Meshk" is a sensory installation created as a collaboration between an anthropologist and an artist. Together they undertook five months of fieldwork in Istanbul studying with and learning from the Sufism practitioners. Sufism is a mystical path of Islam, which invites to search for the divine Love through personal experience and, for instance, the practices of ecstatic whirling, playing music, making art and calligraphy.

The word *meshk* in Turkish means a physical and emotional dedication to a practice of whirling, playing the ney flute, making marbling art, or calligraphy. By following the teacher's subtle guidance, the disciples co-create an intimate space and a shared ecstatic state of consciousness.

For the purpose of our work we tried to capture the co-created space of collaborative intimacy which occurs during the practice of sema, the ecstatic whirling. It focuses on the state of being in sound and in movement.

The process of discovery and gaining sensory knowledge always leaves traces which are "burnt" on the practitioner. The traces of ecstatic whirling experience are burnt and depicted on our canvas. The sounds and voices were recorded during the practice of *sema* – whirling.
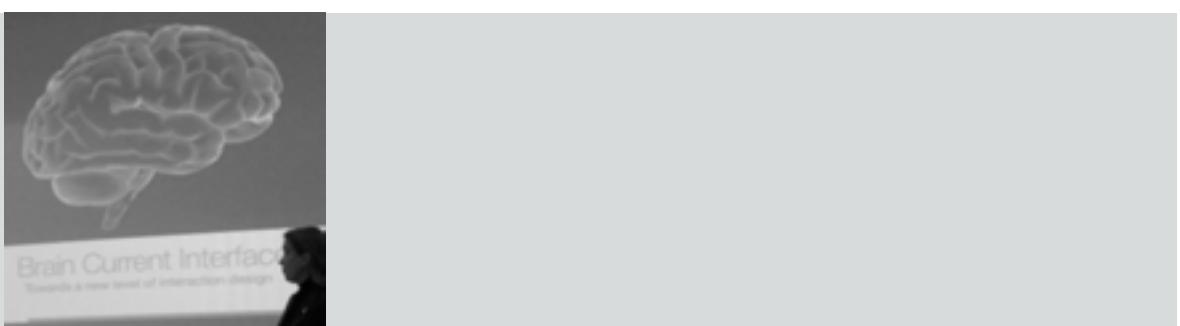
„Meshk" on meeli mõjutav installatsioon, mis loodud antropoloogi ja kunstniku koostöös, kes käisid Istanbulis viiekuulisel uurimisretkel *sufi* traditsioonidega lähemalt tutvumas. Sufism on islami müstiline suund, mis kutsub üles isikliku kogemuse läbi Jumalikku Armastust otsima ja praktiseerib sealjuures näiteks ekstaatilist keerutamist, muusika mängimist, kunsti ja kalligraafiat. Sõna *meshk* tähendab türgi keeles füüsilist ja emotsionaalset pühendumist keerutamisele, *ney* flöödi mängimisele, kunstile või kalligraafiale. Õpetaja vaikse juhatuse järgimisel luuakse intiimne ruum ja jagatud ekstaatiline teadvusseisund.

Antud töös püüame edasi anda koostöös loodud lähedusruumi, mis tekib *sema* ehk ekstaatilise keerutamise praktiseerimisel. Keskendume olemise seisundile helis ja liikumises.

Avastamise protsess ja meeltega kogetu jätavad alati jälgi, mis on justkui praktiseerijasse „põletatud". Ekstaatilise keerutamise jäljed on ka meie lõuendile põletatud. Helid ja hääled on salvestatud *sema* – keerutamise – käigus.

All images © Tjader-Knight Inc, 2014

Maria Tjader-Knight is an artist and designer, MA University of Art and Design, Helsinki, 2000.
With an international artist career since 1996, since 2000 within Tjader-Knight Inc., exhibitions: Pinacoteca di Brera, Musée d'Orsay, Paço das Artes, São Paulo and Kiasma, Helsinki. She is currently working as curator within Vantaa Art Museum and carrying out doctoral research at Aalto University, School of Art and Design. Her spare time is mainly occupied by green values, keeping chicken, organic vegetables and composting.

Maria Tjader-Knight on kunstnik ja disainer, kel on Helsingi Kunsti- ja Disainiülikooli magistrikraad (2000. a).Ta alustas rahvusvahelist kunstnikukarjääri 1996. aastal, alates aastast 2000 esineb ja töötab ta Tjader-Knight Inc. nime all. Ta on esinenud näitustega mitmel pool : Pinacoteca di Brera (Milano), Musée d'Orsay (Pariis), Paço das Artes (São Paulo) ja Kiasma, (Helsinki).
Käesoleval ajal töötab ta Vantaa kunstimuuseumi kuraatorina Soomes ja teeb doktoritööd Aalto Kunsti- ja Disainiülikoolis. Tema vaba aeg on seotud rohelise mõtteviisi väärtustamisega: kanade pidamise, maheaianduse ja kompostimisega.

BCIm
Brain Current Interface model

Maria Tjader-Knight
Audio composition, editing: David Knight
Hardware, coding: Gareth Spor

BCIm takes place at the focal point where interactive installation art joins neurology. Brain Current Interface model (BCIm) seeks to enlighten a mechanism that enhances usability of the human brain as a more intriguing alloy for contemporary art.

Attention! Relax!

Just by placing an unobtrusive headset on you can control an audiovisual landscape, without lifting a finger.

