



Finding Affinities - At the Nexus of Art and Science

ArtSci Nexus

ArtSci Nexus is an international, open platform centered around collaborative aesthetics between the arts and sciences. The mission of the Nexus is to facilitate the creation of in-lab artist residencies in university settings in order to generate long-term partnerships across disciplines. Once established, the teams work with scientific themes, data sets, and tools and techniques to constructively critique the scientific process, visualize research, and work towards contributing to new methodologies and approaches.

Four active Nexus teams will be presented in this exhibit: Arrhythmia, Neural Module, Bacteriality, and the Well-Tempered Brain, alongside guest project Dolphinet, guest sound artist Miriam Akkermann from the German Young Academy (Die Junge Akademie), and a children's book publication by Dmitry Alexeev. These teams first met at the inaugural ArtSci Nexus Think Tank in Leipzig, Germany in April 2016 and have been collaborating ever since. They have exhibited in Lisbon, Stockholm, New York City, and Hamburg, and have participated in summer education programs in Barcelona.

Global Young Academy Science & Art = Peace and Justice Working Group

The GYA working group Science & Art = Peace and Justice was launched in 2016 and had a strong connection with ArtSci Nexus platform from the very beginning. During the first seminar, organized in Edinburgh in August 2016, a team of scientists from the Global Young Academy with expertise in cell biology, bioinformatics, neurobiology, microelectronics, computer science, partnered with ArtSci Nexus artists to discuss the problems related to the sonification of biological data. Scientific as well as the aesthetic questions were raised. Following this initial contact, the aims and objectives of the working group were formulated to include the idea of promoting an active engagement of scientists in the arts and set up mutually beneficial creative collaborations with artists to develop new techniques and expand old disciplinary boundaries.

Cooperation with the Kulturstiftung Sachsen-Anhalt and the Moritzburg Art Museum Halle (Saale)

The GYA Art-Science exhibit takes place in cooperation with the Kulturstiftung Sachsen-Anhalt in the Art Museum Moritzburg Halle (Saale). At the same time, the Art Museum hosts the special exhibition "The silence in the noise of the time. Marc, Macke, Nolde. Masterpieces from the Ziegler Collection".

Arrhythmia

Arrhythmia is collaboration between Peter Bosch & Simone Simons and Sergey Kostyrko. In this installation they transform video images into sound. These images were created via laser scanning confocal microscopy of a live isolated rat heart in scientific experiments by Dr. Danyla Bobkov and his colleagues from the Institute of Cytology located in St. Petersburg, Russia. The main focus of the research was on the arrhythmic behavior of a rat heart and the central question they were investigating pertained to why the arrhythmia arises and how it's possible to avoid it. It was shown that some of the cells one by one start beating with frequencies different from the original cell due to chemical factors. The noise from these cells may grow, and finally affect the fundamental frequency causing an irregular heartbeat.

It's a well-known phenomenon that the reduction of a cell is related to the calcium level in it. Using a special dye that reacts with calcium, it is possible to observe the beating even of only one cell. In this art project the main interest of the team lies in converting the movements of a biological system into sound patterns. They extract signals from the RGB channels of these videos and analyse and employ them to trigger industrial vibrators. The different temporal behaviors of the videos, coupled with different resonators result in a rich sound palette and unique polyrhythmic structures.

To increase the artistic result, the team applied an algorithmic approach to manage the video footage and organize the material into collage movies that are synchronized with sounds, mechanically produced by their vibrators. These movies, being projected on one or more screens, in combination with the sound of resonating objects (animal cages) create an audio-visual metaphor of a biomechanical machine.

Neural Module

Neural Module is an audio-visual performance by Sergey Kostyrko. The signals of 64 nanoelectrodes, which were covered by the layer of striatal and cerebral cortex cells, were recorded in the laboratory of Dr. Paul Roach from Loughborough University (UK) as a data array for further structuring and study. Using different software and hardware solutions, data is converted into electrical signals controlled by oscillators, filters, envelope generators and other modules of a Eurorack system. During the performance, the modules are combined into various functional blocks, which allow for a wide range of sound and video synthesis techniques. As a result, the electric signals from nerve cells are organized into complex audio-visual patterns.