Learning to deliberately alter your attention, influences cognitive performance and advances wellbeing of individuals of any age.
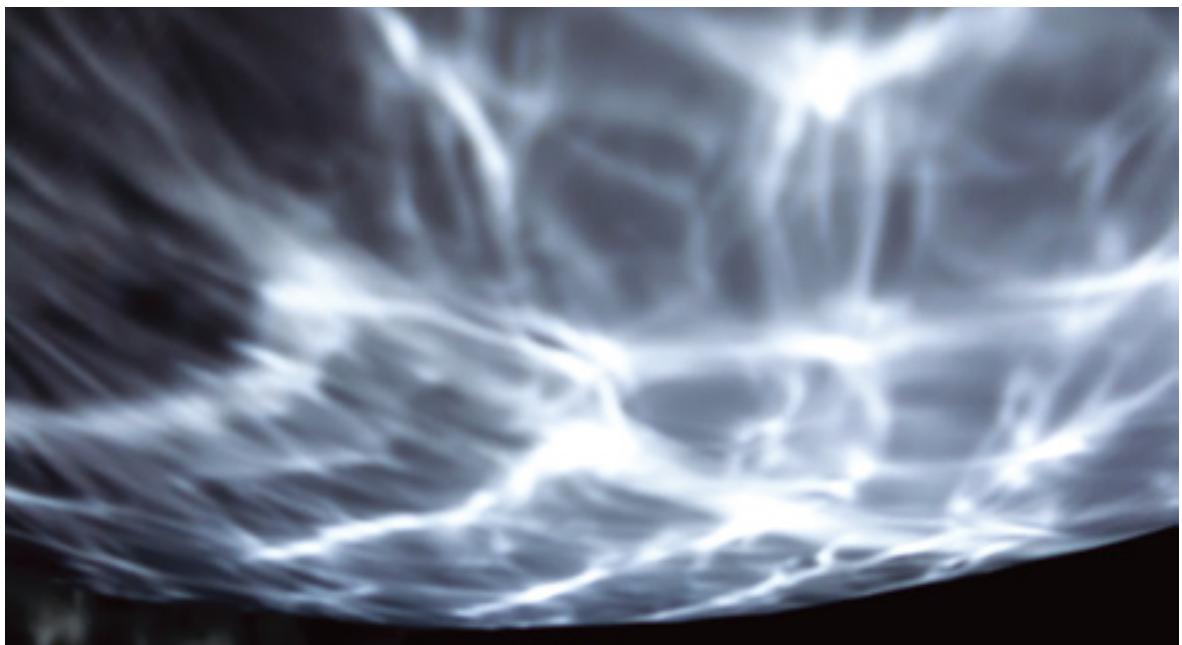
BCIm toimib selles olulises punktis, kus interaktiivne kunst kohtub neuroteadusega.
Brain Current Interface model (BCIm) on installatsioon, mis püüab näha inimaju tajumisvõimet tänapäeva kaasaegse kunsti võtmes.
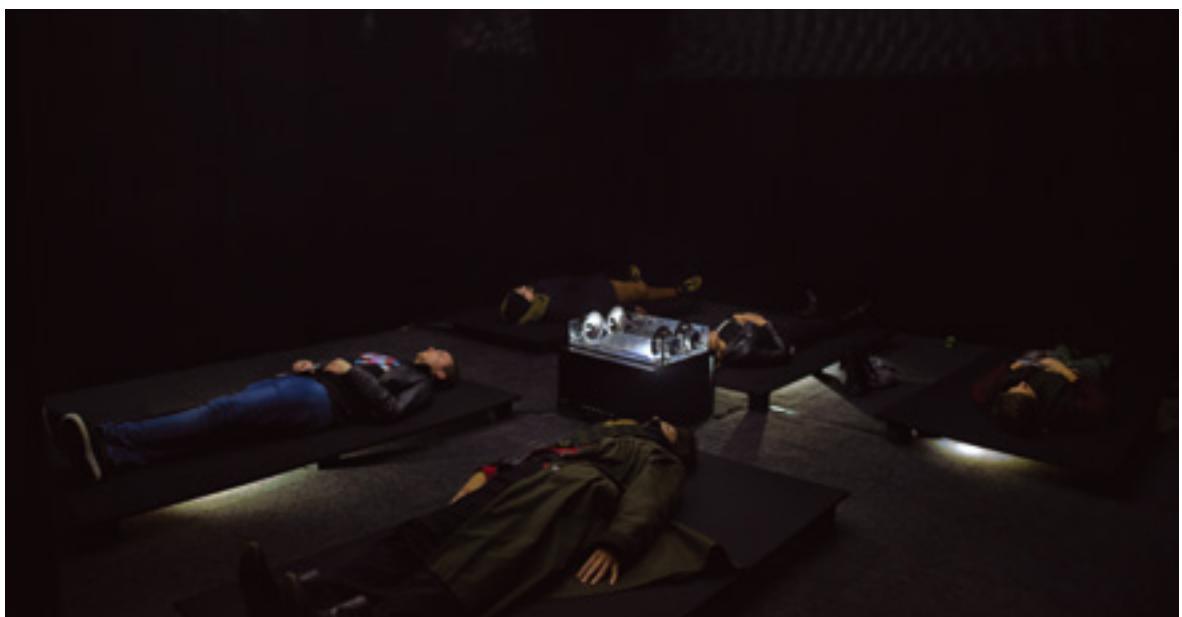
Tähelepanu! Lõõgastu!

Sõrmegi liigutamata saate lihtsat aju-uuringutes kasutusel olevat peakomplekti kasutades kontrollida audiovisuaalset maastikku, selle muutumist.

Sõrmegi liigutamata saate lihtsalt aju-uuringutes kasutusel olevat peakomplekti kasutades kontrollida audiovisuaalset maastikku, selle muutumist. Oskus teadlikult ja kaalutletult suunata oma tähelepanuvõimet, mõjutab igas vanuses isikute kognitiivset võimekust ja toimetulekut ning tõstab nende heaolu.

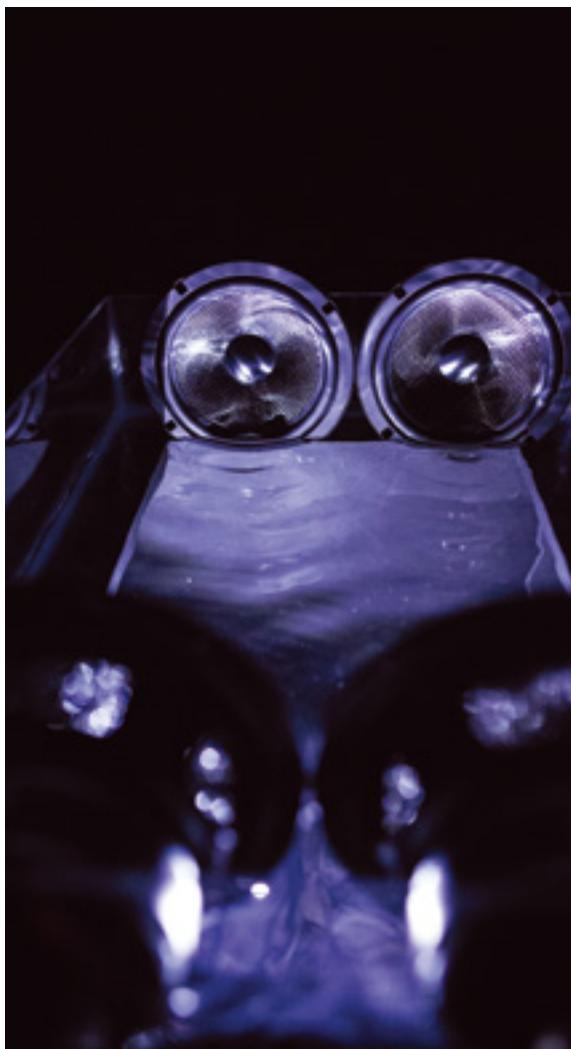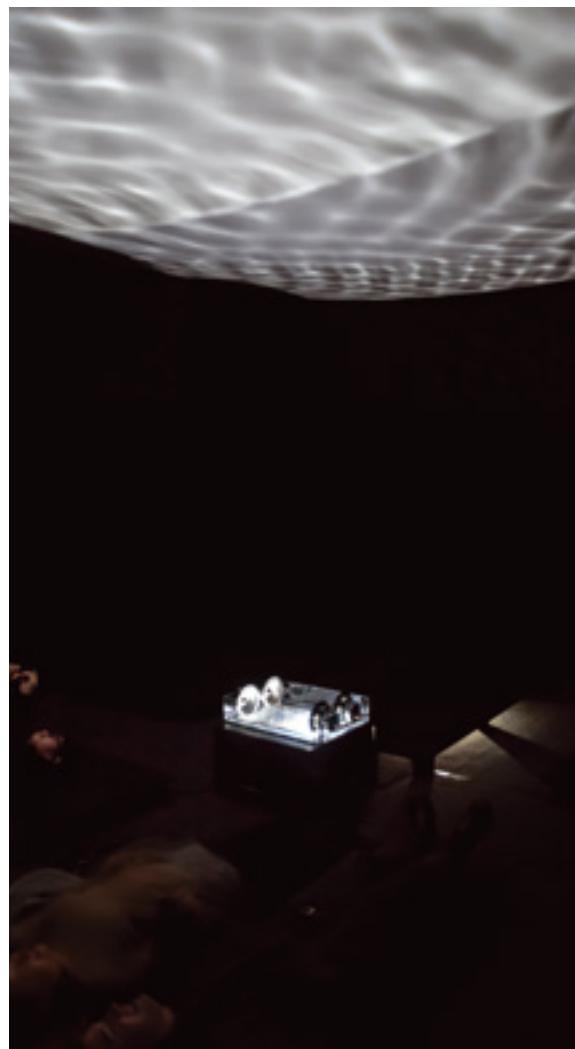### Yolanda Uliz Elizalde

With the aid of nowadays technology, Yolanda's work is focused on creating immersive experiences by bringing to awareness matters that are unnoticed. She uses sound as her main medium exploring the phenomenon itself from a personal perspective. Based in The Netherlands she holds a Master in ArtScience.