The Well Tempered Brain

The Well Tempered Brain, also called „nanobrain“ is cultured “in vitro” in the laboratory and well tempered by algorithms that sonify it´s living neurons into polyphonic music.

Visual artist and musician Mark Matthes explores the linkage between neuroscience, art and music in a cross-disciplinary collaboration with programmer Anton Koch (Motion Lab, Frankfurt) and bioengineer Dr. Paul Roach (Loughborough / Keele University UK) and performed together with Sasha Kagansky and Sergey Kostyrko.

The conceptual experiment is to show that a group of neurons can be imagined like a group of instruments within an orchestra. The logic behind this is that while neurons interact and communicate with each other in the human brain, they create electric pulses. These pulses in turn, are stored in Big Data sets, which can be used in various ways. While graphs are a common way to showcase brain activity, the active neurons' data sets can also be turned into sound and visuals.

The resulting artistic audiovisual interpretation, consisting of live performance and installation provide a unique insight into this current scientific research, as well as an intuitive experience for both the audience and musicians themselves. The concert-performance combines sonified data in form of electronic music with arrangements for string trio. The installation consists of several digital and analog media, combining video mapping with painting and objects and thereby using both the benefits of the computer as well as artistic interpretation and intervention.

Bacteriality

Bacteriality, by Wolfgang Ganter, is comprised of two series, titled, “Micropaintings” and “Works-in-Progress”, realized in collaboration with biochemists Dr. Ana Domingos, Dr. John LaCava, physicist Prof. Dr. Ben Eshel Jacob, biologists Prof. Dr. Klaus Hausmann and Dr. Diego Serra. The process involved in creating “Micropaintings” consists of instigating chemical reactions on glass plates (measuring maximum 5 x 5 cm), while instantaneously digitally documenting these reactions under a microscope in real time.

The Self-organization of the reaction (based in chaos theory), also called spontaneous order (in the social sciences), is a process where some form of overall structural order arises from local interactions between parts of an initially disordered system, without a controlling external element. In the case of “Micropainting”, the consequence is the creation of an image that is mutually executed both by the artist and by the medium itself, passing the authorship beyond the realm of human creation. The artist stitches, stacks, and enlarges the microscopic data to show the rich information contained in these images that is otherwise impossible to perceive with the naked eye. The results are analogous to pictures from the Hubble Space Telescope or Google Earth.

In the second series “Works-in-Progress”, the artist begins by visiting museums and significant private collections to produce photographic DIA slides and color negatives depicting the “great masterpieces of the world history of art”. After duplicating then the photos onto 35mm analogue film, the artist infects the films with various bacteria strains, yeasts or fungi, to transform the original image through biological processing. As the

bacteria feeds on the gelatine layers of the photographs, while eating the emulsion, the color and pictorial arrangement of the image is altered, bringing hidden colors to the surface according to the gastronomical preferences of the particular strain of bacteria used. With the assistance of his scientific partners, Ganter has gained access to a large variety of microorganisms while in residence in their laboratories and remotely by consultation. When a slide has reached an optimal stage he stops the process by means of dehydration. Back under the microscope Ganter takes up to 300 digital detail photos to cover the surface of the 24 x 36 millimeter sized piece of treated reproduction film. He then seamlessly stitches the image back together and by this method he is able to realize supreme quality prints in any size. The results are both aesthetic, scientific, and challenge the notion of what is a “masterpiece” and how the canon is constructed. It shows the beauty of decay, the necessity of change and can be seen as symbol of “Vanitas” or “Memento Mori”. The series indicates that decay is less disappearance but rather a change to something new. This transfer also touches the question of whether a piece of art is ever really finished.

Dolphinet

Dolphinet is a project initiated by Nicola Swietkowiak and Sasha Kagansky that takes place in several locations at the same time, Berlin (Germany), Hawaii (USA), and Vladivostok (Russia). Joined by one of the pioneer researchers of the Marine mammals communication, Michael Hyson, Greenpeace co-founding member Michael Bailey, among others, an audio communication and web portal has been collaboratively designed, which should allow dolphins and whales to send and receive audio messages, in real-time, across participating venues and selected wildlife locations around the world. Through this web portal, the team plans to connect natural and ectopic dolphin habitats. Pending the results of this communication, they intend to further expand the network to include humans, dolphins, and whales located distally around the world, allowing cultural and research enlightenment embracing highly intelligent non-human species.

In the pilot phase of this initiative, the team is testing audio equipment to collect and receive a broad range of audio signals to mimic telephone communication. The water-internet-water sequence was adapted to the wavelengths transmitted and received by the sonic organs of the free-living dolphins and whales in Hawaii. Previous attempts to establish behavioural reactions to the playback audio of the recorded voices of the dolphins were not absolutely conclusive. The Dolphinet team expects that the ability to transmit voices in real time will be the next step forward to assure reactions as there would be synchronisation of the conversation, which is essential for the communication development. The expectation is that this initiative will raise awareness, compassion, and understanding of large water mammals, and potentially help rehabilitate them, alleviating the effects of their psychological isolation. Furthermore, this experiment could lead to the breakthroughs in the understanding of their communication, and even allow formal deciphering of the first non-human languages in the future.

Tim's Adventures in the World of Bacteria

The children's book series "Tim's Adventures in the World of Bacteria" was inspired by the keen interest of the sons and daughters, and nieces and nephews of the authors themselves. The inquisitive spark that the children in their own lives exhibited, led them to the idea of publishing a series about their own research, the bacterial kingdom. Much to their surprise, they found that the project was not only supported by publishing house, but in fact it follows a driving trend in the genre of children's non-fiction. The book's artwork is in keeping with the spirit of adventure and the magic of a fairy tales, but with a strong basis in scientific fact, making the series exciting for both children and adults. The book itself has become a point of scholastic discussion at the dinner table, encouraging children to ask for microscopes for Christmas, and putting them on the path to future careers in the sciences.

Programme - 28 April - 4 May 2019

*Art Museum Moritzburg
Friedemann-Bach-Platz 5, 06108 Halle (Saale)*

Visiting Hours 28 April - 4 May: 12:00-18:00

Special Events

Sunday, 28 April 2019

Vernissage 12:00-18:00

12:30-13:00 Introduction Speech

13:00-14:00 Dmitry Alexeev „Science. Martyrdom. Entrepreneurship. Vision“

14:00-15:00 Performances by Arrhythmia, Neural Module, Well-Tempered Brain and Dolphinet, with guest sound artist Miriam Akkermann

Monday, 29 April 2019

After-Hours Programme

18:00-18:40 Lecture by ArtSci Nexus curator Candace Goodrich 30 min, 10 min Q&A
“Anthropocentrism: The Failure of Modernity - How do we decolonize the sciences through ecovention?”

19:00-21:00 Performances by Arrhythmia (20 min), Neural Module (20 min), Well-Tempered Brain (20 min), Dolphinet with Guest sound artist Miriam Akkermann (20 min)

Saturday, 4 May 2019

March4Science Workshop

12:00-12:30 Workshop opening featuring poetry by Martin Dominik (University of St. Andrews)

Lecture by Rob Jenkins (University of York, UK) „Lessons from illusions“

12:30-13:00 One of the most important insights from psychology is that we do not experience reality as it is. We experience reality as it seems. Our picture of reality emerges from the interaction between evidence arriving at the senses and expectations drawn from memory. This interaction is called perception. The role of expectations in shaping perception can sometimes be exposed by illusions. The great appeal of perceptual illusions is that they offer us glimpses into the workings of our own minds. They also offer a source of humility. None of us has direct access to the truth. None of us is infallible. Contemplating the limits of the human mind gives us a better understanding of ourselves and our place in the world. In this talk, I will explore fundamental principles of perception, what they tell us about how the mind works, and how they can inform better decisions.