Yolanda Uliz Elizalde loob tänapäevase tehnoloogia abil endassehaaravaid nn totaalseid kogemusi, teadvustades asju, mis võivad tähelepanuta jääda. Ta kasutab põhilise meediumine heli, uurides seda nähtust isiklikust vaatenurgast. Ta tegutseb Hollandis ja tal on teaduskunsti (ArtScience) magistrikraad.

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© Photo by Florian Schulte, 2012

© Photo by Pieter Kers, 2013

~~Kulunka~~
~~Kulunka~~

Yolanda Uliz Elizalde

Longing for a re-encounter with the tangible, ~~Kulunka~~ overcomes the overload of audiovisual stimuli by experiencing our physical limits morphing in connection with the vibrating surroundings. It is an installation where to see, hear and touch sound waves, immersed in the sway of its oscillations. Embraced in a tactile sonic experience, viewers contemplate a universe of all pervading vibrations in an astral travel for the in and out of the body experience, where the boundaries between imagination and reality blur in an amalgamation of the senses. It is an immersive journey across sound and light encounters in space.
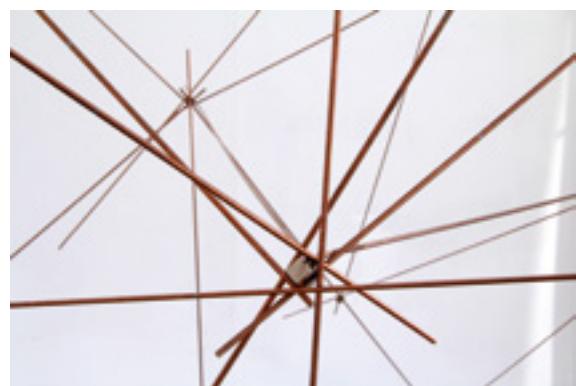
Premiered at Kontraste Festival in Krems (Austria) in 2012, was Co-produced by Sonic Acts/Kontraste

~~Kulunka~~ on installatsioon, mis võimaldab näha, kuulata ja kombata helilaineid, haarates näitusekülastaja nende võngete mõjuvälja. Ümbritsetuna taktiilsest helilisest kogemusest, peaksid vaatajad mõtisklema universumit läbivate vibratsioonide üle astraalsel teekonnal keha sisse ja sealt välja,. Tegu on haarava teekonnaga läbi heli ja valguse kohtumiste ruumis, kus meelte ühtesulamise tõttu ähmastub piir kujutlusvõime ja tegelikkuse vahel. Installatsioon uurib, kuidas heli käitub kolmes materia olekus, kasutades selleks erinevaid tehnikaid. Üksindus tekitab vaataja ja teose vahel intiimse suhte, luues meelihaarava kogemuse. Teost on esitletud ka viiest vibreerivast platvormist koosneva süsteemina, võimaldamaks sellest osa saada korraga viiel inimesel. Esmakordselt esitleti seda Kontraste festivalil Kremsis (Austria), 2012. aastal.

Untitled drawing by Jon Knowles, visual inspiration
© Jon Knowles

Detail of metal rods connected by magnets
© Christine Swintak, Peter Flemming

© Eric Mattson, 2013

Peter Flemming is a Canadian artist active for over fifteen years and working with robotics, kinetics, electronics, mechanics, sound, video, performance and new media. His past work has included lazy machines, solar powered robotics, and hypnotically repetitive automata. His current ongoing projects make use of improvisational kinetics and intuitive electronics, exploring sound and resonance in installations and performances featuring electromagnetically activated materials, mechanical performers and makeshift amplification devices. He has exhibited extensively at galleries, festivals and museums both nationally and internationally, garnering numerous grants and awards to support both his research and creative practice.

In 2012–2014, variations of his site-specific sound installation Instrumentation toured internationally, notably in the International Biennial of Digital Art (Montréal) and the Meta.morf, Biennale for Art & Technology (Trondheim). Additional versions appeared in Portugal, Chicoutimi, Bergen, Halifax, Slovenia, Italy, France and most recently in a solo exhibition for Le Mois Multi (Québec City). In addition to particiapting at current "Rhizope", his upcoming engagements include participation as the keynote artist for the "Sounds Like" festival of sound art at PAVED Arts Centre for Contemporary Media Art (Saskatoon). In 2014, Flemming will participate in the Transitory Research Initiative of the Balkans & Eastern Europe in Prague and Ljubljana with collaborator Christine Swintak. He was recently awarded a prestigious fellowship at Headlands Centre for the Arts (San Francisco, California), and residency at Treasure Hill Artist Village (Taipei, Taiwan). Flemming was also long-listed as Québec representative for the 2013 Sobey Art Award, Canada's pre-eminent annual prize for Contemporary Art.

Peter Flemming on kanada kunstnik, kes on aktiivselt tegutsenud juba enam kui 15 aastat. Tema tööd puudutavad robootikat, kineetikat, elektroonikat, mehhanikat, heli, videod, performance'i ja uut meediat. Tema viimaste tööde hulgas on „laisad masinad", päikeseenergial töötavad robotid, hüpnootiliselt oma tegevust kordavad automaadid. Tema praeguse töö eesmärgiks on kasutada kineetika ja elektroonika võimalusi improviseerimiseks, otsida heli ja selle resonantsi installatsioonides ja *performance´*ites. Ta katsetab erinevate materjalide elektromagneetilist mõjutamist ja lihtsaid vahendeid, mis saadavat heli võimendavad.

Peter Flemming on esinenud rohketel festivalidel, näitustel ja muuseumide väljapanekutel, saanud oma tegevuse jätkamiseks loometoetusi nii teadusliku uurimuse kui ka kunstipraktika viljelemiseks, samuti on ta oma töö eest pälvinud mitmeid auhindu. Variatsioone tema ruumiinstallatsioonist „Instrumentation" on aastail 2012–2014 esitatud mitmel pool. Olgu nimetatud rahvusvaheline digitaalkunsti biennaal Montréalis (Kanadas) ja Meta.morf kunsti ja tehnoloogia bienaal Trondheimis (Norras). Erinevaid versioone tema loomingust on esitatud ka Portugalis, Chicoutimis, Bergenis, Halifaxis, Sloveenias ja Itaalias, Prantsusmaal ja hiljutisel soolonäitusel „Le Mois Multi – Québec City". Lähitulevuks astub ta peaesinejana üles „Sounds Like" helikunsti festivalil (PAVED Arts Centre for Contemporary Media Art – Saskatoon) ning koos Christine Swintakiga võtab osa ka Balkani ja Ida-Euroopa maade uurimisgrupi tööst. Ta sai hiljuti stipendiumi Headlandi kunstikeskuselt (San Francisco, California) ja kutsuti residentuuri Taipeisse. Samuti oli ta Kanada kaaluka kunstipreemia Sobey Art Award 2013. a nominent.

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Irrational Orchestration (prototype)
Irratsionaalne orkester (prototüüp)

Peter Flemming

Irrational Orchestration playfully imagines the idea of electromagnetic activity as physical lines in space, embodied in a temporary structure that can be entered and experienced. Structured, but not scripted in advance, it spills organically in a space, unfolding in a tension between chaos and structure, mess and design, felt in the body.

With an untitled drawing by the artist Jon Knowles as visual inspiration, *Irrational Orchestration* is being developed as a schematic, rather than a pre-determined finished piece. Presented here as the initial prototype of a project in-progress, its current state is the result of a series of experiments with hand-wound electromagnets, simple alternating current circuits, and ad hoc architecture. Future versions will implement an underlying behavioural layer consisting of chains of analog circuit cells that form a large neural network, based on Norman T. White's *Neuromime* circuit. (As presented at the 2009 Grounding Open-source hardware Summit in Banff, Alberta, Canada and in Garnet Hertz's "Critical Making: Projects" (2013)

This implementation *Irrational Orchestration (prototype)* is a large network of metal rods interconnected by strong rare earth magnets. The installation is improvised on site, emerging as an erratic extension of both the space and the electricity from a single 220VAC receptacle. Found metal elements in the gallery such as water pipes, light fixtures, nails hidden under layers of paint, and window frames, are used as anchor points for the structure. Copper wire coils drawing (nearly) raw electricity from a wall outlet, harness the alternating current in order to subtly oscillate the assembly. The resulting vibrations can be magnified with found acoustic resonators such as boxes, cans or pails.

In future versions, these oscillations would be augmented by a matrix of neuromime circuits. The entire system would be animated, alive with pulsing patterns of vibration, electrical sparks and distributed sound. A human-scale concrete model of normally abstract phenomena, such as biological nervous activity or electromagnetic activity, the sensation from the point of view of audience would be of stepping into and becoming part of an unfolding physical process.

Project website: **http://www.peterflemming.ca/details/irr_orch_research.html.**

„Irratsionaalne orkester" mängib kujutlusega elektromagneetilistest lainetest kui füüsilistest joontest ruumis, mille omapärast muutuvat struktuuri on ruumi sisenemisel võimalik kogeda. Struktureeritud ja füüsiliselt kogetav, kuid mitte väga täpselt ette planeeritud, voolab joontekogumik ruumis orgaaniliselt, olles ühtaegu segadus ja korrastatus.

Jon Knowles'i pealkirjata joonistus inspireeris mind looma „Irratsionaalset orkestrit", mis on pigem skeem või kavand, kui lõpetatud ja täpselt ette planeeritud teos. Prototüüp ehk n-ö teos oma arenemise järgus on hulga eksperimentide tulemus, mille ma olen magneteid käsitsi reguleerides ning lihtsaid vahelduvvoolu ahelaid ja seadmetevahelisi otseühendusi kasutades läbi viinud. Selle töö edasiarendamisel tulevikus lähtun ma T. White'i Neuromime ideest, mille kohaselt võib analoogühenduste võrgustiku loomisel aluseks võtta ka inimese keerulise närvisüsteemi struktuuri.

Esitletav „Irratsionaalse orkestri" prototüüp kujutab endast metallvarraste võrgustikku, mille ühenduskohad on kokku liidetud tugevate haruldastest muldmetallidest magnetitega. Kummalisteesse vabalt improviseeritud ja ruumi omapärasid arvesse võtvaisse kompositsioonidesse seatud leidesemed, nagu metalltorud, valgustid, värvikihtidega kaetud naelad, aknaraamid jms on selles võrgustikus n-ö ankrupunktideks. Elekter ja vahelduvvoolu jadad tekitavad võnkeid ja võnkumise tsükleid, mis omakorda mõjutavad kogu loodud ruumiinstallatsiooni. Saadud vibratsioonile annavad uue ja tugevama kõla lihtad resonaatorid – nt karbid, purgid ja ämbrid.

Tulevikuversioonides soovin ma tekkivaid võnkeid ja tükleid laiendada, lähtudes neuroloogiliste võrkude väga keerulise, kuid suurepäraselt toimiva struktuuri põhimõttest.

Kogu süsteem on nagu elus kogum pulseerivatest ja vibreerivatest mustritest, elektrilistest sädemetest ja sellest tekkivatest põnevatest helidest. Abstraktse fenomeni ja inimmõõtme ehk bioloogilise närvisüsteemi omavaheline kontseptuaalne sidumine ruumiinstallatsioonis on põnev mõte, see on füüsikalise protsessi toomine inimese tasemele.

Conseil des arts et des lettres
Québec

Conseil des arts du Canada   Canada Council for the Arts

© Angelika Böck, 1996
Material: eye-drawing, sandblasted glass (4 layers each)
Size 400x400x5mm each

Angelika Böck was born 1967 in Munich, Germany. She graduated 1992 in interior design and 1998 in sculpture at the Academy of Fine Arts in Munich. Human perception and representation are the focal point of her pratice. Her artistic strategies are laid out along the lines of scientific experiments and feature similarities to scientific disciplines, such as anthropology, sociology or psychology. Between 1996 and 2000 she employed eye-tracking technology. 'Portrait as Dialogue' explores "portrayal" as an art form. Her "Dialogical Portraits" are intended as a dual relation between both objectivities and subjectivities within the order of representation and represent both a crossover and reversal of the traditional roles of the artist on the one hand and model on the other.

Angelika Böck lõpetas 1988. aastal Müncheni kunstiakadeemia skulptuuri erialal ja 1992. aastal sama kooli sisearhitektuuri eriala. Teda huvitavad inimese maailma tajumise ja selle esitlemise viisid. Oma loomingu on ta üles ehitanud reale teaduslikele eksperimentidele ja sel on ühendkohti teadusvaldkondadega nagu nt antropoloogia, sotsioloogia või psühholoogia. Vahemikus 1996–2000 hakkas ta kasutama nn silma-jälgimise tehnoloogiat. Tema teos „Portree kui kahekõne" uurib portreteerimist kui kunstivormi. Tema „Kahekõnelised portreed" on kavandatud kahetise objekti-subjekti suhtena esitlusvormi sees ja on ühtaegu nii kunstniku-modelli vahelise harjumuspärase rolli sillaks kui ka ümberpöörajaks.

Blanks

Angelika Böck, 1996
Text: Randy Gunzenhäuser

Angelika Böck has used eye-trackers to make the laws of perception visible and tangible. For the artist, technology is both a source of inspiration and a mechanism of mediation. It communicates closeness, creates presence, involves the viewer. The eye-tracker consists of infrared or video glasses which follow the eye movements and are linked to a PC for analyzing the optic data and converting it into lines and points. the drawings created by the eye movements represent visual studies. they store transient visual tracks, allowing individual eye movements to be retracted again and again.

Elaborate glass techniques, systems of mirrors and digital recordings as well as play-back technology makes it possible to observe things that usually go unnoticed and see things that normally go unseen. In this way, the past can be brought into the present. The intimacy of a by-gone moment of eye contact is conspicuously staged, only to be destroyed again; the present gives rise to new intimacy which is in turn abandoned.

Eye-tracking technology formed the basis for the creation of "blanks", an installation comprising visual tracks characterized by the figure four. This works shows a series of four portraits. Four people each looked at a square sheet of blanks paper, their range of vision being restricted to a 40x40-centimetre section. Each person was subsequently presented with the recording of his or her eye movements while looking at the empty sheet, and the eye movements recorded once again until this had been repeated for four one-minute intervals.

The tracks recorded each time were marked in black on a pane of glass and the panes placed on top of one another. Standing directly in front of the composition, all levels merge and can be viewed as one image. Only by changing the angle of observation can the viewer distinguish individual layers of the dialogues between the different viewing processes and consequently follows the history of perception. The four individual portraits illustrate how a person's mode of observation is increasingly consolidated on each occasion, reflecting his/her own mode of perception and that of an outsider.

In this instance, the eye is used directly as a drawing tool in order to perceive perception – observation is transformed into a portrayal without taking the route via hand and canvas. The perceiving eye is at the same time executing the drawing.

...

Angelika Böck kasutab n-ö pilgujälgijaid, et muuta nägemise seaduspära meile nähtavaks ja käega-katsutavaks. Kunstniku jaoks on tehnoloogia ühtaegu inspiratsiooniallikas ja mõtlemisvahend. See annab edasi lähedust, loob kohalolu ja kaasab vaataja. Pilgujälgimisseade koosneb infrapuna- või videoprillidest, mis jälgivad silma liikumist ja mis on ühendatud arvutiga, kus saadud optilised andmed töödeldakse ja pakitakse joonteks ning punktideks. Saadud joonised kujutavadki endast visuaalseid uuringuid. Nad peidavad endas põgusaid nägemisradu, mis lubavad taas ja taas individuaalseid silma liikumisi ajas tagasi kerida.