13:00-15:00 Workshop on sonification of science data with Mark Matthes (artist, musician and curator from Hamburg, Germany) and Sergey Kostyrko (St. Petersburg State University, Russia)

Sonification is advanced fast growing technique allowing explore scientific data and monitoring complex processes using sound generating systems. The data obtained during the measurements can be converted into sound vibrations, which makes it possible to register them through the human auditory system. The goal of many sonification systems is to process the multimodal data streams in real time, as well as to operative detect the changes in critical parameters. In the same way as visualization of datasets creates the visual abstractions for the complex relationships between variables, sonification transforms the data in audible abstractions. As audible sound itself is a very complex phenomenon, special attention is paid to the issues of sound design. Often, aesthetic and artistic experiments translate sonification projects from the field of scientific research into the field of digital art. Thus, the purpose of this workshop is to introduce the theoretical and practical aspects of the considered technique.

Biographies - ArtSci Nexus

Candace Goodrich is an artist and independent curator, currently living between Stockholm, Sweden and Vilnius, Lithuania. She holds a BFA from the School of Visual Arts (NYC) and a MFA from the New York Academy of Art (NYC), with a concentration in painting. She was a participant in Curatorlab at Konstfack in Stockholm in 2016/2017, and in 2018 she completed a second Master's in Postcolonial Theory and Multiculturalism at Södertorns Högskola, Stockholm. She founded and directed her first curatorial project in 2012-2014, the international artist residency One-Sided Story involving 38 artists. She was the founding Art Director of the Kunstkraftwerk Leipzig, where she curated 16 international exhibitions, involving 100+ artists, representing 30+ countries, sponsored by numerous foundations, embassies, and ministries of culture worldwide. In addition to the exhibition program, she co-directed a complimentary education program and together with Pogon-Zagreb, hosted ICSC-Intercity/Switchcity, a 3 year curatorial/collective residency exchange program. She is co-founder of the ArtSci Nexus, an interdisciplinary platform fostering collaborations between the arts and sciences.

www.candacegoodrich.com

John LaCava, PhD is a research faculty member at The Rockefeller University, New York, NY. His research is broadly concerned with the biomedical significance of molecular interaction networks that form within living cells; his work is sponsored by the National Institutes of Health and Worldwide Cancer Research, among others. In the summer of 2019, John will open a new laboratory located at The European Research Institute for the Biology of Ageing, Groningen, NL. Apart from his scientific studies, he is a frequent organizer and/or participant in programs for science-and-art-based public outreach, communication, and youth mentorship. Among these, he is co-founder of the ArtSci Nexus, an interdisciplinary platform fostering collaborations between the arts and sciences.

www.macromolecule.fun

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Alexander (Sasha) Kagansky is leading the Centre for Genomic and Regenerative Medicine, School of Biomedicine at the Far Eastern Federal University (Vladivostok, Russia) and is currently setting up an international consortium Biodiversity-to-Biomedicine (Bio2bio). Apart from the research in the lab, he is leading the international PhD course for the entrepreneurship in biotechnology in the University of Gdansk, and regularly organizes public engagement of science activities for different target groups including school students, and general public - in different parts of the world, resulting in new collaborations between scientists and artists. He is also a member of the Global Young Academy IUCN member.

His academic qualifications include PhD (2004), Molecular Biology, National Institutes of Health, Bethesda, USA, and Cytology Institute, Saint-Petersburg, Russia; MSc (1998) and BSc (1996) in Biophysics from Saint-Petersburg Polytechnical University, Russia.