Pilgujälgimise tehnoloogia põhjal on valminud „blanks" portreesari. [—] Silmamuna kasutatakse kui joonistusvahendit, et näha nägemist – vaatlus on muudetud portreteerimisvahendiks, pintslit ja lõuendit appi võtmata.

All images © Martin Howse

The interdisciplinary work of **Martin Howse** is preoccupied with a broad questioning of the exact location of execution and of code within the world (psychogeophysics). Through the construction of experimental situations (within process-driven performance, laboratories, walks, and workshops), material art works and texts, Martin Howse explores the rich links between substance or materials and execution or protocol, excavating issues of visibility and of hiding within the world.

Martin Howse'i valdkondadevahelise loomingu keskmeks on psühhogeofüüsika.
Eksperimentaalsete olukordade (protsessipõhine *performance*, laboratoorne töö, jalutuskäigud, töötoad), kunstiteoste ja tekstide loomise abil uurib ta mateeria ja materjalide ning sellest saadava teabe omavahelisi rikkalikke seoseid, tuues päevavalgele „nähtavuse" ja „peitmise" küsimused.

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Sketches towards an Earth Computer
Maa-arvuti visandid

Martin Howse

Sketches for an Earth Computer presents a living "laboratory" study enacted as a possible earth computer, alongside photographic documentation of various attempts to implement a literal, artistic investigation of the links between the earth, code and the human psyche of the viewer.

The earth computer proposes the bootstrapping of a long-term, visible computational device self-constructed solely from the earth, and embedded within the earth as a critical monument to human technology.
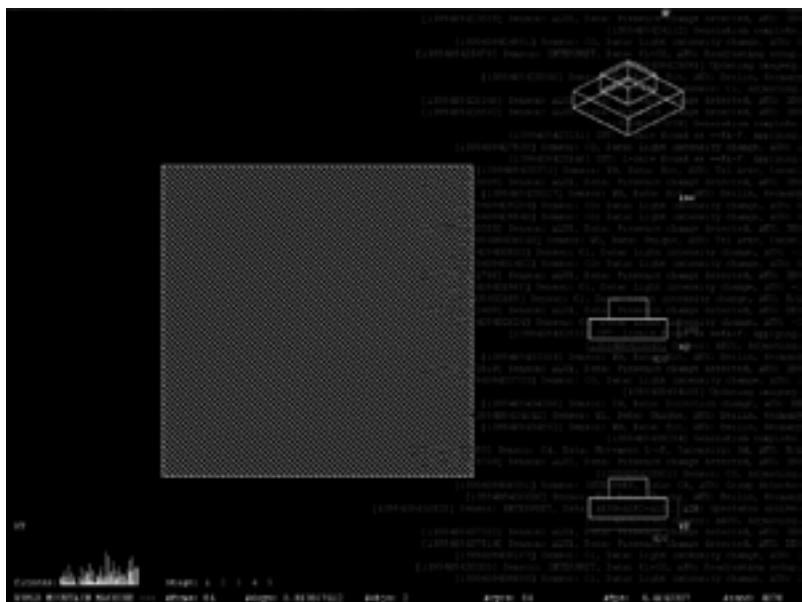
The total environment (geophysical, biological, electro-chemical) itself encodes and manipulates active, new computational-crystalline structures which compute, impact on and re-code this environment within a complex feedback system.

The living "lab" study consists of a single container which explores within a restricted environment the various coded and energetic transformations which the earth computer enacts. This container is open to, and influenced by local environmental and electromagnetic changes; these changes could visibly re-code the enclosed substrates.

„Sketches for an earth computer" ehk „Maa-arvuti visandid" on n-ö eluslaboriuuring, mis on teostatud visioonina maa-arvutist. Seda saadab foto-dokumentatsioon sellest, kuidas mitmete literatuursete ja kunstiliste katsete abil püüti leida seoseid maa, koodi ja vaataja inimpsüühe vahel. Maa-arvuti on kauakestev, nähtav, omaloodud arvutusvahend, mis on ehitatud pinnasest ja maetud maha kui inimese poolt loodud tehnoloogia kriitiline mälestusmärk.

Kogu keskkond (geofüüsiline, bioloogiline, elektro-keemiline) iseenesest kodeerib ja mõjutab aktiivselt uusi arvutuslik-kristallilisi struktuure, mis arvutavad, mõjutavad ja taaskodeerivad seda keskkonda keeruka tagasisidesüsteemi sees.

„Eluslaboriuuring" tähendab anumat, milles tehnoloogia abil uuritakse selles anumas olevas materjalis (muld, maapind) toimuvaid mitmesuguseid kodeeritud ja energeetilisi muutusi. See anum on kohalikele keskkonna- ja elektromagneetilistele muutustele avatud ja samas neist mõjutatud; muutused võivad ka anumas sisalduvat mateeriat ümber kodeerida.

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*World Mountain Machine
start configuration
© Martin Reiche and
Ulrich Gehmann*

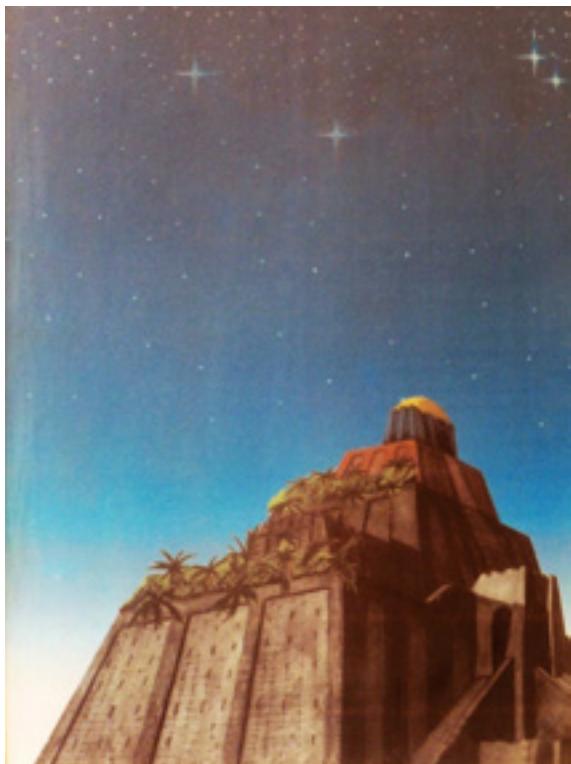

© Martin Reiche 2013 © Ulrich Gehmann, 2014

Martin Reiche is an audiovisual artist living and working in Berlin. He is co-founder and former head member of the Laboratory for the Analysis of Social Networks (LASN) at Karlsruhe University of Arts and Design, co-founder of the Subformat Research Group with research on theory of space and spatial digitalization phenomena and regularly presents on professional computer science and digital art and gaming conferences.

Ulrich Gehmann (Dipl Biol. et lic. oec. HSG et MA history, studied biology, business administration and history, receiving an education in the humanities. He worked in industry and international consulting, the latter covered enterprise reorganization and institutional cooperations, many of them funded by international donor agencies (IMF, World Bank, etc), in former GUS, Central Asia and the Middle East. Director in charge for management consulting in Bucharest, Romania. Lecturer at Wuppertal University, Germany, for business administration. Founder of the research group formatting of social spaces, and of the journal New Frontiers in Spatial Concepts, University of Karlsruhe (KIT), Germany. Publications on occidental mythology and its impact on recent sociocultural reality, spatial issues, and virtual worlds, inter alia at Oxford University Press. Museum projects. Lecturer at Karlshochschule International University, (cultural issues of organizations); partner in a German consulting firm active in the EU and European Commission, founding member of the Subformat Research Group.

Martin Reiche on audiovisuaalne kunstnik, kes elab ja töötab Berliinis, Saksamaal. Ta on üks Karlsruhe Kunsti ja Disaini Ülikooli Sotsiaalvõrkude Analüüsi Laboratooriumi loojatest (Laboratory for the Analysis of Social Networks). Lisaks on ta olnud ruumiteooriat ja ruumi digitaliseerimist uurinud *Subformat* uurimisgrupi kaasasutajaks. Ta on esinenud erinevatel arvutiteaduse, digitaalse kunsti ja arvutimängude konverentsidel.

Ulrich Gehmann on õppinud bioloogiat, ärijuhtimist ja ajalugu. Ta on töötanud rahvusvahelise ja ärialase nõustamise alal ning on olnud suure rahvusvahelise konsultatsioonigrupi direktor Rumeenias. Tema pädevusse kuulus institutsionaalne koostöö, ärijuhtimine ning regionaalareng, seda peamiselt Ida-Euroopas, Venemaal, Põhja-Aafrikas ja Kesk-Aasias. Alates aastast 1996 on ta partner konsultatsioonifirmas, mis töötab Euroopa Komisjoni heaks.

Ulrich Gehmann on rahvusvahelise juhtimiskooli õppejõud ning töötab ühtlasi Karslruhe Ülikoolis. Ta juhib kultuuriuuringute töögruppi Karsruhe Ülikooli ajaloo osakonnas ja on ruumi küsimustega tegeleva ajakirja peatoimetaja. Ta on juhtinud veel mitmeid erinevaid uuringuid, näiteks projekti, mis tegeles evolutsiooni kui protsessiga ja mida toetas Baden-Würtembergi teadus- ja kultuuriministeerium.

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Early Ziggurat in imaginative scenery (from Uruk, city of Gilgamesh, the mythic founder of human civilization). Poster Print.
© Photo by Ulrich Gehmann

History, Progress, and Form: Maerten van Valckenborch 1595, Tower of Babel; detail. Exposition Brueghel - The Fascinating World of Flemish Art. Chiostro del Bramante, Rome, December 18th, 2012 - June 2nd, 2013. © Photo by Ulrich Gehmann

World Mountain Machine
Maailmamäemasin

Ulrich Gehmann and Martin Reiche, 2014

The World Mountain Machine shows architectural morphology as a historical process and translates it into a visual language. The spectator is offered a view of a process that develops over the course of the whole exhibition: A world mountain (a mythological expression of world "as it is" in its cosmic order in form of a concrete architecture) is created that transcends through different stages of evolution based on the sensory input coming from the venue of the exhibition and methods derived from computational biology and fractal geometry. The spectator thus becomes the active participant in the evolution of the architecture that is presented to him while at the same time he is only displayed a snapshot of the whole development. The work highlights the ephemeral nature of a historical process while at the same time creating an abstract mathematical model for process morphology throughout the exhibition. It shows the ongoing development of the architecture that will be completed on the last day of the exhibition.

„World Mountain Machine" ehk "Maailmamäemasin" näitab arhitektuurset morfoloogiat kui ajaloolist protsessi ja tõlgib selle visuaalsesse keelde. Vaataja näeb protsessi, mis areneb kogu näituseperioodi vältel: luuakse maailma mägi (mütoloogiline väljend maailma kohta sellisena „nagu ta on" oma kosmilises korras ja konkreetse arhitektuuriga), mis läbib erinevaid arenguetappe tänu näitusesaali paigutatud sensoritelt saadud sisendile ja arvutuspõhise bioloogia ning fraktaalgeomeetria meetoditele. Külastaja osaleb seega aktiivselt areneva arhitektuuri loomisel, kuigi näeb sellest vaid üht ajalist fragmenti.

Teos toob esile ajaloolise protsessi efemeersuse ja loob samal ajal kogu näituse kestel aset leidva protsessi morfoloogia abstraktse matemaatilise mudeli. Teos, mis valmib näituse viimasel päeval, näitab arhitektuuri pidevat arengut.

Video still: Antonio

Video still: Elisabeth

Video still: Merce

© *Diana Rivera, Amanda de Luis Balart*

Diana Rivera is a leading creativity coach, facilitator and specialist who uses creative practices, coaching models and contemporary research in psychology to create profound purpose and direction for her students and clients. Diana develops innovative multi-week, arts integration programs for children, adolescents and professional development for teachers. She also develops programs for nonprofit and for-profit organizations on creative process, collaboration and enhanced communication. Diana has a MA in Psychology, specialization creativity research, and is currently pursuing her PhD.

Amanda de Luis Balart earned her Master's Degree in Communications in Barcelona shortly after she moved to San Francisco where she worked in film. In 2005 she moved back to Spain where she works in directing, writing and producing for feature films and documentaries. In 2008 she produced the film "The Frost". She spent 2010 in India making videos for NGOs. Recently she produced "La Estrella" and directed the music video "Monkey Girl" and the documentary "Marta's Recovery".

Diana Rivera on magistrikraadiga psühholoog ja doktorant, kelle suunaks loovuse uurimine. Ta on nn loovustreener ja -spetsialist, kes kasutab loovpraktikat, treenimismudeleid ja psühholoogia tänapäevast uurimust, et oma tudengeid ja teisi huvilisi juhendada. Ta arendab mitmenädalast lastele, noortele ning õpetajatele suunatud kunsti integratsiooni programmi. Samuti tegeleb nii mittetulunduslikele organisatsioonide kui äriühingute nõustamisega loova protsessi, koostöö ja tõhusama kommunikatsiooni vallas.

Amanda de Luis Balart sai Barcelonas kommunikatsiooni alal magistrikraadi peatselt pärast seda, kui kolis San Franciscosse, kus töötas filminduses. 2005. aastal siirdus ta tagasi Hispaaniasse, kus töötab mängufilmide ja dokumentaalfilmide rezissööri, stsenaristi ja produtsendina. 2009. aastal valmis tal film „The Frost". 2010. aasta veetis Amanda de Luis Indias, kus tegi valitsusvälistele organisatsioonidele videosid. Hiljuti valmis film „La Estrella" (2013).
Ta on muusikavideo „Monkey Girl" ja dokumentaalfilmi „Marta's recovery" režissöör.

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I Am Like Dali
Ma olen nagu Dali

Diana Rivera, Amanda de Luis Balart

"I Am Like Dali" is a collection of short videos in English, Spanish, and Catalan. Each visual exposé is about the person one is said to be like, not like, or the person one always wanted to be like. Each narrative is filmed with the use of an accessible form of technology (iphone, flip camera, and/or laptop video camera). The recording is five minutes or less.

The project is led by Diana Rivera (academic researcher/artist) and Amanda de Luis (film researcher/artist). All participants live in Barcelona, Los Angeles, and New York.

The project is influenced by research in personality psychology, wherein the discussion of self is informed in part by past and present experiences and relationships with others, and more current research may ask how it is informed by the technologies one uses. In this study, the researchers are interested in how the participant responds to the questions as a stream of association, how they engage in role/self performance, and the ways they decide to use accessible technology as a space of narrative to discuss self. "I Am Like Dali" resembles a walk through one's personal and imaginative catacomb where an individual participant can share content on parts of self.

„Ma olen nagu Dali" on kogumik hispaania-, katalaani- ja inglisekeelseid lühifilme. Iga visuaalne episood on inimesest, keda öeldakse meenutavat, või mitte meenutavat kedagi, või inimesest, kelle moodi keegi on alati olla soovinud. Lood on üles võetud käepäraste vahenditega. Kas iPhone'i või mõne teise nutiseadme kaamera või sülearvuti videokaameraga. Salvestuse pikkus on kuni viis minutit. Projekti autoreiks on Diana Rivera (akadeemiline teadustöö/kunstnik) ja Amanda de Luis (filmiuurija/kunstnik). Kõik videodes osalejad elavad kas Barcelonas, Los Angeleses või New Yorgis.
Projekt on mõjutatud uurimistööst isiksusepsühholoogia vallas, kus arutlust enesemääratluse üle suunavad nii minevikus kui tänapäeval olulised küsimused ning inimeste suhted teistega. Veelgi põletavam on küsimus sellest, kuidas kõike eeltoodut omakorda mõjutab tehnoloogia, mida me kasutame.