Research Interests: Cancer (esophagus cancer and gliomas) mechanisms, including molecular and cell biology, transcriptomics, epigenetics, genomics, metabolomics, proteomics, diagnostics, and using natural products for the prevention and treatment, functional nutrition, crossover between biodiversity and biomedicine, gene therapy, and applications of the Synthetic Biology.

<https://globalyoungacademy.net/alexander-kagansky/>

Sergey Kostyrko is an associate professor at St. Petersburg State University. He has a background in the development of analytical and computational methods for solving boundary value problems in elasticity theory. His research area covers the different aspects of mechanics and thermodynamics of thin film materials. The results of his research are supported by numerous grants of Russian Foundation of Basic Research, Government of Saint-Petersburg, Saint-Petersburg State University and German Academic Exchange Service. In 2018, he was elected as a member of Global Young Academy.

Kostyrko is also active as a musician working in the field of improvisational and noise music as well as sound and video artist. He took a part in numerous of international festivals with solo project and in collaborations with Ilia Belorukov, Konstantin Samolovov, Alexei Borisov, Alexandr Zaitsev, Andrey Popovskiy, Alexandr Markvart, Boris Shershenkov, Kurt Liedwart, Rutger Zuydervelt, Daichi Yoshikawa, Dariusz Mazurowski, Gaudenz Badrutt, Gaute Granli, Jason Kahn. Recordings in which he participated have been released by The Cyland Audio Archive (Russia), reMusik.org (Russia), Mikroton Digital (Russia), Spina!Rec (Russia), Dinzu Artefacts (USA), Zeromoon (USA), Pilot Eleven (UK), Midnight Circles (Germany), A.M.P.-Recs (Mexico), Urbsounds (Slovakia), Audiomat (Poland). He visited with concerts Finland, UK, Germany, Italy, Hungary, Sweden. Recent performances and exhibitions include Inversia (Murmansk, 2019), Present Perfect Festival (St. Petersburg, 2018), Protoart (St. Petersburg, 2018), Prepared Wednesdays (Moscow, 2018), Cyfest-11 (St. Petersburg, 2018).

<https://globalyoungacademy.net/skostyrko/>

Dmitry Alexeev is a multidisciplinary scientist in the field of microbiome and bioinformatics. Being assistant professor in ITMO university, Alexeev supports the development of algorithms for complex system analysis and modeling. Alexeev is involved with private sector, consulting microbiome companies in the UK and administrating cancer immunotherapy trials, where microbiome has a promising potential. Over the last ten years, Alexeev has been involved in teaching and other public outreach activities supporting sustainable health education. In 2017, Alexeev and his partner started a kids book series on micro-work exploration, falling under non-fiction category. Alexeev has been collaborating in variety of science-art workshops with ArtSci Nexus and Guy Ben-Ary. Alexeev has been involved in a few different non-profit organizations, such as the Global Young Academy (member), and the MIT Inclusive innovation (Core Judge).

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PETER BOSCH & SIMONE SIMONS (Bosch & Simons)

Since 1987, Bosch & Simons have created installations in museums, at international symposiums and in concert halls around the world. Their best-known piece is *Krachtgever*, which received a Golden Nica at the 1998 Prix Ars Electronica (Linz, Austria). Other projects include *Cantan un Huevo*, awarded at the 29th Concours International de Bourges (2002) and *Aguas Vivas*, awarded a mention at VIDA 6.0 (2003) in Madrid. In 2009, a retrospective of their work was held at La Tour du Pin (France) curated by GRAME (Lyon). In 2012, they premiered *Mirlitones*, commissioned by DordtYart in Dordrecht (Holland) and *Wilberforces* during the Winter Sparks exhibition at FACT in Liverpool (UK). *Mirlitones* was shown in a new, improved form at the ICMC 2013 in Perth/Fremantle and at the Sound Travels Festival of Sound Art (Toronto, 2015). Their latest project *Último Esfuerzo Rural III–V* was premiered at the justMAD art fair, Madrid (2017) and has been shown thereafter at the Museum Patio Herreriano, Valladolid, Digital Arts Festival, Sofia and November Music, Bois-Le-Duc, Netherlands (all 2017). Other activities by Bosch & Simons have included workshops, based on the concepts of their own work, among others at the Universidad Politécnica de Valencia (2002 and 2005), LIEM, Museo Reina Sofía, Madrid (2005), FACT, Liverpool (2012), NAISA, Toronto (2015) and KunstKraftWerk, Leipzig (2016).