Teoses uuritakse, kuidas osaleja vastab küsimustele seostevooluga, kuidas osaleja end rolli asetab ja kuidas otsustab tehnoloogiat kasutada, et oma mina üle arutleda.

„Ma olen nagu Dali" meenutab jalutuskäiku läbi kellegi isikliku ja kujuteldava katakombi, kus osaleja võib jagada oma enesemääratluse osiste sisu.

Terje Toomistu and **Kiwa** are collaborating in running the multimedia project focusing on the youth counter-culture and the hippie movement in Soviet Union. Their co-curated exhibition "Soviet hippies: The Psychedelic Underground of the 1970s Soviet Estonia" has so far been exhibited in Estonian National Museum, *Moderna Museet* in Malmö and Uppsala *Konstmuseum* in Sweden.

Kiwa (**Kiwanoid** as sound artist, born 1975 in Soviet Union) – multidisciplinary artist, lives and works in Tartu and Tallinn. He actively explores and blends different media, from conceptual objects to total audiovisual environments. His artistic practices include painting, objects and installation, video, performance, sound art, scenography, text, books etc., which all together function as a hypertextual research of meaning-making and cultural codes on different levels. While participating in exhibitions since 1995, his work has been featured over 40 solo exhibitions and in over 300 group exhibitions and festivals in Europe, America and Asia. He has also lectured in the Estonian Academy of Arts (since 2006) and worked as a curator (since 1999). **www.kiwanoid.com.**

Terje Toomistu (born 1985 in Paide, Estonia) is an author, documentary filmmaker and anthropologist, whose works are often related to various cross-cultural processes, queer realities and subjectivities, and cultural memory. She is currently a PhD student in University of Tartu in the Department of Ethnology, and in 2013-2014 she is also a Fulbright scholar in University of California, Berkeley, US. She holds double MA degrees *cum laude* in Ethnology and in Media and Communication from University of Tartu. Among her creative works, she has co-written a novel entitled "Seven Worlds" (2009) about spiritualities in South America and she is one of the authors of the independent documentary Wariazone (2011, **www.wariazone.com**).

Terje Toomistu ja **Kiwa** töötavad koos multimeediaprojektiga, mis keskendub noorte kontrakultuurile Eestis ning hipiliikumisele Nõukogude Liidus. Nende kuraatoriprojekti „Nõukogude lillelapsed: 70ndate psühhedeelne underground" on esitatud Eesti Rahva Muuseumis, *Moderna Museet*'is Malmös ning Uppsala *Konstmuseum*'is Rootsis.

Kiwa (helikunstnikuna **Kiwanoid**, sündinud 1975 Nõukogude Liidus) on multidistsiplinaarne kunstnik, kes elab ja töötab Tallinnas ja Tartus. Ta kasutab ja segab erinevaid meediumeid, kontseptuaalsetest objektidest audiovisuaalsete keskkondadeni. Tema kunstnikupraktika hõlmab maali, objekte ja installatsioone, videot, *performance*'it, helikunsti, skenograafiat, teksti, raamatuid, dokumentalistikat, mis toimivad hüpertekstuaalse uurimusena tähendusloomest ja erineva tasandi kultuurilistest koodidest. Alates 1995. aastast on tema töid esitatud üle 40 isikunäitusel ning üle 300 grupinäitusel ja festivalil üle Euroopa, Ameerika ja Aasia. Ta on töötanud lektorina Eesti Kunstiakadeemias (alates 2006. aastast) ning kuraatorina (alates 1999. aastast). Vt **www.kiwanoid.com.**

Terje Toomistu (sündinud 1985. aastal Paides) on dokumentalist ja antropoloog, autor, kelle tööd viitavad sageli erinevatele kultuuridevahelistele protsessidele, *queer*-reaalsustele ja subjektsustele ning kultuurimälule. Ta on Tartu Ülikooli etnoloogia osakonna doktorant ning aastal 2013-2014 ka Fulbright'i stipendiaat California Ülikoolis Berkeley's. Tal on *cum laude* magistrikraadid etnoloogia ja kommunikasiooni erialadelt Tartu Ülikoolist. Toomistu loomiguliste tööde seast on tähelepanuväärsed kaasautorlus novellile „Seitse maailma" (2009), mis käsitleb spirituaalsust Lõuna-Ameerikas, ning koos Kiwaga loodud dokumentaalfilm „Wariazone" (2011).

Flower Power Soviet Power

Kiwa & Terje Toomistu

Combining ethnological research of oral history and analyses of popular culture with the use of video, photo, text and illustrative artifacts, the selection of work sheds light on the youth counter-culture of the 1970s Soviet Estonia.

Coveting Western freedoms, inspired by rock music and spiritually influenced by the cultures of the East, a generation of flower children also grew up on the other side of the Iron Curtain. The mere trend toward hippie fashions, long hair and great rock concerts was, however, enough to make the Soviet authorities see the 'different' and 'deviant' as a political threat that could subvert its regime. This resulted in several measures designed to mitigate the youth: strategic harassment by the KGB, strict limits on cultural activities, censorship, expulsions based on appearance, treatment in mental hospitals, etc. Ironically, however, many young men voluntarily admitted themselves to insane asylums in an attempt to avoid army service obligations.

While the politics around the Soviet hippie culture reveals vividly the conflicting personal and social 'truths', subjective and 'objective', the psychedelic and the 'rationale', it also illustrates how power acts as simultaneously repressive and productive.

Ühendades etnoloogilise uurimuse suulisest ajaloost popkultuuri analüüsiga ning kasutades meediumitena videot, fotot, arhiivitekste ning artefakte, tutvustab väljapanek 1970. aastate Nõukogude Eesti noorte kontrakultuuri.

Ihaldades Lääne vabadusi, olles inspireeritud rock-muusikast ning spirituaalselt mõjutatud idamaadest, kujunes ka teisel pool raudset eesriiet lillelaste põlvkond. Nõukogude võimule piisas aga pelgalt hipilikust riietusstiilist, pikkadest juustest või liiga heast rock-kontserdist, et näha Lääne mõjutustest „rikutud" hipides režiimi õõnestavat poliitilist ohtu. See tõi kaasa mitmeid meetmeid noorte ohjamiseks: KGB strateegiline jälitustegevus, kultuurilise tegevuse ranged piirangud, tsensuur, välimuse põhjal väljaarvamine, sundravi vaimuhaiglas jne. Samas, selleks, et vältida patsifismi ideega vastuolus sõjaväeteenistust, läksid paljud noormehed vabatahtlikult nö *hullarisse.*

Nõukogude hipikultuuri ümbritsev poliitika ei ava mitte ainult personaalsete ja sotsiaalsete „tõdede", subjektiivse ja „objektiivse", psühhedeelse ja „ratsionaalse" vahelisi konflikte, vaid ilmestab elavalt, kuidas võim saab korraga toimida nii repressiivse kui produktiivsena.

Young hippie Peti behind the bars of special clinic for venereal diseases. Hippies used to refer to this institution as "tripperbar" as this was one of the common methods of rein in the youth in late 1970s and early 1980s.
(Courtesy of Peti)

Hippies playing flute in front of Lenin's statue in Tallinn.
(Late 1970s. Courtesy of Peti)

Militia on guard at Viljandi festival.
© Tõnu Tormis 1976

While hitchhiking to Crimea in order to attend the hippie summer camp, these Estonian youth were caught as the militia found a pacifist symbol on one of their bags. They were taken to the clinic of venereal diseases and threaten to cut off their hair in an excuse of hosting lice.
© Aivar Vilipere, 1982

Diapause Installation © Natalie Tyler 2010

Natalie Tyler received her MFA from California College of the Arts. She is a sculptor and international curator. As the Artist-in-Residence at Cornell University, 2011-2012, she was awarded the Cornell Council of the Arts grant to curate "LUX-Art and Science Exhibition". Her work has exhibited in New York, California, Ireland, London.

Natalie Tyler omandas kunstimagistri hariduse Kalifornia kunstikolledžis (California College of the Arts). Ta tegutseb skulpori ja rahvusvahelise kuraatorina. Aastail 2011–2012 töötas ta residendina Cornelli Ülikoolis Ameerikas (Cornell University, New York), kus ta ülikooli kunstistipendiumi toel korraldas rahvusvahelise näituse „LUX – Art and Science Exhibition". Tema teoseid on esitatud väga mitmes paigas maailmas: Ameerikas (New York, Kalifornia), Iirimaal, Inglismaal (London).

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Diapause
Diapause

Natalie Tyler

The great Greek writer Nikos Kazantzakis (*Zorba the Greek*) tells us that when he was a boy, he noticed a cocoon stuck to a tree with a butterfly that was about to be born. He waited a while, but it was taking so long, that he decided to warm the cocoon with his breath. The butterfly finally emerged, but its wings were still stuck together and it died soon afterwards.

In the installation "Diapause", the cocoon is a metaphor for the emotional, philosophical, and physical states of transformation that occur during life. These sculptures explore the dynamism of the cocoon, in which contains a deep essence made of delicate potentiality and powerful creativity.

The cocoons brighten and dim, reacting to the movement of the viewers. Creating a living installation in which people are welcome to interact with the sculptures and establish a dialogue between their reciprocal energies.

My work reveals part of the cycle of life connecting us back to nature. The life cycle stages, humans share with creatures and plants of the earth. These sculptures are poetic symbols to depict deeper senses of being, aiming to highlight aspects of nature's wonders. Giving importance back to the little amazing things we so easily take for granted.

Kreeka suurkirjanik Nikos Kazantzakis („Zorba the Greek") kirjeldab ühte lugu oma poisikesepõlvest. Ta leidis puu külge klammerdunud kookoni, millest oli väljumas liblikas. Oodanud mõne aja, otsustas ta liblikat aidata ja teda oma rinnaga soojendada. Liblikas pääses küll kookonist lõpuks välja, kuid tema tiivad olid kokku kleepunud ja seetõttu ta suri peatselt.
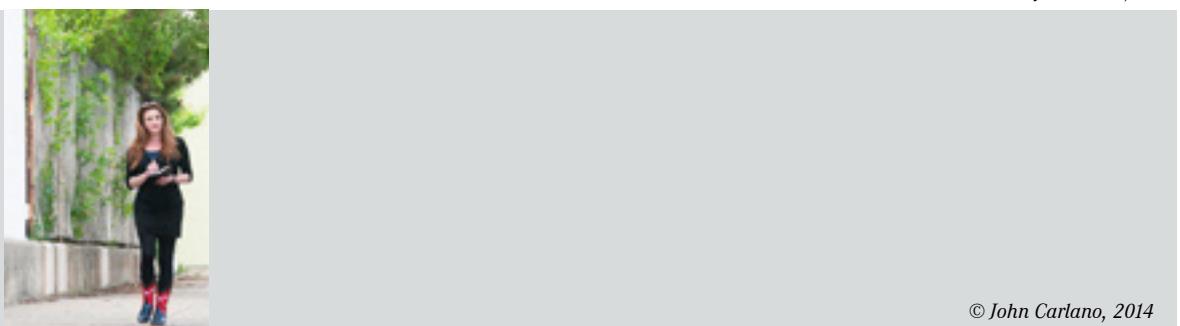
Installatsioonis „Diapause" on kookonit kujutatud metafoorina, mis räägib meile emotsionaalsetest, filosoofilistest ja füüsilisest seisundimuutustest, mis leiavad aset meie eluea jooksul. Skulptuurid uurivad kookonite dünaamilist olemust, milles on koos ühtaegu õrn nüansirikas potentsiaal ja võimas loovus.

Kookonid muudavad oma valgust heledamast sumedamaks, reageerides nõnda näitusekülastajate liikumisele. See on n-ö elus installatsioon, millega toimub vastastikune suhtlus, energia vahetamine.

Läbi oma teose püüan ma näidata elutsüklit ja seeläbi meid loodusele lähemale viia. Elutsükli erinevad etapid on omased kõigile elusolendeile maa peal, nende hulgas ka inimestele. Skulptuurid on poeetilised sümbolid, mis püüavad edasi anda ettekujutust meie olemisest läbi sügavamate meelte ja tõstavad esile looduse imesid. Püüdkem siis tähtsustada väikesi imesid, mida me oleme harjunud pidama iseenesestmõistetavaiks.

Sharyn O'Mara's drawings and installations explore the relationship between the mapping of the land – with roads that create lines, intersections, and grids – and the mapping of experience using written language – through grammar and composition. Structures imposed on the topography of the land act as a metaphor for the organization and divided nature of language, and thus for the territories of experience. She explores notions of loss within this context, that which is missing but not necessarily known.

What is the power of pause: the significance and weight of the spaces in between words, sentences, paragraphs, or the steps between one place and another?

Sharyn O'Mara joonistused ja installatsioonid võrdlevad kahte kaardistamise viisi – geograafilist, mis moodustab maanteede graafilise võrgustiku, ja keelelist, mille vahendiks on grammatika ja lausete, mõtete kompositsioonid. Topograafilised struktuurid on metafooriks keelele, mis on samuti jagatud osadeks, kogemuslikeks territooriumideks. Teda huvitavad eriti keelest kaduma läinud mõisted ja kontekstid, mille puudumist me ei pruugi märgata. Ta uurib mõisteid, mida me kõik teame, aga mis on tegelikult kaotanud oma konteksti.

Mis on pausi olemus ja võim? Kas see on sõnade, lausete ja paragraafide vaheliste tühikute abil tekstile tähenduse andmine või liikumine ühest paigast teise?

Untitled (wall)

Sharyn O'Mara

"Untitled" (wall) is part of an ongoing series of sited sculptural works that intervene in the structure of the surrounding architecture through light and form. Comprised of optical fiber – one of the most current methods for transmitting mass quantities of information – these fields and forms quietly assert themselves in a world where the means to communicate with one another both personally and globally has never been easier. In spite of this, tensions and conflict have perhaps never been more heightened, nor the existing and potential consequences more grave.

„Nimeta" (sein) on osa skulptuurisarjast, mille kunstnik on viimastel aastatel loonud. Teos sulandub ümbritsevasse ruumi valguse ja vormi abil. Skulptuuri üheks osaks on optilised fiiberkiud (ehk fiiberoptika) ehk massikommunikatsiooni viimaseimaid tehnoloogiaid ja meetode, mida kasutatakse kiire ja suuremahulise info edastamisel. Skulptuursed vormid sobitavad end ruumi ja maailma, kus suhtlemine on lihtsam kui ei kunagi varem. Vaatamata infoedastuse lihtsusele pole kunagi varem olnud ka nii palju pingeid ja konflikte, võimalikke ja tulevasi negatiivseid tagajärgi.

"The relationship between art and new technology is as old as art itself **"**
– *Eduardo Kac*

" Paintings are but research and experiment. I never do a painting as a work of art. All of them are researches **"**
– Pablo Picasso

" Art is I,
science is We,
— Claude Bernard

❝ Hence the yearning for
primitive, unbroken, immediate
existence must repeatedly break
forth; and the more numerous
the areas of life taken over by
technology, the louder
the call, "Back to nature!" **❞**
— Ernst Cassirer

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