Peter Bosch (1958) studied psychology at the Universities of Leiden and Amsterdam (1976-'83) and thereafter studied sonology at the Royal Conservatory in The Hague (1986-'87). Simone Simons (1961) studied at the audiovisual department of the Gerrit Rietveld Art Academy in Amsterdam (1980-'85). Since 1997 they work and live in Valencia, Spain.

<http://www.boschsimons.com>

Mark Matthes is a visual artist in the fields of painting, collage and installations, as well as a composer & musician for contemporary music and string arrangements.

He received his diploma in arts in 2006 at the HfbK Hamburg with Prof. Werner Buettner. After living and working in Leipzig at the „Baumwollspinnerei“ for 5 years, he now lives in Hamburg again. He exhibits frequently in solo and group shows throughout Germany, as well as other European cities (Ljubljana, Stockholm, Copenhagen, Zurich, Prague, Lisbon, Venice) and tours with different ensembles, bands, or solo projects. Coming from painting his field expanded towards wall-objects, collages, interventions. For the past few years he developed mixed-media room-installations, which also involve sound and composed music. He collaborates with scientists, programmers, light-technicians and other musicians in an interdisciplinary approach.

Matthes is classically educated as a child in the violin, and later in jazz improvisation. This traditional base has supported his continuous activity as a musician and composer in projects ranging from experimental, classical, jazz, and pop. Matthes curates and organizes several independent artspaces and festivals in Hamburg (Faktor e.V., Gängeviertel e.V., Frappant e.V., 4fakultaet, Walk Of Fame, Fenster Zum Hof) and initiated

an enormous exchange of 300 artists between Leipzig and Hamburg the „Betriebsausflug“.

www.markmatthes.info

Nicola Swietkowiak has worked worldwide in dolphin-assisted therapy programs and continues her path as a dolphin enthusiast who creates, cultivates and works globally with interspecies communication. Dolphinet is one such project that manifests fresh modes of interaction between cetaceans, humans, cultures and nature. Such practices calls upon ancient wisdom, innovative technology, and requires courage and a commitment to a common purpose to make the world a better place of coexistence. Swietkowiak's inherent curiosity about nature has led her to explore the macro and micro cosmos with the help of a microscope and camera and inspires many people of various age and culture. Her bodily fluid portraits of rivers, oceans, plants, animals, human beings, and food are presented in exhibitions and microscopic workshops.

Swietkowiak asks us: “We dream to travel the universe, is not the universe within us?”

www.allismicro.de

<https://vimeo.com/209904090>

Miriam Akkermann is a musicologist and sound artist. She studied classical flute and “New Music and Technologies” at Conservatorio C. Monteverdi in Bolzano, Italy, Audio Communication at TU Berlin, and Composition and Sonic Arts at Berlin University of the Arts, where she also completed her PhD in musicology in 2014. In her research in the field of musicology and media studies, she focuses on analysis methodology and history of music of the 20th and 21st century. Her special interest is in computer music, electro-acoustic composition, improvisation, and historic informed performance practice. The focus in her artistic work is set on sound art and experimental music, where she develops sound installations with conceptual approaches and improvisational formats in which she also collaborates with dancers, performers and visual artists. Her compositions, sound installations, and performances have been shown at international festivals and galleries, and she published papers on artistic topics as well as her research at international conferences. Since 2015, she is a Member of the German Young Academy, and works as a lecturer at Bayreuth University.

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